2023 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference

Advance Programme

Munich ICM

International Congress
Centre Munich, Germany

26 - 30 June 2023

www.cleoeurope.org

Sponsored by
- European Physical Society / Quantum Electronics and Optics Division
- IEEE Photonics Society
- Optica

WORLD OF PHOTONICS CONGRESS

26th International Congress on Photonics in Europe

Collocated with Laser World of Photonics Industry Days

https://world-of-photonics.com/en/

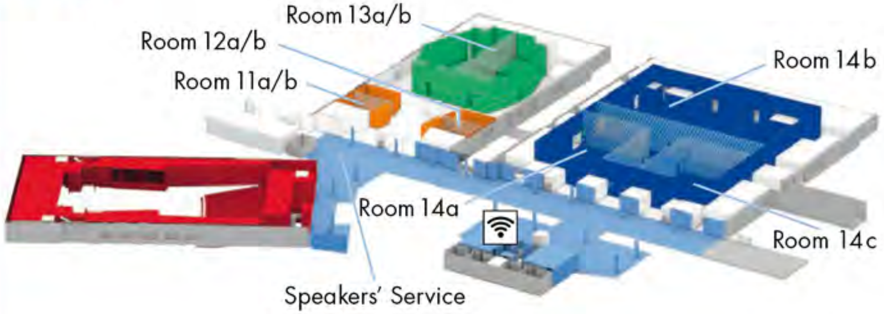
Messe München
International

ICM International Congress Center Messe München

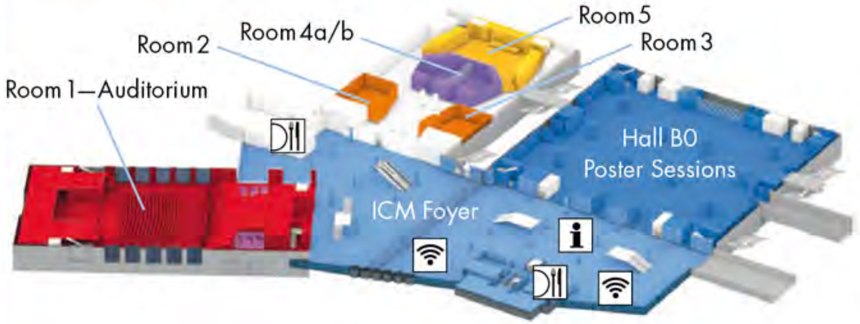
Rooms at the ICM and B0

2nd Floor

1st Floor

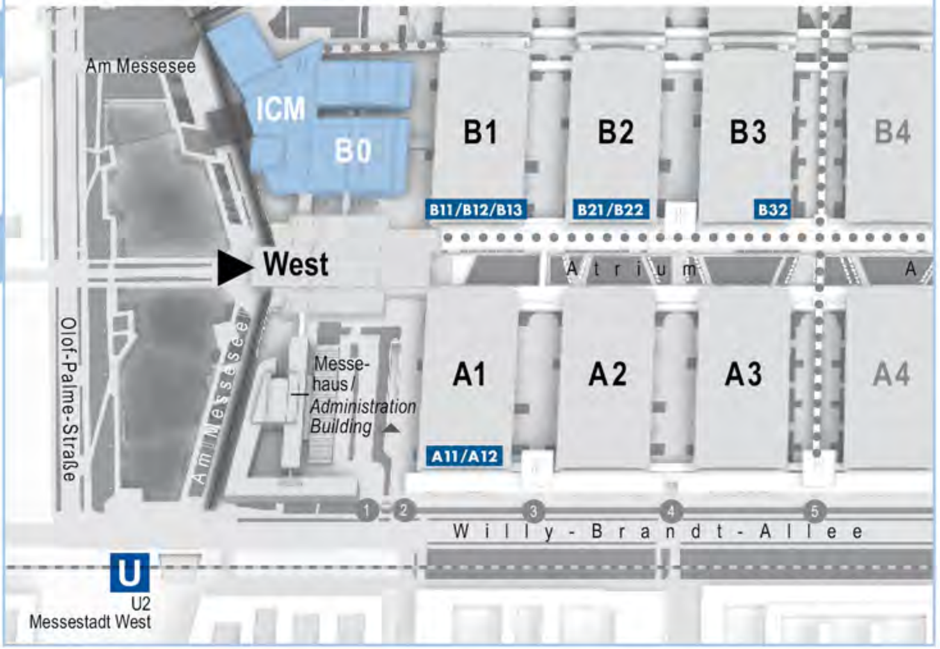


Ground Floor



WiFi Lounge Catering Information Desk

Rooms at the Exhibition Halls



B11	Room **"Albert Einstein,"** 1st Floor, Hall B1
B12	Room **"Emmy Noether,"** 1st Floor, Hall B1
B13	Room **"Wilhelm Röntgen,"** 1st Floor, Hall B1
B21	Room **"Theodore Maiman,"** 1st Floor, Hall B2
B22	Room **"Thomas Edison,"** 1st Floor, Hall B2
B32	Room **"Emmett Leith,"** 1st Floor, Hall B3
A11	Room **"Charles Townes,"** 1st Floor, Hall A1
A12	Room **"Gustav Hertz,"** 1st Floor, Hall A1

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2023 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference

CLEO®/Europe - EQEC 2023

Munich, International Congress Centre (ICM), Germany, 26 - 30 June 2023

www.cleoeurope.org

Organised and Sponsored by

- European Physical Society / Quantum Electronics and Optics Division
- IEEE Photonics Society
- Optica

Also sponsored by

- World of Photonics Congress
- EPS Young Minds

Welcome to the 2023 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference (hereafter CLEO®/Europe-EQEC) at the World of Photonics Congress 2023

Following on from the very successful previous conferences held in Amsterdam (1994), Hamburg (1996), Glasgow (1998), Nice (2000) and Munich (2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019), and the 2021 virtual conference, the General and Programme Chairs warmly welcome you to the 2023 CLEO®/Europe-EQEC conference, which is being held in Munich from June 26 - 30. CLEO®/Europe-EQEC targets university and industry scientists and researchers as well as students and graduates. We extend a special welcome to attending young researchers, postgraduate and PhD students, and we wish them every success, especially if this is their first participation in a major scientific conference.

The CLEO®/Europe-EQEC conference series has established a strong tradition as the largest, most comprehensive and prestigious gathering of optics and photonics researchers and engineers in Europe. With technical co-sponsorship provided by the European Physical Society (EPS), the Institute of Electrical and Electronics Engineers (IEEE) Photonics Society, and Optica (formerly OSA), CLEO®/Europe and EQEC have a strong international presence in the complementary research areas of laser science, photonics and quantum electronics.

More specifically, CLEO®/Europe emphasizes applied physics, optical engineering and applications of photonics and laser technology, whereas EQEC addresses more basic research in laser physics, nonlinear optics and quantum optics.

CLEO®/Europe will showcase the latest developments in a wide range of laser and photonics areas including solid-state lasers, semiconductor lasers, terahertz sources and applications, applications of nonlinear optics, optical materials, optical fabrication and characterization, ultrafast optical technologies, high-field laser and attosecond science, optical sensing and microscopy, optical technologies for communications and data storage, fibre and guided wave lasers and amplifiers, micro- and nanophotonics, photonic applications in biology and medicine, and material processing.

EQEC will feature the fundamentals of quantum optics and ultracold quantum matter, quantum information, quantum communication and sensing, topological states of light, precision metrology, ultrafast optical science, nonlinear phenomena, solitons, and self-organization, plasmonics and metamaterials, two-dimensional and novel materials, and theoretical and computational photonics modelling.

CLEO®/Europe-EQEC creates a unique forum where participants can obtain informative overviews and discuss recent advances on a wide range of topics, from fundamental light-matter interaction and new sources of coherent light to technology development, system engineering and various applications of photonics.

Over five days CLEO®/Europe-EQEC 2023 will showcase around 1759 technical contributions in the form of oral presentations in parallel sessions and posters from university, research organisations and industry, drawn from all countries around the world, and will provide an unparalleled opportunity to bring together scientists, engineers and users of laser and photonics technologies under the same roof.

Particular highlights of the 2023 programme will be a series of symposia:

- JSI - Free electron lasers
- JSII - Infrared integrated photonics for astronomical applications
- JSIII - Photonics for artificial intelligence
- JSIV - Photonics for sustainability
- JSV - Diversity in Photonics
- JSVI - Nanophoxonics and nanoscale heat transfer

This year a particular highlight devoted to diversity in photonics will be featured. Several events managed by our conference or other collocated conferences will take place. See “Special events” in this programme or the separate leaflet detailing the programme. This program will span five days and include a range of activities, such as workshops, panel discussions, keynote speeches, career and networking events. These activities will cover a variety of topics, including:

- The importance of diversity, equity, and inclusion in the photonics industry
- Support for early-stage researchers
- DiversiWiki session
- Workshop exploring the concept of privilege.

The programme will be open to all attendees of Laser World of Photonics 2023 and will be run in collaboration with several organizations, including the European Optical Society (EOS), the European Physical Society (EPS), Wissenschaftliche Gesellschaft Lasertechnik und Photonik e.V. (WLT), Optica, IEEE Photonics Society, and the International Society for Optics and Photonics (SPIE).

Overall, this diversity, equity, and inclusion programme aims to raise awareness of the importance of diversity and inclusivity within the photonics community and provide attendees with the tools and strategies they need to create a more welcoming and inclusive industry for all. See https://www.photonics-congress.com/en/about/conferences/diversity-program/

This year in collaboration with the CLEO/Europe-EQEC 2023 co-organizers (European Physical Society, Optica, IEEE Photonics Society), the European Optical Society will chair two Early-Stage Researcher (ESR) sessions, offering an opportunity for PhDs and Post-docs to hold a 3-minute oral presentation (pitch) to draw attention to their upcoming poster presentation. Thirteen presentations were selected per session. Each registered participant is cordially invited to attend on Monday 26 and Wednesday 28 June, 12:00-13:00, Room 4a ICM.

Additionally, one joint session LiM-CLEO®/Europe will take place on lightmatter interaction.

As usual a series of prestigious EPS-QEOD prizes and awards will be remitted during a special plenary and award ceremony to take place on Tuesday 27 June 2023 from 10:30 to 12:30, room 1. For further information, see the separate booklet.

All conferences together form the **World of Photonics Congress** bundling various topical conferences under one roof and under the organisation of Messe München International. It is a strategic and operative umbrella for various individual conferences held by leading associations and organisations. The other co-located conferences include:

- ECBO - European Conferences on Biomedical Optics organised by SPIE in cooperation with Optica (Formerly OSA).
- LiM 2023 - Lasers in Manufacturing organised by the German Scientific Laser Society (WLT).
- Digital Optical Technologies organised by SPIE Europe.
- Optical Metrology organised by SPIE Europe.

All co-located conferences will share registration and allow delegates to attend sessions.

As in former years, the meeting will be complemented by the **LASER 2023 World of Photonics**, the world's largest tradeshow of laser and optical technology, which will provide researchers with the opportunity to see the latest developments in a very wide range of laser sources, optical and photonics products, and components.

Conference Structure and Technical Sessions

CLEO®/Europe-EQEC consists of a large number of technical presentations in a number of different formats:

Plenary talks are broad-scope, 60-minute long talks given by these world-leading scientists, and are accessible to a general technical audience including conference attendees, exhibitors, and exhibit visitors. Plenary talks are not held in parallel with other sessions, allowing maximum possible attendance. The 2023 plenary talks will be presented by **Donna Strickland** (CLEO®/Europe), **Claudio Conti** (EQEC), and **Constantin L. Haefner** and **Tammy Ma** (World of Photonics).

Tutorials (60-minute talks) and **Keynote presentations** (45-minute talks) are also given by the world leaders in particular technical areas. They are generally directed at a more specific audience, and are thus delivered in parallel with other sessions. Keynotes provide a survey of exciting recent developments, and Tutorials are particularly valuable for those unfamiliar with a particular field.

Additionally to these talks the conference will feature invited talks, orals and poster presentations.

Other very much appreciated CLEO®/Europe-EQEC meetings are the special **Symposia** settled to anticipate and capture emerging fields in optics by giving emphasis to fast developing, well defined topics.

CLEO®/Europe-EQEC 2023 will also present **ten Short Courses** covering a wide range of topics in photonics and laser technology. All courses will be open to attendees of the World of Photonics Congress and Laser World of Photonics subject to payment of the course fee. All Short Courses will be 2 × 1.5 hour long (with ½ an hour coffee break in-between). The courses will take place from Monday 26 June to Friday 30 June 2023 as. A few courses are running in parallel. See details at https://www.cleoeurope.org/short-courses/

The conference will also feature two postdeadline sessions on Thursday evening, 29 June 2023 (from 17:45 to 19:15). Their purpose is to give the audience the chance to listen to the latest breaking news in optics. This makes them particularly attractive events that certainly contribute to the great atmosphere that makes the CLEO®/Europe-EQEC conference a unique meeting.

In addition to the technical sessions involving oral presentations, all scientific areas of both CLEO®/Europe and EQEC will be covered in **poster sessions**, which will provide an interactive and less formal way for researchers to discuss their work, interact and exchange ideas.

CLEO®/Europe-EQEC is now established as the largest and most comprehensive gathering of optics and photonics researchers and engineers in Europe, spanning classical and quantum optical science, laser technology and photonics applications.

The conference programme could not have been elaborated without the vital support and effort of **273 scientists, forming 13 CLEO®/Europe, 10 EQEC, 6 Joint Symposia and 1 Joint Session sub-committees**, who have assembled an excellent series of talks and posters covering a wide range of fields in optics and quantum electronics. The technical programme featuring 1759 presentations including **3 plenary talks, 7 tutorial talks, 10 keynote talks, 77 invited talks, 17 talks upgraded to invited, 1109 oral presentations, 10 short courses and a poster programme including 526 posters** to be presented in five poster sessions (**among them 26 selections for poster pitches**). 17 oral presentations will also be featured in the two post-deadline sessions to take place on Thursday evening.

The Conference Chairs would like to extend their sincere thanks to the technical programme committee members for all their hard and fruitful work. A conference as large as CLEO®/Europe-EQEC requires two years of planning and organisation. Here, we also thank the staff of the European Physical Society, and the local conference chair in Munich for invaluable profes sional assistance during this period. We thank Messe München GmbH, the World of Photonics Congress steering committee, the CLEO/Europe-EQEC steering committee and all the Sponsoring Societies for their guidance, support, and their invaluable advice, which ensures that this event not only remains at the core of optics and photonics research for many nations, but will also be a major event in Europe.

Let us finally thank our attendees. The real success of CLEO®/Europe-EQEC 2023 indeed rests on the effort and commitment of these researchers and students, who all contribute to the tremendous evolution of our research field and to the high quality of the papers that will be presented.

We wish you all a lively, fruitful, and enjoyable conference, and we are looking forward to see you in Munich!

	ICM - ROOM 1	ICM - ROOM 4A	ICM - ROOM 4B	ICM - ROOM 13A	ICM - ROOM 13B	ICM - ROOM 14A	ICM - ROOM 14B
08:30 09:00 09:30	CM-1 Laser additive manufacturing I	EJ-1 Simulating multi-mode and non-hermitian systems	EG-1 Nanoantennas and nanoconfinement	CA-1 Mid-infrared lasers	CB-1 Photonic crystal lasers	CD-1 Frequency conversion I	CH-1 Imaging through scattering media
10:00	COFFEE BREAK						
10:30 11:00 11:30	CM-2 Laser semiconductor processing	EJ-2 Computational photonics at the light-matter interface	EG-2 Metasurfaces	CA-2 Ultrafast lasers at 2 µm and beyond		CD-2 Frequency conversion II	CH-2 AI for optical sensing
12:00 12:30		PP-1 Early-stage researcher (ESR) session - Poster pitches I	LUNCH BREAK				
13:00 13:30	CA, CB, CM, ED, EJ AND JSII POSTER SESSIONS - HALL B0						
14:00 14:30 15:00	CM-3 Temporal and spatial beam shaping for laser processing I	CK-1 Lithium niobate and silica systems	EG-3 Optoelectronics and light-electron interactions	CA-3 Novel laser materials	CB-2 Surface-emitting lasers	CD-3 Integrated nonlinear photonics	
15:30	COFFEE BREAK						
16:00 16:30 17:00	PL-1 CLEO/Europe 2023 Plenary						
17:30 18:00 18:30		PL-C Career event with Donna Strickland					
19:00 19:30 20:00	HAPPY HOUR KINDLY SPONSORED BY THE QUANTUM ELECTRONICS OPTICS DIVISION (QEOD) OF THE EUROPEAN PHYSICAL SOCIETY - ICM FOYER, HALL B0, GROUND FLOOR (END 21:00)						

	ICM - ROOM OSTERSEEN	HALL B1 (B11) - ROOM 1	HALL B1 (B12) - ROOM 2	HALL B3 (B32) - ROOM 6	HALL A1 (A11) - ROOM 7	HALL A1 (A12) - ROOM 8
08:30	JSII-1 The photonic yield in astronomy	CF-1 Advances in attosecond technology and high order harmonic generation I	SH-3 Short course: Laser beam analysis, propagation, and spatial Shaping techniques	ED-1 Precision spectroscopy for fundamental science	CE-1 Specialty optical fibres	EB-1 Optomechanical and other quantum oscillators
09:00						
09:30						
10:00	COFFEE BREAK					
10:30	JSII-2 Manipulating astronomical signals with photonics and future challenges I	CF-2 Advances in attosecond technology and high order harmonic generation II	SH-3 Short course: Laser beam analysis, propagation, and spatial Shaping techniques	ED-2 Direct comb spectroscopy	CE-2 Hollow core optical fibres	EB-2 Quantum interferometry
11:00						
11:30						
12:00	LUNCH BREAK					
12:30						
13:00	CA, CB, CM, ED, EJ AND JSII POSTER SESSIONS - HALL B0					
13:30						
14:00	JSII-3 Manipulating astronomical signals with photonics and future challenges II	CF-3 Complex pulses and their characterization	CL-1 Brain imaging	ED-3 Frequency references and transfer	CE-3 Optical materials: Structures	EB-3 Quantum optics I
14:30						
15:00						
15:30	COFFEE BREAK					
16:00						
16:30						
17:00						
17:30						
18:00						
18:30						
19:00	HAPPY HOUR KINDLY SPONSORED BY THE QUANTUM ELECTRONICS OPTICS DIVISION (QEOD) OF THE EUROPEAN PHYSICAL SOCIETY - ICM FOYER, HALL B0, GROUND FLOOR (END 21:00)					
19:30						
20:00						

Tuesday at a glance

	ICM - ROOM 1	ICM - ROOM 4A	ICM - ROOM 4B	ICM - ROOM 13A	ICM - ROOM 13B	ICM - ROOM 14A	ICM - ROOM 14B
08:30	CM-4 Temporal and spatial beam shaping for laser processing II	CK-2 Plasmonic structures and components	EG-4 Ultrastrong light matter interactions and nonlinear optics	CA-4 Polarization effects and structured laser beams	CB-3 Novel semiconductor laser concepts	CD-4 Specialty fibers	CH-3 On-chip optical sensing
09:00							
09:30							
10:00	COFFEE BREAK						
10:30	PL-2a EQEC 2023 Plenary talk						
11:00							
11:30	PL-2b Award ceremony						
12:00		LUNCH BREAK					
12:30							
13:00	CD, CF, CK AND EG POSTER SESSIONS - HALL B0						
13:30							
14:00	PL-3 World of Photonics Plenary			CM-5 Modelling of laser-induced processes	CB-4 Photonic integration I	CD-5 Supercontinuum generation	
14:30							
15:00							
15:30	COFFEE BREAK						
16:00	CM-6 Laser volume processing	CK-3 Resonant structures and cavities	EG-5 Single emitters	CA-5 Diamond lasers and frequency converters	CB-5 Photonic integration II	CD-6 Mid-IR applications	CD-4 Field applications
16:30							
17:00							
17:30							
18:00	"BIER & BREZEL" GET TOGETHER KINDLY SPONSORED BY SPIE - ICM FOYER, HALL B0, GROUND FLOOR						
18:30							
19:00							
19:30							
20:00							

	ICM - ROOM OSTERSEEN	HALL B1 (B11) - ROOM 1	HALL B1 (B12) - ROOM 2	HALL B3 (B32) - ROOM 6	HALL A1 (A11) - ROOM 7	HALL A1 (A12) - ROOM 8
08:30	JSVI-1 NanophoXonics, optomechanical systems and thermal transport	CF-4 Complex pulse shaping and characterization	ED-4 Cavity-enhanced precision spectroscopy	CG-1 Ultrafast magnetic fields and anisotropy	EA-1 Fundamental quantum optics	EB-4 Quantum computation I
09:00						
09:30						
10:00	COFFEE BREAK					
10:30						
11:00						
11:30						
12:00	LUNCH BREAK					
12:30						
13:00	CD, CF, CK AND EG POSTER SESSIONS - HALL B0					
13:30						
14:00						
14:30						
15:00						
15:30	COFFEE BREAK					
16:00	JSVI-2 Radiative heat transfer, thermoelectrics & thermochromics, SPP	CF-5 Carrier-envelope phase metrology and applications	CE-4 Emission materials	CG-2 Ultrafast physics in condensed matter	CJ-1 Transverse mode instability in fiber lasers and amplifiers	EB-5 Quantum key distribution
16:30						
17:00						
17:30						
18:00	"BIER & BREZEL" GET TOGETHER KINDLY SPONSORED BY SPIE - ICM FOYER, HALL B0, GROUND FLOOR					
18:30						
19:00						
19:30						
20:00						

	ICM - ROOM 1	ICM - ROOM 4A	ICM - ROOM 4B	ICM - ROOM 13A	ICM - ROOM 13B	ICM - ROOM 14A	ICM - ROOM 14B
08:30 09:00 09:30	CM-7 Laser written waveguides and gratings	CK-4 Active components	EG-6 Nanomanipulation, nano-organization and correlation	CA-6 Visible and UV lasers	JSI-1 Nonlinear X-ray wave-mixing	CD-7 Spectroscopy applications	CH-5 Optical frequency combs
10:00	COFFEE BREAK						
10:30 11:00 11:30		CK-5 Silicon nitride systems and devices	JSIV-1 Photo(electro)chemistry and desalination	CA-8 High-power lasers and facilities	JSI-2 X-ray source developments	CD-8 Nonlinear dynamics I	CH-6 Imaging at the nanoscale
12:00 12:30		PP-2 Early-stage researcher (ESR) session - Poster pitches I	LUNCH BREAK				
13:00 13:30	CH, EE, EF, JSI AND JSIV POSTER SESSIONS - HALL B0						
14:00 14:30 15:00	JSI-3 Imaging geometric and electronic structures	CK-6 Integrated optical devices I	JSIV-2 Thermal radiation and photovoltaics	CA-7 Power scaling	CB-6 Integrated photonics and frequency combs	CD-9 Nonlinear dynamics II	CH-7 Instrumentation for optical sensing and microscopy
15:30	COFFEE BREAK						
16:00 16:30 17:00	JSI-4 Nonlinear and ultrafast X-ray spectroscopy	CK-7 Integrated optical devices II	EH-1 Temporal and topological metamaterials	CA-9 Waveguide lasers	CB-7 Diode laser frequency combs	CD-10 Resonant structures	CH-8 Methods in optical sensing and microscopy
17:30 18:00 18:30							
19:00 19:30 20:00	CLEO®/EUROPE-EQEC CONFERENCE DINNER, LÖWENBRÄUKELLER - MUNICH (END 23:00)						

Wednesday at a glance

	ICM - ROOM OSTERSEEN	HALL B1 (B11) - ROOM 1	HALL B1 (B12) - ROOM 2	HALL B2 (B22) - ROOM 5	HALL B3 (B32) - ROOM 6	HALL A1 (A11) - ROOM 7	HALL A1 (A12) - ROOM 8
08:30 09:00 09:30	EE-1 Ultrafast spectroscopy of solids	CF-6 New trends in post-compression I	SH-1 Short course: High-power fiber lasers	SH-9 Short course: Silicon photonics	CI-1 Fibers for telecommunications	CJ-2 Beam combination of fiber lasers and amplifiers	EB-6 Integrated quantum optics
10:00	COFFEE BREAK						
10:30 11:00 11:30	CM-LIM Lightmatter interaction	CF-7 Ultrafast laser technology I	SH-1 Short course: High-power fiber lasers	SH-9 Short course: Silicon photonics	CI-2 Frequency combs	CJ-3 Mode-locked fiber lasers	EB-7 Quantum sensing
12:00 12:30	LUNCH BREAK						
13:00 13:30	CH, EE, EF, JSI AND JSIV POSTER SESSIONS - HALL B0						
14:00 14:30 15:00	EF-1 Complex fiber dynamics I	CF-8 Ultrafast laser technology II	SH-7 Short course: Nonlinear crystal optics	SH-8 Frequency combs principles and applications	CI-3 Ultrafast telecommunications	CJ-4 Specialty fiber characterisation techniques and components	EB-8 Quantum imaging
15:30	COFFEE BREAK						
16:00 16:30 17:00	EF-2 Kerr solitons and frequency combs I	CF-9 Ultrafast spectroscopy	SH-7 Short course: Nonlinear crystal optics	SH-8 Frequency combs principles and applications	CI-4 Fibers for telecommunications and THz	CJ-5 Novel fiber lasers	EB-9 Quantum communication
17:30 18:00 18:30							
19:00 19:30 20:00	CLEO®/EUROPE-EQEC CONFERENCE DINNER, LÖWENBRÄUKELLER - MUNICH (END 23:00)						

Thursday at a glance

	ICM - ROOM 1	ICM - ROOM 4A	ICM - ROOM 4B	ICM - ROOM 13A	ICM - ROOM 13B	ICM - ROOM 14A	ICM - ROOM 14B
08:30 – 10:00	EA-2 Nonlinear quantum optics	CK-8 Advanced design methods	EH-2 Quantum plasmonics	CA-10 Ytterbium lasers	CB-8 Quantum cascade laser frequency combs	EF-3 Kerr solitons and frequency combs II	CH-9 Quantum and single-photon sensing
10:00 – 10:30	COFFEE BREAK						
10:30 – 12:00	EA-3 Photonic quantum technology	CK-9 Micro optical combs	EH-3 Nonlinear and active metastructures	CA-11 New laser designs	CB-9 Quantum cascade lasers and frequency combs	EF-4 Spatiotemporal effects in optical systems	CH-10 Fiber sensors I
12:00 – 13:00	CLS-1 - FOYER 1st FLOOR Career and diversity lunch for early postdocs	LUNCH BREAK					
13:00 – 14:00	CE, CG, EA, EB AND EH POSTER SESSIONS - HALL B0						
14:00 – 15:30	EA-4 Quantum light sources I	CK-10 Metasurface technologies and applications	EH-4 Tunable and holographic metasurfaces	JSIII-1 Photonic reservoir computing, extreme learning and ising machines I	CB-10 Single mode and narrow linewidth semiconductor lasers	EF-5 Dissipative solitons and mode-locking I	CH-11 Fiber sensors II
15:30 – 16:00	COFFEE BREAK						
16:00 – 17:30	EA-5 Quantum light sources II	CK-11 Photonic crystals and periodic structures	EH-5 Concepts and applications in plasmonics and metastructures	JSIII-2 Photonic reservoir computing, extreme learning and ising machines II	CB-11 High-performance diode lasers	EF-6 Dissipative solitons and mode-locking II	CH-12 Super-resolution imaging
				PD-1 Postdeadline session I	PD-2 Postdeadline session II		

	ICM - ROOM OSTERSEEN	HALL B1 (B11) - ROOM 1	HALL B1 (B12) - ROOM 2	HALL B2 (B22) - ROOM 5	HALL B3 (B32) - ROOM 6	HALL A1 (A11) - ROOM 7	HALL A1 (A12) - ROOM 8
08:30	JSI-5 Ultrafast molecular dynamics	CF-10 New trends in post-compression I	SH-2 Short course: Optical parametric oscillators	SH-4 Short course: Practical quantum optics	CG-3 Taylored targets and fields	CJ-6 Specialty fiber and devices	EB-10 Quantum memories
09:00							
09:30							
10:00	COFFEE BREAK						
10:30	CL-2 Flow cytometry and ultrasound	CC-1 Nonlinear THz phenomena	SH-2 Short course: Optical parametric oscillators	SH-4 Short course: Practical quantum optics	CG-4 Few-cycle drivers and harmonic sources	CE-5 Sensor materials and structures	EB-11 Single photon sources and detectors
11:00							
11:30							
12:00	LUNCH BREAK						
12:30							
13:00	CE, CG, EA, EB AND EH POSTER SESSIONS - HALL B0						
13:30							
14:00	CL-3 Lightmatter interaction	CC-2 High power THz sources	SH-5 Short course: Mid-infrared semiconductor lasers	SH-6 Short course: THz measurements and their applications	CG-5 Ultrafast quantum physics and correlated systems	CE-6 Optical materials: Measurements	EB-12 Quantum optics II
14:30							
15:00							
15:30	COFFEE BREAK						
16:00	CL-4 Photonic technology for biomedical applications	CC-3 Novel approach THz sources	SH-5 Short course: Mid-infrared semiconductor lasers	SH-6 Short course: THz measurements and their applications	CG-6 Attosecond methods and fundamentals	CE-7 Nonlinear optical materials	EB-13 Quantum simulation and computation
16:30							
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Friday at a glance

	ICM - ROOM 1	ICM - ROOM 2	ICM - ROOM 3	ICM - ROOM 4A	ICM - ROOM 4B	ICM - ROOM 5	ICM - ROOM 11	ICM - ROOM 12A	ICM - ROOM 12B
08:30	CM-8 Laser-based surface functionalization and sensors	CJ-7 Mid-IR fiber sources	EA-6 Quantum optics in imaging	CK-12 Photonic crystals	EI-1 2D van der Waals materials: fundamentals and applications	CC-4 THz QCL	CI-5 Quantum and free-space communications	CE-8 Photonic integrated circuits	ED-5 Precision metrology
09:00									
09:30									
10:00	COFFEE BREAK								
10:30	CM-9 Laser-induced periodic surface structures	CJ-8 Pulsed fiber sources	EA-7 Atomic systems	CK-13 Advanced photonic devices	EI-2 Nonlinear and quantum optics with van der Waals layered materials	CC-5 THz spectroscopy and techniques	CI-6 Modulation and demodulation	CE-9 Lithium niobate platform	ED-6 Frequency combs: Sources and characterization
11:00									
11:30									
12:00	CLS-2 - FOYER 1st FLOOR Career and diversity lunch for PhD candidates	LUNCH BREAK							
12:30									
13:00	CC, CI, CJ, CL, EC, EI AND JSIII POSTER SESSIONS - HALL B0								
13:30									
14:00	CM-10 Dynamics of laser-induced processes	CJ-9 Novel fibers	EA-8 Nonclassical states of light	CK-14 Recent advances in laser technology	EI-3 Novel low-dimensional and functional materials	CC-6 THz devices	CI-7 Satellite and radio	CE-10 Doped optical materials	SH-10 Short course: Finite element modelling methods for photonics
14:30									
15:00									
15:30	COFFEE BREAK								
16:00	CM-11 Laser additive manufacturing II	CJ-10 2-micron fiber sources	EA-9 Optomechanical systems	CK-15 Micro- and nano-optical cavities	EI-4 Ultrafast dynamics in layered materials	CC-7 THz applications	CI-8 Frequency combs and microwave photonics	CE-11 Fabrication methods	SH-10 Short course: Finite element modelling methods for photonics
16:30									
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19:00									
19:30									
20:00									

	ICM - ROOM 13A	ICM - ROOM 13B	ICM - ROOM 14A	ICM - ROOM 14B	ICM - ROOM 14C	ICM - ROOM OSTERSEEN	ICM - ROOM 21	ICM - ROOM 22A
08:30	JSIII-3 Photonic accelerators I	CD-11 Nonlinear metasurfaces	EF-7 Complex fiber dynamics II	CH-13 IR & Raman sensing	EE-2 Ultrafast processes in ionised media	CL-5 Spectroscopy	EJ-3 Nonlinear optics modeling & artificial intelligence	EC-1 Non-linear and non-hermitian topological photonics
09:00								
09:30								
10:00	COFFEE BREAK							
10:30	JSIII-4 Photonic accelerators II	CD-12 Stimulated Brillouin scattering	EF-8 Symmetry breaking in coupled resonators	CH-14 Photothermal and photoacoustic sensing	EE-3 Ultrafast XUV and soft X-ray spectroscopy	CL-6 Advanced microscopy I	EJ-4 Tailored light and optical design	EC-2 Photonic band topology
11:00								
11:30								
12:00	LUNCH BREAK							
12:30								
13:00	CC, CI, CJ, CL, EC, EI AND JSIII POSTER SESSIONS - HALL B0							
13:30								
14:00	JSIII-5 Brain-inspired photonic devices and computing I	CD-13 Nonlinear imaging and microscopy	EF-9 Topological and nonlinear effects	CH-15 Bio-sensing	EE-4 Ultrafast nonlinear optics in gases	CL-7 Advanced microscopy II	CF-11 Parametric ultrafast sources	EC-3 Emerging trends and singular photonic topology
14:30								
15:00								
15:30	COFFEE BREAK							
16:00	JSIII-6 Brain-inspired photonic devices and computing II	CD-14 Quantum applications	EF-10 Extreme events and forecasting techniques	CH-16 Environmental optical sensing	EE-5 Ultrafast manipulation and control	CL-8 Novel laser sources	CF-12 Mid-IR sources	
16:30								
17:00								
17:30								
18:00								
18:30								
19:00								
19:30								
20:00								

PLENARY SESSIONS AWARD CEREMONY

PL-1 **CLEO®/Europe 2023 Plenary talk**
Monday, 16:00 - 17:30, Room 1 ICM

PL-2a **EQEC 2023 Plenary talk**
Tuesday, 10:30 - 11:30, Room 1 ICM

PL-2b **Award ceremony**
Tuesday, 11:30 - 12:30, Room 1 ICM

PL-3 **World of Photonics Plenary talk**
Tuesday, 14:00 - 15:30, Room 1 ICM

SPECIAL EVENTS DIVERSITY IN PHOTONICS

PP-1 **Early-stage Researcher (ESR) session - Poster pitches I**
Monday, 12:00 - 13:00,
Room 4a ICM

PL-C **Career event with Donna Strickland**
Monday, 17:30 - 18:30,
Room 4a ICM

PP-2 **Early-stage Researcher (ESR) session - Poster pitches II**
Wednesday, 12:00 - 13:00,
Room 4a ICM

CLS-1 **Career and diversity lunch for early postdocs**
Thursday, 12:00 - 13:00,
Foyer, 1st floor ICM

CLS-2 **Career and diversity lunch for PhD candidates**
Friday, 12:00 - 13:00,
Foyer, 1st floor ICM

POSTDEADLINE

PD-1 **Postdeadline session I: Beam and pulse control and quantum physics**
Thursday, 17:45 - 19:15, Room 13a ICM

PD-2 **Postdeadline session II: Nonlinear effects and electron physics**
Thursday, 17:45 - 19:15, Room 13b ICM

CLEO®/EUROPE 2022 SESSIONS

CA – SOLID-STATE LASERS

CA-1 **Mid-infrared lasers**
Monday, 8:30 - 10:00, Room 13a ICM

CA-2 **Ultrafast lasers at 2 µm and beyond**
Monday, 10:30 - 12:00, Room 13a ICM

CA-P **CA Poster session**
Monday, 13:00 - 14:00, Hall B0

CA-3 **Novel laser materials**
Monday, 14:00 - 15:30, Room 13a ICM

CA-4 **Polarization effects and structured laser beams**
Tuesday, 8:30 - 10:00, Room 13a ICM

CA-5 **Diamond lasers and frequency converters**
Tuesday, 16:00 - 17:30, Room 13a ICM

CA-6 **Visible and UV lasers**
Wednesday, 8:30 - 10:00, Room 13a ICM

CA-8 **High-power lasers and facilities**
Wednesday, 10:30 - 12:00, Room 13a ICM

CA-7 **Power scaling**
Wednesday, 14:00 - 15:30, Room 13a ICM

CA-9 **Waveguide lasers**
Wednesday, 16:00 - 17:30, Room 13a ICM

CA-10 **Ytterbium lasers**
Thursday, 8:30 - 10:00, Room 13a ICM

CA-11 **New laser designs**
Thursday, 10:30 - 12:00, Room 13a ICM

CB – SEMICONDUCTOR LASERS

CB-1 **Photonic crystal lasers**
Monday, 8:30 - 10:00, Room 13b ICM

CB-P **CB Poster session**
Monday, 13:00 - 14:00, Hall B0

CB-2 **Surface-emitting lasers**
Monday, 14:00 - 15:30, Room 13b ICM

CB-3 **Novel semiconductor laser concepts**
Tuesday, 8:30 - 10:00, Room 13b ICM

CB-4 **Photonic integration I**
Tuesday, 14:00 - 15:30, Room 13b ICM

CB-5 **Photonic integration II**
Tuesday, 16:00 - 17:30, Room 13b ICM

CB-6 **Integrated photonics and frequency combs**
Wednesday, 14:00 - 15:30, Room 13b ICM

CB-7 **Diode laser frequency combs**
Wednesday, 16:00 - 17:30, Room 13b ICM

CB-8 **Quantum cascade laser frequency combs**
Thursday, 8:30 - 10:00, Room 13b ICM

CB-9 **Quantum cascade lasers and frequency combs**
Thursday, 10:30 - 12:00, Room 13b ICM

CB-10 **Single mode and narrow linewidth semiconductor lasers**
Thursday, 14:00 - 15:30, Room 13b ICM

CB-11 **High-performance diode lasers**
Thursday, 16:00 - 17:30, Room 13b ICM

CC – TERAHERTZ SOURCES AND APPLICATIONS

CC-1 **Nonlinear THz phenomena**
Thursday, 10:30 - 12:00, Room 1 Hall B1 (B11)

CC-2 **High power THz sources**
Thursday, 14:00 - 15:30, Room 1 Hall B1 (B11)

CC-3 **Novel approach THz sources**
Thursday, 16:00 - 17:30, Room 1 Hall B1 (B11)

CC-4 **THz QCL**
Friday, 8:30 - 10:00, Room 5 ICM

CC-5 **THz spectroscopy and techniques**
Friday, 10:30 - 12:00, Room 5 ICM

CC-P **CC Poster session**
Friday, 13:00 - 14:00, Hall B0

CC-6 **THz devices**
Friday June 30, 14:00 - 15:30 Room 5 ICM

CC-7 **THz applications**
Friday June 30, 16:00 - 17:30 Room 5 ICM

CD – APPLICATIONS OF NONLINEAR OPTICS

CD-1 **Frequency conversion I**
Monday, 8:30 - 10:00, Room 14a ICM

CD-2 **Frequency conversion II**
Monday, 10:30 - 12:00, Room 14a ICM

CD-3 **Integrated nonlinear photonics**
Monday, 14:00 - 15:30, Room 14a ICM

CD-4 **Specialty fibers**
Tuesday, 8:30 - 10:00, Room 14a ICM

CD-P **CD Poster session**
Tuesday, 13:00 - 14:00, Hall B0

CD-5 **Supercontinuum generation**
Tuesday, 14:00 - 15:30, Room 14a ICM

CD-6 **Mid-IR applications**
Tuesday, 16:00 - 17:30, Room 14a ICM

CD-7 **Spectroscopy applications**
Wednesday, 8:30 - 10:00, Room 14a ICM

CD-8 **Nonlinear dynamics I**
Wednesday, 10:30 - 12:00, Room 14a ICM

CD-9 **Nonlinear dynamics II**
Wednesday, 14:00 - 15:30, Room 14a ICM

CD-10 **Resonant structures**
Wednesday, 16:00 - 17:30, Room 14a ICM

CD-11 **Nonlinear metasurfaces**
Friday, 8:30 - 10:00, Room 13b ICM

CD-12 **Stimulated Brillouin scattering**
Friday, 10:30 - 12:00, Room 13b ICM

CD-13 **Nonlinear imaging and microscopy**
Friday, 14:00 - 15:30, Room 13b ICM

CD-14 **Quantum applications**
Friday, 16:00 - 17:30, Room 13b ICM

CE – OPTICAL MATERIALS, FABRICATION AND CHARACTERISATION

CE-1 **Specialty optical fibres**
Monday, 8:30 - 10:00, Room 7 Hall A1 (A11)

CE-2 **Hollow core optical fibres**
Monday, 10:30 - 11:45, Room 7 Hall A1 (A11)

CE-3 **Optical materials: Structures**
Monday, 14:00 - 15:30, Room 7 Hall A1 (A11)

CE-4 **Emission materials**
Tuesday, 16:00 - 17:30, Room 2 Hall B1 (B12)

CE-5 **Sensor materials and structures**
Thursday, 10:30 - 12:00, Room 7 Hall A1 (A11)

CE-P **CE Poster session**
Thursday, 13:00 - 14:00, Hall B0

CE-6 **Optical materials: Measurements**
Thursday, 14:00 - 15:30, Room 7 Hall A1 (A11)

CE-7 **Nonlinear optical materials**
Thursday, 16:00 - 17:30, Room 7 Hall A1 (A11)

CE-8 **Photonic integrated circuits**
Friday, 8:30 - 10:00, Room 12a ICM

CE-9 **Lithium niobate platform**
Friday, 10:30 - 12:00, Room 12a ICM

CE-10 **Doped optical materials**
Friday, 14:00 - 15:30, Room 12a ICM

CE-11 **Fabrication methods**
Friday, 16:00 - 17:30, Room 12a ICM

How to read the session codes?

The following pages contain the abstracts of the papers presented at the 2023 CLEO®/Europe-EQEC.

All CLEO®/Europe sessions are on a white background and have a code beginning with a **C**.

All EQEC sessions are on a shaded background and have a code that begins with an **E**.

Both post-deadline sessions including CLEO®/Europe and EQEC presentations are on a white background and have a code beginning with **PD**.

Exceptions mentioned below are on a dark background:

- Short courses referenced with **SH**
- Plenary talks, Award ceremony referenced with **PL**
- Career event with Donna Strickland referenced with **PL-C**
- Career and diversity lunches for early postdocs / for PhD candidates referenced with **CLS**
- CLEO®/Europe-EQEC joint symposia referenced with **JS**.
- CLEO®/Europe-LiM joint session referenced with **CM-LiM**
- Early-stage researcher (ESR) sessions - Poster pitches referenced with **PP**.

ORAL PRESENTATIONS

Oral presentations have a code made up of two parts, *e.g.*

CD-8.1 WED (Invited) 10:30

The first part (CD-8.1) indicates the Conference, the topic title, the session title and the placement of the presentation within the session, *e.g.*

CD-8.1 = CLEO®/Europe (Conference)
CD-8.1 = Applications of nonlinear optics (Topic)
CD-8.1 = Nonlinear dynamics I (Session title and 8th position in the session)
CD-8.1 = First paper presented in the " Nonlinear dynamics I" session of the CD topic.

The second part indicates the day when the presentation takes place.

MON = Monday
TUE = Tuesday
WED = Wednesday
THU = Thursday
FRI = Friday

The figures on the right specify at what time the talk begins (10:30 am).

Plenary, Tutorial, Keynote and Invited Talks are marked between brackets. Other talks have no marking.

POSTERS

The first part indicates the Conference, the topic title, the poster destination, and the order of presentation within the topic, *e.g.*

EG-P.2 = EQEC
EG-P.2 = Light-matter interactions at the nanoscale
EG-P.2 = Poster
EG-P.2 = Second poster in the "Light-matter interactions at the nanoscale" topic of the EQEC conference.

The second part indicates the day when the poster presentation takes place with the same abbreviations as for the oral presentations. All posters are displayed per topic according to their reference numbers over the conference days (see “days at a glance”).

CF – ULTRAFAST OPTICAL TECHNOLOGIES

CF-1 **Advances in attosecond technology and high order harmonic generation I**
Monday, 8:30 - 10:00, Room 1 Hall B1 (B11)

CF-2 **Advances in attosecond technology and high order harmonic generation II**
Monday, 10:30 - 12:00, Room 1 Hall B1 (B11)

CF-3 **Complex pulses and their characterization**
Monday, 14:00 - 15:30, Room 1 Hall B1 (B11)

CF-4 **Complex pulse shaping and characterization**
Tuesday, 8:30 - 10:00, Room 1 Hall B1 (B11)

CF-P **CF Poster session**
Tuesday, 13:00 - 14:00, Hall B0

CF-5 **Carrier-envelope phase metrology and applications**
Tuesday, 16:00 - 17:30, Room 1 Hall B1 (B11)

CF-6 **New trends in post-compression I**
Wednesday, 8:30 - 10:00, Room 1 Hall B1 (B11)

CF-7 **Ultrafast laser technology I**
Wednesday, 10:30 - 12:00, Room 1 Hall B1 (B11)

CF-8 **Ultrafast laser technology II**
Wednesday, 14:00 - 15:30, Room 1 Hall B1 (B11)

CF-9 **Ultrafast spectroscopy**
Wednesday, 16:00 - 17:30, Room 1 Hall B1 (B11)

CF-10 **New trends in post-compression II**
Thursday, 8:30 - 10:00, Room 1 Hall B1 (B11)

CF-11 **Parametric ultrafast sources**
Friday, 14:00 - 15:30, Room 21 ICM

CF-12 **Mid-IR sources**
Friday, 16:00 - 17:30, Room 21 ICM

CG – HIGH-FIELD LASER AND ATTOSECOND SCIENCE

CG-1 **Ultrafast magnetic fields and anisotropy**
Tuesday, 8:30 - 10:00, Room 6 Hall B3 (B32)

CG-2 **Ultrafast physics in condensed matter**
Tuesday, 16:00 - 17:30, Room 6 Hall B3 (B32)

CG-3 **Taylored targets and fields**
Thursday, 8:30 - 10:00, Room 6 Hall B3 (B32)

CG-4 **Few-cycle drivers and harmonic sources**
Thursday, 10:30 - 12:00, Room 6 Hall B3 (B32)

CG-P **CG Poster session**
Thursday, 13:00 - 14:00, Hall B0

CG-5 **Ultrafast quantum physics and correlated systems**
Thursday, 14:00 - 15:30, Room 6 Hall B3 (B32)

CG-6 **Attosecond methods and fundamentals**
Thursday, 16:00 - 17:30, Room 6 Hall B3 (B32)

CH – OPTICAL SENSING AND MICROSCOPY

CH-1 **Imaging through scattering media**
Monday, 8:30 - 10:00, Room 14b ICM

CH-2 **AI for optical sensing**
Monday, 10:30 - 12:00, Room 14b ICM

CH-3 **On-chip optical sensing**
Tuesday, 8:30 - 10:00, Room 14b ICM

CH-4 **Field applications**
Tuesday, 16:00 - 17:30, Room 14b ICM

CH-5 **Optical frequency combs**
Wednesday, 8:30 - 10:00, Room 14b ICM

CH-6 **Imaging at the nanoscale**
Wednesday, 10:30 - 12:00, Room 14b ICM

CH-P **CH Poster session**
Wednesday, 13:00 - 14:00, Hall B0

CH-7 **Instrumentation for optical sensing and microscopy**
Wednesday, 14:00 - 15:30, Room 14b ICM

CH-8 **Methods in optical sensing and microscopy**
Wednesday, 16:00 - 17:30, Room 14b ICM

CH-9 **Quantum and single-photon sensing**
Thursday, 8:30 - 10:00, Room 14b ICM

CH-10 **Fiber sensors I**
Thursday, 10:30 - 12:00, Room 14b ICM

CH-11 **Fiber sensors II**
Thursday, 14:00 - 15:30, Room 14b ICM

CH-12 **Super-resolution imaging**
Thursday, 16:00 - 17:30, Room 14b ICM

CH-13 **IR & Raman sensing**
Friday, 8:30 - 10:00, Room 14b ICM

CH-14 **Photothermal and photoacoustic sensing**
Friday, 10:30 - 12:00, Room 14b ICM

CH-15 **Bio-sensing**
Friday, 14:00 - 15:30, Room 14b ICM

CH-16 **Environmental optical sensing**
Friday, 16:00 - 17:30, Room 14b ICM

CI – OPTICAL TECHNOLOGIES FOR COMMUNICATIONS AND DATA STORAGE

CI-1 **Fibers for telecommunications**
Wednesday, 8:30 - 10:00, Room 6 Hall B3 (B32)

CI-2 **Frequency combs**
Wednesday, 10:30 - 12:00, Room 6 Hall B3 (B32)

CI-3 **Ultrafast telecommunications**
Wednesday, 14:00 - 15:30, Room 6 Hall B3 (B32)

CI-4 **Fibers for telecommunications and THz**
Wednesday, 16:00 - 17:30, Room 6 Hall B3 (B32)

CI-5 **Quantum and free-space communications**
Friday, 8:30 - 10:00, Room 11 ICM

CI-6 **Modulation and demodulation**
Friday, 10:30 - 12:00, Room 11 ICM

CI-P **CI Poster session**
Friday, 13:00 - 14:00, Hall B0

CI-7 **Satellite and radio**
Friday, 14:00 - 15:30, Room 11 ICM

CI-8 **Frequency combs and microwave photonics**
Friday, 16:00 - 17:30, Room 11 ICM

CJ – FIBRE AND GUIDED WAVE LASERS AND AMPLIFIERS

CJ-1 **Transverse mode instability in fiber lasers and amplifiers**
Tuesday, 16:00 - 17:30, Room 7 Hall A1 (A11)

CJ-2 **Beam combination of fiber lasers and amplifiers**
Wednesday, 8:30 - 10:00, Room 7 Hall A1 (A11)

CJ-3 **Mode-locked fiber lasers**
Wednesday, 10:30 - 12:00, Room 7 Hall A1 (A11)

CJ-4 **Specialty fiber characterisation techniques and components**
Wednesday, 14:00 - 15:30, Room 7 Hall A1 (A11)

CJ-5 **Novel fiber lasers**
Wednesday, 16:00 - 17:30, Room 7 Hall A1 (A11)

CJ-6 **Specialty fiber and devices**
Thursday, 8:30 - 10:00, Room 7 Hall A1 (A11)

CJ-7 **Mid-IR fiber sources**
Friday, 8:30 - 10:00, Room 2 ICM

CJ-8 **Pulsed fiber sources**
Friday, 10:30 - 12:00, Room 2 ICM

CJ-P **CJ Poster session**
Friday, 13:00 - 14:00, Hall B0

CJ-9 **Novel fibers**
Friday, 14:00 - 15:30, Room 2 ICM

CJ-10 **2-micron fiber sources**
Friday, 16:00 - 17:30, Room 2 ICM

CK – MICRO- AND NANO-PHOTONICS

CK-1 **Lithium niobate and silica systems**
Monday, 14:00 - 15:30, Room 4a ICM

CK-2 **Plasmonic structures and components**
Tuesday, 8:30 - 10:00, Room 4a ICM

CK-P **CK Poster session**
Tuesday, 13:00 - 14:00, Hall B0

CK-3 **Resonant structures and cavities**
Tuesday, 16:00 - 17:30, Room 4a ICM

CK-4 **Active components**
Wednesday, 8:30 - 10:00, Room 4a ICM

CK-5 **Silicon nitride systems and devices**
Wednesday, 10:30 - 12:00, Room 4a ICM

CK-6 **Integrated optical devices I**
Wednesday, 14:00 - 15:30, Room 4a ICM

CK-7 **Integrated optical devices II**
Wednesday, 16:00 - 17:30, Room 4a ICM

How to find the room?

A map locating all the rooms can be found in the inner cover of the advance programme.

Talks and courses: CLEO®/Europe-EQEC talks and courses take place in the congress centre, so called **ICM**, on your left when entering the **main entrance West of Neue Messe Munich** or in the **exhibition hall B1** or in the **exhibition hall A1** located on your right. The rooms in the halls are numbered and named according to famous physicists. A few talks take place in the Osterseen room: Follow your way to the ICM and then **on your right** take the stairs or the elevator to go to the second floor and reach this room at the end of the corridor.

To save space in the layout of the parallel sessions, all locations are abbreviated to the strict minimum such as "Room 1 ICM" instead of "Room 1, Ground Floor / First Floor, Congress Centre". Below you will find the detailed locations of all CLEO®/Europe-EQEC rooms:

Rooms located in the ICM:
Room 1, Ground Floor / First Floor, Congress Centre
Room 2, Ground Floor, Congress Centre
Room 3, Ground Floor, Congress Centre
Room 4a, Ground Floor, Congress Centre
Room 4b, Ground Floor, Congress Centre
Room 5, Ground Floor, Congress Centre
Room 11, First Floor, Congress Centre
Room 12a, First Floor, Congress Centre
Room 12b, First Floor, Congress Centre
Room 13a, First Floor, Congress Centre
Room 13b, First Floor, Congress Centre
Room 14a, First Floor, Congress Centre
Room 14b, First Floor, Congress Centre
Room 14c, First Floor, Congress Centre
Room 21, Second Floor, Congress Centre
Room 22a, Second Floor, Congress Centre
Room 22b, Second Floor, Congress Centre
Room Osterseen, Second Floor, Congress Centre
Foyer balcony, First Floor, Congress Centre (opposite Room 14)

Rooms located at the fairground:
Room 1 "Albert Einstein" **B11**, First Floor, **Exhibition Hall B1**
Room 2 "Emmy Noether" **B12**, First Floor, **Exhibition Hall B1**
Room 3 "Wilhelm Röntgen" **B13**, First Floor, **Exhibition Hall B1**
Room 4 "Theodore Maiman" **B21**, First Floor, **Exhibition Hall B2**
Room 5 "Thomas Edison" **B22**, First Floor, **Exhibition Hall B2**
Room 6 "Emmett Leith" **B32**, First Floor, **Exhibition Hall B3**
Room 7 "Charles Townes" **A11**, First Floor, **Exhibition hall A1**
Room 8 "Gustav Hertz" **A12**, First Floor, **Exhibition hall A1**

Note: Be aware that a few minutes are required to walk from the ICM to the rooms located in the exhibition hall A1.

Posters: All poster sessions take place in the **Hall B0**, Ground Floor, Congress Centre.

CK-8	**Advanced design methods**	Thursday, 8:30 - 10:00, Room 4a ICM
CK-9	**Micro optical combs**	Thursday, 10:30 - 12:00, Room 4a ICM
CK-10	**Metasurface technologies and applications**	Thursday, 14:00 - 15:30, Room 4a ICM
CK-11	**Photonic crystals and periodic structures**	Thursday, 16:00 - 17:30, Room 4a ICM
CK-12	**Photonic crystals**	Friday, 8:30 - 10:00, Room 4a ICM
CK-13	**Advanced photonic devices**	Friday, 10:30 - 12:00, Room 4a ICM
CK-14	**Recent advances in laser technology**	Friday, 14:00 - 15:30, Room 4a ICM
CK-15	**Micro- and nano-optical cavities**	Friday, 16:00 - 17:30, Room 4a ICM

CL – PHOTONIC APPLICATIONS IN BIOLOGY AND MEDICINE

CL-1	**Brain imaging**	Monday, 14:00 - 15:30, Room 2 Hall B1 (B12)
CL-2	**Flow cytometry and ultrasound**	Thursday, 10:30 - 12:00, Room Osterseen ICM
CL-3	**Lightmatter interaction**	Thursday, 14:00 - 15:30, Room Osterseen ICM
CL-4	**Photonic technology for biomedical applications**	Thursday, 16:00 - 17:30, Room Osterseen ICM
CL-5	**Spectroscopy**	Friday, 8:30 - 10:00, Room Osterseen ICM
CL-6	**Advanced microscopy I**	Friday, 10:30 - 12:00, Room Osterseen ICM
CL-P	**CL Poster session**	Friday, 13:00 - 14:00, Hall B0
CL-7	**Advanced microscopy II**	Friday, 14:00 - 15:30, Room Osterseen ICM
CL-8	**Novel laser sources**	Friday, 16:00 - 17:30, Room Osterseen ICM

CM – MATERIALS PROCESSING WITH LASERS

CM-1	**Laser additive manufacturing I**	Monday, 8:30 - 10:00, Room 1 ICM
CM-2	**Laser semiconductor processing**	Monday, 10:30 - 12:00, Room 1 ICM
CM-P	**CM Poster session**	Monday, 13:00 - 14:00, Hall B0
CM-3	**Temporal and spatial beam shaping for laser processing I**	Monday, 14:00 - 15:30, Room 1 ICM
CM-4	**Temporal and spatial beam shaping for laser processing II**	Tuesday, 8:30 - 10:00, Room 1 ICM
CM-5	**Modelling of laser-induced processes**	Tuesday, 14:00 - 15:30, Room 13a ICM
CM-6	**Laser volume processing**	Tuesday, 16:00 - 17:30, Room 1 ICM
CM-7	**Laser written waveguides and gratings**	Wednesday, 8:30 - 10:00, Room 1 ICM
CM-LIM	**Lightmatter interaction**	Wednesday, 10:30 - 12:00, Room Osterseen ICM
CM-8	**Laser-based surface functionalization and sensors**	Friday, 8:30 - 10:00, Room 1 ICM
CM-9	**Laser-induced periodic surface structures**	Friday, 10:30 - 12:00, Room 1 ICM
CM-10	**Dynamics of laser-induced processes**	Friday, 14:00 - 15:30, Room 1 ICM
CM-11	**Laser additive manufacturing II**	Friday, 16:00 - 17:30, Room 1 ICM

EQEC 2023 SESSIONS

EA – QUANTUM OPTICS AND ULTRACOLD QUANTUM MATTER

EA-1	**Fundamental quantum optics**	Tuesday, 8:30 - 10:00, Room 7 Hall A1 (A11)
EA-2	**Nonlinear quantum optics**	Thursday, 8:30 - 10:00, Room 1 ICM
EA-3	**Photonic quantum technology**	Thursday, 10:30 - 12:00, Room 1 ICM
EA-P	**EA Poster session**	Thursday, 13:00 - 14:00, Hall B0
EA-4	**Quantum light sources I**	Thursday, 14:00 - 15:30, Room 1 ICM
EA-5	**Quantum light sources II**	Thursday, 16:00 - 17:30, Room 1 ICM
EA-6	**Quantum optics in imaging**	Friday, 8:30 - 10:00, Room 3 ICM
EA-7	**Atomic systems**	Friday, 10:30 - 12:00, Room 3 ICM
EA-8	**Nonclassical states of light**	Friday, 14:00 - 15:30, Room 3 ICM
EA-9	**Optomechanical systems**	Friday, 16:00 - 17:30, Room 3 ICM

EB – QUANTUM INFORMATION, COMMUNICATION, AND SENSING

EB-1	**Optomechanical and other quantum oscillators**	Monday, 8:30 - 10:00, Room 8 Hall A1 (A12)
EB-2	**Quantum interferometry**	Monday, 10:30 - 12:00, Room 8 Hall A1 (A12)
EB-3	**Quantum optics I**	Monday, 14:00 - 15:30, Room 8 Hall A1 (A12)
EB-4	**Quantum computation I**	Tuesday, 8:30 - 10:00, Room 8 Hall A1 (A12)
EB-5	**Quantum key distribution**	Tuesday, 16:00 - 17:30, Room 8 Hall A1 (A12)
EB-6	**Integrated quantum optics**	Wednesday, 8:30 - 10:00, Room 8 Hall A1 (A12)
EB-7	**Quantum sensing**	Wednesday, 10:30 - 12:00, Room 8 Hall A1 (A12)

EB-8 **Quantum imaging**
Wednesday, 14:00 - 15:30, Room 8 Hall A1 (A12)

EB-9 **Quantum communication**
Wednesday, 16:00 - 17:30, Room 8 Hall A1 (A12)

EB-10 **Quantum memories**
Thursday, 8:30 - 10:00, Room 8 Hall A1 (A12)

EB-11 **Single photon sources and detectors**
Thursday, 10:30 - 12:00, Room 8 Hall A1 (A12)

EB-P **EB Poster session**
Thursday, 13:00 - 14:00, Hall B0

EB-12 **Quantum optics II**
Thursday, 14:00 - 15:30, Room 8 Hall A1 (A12)

EB-13 **Quantum simulation and computation**
Thursday, 16:00 - 17:30, Room 8 Hall A1 (A12)

EC – TOPOLOGICAL STATES OF LIGHT

EC-1 **Non-linear and non-hermitian topological photonics**
Friday, 8:30 - 10:00, Room 22a ICM

EC-2 **Photonic band topology**
Friday, 10:30 - 12:00, Room 22a ICM

EC-P **EC Poster session**
Friday, 13:00 - 14:00, Hall B0

EC-3 **Emerging trends and singular photonic topology**
Friday, 14:00 - 15:30, Room 22a ICM

ED – PRECISION METROLOGY AND FREQUENCY COMBS

ED-1 **Precision spectroscopy for fundamental science**
Monday, 8:30 - 10:00, Room 6 Hall B3 (B32)

ED-2 **Direct comb spectroscopy**
Monday, 10:30 - 12:00, Room 6 Hall B3 (B32)

ED-P **ED Poster session**
Monday, 13:00 - 14:00, Hall B0

ED-3 **Frequency references and transfer**
Monday, 14:00 - 15:30, Room 6 Hall B3 (B32)

ED-4 **Cavity-enhanced precision spectroscopy**
Tuesday, 8:30 - 10:00, Room 2 Hall B1 (B12)

ED-5 **Precision metrology**
Friday, 8:30 - 10:00, Room 12b ICM

ED-6 **Frequency combs: Sources and characterization**
Friday, 10:30 - 12:00, Room 12b ICM

EE – ULTRAFAST OPTICAL SCIENCE

EE-1 **Ultrafast spectroscopy of solids**
Wednesday, 8:30 - 10:00, Room Osterseen ICM

EE-P **EE Poster session**
Wednesday, 13:00 - 14:00, Hall B0

EE-2 **Ultrafast processes in ionised media**
Friday, 8:30 - 10:00, Room 14c ICM

EE-3 **Ultrafast XUV and soft X-ray spectroscopy**
Friday, 10:30 - 12:00, Room 14c ICM

EE-4 **Ultrafast nonlinear optics in gases**
Friday, 14:00 - 15:30, Room 14c ICM

EE-5 **Ultrafast manipulation and control**
Friday, 16:00 - 17:30, Room 14c ICM

EF – NONLINEAR PHENOMENA, SOLITONS AND SELF-ORGANIZATION

EF-1 **Complex fiber dynamics I**
Wednesday, 14:00 - 15:30, Room Osterseen ICM

EF-P **EF Poster session**
Wednesday, 13:00 - 14:00, Hall B0

EF-2 **Kerr solitons and frequency combs I**
Wednesday, 16:00 - 17:30, Room Osterseen ICM

EF-3 **Kerr solitons and frequency combs II**
Thursday, 8:30 - 10:00, Room 14a ICM

EF-4 **Spatiotemporal effects in optical systems**
Thursday, 10:30 - 12:00, Room 14a ICM

EF-5 **Dissipative solitons and mode-locking I**
Thursday, 14:00 - 15:30, Room 14a ICM

EF-6 **Dissipative solitons and mode-locking II**
Thursday, 16:00 - 17:30, Room 14a ICM

EF-7 **Complex fiber dynamics II**
Friday, 8:30 - 10:00, Room 14a ICM

EF-8 **Symmetry breaking in coupled resonators**
Friday, 10:30 - 12:00, Room 14a ICM

EF-9 **Topological and nonlinear effects**
Friday, 14:00 - 15:30, Room 14a ICM

EF-10 **Extreme events and forecasting techniques**
Friday, 16:00 - 17:15, Room 14a ICM

EG – LIGHT-MATTER INTERACTIONS AT THE NANOSCALE

EG-1 **Nanoantennas and nanoconfinement**
Monday, 8:30 - 10:00, Room 4b ICM

EG-2 **Metasurfaces**
Monday, 10:30 - 12:00, Room 4b ICM

EG-3 **Optoelectronics and light-electron interactions**
Monday, 14:00 - 15:30, Room 4b ICM

EG-4 **Ultrastrong light matter interactions and nonlinear optics**
Tuesday, 8:30 - 10:00, Room 4b ICM

EG-P **EG Poster session**
Tuesday, 13:00 - 14:00, Hall B0

EG-5 **Single emitters**
Tuesday, 16:00 - 17:30, Room 4b ICM

EG-6 **Nanomanipulation, nano-organization and correlation**
Wednesday, 8:30 - 10:00, Room 4b ICM

EH – PLASMONICS AND METAMATERIALS

EH-1 **Temporal and topological metamaterials**
Wednesday, 16:00 - 17:30, Room 4b ICM

EH-2 **Quantum plasmonics**
Thursday, 8:30 - 10:00, Room 4b ICM

EH-3 **Nonlinear and active metastructures**
Thursday, 10:30 - 12:00, Room 4b ICM

EH-P **EH Poster session**
Thursday, 13:00 - 14:00, Hall B0

EH-4 **Tunable and holographic metasurfaces**
Thursday, 14:00 - 15:30, Room 4b ICM

EH-5 **Concepts and applications in plasmonics and metastructures**
Thursday, 16:00 - 17:30, Room 4b ICM

EI – TWO-DIMENSIONAL AND NOVEL MATERIALS

EI-1 **2D van der Waals materials: fundamentals and applications**
Friday, 8:30 - 10:00, Room 4b ICM

EI-2 **Nonlinear and quantum optics with van der Waals layered materials**
Friday, 10:30 - 12:00, Room 4b ICM

EI-P **EI poster session**
Friday, 13:00 - 14:00, Hall B0

EI-3 **Novel low-dimensional and functional materials**
Friday, 14:00 - 16:30, Room 4b ICM

EI-4 **Ultrafast dynamics in layered materials**
Friday, 16:00 - 17:30, Room 4b ICM

EJ – THEORETICAL AND COMPUTATIONAL PHOTONICS MODELLING

EJ-1 **Simulating multi-mode and non-hermitian systems**
Monday, 8:30 - 10:00, Room 4a ICM

EJ-2 **Computational photonics at the light-matter interface**
Monday, 10:30 - 12:00, Room 4a ICM

EJ-P **EJ Poster session**
Monday, 13:00 - 14:00, Hall B0

EJ-3 **Nonlinear optics modeling & artificial intelligence**
Friday, 8:30 - 10:00, Room 21 ICM

EJ-4 **Tailored light and optical design**
Friday, 10:30 - 12:00, Room 21 ICM

CLEO®/EUROPE-EQEC 2023 JOINT SYMPOSIA SESSIONS

JSI – FREE ELECTRON LASERS

JSI-1 **Nonlinear X-ray wave-mixing**
Wednesday, 8:30 - 10:00, Room 13b ICM

JSI-2 **X-ray source developments**
Wednesday, 10:30 - 12:00, Room 13b ICM

JSI-P **JSI Poster session**
Wednesday, 13:00 - 14:00, Hall B0

JSI-3 **Imaging geometric and electronic structures**
Wednesday, 14:00 - 15:30, Room 1 ICM

JSI-4 **Nonlinear and ultrafast X-ray spectroscopy**
Wednesday, 16:00 - 17:30, Room 1 ICM

JSI-5 **Ultrafast molecular dynamics**
Thursday, 8:30 - 10:00,
Room Osterseen ICM

JSII – INFRARED INTEGRATED PHOTONICS FOR ASTRONOMICAL APPLICATIONS

JSII-1 **The photonic yield in astronomy**
Monday, 8:30 - 10:00,
Room Osterseen ICM

JSII-2 **Manipulating astronomical signals with photonics and future challenges I**
Monday, 10:30 - 12:00,
Room Osterseen ICM

JSII-P **JSII Poster session**
Monday, 13:00 - 14:00, Hall B0

JSII-3 **Manipulating astronomical signals with photonics and future challenges II**
Monday, 14:00 - 15:30,
Room Osterseen ICM

JSIII – PHOTONICS FOR ARTIFICIAL INTELLIGENCE

JSIII-1 **Photonic reservoir computing, extreme learning and ising machines I**
Thursday, 14:00 - 15:30, Room 13a ICM

JSIII-2 **Photonic reservoir computing, extreme learning and ising machines II**
Thursday, 16:00 - 17:30, Room 13a ICM

JSIII-3 **Photonic accelerators I**
Friday, 8:30 - 10:00, Room 13a ICM

JSIII-4 **Photonic accelerators II**
Friday, 10:30 - 12:00, Room 13a ICM

JSIII-P **JSIII Poster session**
Friday, 13:00 - 14:00, Hall B0

JSIII-5 **Brain-inspired photonic devices and computing I**
Friday, 14:00 - 15:30, Room 13a ICM

JSIII-6 **Brain-inspired photonic devices and computing II**
Friday, 16:00 - 17:30, Room 13a ICM

JSIV – PHOTONICS FOR SUSTAINABILITY

JSIV-1 **Photo(electro)chemistry and desalination**
Wednesday, 10:30 - 12:00,
Room 4b ICM

JSIV-P **JSIV Poster session**
Wednesday, 13:00 - 14:00, Hall B0

JSIV-2 **Thermal radiation and photovoltaics**
Wednesday, 14:00 - 15:30, Room 4b ICM

JSV – DIVERSITY IN PHOTONICS

See SPECIAL EVENTS

NANOPHOXONICS AND NANOSCALE HEAT TRANSFER

JSVI-1 **NanophoXonics, optomechanical systems and thermal transport**
Tuesday, 8:30 - 10:00,
Room Osterseen ICM

JSVI-2 **Radiative heat transfer, thermoelectrics & thermochromics, SPP**
Tuesday, 16:00 - 17:30,
Room Osterseen ICM

CLEO®/Europe 2023 Topics

CA – SOLID-STATE LASERS

Advances in solid-state lasers: novel solid-state lasers and amplifiers; high-power and high-energy lasers; power-scalable laser architectures; lasers for large-scale facilities; solid-state micro-chip lasers; crystalline waveguide lasers; short-wavelength lasers; up-conversion lasers; mid-infrared lasers; wavelength tuning techniques and tunable lasers; intracavity wavelength conversion; laser resonator design; techniques for thermal management and beam quality control; novel pump sources and pumping configurations; ns-pulse generation; amplitude and frequency stability; advanced laser crystals and ceramics, and glasses; spectroscopic characterization of solid-state gain media; laser characterization and modelling.

CHAIR: Pavel Loiko, *CIMAP, Université de Caen, Normandie, Caen, France*

CB – SEMICONDUCTOR LASERS

New technology, devices and applications; UV lasers, visible lasers, near-infrared lasers; mid to far-infrared semiconductor lasers including W-lasers, quantum cascade and inter-subband lasers; quantum well, wire, dot and dash lasers; high power and high brightness lasers; vertical (extended) cavity surface emitting lasers; optically-pumped semiconductor lasers; photonic crystal semiconductor lasers, micro-cavity lasers, nanolasers, plasmonic lasers, polariton lasers; semiconductor ring lasers; short-pulse generation, mode locking; semiconductor optical amplifiers; new semiconductor laser materials, silicon-based lasers, novel characterization techniques; functional applications, including but not limited to: switching, clock recovery, signal processing; semiconductor lasers in integrated photonic circuits; laser dynamics, synchronization, chaos.

CHAIR: Mikhail Belkin, *Walter Schottky Institute, Munich, Germany*

CC – TERAHERTZ SOURCES AND APPLICATIONS

Sources for generating terahertz (far-infrared) radiation in the range from 200 GHz to 100 THz, based on various physical principles including ultrafast time-domain systems, direct generation using terahertz lasers, and sources based on nonlinear optical mixing and laser-created plasmas; applications using terahertz radiation for spectroscopy, nonlinear THz phenomena, sensing, and imaging; advances in terahertz communications; new terahertz measurement techniques and instrumentation, including advances in terahertz imaging, detector technologies, near-field microscopy, terahertz devices and environmental monitoring.

CHAIR: Juliette Mangeney, *École Normale Supérieure, Laboratoire Pierre Aigrain, Paris, France*

CD – APPLICATIONS OF NONLINEAR OPTICS

Novel applications of nonlinear optical phenomena and new devices; nonlinear frequency conversion for the UV, visible and IR; telecommunications applications and all-optical switching; all-optical delay lines and slow light; optical parametric devices such as optical parametric amplifiers and oscillators; nonlinear optics in waveguides and fibres, including photonic crystal structures and microstructured optical fibres; quasi-phase-matched materials and devices; novel nonlinear materials; metamaterials and nanostructures; stimulated scattering processes and devices; applications of optical solitons and photorefractives; electro-optic and Kerr devices in crystals and semiconductors; Raman based devices including amplifiers and lasers; nonlinear probing of surfaces; multi-photon imaging and coherent Raman microscopy; quantum oriented applications.

CHAIR: Mikko J Huttunen, *Tampere University of Technology, Tampere, Finland*

CE – OPTICAL MATERIALS, FABRICATION AND CHARACTERISATION

Fabrication of optical materials; new crystalline and glass laser materials in bulk, fiber and waveguide geometry; micro- and nano-fabrication and -engineering techniques; heterogeneous integration techniques; optical characterisation of laser and nonlinear materials, micro-structured fibre and photonic crystal waveguides, micro- and nano-crystalline materials, single defect centres, quantum wells, quantum wires and quantum dots, nano-tubes and nano-needles, innovative organic materials.

CHAIR: Stavros Pissadakis, *Institute of Electronic Structure and Laser (IESL), Heraklion, Greece*

CF – ULTRAFAST OPTICAL TECHNOLOGIES

Femtosecond and picosecond pulse generation from solid state, fiber and waveguide sources; mode-locked lasers; few-cycle optical pulses; pulse compression, carrier-envelope phase stabilization and pulse characterization; light waveform synthesis metrology; ultra-short-pulse semiconductor lasers and devices; ultrafast parametric amplifiers and parametric chirped pulse amplifiers; ultrashort-pulse mid-IR generation; supercontinuum generation; dispersion management; ultrafast electro-optics; pulse-shaping; carrier-envelope effects; ultrafast characterization methods and measurement techniques, ultrafast optoelectronic systems and devices; applications of ultrafast technology, technological aspects of ultrafast spectroscopy; ultrafast microscopic techniques; electro-optic sampling.

CHAIR: Caterina Vozzi, *Politecnico di Milano, Milano, Italy*

CG – HIGH-FIELD LASER AND ATTOSECOND SCIENCE

Strong-field and attosecond phenomena; attosecond pulse generation; strong-field ionization and ionization dynamics; novel technologies for high-field physics and attosecond science; probing of ultrafast dynamics with intense free-electron laser pulses; control of high-field and attosecond phenomena; laser-driven rescattering and recollision phenomena; high-harmonic generation; time-resolved XUV/soft x-ray spectroscopy, interferometry and microscopy; attosecond and femtosecond diffraction imaging with electrons or photons; molecular dynamics driven by strong fields or probed by high-field/attosecond methods; attosecond or strong-field driven electron dynamics in the condensed phase, bulk media, nanostructures, quantum-confined structures or at surfaces/interfaces; ultra-high-intensity laser physics and technology; laser-plasma interaction and particle acceleration; relativistic nonlinear optical phenomena.

CHAIR: Adrian Pfeiffer, *Friedrich-Schiller-Universität Jena, Jena, Germany*

CH – OPTICAL SENSING AND MICROSCOPY

Inspection of a wide range of objects, from the macroscopic to the nanometric scale; recent progress in all aspects of optical sensing and metrology, particularly in new photonic sensor technologies and applications; plasmonic sensors; metamaterial sensors; biosensors; terahertz sensors; new trends in optical remote sensing; fibre sensors using conventional and photonic crystal fibres; active multispectral and hyperspectral imaging; sensor multiplexing; novel spectroscopic techniques, nanospectroscopy; applications and systems; novel measurement methods and devices based on interferometry; holography; diffractometry or scatterometry; critical dimension metrology; multiscale surface metrology; UV and DUV microscopy; resolution enhancement

techniques in microscopy; superresolution microscopy inverse problems; active optics; adaptive optics; phase retrieval.
CHAIR: Cristian Focsa, *University of Lille, Lille, France*

CI – Optical Technologies for Communications and Data Storage

Fibre devices including nonlinear fibre, propagation and polarisation effects, fibre gratings. Semiconductor devices for generation, processing and detection of optical signals. Digital signal processing, forward error correction, nonlinear Fourier transform. Submarine, core and metropolitan transport networks, communication and access networks, datacentre networks. Multi-core, multi-mode fibre for transmission, optical amplification and functions; multi-band optical amplification and transmission. Optical sub-systems including clock recovery, packet/burst switching, advanced modulation formats, radio-over-fibre and microwave photonic technologies, optical regeneration and buffering; holographic and 3D optical data storage, near-field recording and super-resolution.
CHAIR: Alessandro Tonello, *Université de Limoges, Limoges, France*

CJ – Fibre and Guided Wave Lasers and Amplifiers

Waveguide and fibre laser oscillators and amplifiers including novel waveguide and fibre geometries; power and energy scaling of waveguide and fibre lasers – including beam combination techniques (for both pump and signal beams) and new waveguide coupling approaches; up-conversion lasers; nonlinear frequency conversion and pulse generation and compression; spatio-temporal pulse evolution; advances in fibre waveguide materials; fabrication techniques for doped waveguide and fibre devices; active microstructured fibre and waveguide laser devices; novel waveguide and fibre sources, and beam delivery fibre for industrial applications; nanomaterials and their applications in fibre and guided wave lasers.
CHAIR: Jayanta Kumar Sahu, *University of Southampton, Southampton, United Kingdom*

CK – Micro- and Nano-Photonics

Nanostructured materials and fabrication techniques for photonic applications; novel phenomena occurring when light is created, transported and detected in environments where either dimensionality or size are reduced and, in particular, when light-matter interaction occurs in regions smaller than or similar to the wavelength of light (nanophotonics). Periodic or quasi-periodic nanostructures (photonic crystals); issues related to order/disorder in nanostructured materials; photonic integrated circuits and applications advancing the integration of photonic devices for biology, lighting, communication, sensing and energy efficiency; optical MEMS; WGM optical resonators; hybrid and 2D nanomaterials including in-/organic nano-layers/wires, nanocrystals and single molecules.
CHAIR: Stefano Pelli, *CNR-IFAC, Sesto Fiorentino (FI), Italy*

CL – Photonic Applications in Biology and Medicine

Emerging concepts in biophotonics: single particle/molecule detection and tracking; spatio-temporal manipulation of light fields for biomedicine; enhanced linear and nonlinear excitation and detection; micro-fluidics, optofluidics and micro-optics; new optical probes for local measurements including organic and inorganic nanoparticles, electric fields and temperature measurements; New routes and modalities for optical detection in biophotonics: spectroscopy; holography, adaptive optics, phase conjugation time reversal; optics in biological media: scattering; coherence; polarization; symmetry and invariance. Advanced light sources and geometries for microscopy, phototherapy, surgery, biomedicine.
CHAIR: Kenneth K. Y. Wong, *The University of Hong Kong, Hong Kong, China*

CM – Materials Processing with Lasers

Fundamentals of laser-materials interactions: phase transformation, chemical reactions, diffusion processes, ablation; high-power laser-materials processing: welding, cutting, surface treatment; thin-film growth: PLD, LCVD, MAPLE; direct write techniques:, 2D and 3D micro/nano structuring, LIFT, near-field techniques; plasma related processes; laser assisted nanosynthesis; femtosecond micromachining; ultrafast laser processing: volume modification, index engineering; laser-assisted manufacturing; additive manufacturing: two-photon polymerization and 3D laser printing.
CHAIR: Jan Siegel, *Instituto de Optica – Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain*

EQEC 2023 Topics

EA – Quantum Optics and Quantum Matter

Quantum light sources and applications; nonlocality and quantum interference; squeezing and entanglement; quantum correlations, coherence, and measurement; quantum fluid of light; multimode and mesoscopic quantum optics; single photon emission and absorption; quantum optics in cavities; slow light and quantum memories; quantum imaging and quantum lithography; quantum coherent effects in biology; Developments in few- and many-body phenomena with ultracold quantum gases of atoms and molecules; quantum simulation; superfluidity and thermodynamics in Bose and Fermi systems; dipolar physics with atoms and molecules; Efimov physics; atom interferometry; hybrid systems such as cold and trapped ion/atom setups, optomechanical devices.
CHAIR: Sebastian Blatt, *MPQ, Garching, Germany*

EB – Quantum Information, Communication, and Sensing

Quantum computers and quantum communication systems; quantum algorithms and communication protocols, quantum simulations, quantum key distribution, quantum logic gates, entanglement distribution and distillation, interfaces between static and flying qubits, quantum memories; integrated quantum devices, quantum nano-mechanics, ion-trap arrays, superconducting structures, quantum dots, cavity QED systems.
CHAIR: Marco Genovese, *INRIM, Turin, Italy*

EC – Topological States of Light

Advances in topological photonic lattices, topological edge states, topological pumps, synthetic dimensions, Dirac and Weyl points, topological lasers, topology and disorder, topology in non-Hermitian systems, probes of topological invariants, topological aspects of photonic quasicrystals, nonlinear topological effects, Floquet-topological photonics, spin-orbit coupling in photonic materials, non-reciprocity.
CHAIR: Stefan Rotter, *Vienna University of Technology, Austria*

ED – Precision Metrology and Frequency Combs

Precision interferometry and spectroscopy including frequency combs; quantum metrology; ultimate limitations of measurement precision as imposed by the nature of quanta; tests of fundamental symmetries; definition of basic units; measurement of fundamental constants; applications in different spectral ranges, including mid-infrared.

CHAIR: Marco Marangoni, *Politecnico di Milano and Institute of Photonics and Nanotechnology, Milano, Italy*

EE – ULTRAFAST OPTICAL SCIENCE

Fundamental aspects of ultrafast science in all spectral regimes; propagation and instabilities of ultrashort pulses in linear and nonlinear media, supercontinuum generation, ultrafast filamentation and applications, extreme events, rogue waves and turbulence dynamics; ultrafast spectroscopy of molecules, solids and low dimensional structures; ultrafast phenomena in physics, chemistry and biology; propagation media: gas, liquid, and solid materials; free-space and waveguided geometries; coherent control using femtosecond pulses.

CHAIR: Jens Biegert, *ICFO - The Institute of Photonic Sciences, Castelldefels, Spain*

EF – NONLINEAR PHENOMENA, SOLITONS AND SELF-ORGANIZATION

Nonlinear optical phenomena including dynamics and self-organization; frequency conversion, wave mixing, parametric processes, conservative and dissipative solitons, pattern formation, interaction between disorder and nonlinearities, complex behaviours and statistically heavy-tailed phenomena. Applications of nonlinear phenomena; nonlinear imaging and manipulation, novel optical materials, devices and systems. Fundamental aspects of nonlinear dynamics in single or coupled photonic devices, polariton condensates, micro and nano lasers, photonic crystals, optomechanical systems.

CO-CHAIRS:

Alessia Pasquazi, *Loughborough University, Loughborough, United Kingdom*

Svetlana Gurevich, *University of Münster, Münster, Germany*

EG – LIGHT-MATTER INTERACTIONS AT THE NANOSCALE

Fundamental aspects of light-matter interactions at the nanoscale: nanoantennas and nanophotonic architectures, classical and quantum models, detection, emission and manipulation of light and/or matter; quantum nano-optics: coherent, quantum and nonlinear optical effects; ultrafast and strong-field phenomena at the nanoscale: interactions with electrons/plasma and their applications, ultrafast dynamics; optical imaging and spectroscopy: nanoscopy, nano-optical forces and tweezers; nano-energy: radiative transfer, photovoltaics and catalysis.

CHAIR: Mathieu Mivelle, *Sorbonne University, Paris, France*

EH – PLASMONICS AND METAMATERIALS

Metal nanophotonics from fundamentals towards applications and including all spectral regimes: plasmonic nanostructures, antennas, cavities and waveguides; metamaterials; hybrid materials; nonlinear structures and effects; active systems, systems with gain.

CHAIR: Paloma Huidobro, *University of Lisbon, Lisbon, Portugal*

EI – TWO-DIMENSIONAL AND NOVEL MATERIALS

Fundamental aspects and applications of graphene and other two-dimensional materials in optics and optoelectronics; light-matter interactions in 2D materials; ultrafast dynamics and nonlinear phenomena in 2D and novel materials, and mode-locked lasers; light sources, modulators, detectors, and other optoelectronic devices; photovoltaics; smart windows and flexible displays; terahertz devices; tunable plasmonics and metamaterials; integration with cavities and waveguides; multi-layered 2D heterostructures; perovskites and perovskite optoelectronics; NV centres; phase change materials.

CHAIR: Nicolo Maccaferri, *Umeå University, Umeå, Sweden*

EJ – THEORETICAL AND COMPUTATIONAL PHOTONICS MODELLING

Predictive theoretical and computational approaches for all fields of optics and photonics: full and semi-analytical treatments; applied mathematics and numerical analysis of partial differential equations; high-performance computing, massively parallel codes, including utilization of hardware accelerators. Modelling of singular nonlinear processes, shocks, wave collapse, material processing; first principle calculations of optical properties in dielectrics, plasmas, semiconductors and plasmonic structures; modelling of artificial optical materials.

CHAIR: Fabian Maucher, *University of Balearic Islands, Palma de Mallorca, Spain*

CLEO®/Europe-EQEC 2023 Joint Symposia Topics

JSI - FREE ELECTRON LASERS

Free-electron lasers (FEL) offer unique opportunity for the investigation of light-matter interaction in the extreme ultraviolet and X-ray spectral ranges. The symposium aims at bringing together the expertise of FEL developers and the community of users and potential users interested in taking advantage for their research of the unprecedented combination of extreme time resolution (down to the attosecond domain), photon flux and high peak intensities available at FELs. The presentations will focus on the latest developments achieved in the operation of FELs and in selected highlights of user experiments.

TOPICS:

Novel seeding concepts; Polarization control of XUV and X-ray pulses; Multi-color and multi-harmonic operation; Light-matter interaction under extreme conditions; Pulse characterization; Time-resolved coherent diffractive imaging; Target development for coherent imaging; High-repetition rate XUV and X-ray sources; Novel schemes for attosecond pulse generation; Crystallography; Biological imaging; FEL optimization based on machine learning approaches; Theoretical modelling of laser-matter interaction; Multiphoton processes in the XUV and X-ray range; Imaging of ultrafast electronic and nuclear dynamics.

CO-CHAIRS:

Christoph Bostedt, *Paul Scherrer Institute, Villigen PSI, Switzerland*

Giuseppe Sansone, *University of Freiburg, Freiburg, Germany*

JSII - INFRARED INTEGRATED PHOTONICS FOR ASTRONOMICAL APPLICATIONS

Major discoveries in astrophysics are enabled by new technologies that respond to the increasing demand for higher spectral, angular and temporal resolution across a broad wavelength range, pushing the limits of the existing infrastructures. In this regard photonics is playing a growing role. Over the last decades strong ties have been built up between the astronomical instrumentation and photonics communities, which has resulted in unique synergies for astrophysics in the 1-10μm infrared wavelength range. The strength of photonics is in the small-size integration of sophisticated optical functions, which once applied to the field of astronomy contributes to reduce the size and complexity of deployable instruments, as well as to increase their functional stability. Furthermore, while ground-based instruments have already directly benefitted from the power of astrophotonics, space applications might be the next frontier. The proposed symposium aims at inspiring additional technology exchanges between the fields of astronomy and photonics by sharing new innovative results and ideas that will raise the state of the art of astrophotonics. The following areas will be broadly covered, with a focus on design, manufacturing and performance, as well as on the benefit of miniaturization in view of future integration in a ground- or space-based scientific instrument.

Topics:
Active/Passive Integrated Optics for beam combination and phase control; Integrated photonic spectrographs: FTS and direct detection units; New photonic functionalities for high-contrast science in astronomy; Frequency conversion of photonic correlation of signals; New micro-structured optical fibers for astronomy; Bridging the gap between THz and mid-IR technologies; Advances in ultrafast laser writing for astronomy; Space qualification of photonic devices; Advances in the lithographic platforms; Photonic calibration sources (*e.g.*, frequency combs, fiber etalons…); Platforms and technologies for spectral coverage extended in the UV/VIS/MIR; Wavefront control and photonics – Integrating the detection stage.

CO-CHAIRS:
Lucas Labadie, *I-Physics Institute University of Cologne, Germany*
Robert R. Thomson, *Institute of Photonics and Quantum Sciences, Heriot Watt University, United Kingdom*

JSIII - PHOTONICS FOR ARTIFICIAL INTELLIGENCE

Nowadays, there are clear global challenges associated to the vast amounts of energy we consume in processing Big Data using Artificial Intelligence (AI) that are putting our industries and societies at risk. AI operate at high-power penalty since they rely on intensive data-driven deep learning neural networks running in conventional computers. There is a demand for new computing paradigms able to run AIs at extremely low energy per bit budgets. Neuromorphic systems, that can mimic the way the brain process information, are among the most promising technologies. Photonics enables the design of energy-efficient computing approaches such as neuromorphic photonic computing, allowing massively distributed power-efficient architectures for parallel processing and enabling new AI applications as required for the Industrial 5.0 Intelligent era revolution. This symposium covers the status, prospects, and challenges of light-based computing for AI taking advantage of new materials, devices, architectures, software, algorithms and simulation tools.

Topics:
Device, circuit; architecture design; analysis and optimization for neuromorphic photonic computing systems; Emerging materials for devices of neuromorphic photonic computing importance; Hardware photonic accelerators for machine/deep learning; Photonic reservoir computing; Novel neuromorphic photonic computing systems; On-chip learning and inference, learning algorithms and optimizations; Complexity and scalability of neuromorphic photonic computing; Emerging technologies for brain-inspired nanophotonic computing and communication.

CO-CHAIRS:
Antonio Hurtado, *University of Strathclyde, Glasgow,United Kingdom*
Bruno Romeira, *INL Institute, Braga, Portugal*

JSIV - PHOTONICS FOR SUSTAINABILITY

Photonics plays a critical role in a growing number of sustainable energy technologies, ranging from more traditional photovoltaics, to emerging devices for the water-energy Nexus. This focused symposium aims at offering a shared platform for discussing photonic innovations for such broad technological applications, fostering interactions and ideas exchange.

Topics:
Photovoltaics/Luminescent solar concentrators; Photo (electro) chemistry/plasmonic (thermos) chemistry; Thermal management; Emerging Technologies for the Water/Energy Nexus (Solar desalination, Water purification, Hydrovoltaic Devices); Sustainable photonics materials.

CO-CHAIRS:
Esther Alarcon Llado, *AMOLF Amsterdam, The Netherlands*
Giulia Tagliabue, *Ecole Polytechnique Fédérale de Lausanne, Joint Center for Artificial Photosynthesis, Lausanne, Switzerland*

JSV - DIVERSITY IN PHOTONICS

Several events managed by CLEO®/Europe-EQEC or other collocated conferences will take place. See “Special events” in this programme or the separate leaflet detailing the programme.

JSVI - NANOPHOXONICS AND NANOSCALE HEAT TRANSFER

The purpose of the “NanoPhoxonics and Nanoscale Heat Transfer” Symposium is to discuss the state of the art in the Nanoscale Heat Transfer and management, as well as the recent advances in the study of self-heating via electron-phonon interaction, of thermal polaritonics/plasmon and phonon-polariton heat transfer in nano devices, of new nanophoxonic devices with innovative optical and acoustical properties, and of near field radiation, allowing to exchange relevant information, to promote collaboration among scientists and to provide the scientific basis to the newcomers.

The symposium will bring together scientists, technology developers and young researchers who are interested in the theoretical tools and in the development and investigation of a large variety of new materials and applications. Participants are encouraged to present their own results in the field.

Topics:
Extreme-near-field heat transport; Heat transport in 2D materials and metamaterials; Thermal Polaritonics/Plasmon and Phonon-Polariton Heat Transfer; Surface Wave Thermal Transport, Heat Guiding and Tunneling; Heat transport in molecular junctions; Micro/Nanoscale Energy Devices and Systems (including bolometers, calorimeters, energy components); Nanoscale/microscale thermal metrology; Near-field radiative heat transfer; Nonequilibrium effects, thermodynamics and devices; Quantum effects in heat transport and quantum thermodynamics; Thermal interface resistance. Thermal rectification; Thermoelectricity and thermophotovoltaics; Ultrafast heat transfer; PhoXonic (*i.e.*, Photonic & Phononic) Crystal Design and Fabrication. Acoustic Metamaterial Design and Fabrication. Applications of Phononic Crystals and Acoustic Metamaterials; Temporally modulated Phononic Crystals and Acoustic Metamaterials; Topological Acoustics and Phononics; Nonlinear Phononic Crystals and Acoustic Metamaterials. Optomechanics and Phonon Coupling.

CO-CHAIRS:
Roberto Li Voti, *Sapienza Università di Roma, Italy*
Sebastian Volz, *Laboratory for Integrated Micro-Mechatronic Systems LIMMS/CNRS-IIS(UMI2820) University of Tokyo, Japan*

CLEO®/Europe 2013 Commitee

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JSIV - PHOTONICS FOR SUSTAINABILITY

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JSV - DIVERSITY IN PHOTONICS

Several events chaired by CLEO®/Europe-EQEC or other collocated conferences. See "Special events" in this programme or the separate leaflet.

JSVI - NANOPHOXONICS AND NANOSCALE HEAT TRANSFER

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NOTES

GENERAL INFORMATION

Short abstracts of the papers to be presented at CLEO®/Europe-EQEC 2023 appear in this advance programme.

The CLEO®/Europe-EQEC 2023 technical programme will feature 1759 presentations including 3 plenary talks, 7 tutorial talks, 10 keynote talks, 77 invited talks, 17 talks upgraded to invited, 1109 oral presentations, 10 short courses and 526 posters. Among them 26 poster presentations were selected to hold a 3-minute oral presentation (pitch). 17 oral presentations will also be featured.

From 11 to 17 parallel sessions will take place daily during the conference. All sessions and short courses will be held at the International Congress Centre in Munich (so called ICM) or the exhibition halls of the trade fair grounds LASER World of PHOTONICS 2023. These rooms are named according to famous physicists.

Conference dates

CLEO®/Europe-EQEC 2023 will be running from Monday, June 26th, 08:30am to Friday, June 30th, 2023, 05:30pm.

Special events

This year a particular highlight devoted to diversity in photonics will be featured. Several events managed by our conference or other collocated conferences will take place.

This program will include a range of activities, such as workshops, panel discussions, keynote speeches, career and networking events including:

- The importance of diversity, equity, and inclusion in the photonics industry
- Support for early-stage researchers
- DiversiWiki session
- Workshop exploring the concept of privilege.

The programme will be open to all attendees of Laser World of Photonics 2023 and will be run in collaboration with several organizations, including the European Optical Society (EOS), the European Physical Society (EPS), Wissenschaftliche Gesellschaft Lasertechnik und Photonik e.V. (WLT), Optica, IEEE Photonics Society, and the International Society for Optics and Photonics (SPIE). Full programme at https://www.photonics-congress.com/en/about/conferences/diversity-program/ or see the separate leaflet.

Diversity programme at CLEO®/Europe-EQEC 2023

CAREER EVENTS:

Career event with Donna Strickland: Monday 26 June 2023, 17:30-18:30, Room 4a ICM
PhD students are cordially invited to interact with **Donna Strickland**, University of Waterloo, Ontario, Canada and co-laureate of Nobel Prize in Physics in 2018 for her work on chirped pulse amplification.
Mandatory registration: www.cleoeurope.org/career-and-diversity-donna-strickland/

Career and diversity lunch for postdocs: Thursday 29 June 2023, 12:00-13:00, Foyer, 1st floor ICM (opposite room 14)
Postdocs looking for the next steps in their career may discuss with their peers and more advanced researchers.
Four panel members (researchers at different universities in Europe from different CLEO-EQEC committees) will lead the discussion:
Francesca Calegari, Leading Scientist at DESY and Professor at the University of Hamburg, Germany
Viola Vogler-Neuling, Postdoctoral Researcher at Adolphe Merkle Institute, University of Fribourg, Switzerland
Arti Agrawal, Professor at the University of Technology Sydney, Australia
Florian Emaury, CEO & Co-founder at Menhir Photonics, Switzerland
Only registered attendees will get a lunch box until the quota is reached.
Registration: https://www.cleoeurope.org/career-and-diversity-lunch-for-early-postdocs/

Career and diversity lunch for PhD candidates: Friday 30 June 2023, 12:00-13:00, Foyer, 1st floor ICM (opposite room 14)
PhD candidates looking for the next steps in their career may discuss with their peers and more advanced researchers.
Four panel members will lead the discussion:
Arti Agrawal, Professor at the University of Technology Sydney, Australia
Clara Saraceno, Professor at Ruhr-Universität Bochum, Germany
Robert Sewell, Tenured Scientist and Head of Academic Affairs, Institute of Photonics Science (ICFO), Barcelona, Spain
Sergi Vizcaino, Strategy & Outreach Manager, LuxQuanta Technologies S.L, Spain
Only registered attendees will get a lunch box until the quota is reached.
Registration: https://www.cleoeurope.org/career-and-diversity-lunch-for-phd-student/
Space is limited, the number of participants is fixed. To participate to the above-mentioned DIVERSITY EVENTS, conference registration is mandatory and additional registration for the Diversity Events at https://www.cleoeurope.org/career-and-diversity/ will be required.
The rule first come, first served will be applied and only attendees who registered for the career and diversity lunch events will get a lunch box until the quota is reached.

POSTER PITCHES:

This year in collaboration with the CLEO/Europe-EQEC 2023 co-organizers (**European Physical Society**, **Optica**, **IEEE Photonics Society**), **the European Optical Society** will chair two Early-Stage Researcher (ESR) sessions, offering an opportunity for PhDs and Post-docs to hold a 3-minute oral presentation (pitch) to draw attention to their upcoming poster presentation. Thirteen presentations were selected per session. Each registered participant is cordially invited to attend on Monday 26 and Wednesday 28 June, 12:00-13:00, Room 4a ICM.

DIVERSITY EVENT MANAGED BY OPTICA (FORMERLY OSA):

DiversiWiki: Monday 26 June 2023, 10:00 – 15:00, Foyer Room 1, 1st floor, ICM

Wikipedia is the fifth most visited site in the world. Still, only 18% of the 1.6 million biographies in the English Wikipedia are about women, and only 16% of those individuals are tagged as scientists. During this event, you will learn how to be a Wikipedia editor – or hone your skills if you already are one – as we edit, update or add articles on Wikipedia. Trainers will be on hand throughout the day to provide guidance and assistance. To help get you started, Optica will have a list of people and pages we have identified that you can use to edit or create.

Join Optica when you can throughout the day to help:

1. Improve Diversity – Having more editors focused on strengthening existing or creating new pages for marginalized people in science. Visit the Wikipedia Cultural Diversity Observatory to learn more about efforts to improve diversity on the site.

2. Translate Pages – Wikipedia pages exist in multiple languages, but not all are equal. By translating existing pages where a page does not exist or includes less information, we can help the distribution of information on a global scale.
3. Simple Wiki – This site is designed for children and adults learning English. By contributing to these pages, you can open the door to the world of optics and physics and inspire the next generation of scientists.

RSVP here for additional information on the program: https://forms.gle/Au2nVT37viBsLVhU7

2023 World of Photonics Congress

The World of Photonics Congress bundles various topical conferences under one roof under the organization by Messe München International. Registered attendees will have access to all conferences:

- CLEO®/Europe-EQEC - Conference on Lasers and Electro-Optics®/Europe-European Quantum Electronics Conference organised by the European Physical Society (EPS), Optica (Formerly OSA), IEEE Photonics Society.
- ECBO - European Conferences on Biomedical Optics organised by SPIE in cooperation with Optica (Formerly OSA).
- LiM 2023 - Lasers in Manufacturing organised by the German Scientific Laser Society (WLT).
- Digital Optical Technologies organised by SPIE Europe.
- Optical Metrology organised by SPIE Europe.

The 2023 World of Photonics Congress covers the whole spectrum from science to application. Current fundamental research, the practice-oriented development of photonics solutions, success stories for industrial applications, networking and knowledge-sharing – the World of Photonics Congress has been bridging the gap between science and industry since 1973.

Opening and Plenary Talk of the World of Photonics Congress, LASER World of PHOTONICS and World of QUANTUM:

Tuesday 27 June 2023, Room 1, Ground Floor, ICM

14:00 – 14:10 Opening of Congress and Trade Fairs / 50 years of LASER World of PHOTONICS Welcome Note by **Reinhard Pfeiffer**, Managing Director | CEO, Messe München

14:10 – 14:20 Welcome Note by **Peter Loosen**, Chair World of Photonics Congress Steering Committee

14:20 – 15:30 World of Photonics Congress Plenary Talk "Laser-driven inertial confinement fusion, power source of the future?" by **Tammy Ma**, PhD, Program Element Leader for High-Intensity Laser HED Science, Advanced Photon Technologies, Lead Inertial Fusion Energy (IFE) Institutional Initiative, Lawrence Livermore National Laboratory LLNL, USA and **Constantin L. Haefner**, Director, Fraunhofer-Institute for Laser Technology, Head of the Expert Group on Laser Inertial Fusion Commissary Fusion Research, Fraunhofer Gesellschaft, German Federal Ministry of Education and Research, Germany

Abstract: Fusion ignition has been achieved at the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory. This experimental result, decades in the making, is a major scientific breakthrough for laser-driven inertial confinement fusion. This talk will present the experimental results and the many technological innovations that made this achievement possible, including advances in photonics.

Prizes and awards

A series of Prize and Award ceremonies will take place during the EQEC Plenary session scheduled Tuesday 27 June from 10:30 to 12:30, room 1.

During this session **Claudio Conti**, Sapienza Università di Roma, Italy will present a plenary talk on "Photonic Machines for Large-scale Applications and Fundamental Physics".

Abstract: Which is the simplest way to process information with light? By spatial modulation, we demonstrate combinatorial optimization and natural language processing at the largest scale. Novel computational paradigms open the road to new physics and applications with photonics.

A series of Prizes and Awards will be presented.

Prizes or Awards of the European Physical Society (EPS) through its Quantum Electronics and Optics Division:

- Quantum Electronics Prizes (2021 and 2023).
- 2023 Fresnel Prizes.
- 2023 PhD Thesis Prizes.
- 2023 EPS-QEOD and EPS Young Minds Travel Grant Student Awards.

Prize, Awards and Honours of the Optica (Formerly OSA):

- Herbert Walther Award (2021 and 2023).
- Bernard J. Couillaud Prize.
- Fellow Members.
- Optica Foundation Student Travel Grant laureates.

See separate leaflet.

Award of the European Optical Society (EOS):

- 2023 EOS Early Career Women in Photonics Award

The Early Career Women in Photonics Award is presented to honour a young female scientist who has made outstanding contributions to photonics. Website: https://www.europeanoptics.org/pages/distinctions/awards/early-career-women.html

Prize of SPRINGER NATURE:

- Julius Springer Prize for Applied Physics
  The Julius Springer Prize for Applied Physics recognizes researchers who have made an outstanding and innovative contribution to the field of applied physics. It has been awarded annually since 1998 by the editors-in-chief of the Springer Journals Applied Physics A – Materials Science & Processing and Applied Physics B – Lasers & Optics.

Speakers' information

Duration of the talks:

- Oral presentations are 15 minutes long (12 minutes presentation + 3 minutes for discussion).
- Post-deadline presentations are 10 minutes long (7 minutes presentation + 3 minutes for discussion).
- Invited presentations are 30 minutes long (25 minutes presentation + 5 minutes for discussion).
- Tutorial presentations are 60 minutes long (50 minutes presentation + 10 minutes for discussion).
- Keynote presentations are 45 minutes long (38 minutes presentation + 7 minutes for discussion).
- Plenary presentations are 60 minutes long (50 minutes presentation + 10 minutes for discussion).
- Short Course presentations are 2 ×1.5 hour and half an hour break in-between long.

Speakers are requested to strictly stick to these time lengths, no extra time can be given.

Speakers are asked to check-in with the session chair in the room of their relevant session ten minutes before the beginning of the session.

Presentation Management / Speakers‘ Service
Each conference room used for World of Photonics Congress sessions is equipped with the complete presentation equipment: Beamer / screen, laptop & presenter.

Please note:

- Due to time limitations, it is not possible to connect the speaker's laptop/hardware device for the lecture directly in the conference room.
- It is also not possible to upload presentations directly to the conference room using the installed presentation laptop.
- For this reason, all presentations must be uploaded in advance to the presentations management system of Neumann & Müller.

Upload Service in advance
All speakers can upload their presentations to a protected server of Neumann & Müller prior to the conference. Upload-Link and login details were announced mid of June. Each speaker got his/her own account and a link where he/she can upload his/her presentation until one hour before session starts.

Onsite Service / Opening times Speaker' Check-In
Onsite at the ICM, speakers can upload their presentations at the Speakers' Check-In.The Speakers' Check-In is located in the foyer on the 1st floor of the ICM. The Speakers' Check-In will be open during the following hours, with technicians available to assist the attendees:

Sunday, 25 June 2023	7:30 a.m. – 6:30 p.m.
Monday, 26 June 2023	7:30 a.m. – 6:30 p.m.
Tuesday, 27 June 2023	7:30 a.m. – 6:30 p.m.
Wednesday, 28 June 2023	7:30 a.m. – 6:00 p.m.
Thursday, 29 June 2023	7:30 a.m. – 6:00 p.m.
Friday, 30 June 2023	7:30 a.m. – 4:00 p.m.

In any case each speaker must be reviewed and check her/his presentation in the Speakers' Check-In, when she/he arrives at the ICM, to certain that the presentation works correct! It is possible to check or edit the presentation up to one hour prior to the session timeslot.

Guidelines Presentation Formats
We recommend PowerPoint Presentation for all speakers with a slide ratio 16:9.
It is also possible to use PDF, Word and Excel files for the presentation.
For video we prefer mp4 file container with a h264 codec. It is also possible to use (.wmv), (.avi) or (.mov), so they will run properly on the computers provided.
There is no Internet available on the presentation computers.

On the presentation laptops in the conference rooms Microsoft Windows 10 with Power Point 2021will be installed.

In case if you have to use another presentation software, please contact us at
mediacheck@neumannmueller.com

Provided Audiovisual Equipment
The standard AV meeting package available in each session rooms includes:

- HD Video Projector
- Screen with ratio 16:9
- Laser pointer
- Lectern microphone

Session chairs' information

For each oral session, a nominated session chair will be responsible for introducing the speakers, ensuring that they adhere to the allocated time limits, and facilitating discussion among the participants. At the end of the session, a form will need to be returned to conferences@eps.org giving feedback on attendance, no-shows, room logistics.

Poster sessions - poster presenters' information

Posters are a major attraction and provide an intimate interaction between the presenter and the viewer. To allow participants to see as many posters as possible, all CLEO®/Europe-EQEC 2023 posters will be displayed in Hall B0 (ground floor) next to the ICM centre. The conference will feature 5 poster sessions taking place from Monday to Friday after lunchtime. There will be no oral presentations during this time.

Poster day schedules:
MONDAY: CA, CB, CM, ED, EJ and JS-II topics.
TUESDAY: CD, CF, CK and EG topics.
WEDNESDAY: CH, EE, EF, JS-I and JS-IV topics.
THURSDAY: CE, CG, EA, EB and EH topics.
FRIDAY: CC, CI, CJ, CL, EC, EI, JS-III topics.
All take place from 13:00 to 14:00.

Authors are requested to display their poster on their allocated board in the morning of the day of their presentation. The poster presentations can remain on the boards until 4:00pm on the allocated day.
In order to present their work and answer questions, authors are requested to be present in the vicinity of their poster on the day of their presentation time. There will be no oral presentations during this time.
Each author is provided with one board on which to display a summary of the paper. The size of the poster should not exceed 100-105 cm wide x 150 cm high. Fixing material (adhesive tape) will be provided. The boards will be grouped by topics and marked with the poster reference numbers.
Authors absolutely need to display their poster on their allocated board in the morning of the day of their presentation. In order to present their work and answer questions, authors are requested to be present in the vicinity of their poster on the day of their presentation time. There will be no oral presentations during this time.
All poster presenters need to be physically present during their assigned poster session on the assigned day and place. In case of no show, the poster presentation will be discarded from the publications.

Early-stage Researcher (ESR) Session – Poster Pitches:
In collaboration with the CLEO/Europe-EQEC 2023 co-organizers (European Physical Society, Optica, IEEE Photonics Society), the European Optical Society will chair two Early-Stage Researcher (ESR) sessions, offering an opportunity for selected PhDs and Post-docs to hold a 3-minute oral presentation (pitch) to introduce their upcoming poster presentation. Two sessions with thirteen presentations each will take place on **Monday 26 and Wednesday 28 June, 12:00-13:00, Room 4a ICM. As all other oral presentations, presentations will need to be uploaded in advance.**

Short courses

Ten short courses at an extra cost will be presented in parallel on Monday, Wednesday, Thursday and Friday. Each course is scheduled in two parts: Course Part I (1 hour 30 minutes), coffee break (30 minutes), Course Part II (1 hour 30 minutes). The courses are open to attendees of the World of Photonics Congress and Laser World of Photonics exhibition, subject to payment of the course fee. The short course material will only be available online.

Social events

All conference attendants are cordially invited to attend the following parties:

Monday 26 June 2023, from 18:45 to 21:00 – ICM Foyer and Hall B0, ground floor
"Happy Hour" kindly sponsored by the European Physical Society through its Quantum Electronics Optics Division.

Tuesday 27 June 2023, from 17:45 to 19:45 – ICM Foyer and Hall B0, ground floor
"Bier & Brezel" Get together kindly sponsored by SPIE.

Conference dinner

The "CLEO®/Europe-EQEC Conference Dinner" will take place on **Wednesday 28 June 2023, from 19:00** at the famous **Löwenbräukeller**, Nymphenburger Straße 2, D-80335 München

A delightful selection of authentic Bavarian cuisine will be provided during the buffet dinner.

In case you wish to attend, an exceptional additional cost of 20€ (including buffet + 2 drinks) will be invoiced per conference participant. For accompanying person, the cost will be of 35€.

Reservation possible until the quota is reached. To secure your spot at the dinner, please proceed with the online registration during your conference registration. The dinner can also be added later on when proceeding with a new registration including the dinner only. On-site reservations will not be possible. Only registered individuals with a valid invitation card will be allowed to attend.

The Löwenbräukeller is located at Stiglmaierplatz in the heart of Munich, offering excellent accessibility:

- Public transportation stops directly at Stiglmaierplatz (Metro U1, Tramway 20/21).
- The main station (serving international and regional trains, as well as public transport) is just one metro station away or within an 8-minute walking distance.

Conference publication

The accepted one-page summaries (oral or posters) will be available online during the conference for those who have registered for the CLEO®/Europe-EQEC conference.

Post conference publication

After the conference, if approval given during the online submission and physical presentation done by the author, the one-page summaries will be published online by:

OSA Publishing

https://www.osa.org/en-us/publications/

IEEE Photonics Society's IEEE Xplore Digital Library
https://ieeexplore.ieee.org/xpl/conhome/1000412/all-proceedings

Only papers (either oral or poster) for which the author(s) made the presentation at the conference will be eligible for the publications.

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http://www.crossref.org/crosscheck/index.html

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An author's copyright status is determined to a large extent by the type of employer for whom the author works. For example, if you are employed by the U.S. Government, and you are the sole author of your paper, then you should select "Employed by United States Government."

Similarly, if you are the sole author and you are employed by a Crown Government (or if you and all your co-authors are Crown Government employees), then copyright to your paper will remain with the Crown Government. You should select "Employed by a Crown Government."

Optica is the exclusive owner of all rights, titles and interests throughout the world of the names "Conference on Lasers and Electro-Optics" and "CLEO®" which is a registered trademark CLEO®/.

Anti-harassment policy and code of conduct

CLEO®/Europe-EQEC is committed to providing an environment that is conducive to the free and robust exchange of scientific ideas. This environment requires that all participants be treated with equal consideration and respect. While CLEO®/Europe-EQEC encourages vigorous debate of ideas, personal attacks create an environment in which people feel threatened or intimidated. This is not productive and does not advance the cause of science. All participants in CLEO®/Europe-EQEC and CLEO®/Europe-EQEC-managed events and activities are therefore expected to conduct themselves professionally and respectfully.

It is the policy of CLEO®/Europe-EQEC that all forms of bullying, discrimination, and harassment, sexual or otherwise, are prohibited in any CLEO®/Europe-EQEC or CLEO®/Europe-EQEC-managed events or activities. This policy applies to every individual at the event, whether attendee, speaker, exhibitor, award recipient, staff, contractor or other. It is also a violation of this policy to retaliate against an individual for reporting bullying, discrimination or harassment or to intentionally file a false report of bullying, discrimination, or harassment.

Bullying, discrimination, and harassment of any sort by someone in a position of power, prestige or authority is particularly harmful since those of lower status or rank may be hesitant to express their objections or discomfort out of fear of retaliation.

CLEO®/Europe-EQEC may take any disciplinary action it deems appropriate if, after thorough investigation, it finds a violation occurred.

Audio, video, photography, digital recording policy

Conferences, courses, and poster sessions: For copyright reasons, photographs or recordings of any kind are prohibited without the prior written consent of the presenter or instructor.

Exhibition halls: For security and courtesy reasons, recordings of any kind are prohibited unless one has explicit permission from on-site company representatives.

Capture and use of a person's image

By registering at CLEO®/Europe-EQEC, the registrant grants full permission to the management society to capture, store, use, and/or reproduce his/her image to be used in future CLEO®//Europe-EQEC marketing materials or the conference website. The registrant also waives any right to inspect or approve the use of the images or recordings. They also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials.

Persons not wishing to be photographed or videotaped by the management staff or its supplier need to send their request by email to conferences@eps.org, including their picture to allow for their identification.

By registering at CLEO®//Europe-EQEC, the registrant also agrees to have Messe München GmbH use their personal particulars (title, first name, last name, company name, company address, country) for badge printing purposes and to pass on said information to exhibitors in case the registrant allowed scanning of the badge during online registration.

Exhibition information

From Tuesday to Friday, a major exhibition of laser and electro-optic equipment and services, **LASER World of PHOTONICS 2023** (See list of exhibitors at https://world-of-photonics.com/en/about/information/exhibitor-list/) and the meeting place for quantum technology, **World of QUANTUM** (See https://world-of-photonics.com/en/about/exhibition-sectors/world-of-quantum/world-of-quantum-supporting-program.html) will be held in conjunction with the congress. The latest technology firsthand will be exhibited. The range of products exhibited will cover innovative optical technologies:

- Illumination and energy
- Biophotonics and medical engineering
- Manufacturing technology for optics
- Imaging
- Integrated Photonics
- Laser systems for industrial production engineering
- Lasers & Optoelectronics
- Optics
- Optical information and communication
- Sensors, test and measurement and optical measurement systems
- Security

All conference registrants will have free entrance to the technical exhibition and World of Quantum. Longer lunch breaks are organized to allow visits to the exhibition.

This combination of theory and practice, an extensive program of conferences and related events, and the presence of all market leaders, decision-makers, and users make LASER World of PHOTONICS unique and, at the same time, the most important international information and networking platform for the industrial, research, and development sectors.

LASER World of PHOTONICS features around 1,300 exhibitors in 5 halls (A2, A3, B1, B2, B3) and gives a complete overview of all the latest trends and applications. The exhibition is expected to attract over 30,000 visitors. World of QUANTUM will take place in Hall A1.

Further information on the exhibition is available at https://world-of-photonics.com/en/. Entry is included in your conference ticket.

Opening hours of the exhibition
The exhibition will be open from Tuesday through Thursday 09:00 - 17:00 and on Friday 09:00 - 16:00.

Application panels

The application panels organized by Messe München International are now a permanent part of the World of Photonics congress. The series of lectures held in the forums of the LASER World of PHOTONICS 2023 exhibition halls bridge the gap between science and practical application. Well-known speakers from industry and research institutes will report on the latest industrial and medical application findings in the sector for optical technologies and discuss current challenges with attendees. They will provide a comprehensive look at the latest trends and developments.

A series of application panels will be held from Tuesday to Thursday, broken down into three main categories:
- Forum Lasers and Optics (Hall A2)
- Forum Laser Materials Processing (Hall B3)
- Forum Biophotonics and Medical Applications (Hall B2)

For further information, see https://world-of-photonics.com/en/supporting-program/information/application-panels/:

Admission is free for all trade-fair visitors, exhibitors, and congress participants. All panels will be held in English.

On-site facilities for attendees

The entire programme of events at the World of Photonics Congress is available online at:

https://www.photonics-congress.com/en/about/conferences/

Wifi

All congress attendees with a WiFi-enabled device have free access to the Internet in special WiFi Lounges at the Foyer of the ICM and in Hall A1. The Internet in the lounges has an unlimited bandwidth and download volume.

How it works:
- Switch on the WiFi function on your terminal device.
- Search for wireless networks and connect to the messeWifi network.
- Start your internet browser and enter any internet address.
- The portal page of the free WiFi will appear on screen.
- Once you have accepted the General Terms and Conditions, you may access the internet.
- You only need to register one time during the entire event.

In addition, attendees can use Messe München WiFi at the fairgrounds. Availability is based on the halls, entrances and atrium areas that are being used for the event in question. Bandwidth is up to 4 Mbit / sec. and the download volume is limited to 200 MB per user per day.

The reception quality and signal availability depend on structures, exhibits and other sources of interference in the halls and cannot be guaranteed.

Message board

A message board will be installed. Participants should consult it daily for internal messages. It will be placed in the corridor between Entrance West and ICM.

Catering

All conference attendees are invited to attend the free coffee breaks as marked in the tables of the "Days at a Glance" section (first pages of the advance program). Lunches are not included in the conference fee.

Several gastronomy facilities are available onsite. Depending on the weather, the beer garden outside (located between Halls A1 and B1) will be open.

Besides two permanent food service operations in the foyer - the ICM Bistro and the ICM Café - you can also visit the restaurant Käfer am See which can be reached directly via the 1st floor.

Snack bars with a large assortment of snacks and beverages are located on the ground floor in each hall. The snack bars in the ICM are located on the ground floor and on the first floor.

Full-service restaurants are located on the first floors of the East and West entrances and above the halls. Other self-service restaurants on the first floor can also be found in the exhibition halls, offering international cuisine. Many snack bars located in the exhibition halls offer Alpine, American, Asian, and Italian cuisine.

Visit the gastronomic guide: https://messe-muenchen.de/media/projekt/pdf/service/gastroguide.pdf

Other catering options can be found at the Riem Arcaden shopping centre located at the exit of the Messestadt West subway station.

Banks

Following companies offer you ATM/cash machines:
- Euronet
  East Entrance, North Entrance, 1st floor, expressway next to Hall B4
- IC Cash Services GmbH
  West Entrance, at the Parking Garage next to the North-West Entrance, North-East Entrance

Note: No currency exchange is available.

Banks can be found at the Riem Arcaden (three-minute walk from the West Entrance), in the center of Munich or at the main railway station.

Taxi service

The taxi service is in front of the ICM main entrance.

Airport shuttle

An airport shuttle operated is organized in connection with the trade fair (from Monday to Friday) to and from Munich airport. For further details, see https://messe-muenchen.de/en/meta/getting-there/icm/.

First aid

First-aid stations are located in the West and East Entrances and on the North side of Hall C4 and are clearly marked.

Bayerisches Rotes Kreuz (BRK)
Perchtinger Straße 5
81379 München
Tel. +49 89 2373-282
sanitaetsdienst@brk-muenchen.de,
www.brk-muenchen.de

Service branch
Messegelände **Eingang West, Eingang Ost und Nordseite Halle C4**
81829 München
Tel. +49 89 949-28103
Fax +49 89 949-28106

Security service/lost and found office

The Security Headquarters is located in the Administration Building by Gate 1. It is open 24 hours a day and is accessible from the inside (via the Administration Building) and from the outside. This is also where you can claim lost items or turn in objects found at the Lost & Found office.

Pharmacy

The nearest pharmacy SaniPlus Apotheke is in the Riem Arcaden shopping center. It is located on the ground floor in the right portion of the building. Opening hours: Monday through Saturday 09:00-20:00.

Optician

The optician Fielmann has a retail outlet in the Riem Arcaden (Willy-Brandt-Platz 5) shopping centre. Opening hours: Monday through Saturday 10:00-20:00.

Groceries, information, travel service

They are in the Main Hall of the Entrance West leading to Halls A1 and B1.

Post office

Deutsche Post has a branch office in the Riem Arcaden shopping center (EDEKA Uhlig, Willy-Brandt-Platz 5). Opening hours: Monday through Saturday 10:00-20:00.

Dry cleaning

Die Reinigung Laundry dry cleaning is in the Riem Arcaden shopping center. Opening hours: Monday through Saturday 10:00-20:00.

Press services

All members of the press are requested to register with Messe Munich. They will receive conference materials and badges that will admit them to all technical sessions and the exhibition.

Cloakroom

For congress attendees, a cloakroom is located on the intermediate level of the ICM. In addition, a cloakroom is located on the lower levels of the West Entrance. As a rule, it opens one hour before the exhibition begins and closes one hour after the exhibition ends.

Note for smokers

Smoking in the ICM is forbidden. Smoking on the grounds of the exhibition space is only permitted in designated smoking areas outside the halls.

All services

https://messe-muenchen.de/en/services/trade-fair-participation/trade-fair-services/service-types/services-for-visitors.php

Conference venue

CLEO®/Europe-EQEC 2023 will take place at the: New Munich Trade Fair Centreat the ICM International Congress Centre Am Messesee 6, 81829 Munich, Germany

Please visit:

http://www.messe-muenchen.de
http://www.icm-muenchen.de

How to reach the ICM centre

BY CAR
Simply follow the trade fair signs from the outskirts and throughout the city to the ICM. There you will find parking space.

BY TRAIN
The ICM is about 20 minutes from Munich central station (Hauptbahnhof) by underground U2, exit "Messestadt West." The U2 subway runs from 4:04 in the morning to 1:24 after midnight. Further information on the underground is available at the information counters on the trade fair grounds or at:

http://www.mvv-muenchen.de

BY U-BAHN FROM THE AIRPORT
At Munich airport, the station for urban railway lines S1 and S8 is directly below the central area. Trains in the direction of the city center run at 10-minute intervals. There are two routes from the airport to the ICM:

- Route S1/U2:
  S1 from the airport to Feldmoching station or Munich Central Station (Hauptbahnhof).
  Change to underground U2 that takes you directly to the ICM - Messestadt West.

- Route S8/U2:
  S8 from the airport to Munich central station (Hauptbahnhof).
  Change to underground U2 that takes you directly to the ICM - Messestadt West.

BY TAXI FROM THE AIRPORT
The fixed price for a single taxi journey to the exhibition center is €85. The one-way journey will take around 35 minutes. Numerous taxis are available at the airport directly in front of the terminals

BY RENTAL CAR FROM THE AIRPORT
All the major car rental firms are represented at Munich airport. The car rental center with its own parking facilities is in front of module A, to the north of car park P6.

Please take the following route:
- From Munich Airport, follow the signs "Messe/ICM" on the A92 in the direction of Munich to the motorway General Information intersection Eching/Neufahrn.
- Then take the A9 in the direction of Munich to the motorway intersection München-Nord.
- Continue on the motorway ring road A99 in the direction of Salzburg to the motorway intersection München-Ost.
- Then take the A94 in the direction of Munich to the exit Feldkirchen-West or München-Riem.

The journey takes about 35 minutes, depending on the volume of traffic.

TAXI FROM THE ICM CENTRE TO THE AIRPORT
You will find taxi ranks at all trade fair entrances and in front of the ICM going to the airport (Central Building).

AIRPORT SHUTTLE
An airport shuttle operated by Autobus Oberbayern is organized in connection with the trade fair (from Monday to Friday) to and from Munich airport. The bus departs several times per hour. There is convenient online ticketing at:

https://www.airport-messe-shuttle.com/en

There are two departure points at Munich Airport: Terminal 2 (bus park) and the Central Concourse (MAC). Please follow the signs.

When arriving from Munich Exhibition Centre, buses stop exclusively at the Central Concourse (MAC), from where both terminals are just a few minutes' walk away.

At Munich Exhibition Centre, buses arrive at the stop closest to the North, East or West entrance. Please refer to the timetable for the exact departure and arrival points.

Here you can find all the times of the bus shuttle:

https://www.airport-messe-shuttle.com/ams/teaserbilder/mm23_shuttle_airport-messe_v2_januar.pdf

The bus runs every 30 minutes. One way journey costs €11.00, return ticket costs €17.00.

Conference registration

CONFERENCE REGISTRATION FEES

- EPS, Optica, IEEE Member, Full week registration €750
- Non-Member, Full week registration €900
- Student Member, Full week registration €290
- Student Non-Member, Full week registration €320
- One-day registration €370
- Dinner ticket per conference participant €20
- Dinner ticket per accompanying guest €35
- Additional cost per Short Course, Student €160
- Additional cost per Short Course, Non-Student €260

Applications for the student rates must include a copy of an official student identity card, which must also be presented on-site when collecting registration materials.

The full week registration fee for the meeting includes admission to all CLEO®/Europe-EQEC 2023 technical sessions, as well as to those of all conferences co-located with the congress. Coffee during the coffee breaks (as marked in the days at a glance) is included. Lunches and tickets for public transportation are not included in the fees.

One-day registration fees are available for those wishing to attend one session rather than the whole conference. Coffee during the coffee breaks (as marked in the days at a glance) is included. Lunches and tickets for public transportation are not included in the fees.

One-day registration tickets are activated on the day the participant goes through the electronic gates of the congress or the fair and will only be valid for that day.

Cancellation policy

All requests for refunds must be received in writing by Thursday, 8 June 2023. A € 50.00 service charge will be assessed for processing refunds. Requests for refunds are to be sent to conferences@eps.org. All registrations received after Thursday; 8 June 2023 are non-refundable.

Language

English is the official language of the conferences.

Conference management

European Physical Society
6 rue des Frères Lumière
68200 Mulhouse
France

This program is edited by Patricia Helfenstein and André Wobst.

Hotel information

The International Congress Centre (ICM) is located about 20 minutes from the Munich Central Station (Hauptbahnhof) by underground U2, exit Messestadt West. Whether you are looking for a hotel, a guesthouse, a private accommodation, or a boarding house, you should be able to find your accommodation downtown or in the surrounding area of Munich.

Messe Munich has arranged for an online hotel reservation which can be used for the CLEO/Europe-EQEC 2023 participants:

https://tradefairs.com/en/LASER%20World%20of%20PHOTONICS/2023

The hotel guide of the Munich Trade Fairs offers you a large variety of accommodation possibilities for a pleasant stay. Whether near the ICM or centrally located and in the middle of the nightlife of Munich's trendy neighbourhoods or close to the mountains with a high recreation value - here you will find a comprehensive offer of accommodation in and around Munich as well as in the alpine upland - meeting your personal criteria.

Hotels can be directly searched and booked via the hotel directory. A larger variety of rooms can be found using the link of the Tourism office:

https://www.muenchen.de/en/accomodation-hotels

Hotels, pensions, apartments, or youth hostels in Munich can also be found at:

https://www.euro-youth-hotel.de/en

https://www.hostelworld.com

Considering the large number of attendants to the exhibition, running in conjunction with the conference, we recommend making your hotel reservation as soon as possible.

Transportation in munich

Munich offers very good transportation means (hire cars, trams, metro, and buses).

Participants of the World of Photonics congress who use local public transportation (MVV) to get to Neue Messe Munich must buy a travel ticket at their own expense.

The Single Ticket is ideal for spontaneous journeys with the MVV – and it is even cheaper when bought at a ticket machine by cashless payment. If you're planning more than 2 trips in the Munich city area per day, we recommend purchasing the Day Ticket. It can be used within the selected area of validity for as many trips as you like on one day.

The AirportPLUS-Ticket is a day ticket which includes the journey to/from the airport and the city area of Munich (validity zone M - 6). The AirportPLUS-Ticket is available as a single ticket or as a group ticket for up to 5 people.

Ticket machines are located at the stops/stations, in trams and on buses within the MVV network. The machines understand several languages. Just select your flag. Some ticket machines accept 10 € and 20 € banknotes, and most will give change. Please have some small coins ready. Online tickets and mobile tickets can now also be purchased.

Buy your ticket depending on the zones you will cross and the time length you will need to travel:

- Stripe ticket (Streifenkarte):
  Stamp two stripes per zone. You are allowed to change and interrupt your journey. Return and round trips are not permitted.
- Single trip ticket:
  Valid for one person for one trip. You are allowed to change and interrupt your journey. Return and round trips are not permitted. The fare depends on the number of zones passed through.
- Single day ticket (Tageskarte):
  The most popular day tickets are also available as excellent value-for-money 3-day tickets. If you want to stay for 2 days, 4 days, or even longer, simply combine the 1-day ticket and 3-day tickets.
- Partner day ticket:
  Available for as many trips as you like for up to five adults together.

Before buying a day ticket you decide which validity it should have. The MVV area is valid for all ticket offers in tariff zones divided:

- The M-Zone encompasses the entire city of Munich and in part extends beyond it
- The Zones 1 - 6 comprise the interconnected districts belonging to the MVV area
- Munich Airport is in Zone 5
- Messe Munich is in Zone M
- On the network plans, each stop is also marked with the corresponding zone

ONLY VALID WITH A STAMP
Your Single Trip Tickets, Stripe Tickets and Day Tickets must be stamped prior to the start of your journey. These tickets only become valid for travel once they have been validated in this way at the ticket machines provided for this purpose.

VALIDATED AUTOMATICALLY
You can buy most tickets in advance so that you have a ready supply. However, please note that some tickets are already validated at the time of purchase:

- Single Trip and Day Tickets bought at ticket machines in trams, metro buses and city buses in Munich
- Single Trip and Day Tickets bought from the electronic ticket printers in MVV regional buses
- Airport-City Day Tickets

More information can be found at:

https://www.mvv-muenchen.de/en/index.html

Munich, Germany

The celebrated capital of Bavaria, located in the foothills of the Alps, is one of the major cities in Europe. The city, with its 1.4 million inhabitants, is renowned for its vibrant science and industry environment. Munich offers fantastic opportunities for shopping, museums, theaters, art galleries, and sightseeing. Its October beer festival is world-famous. Tourist attractions include the Bavarian beer and South German cuisine tradition, as well as numerous half-day or one-day excursions to the nearby Bavarian Alps, fairy-tale castle of Neuschwanstein, or the beautiful Tegernsee.

In June, the weather is likely to be warm with plenty of sunshine, although some rainfall is possible. Munich boasts an outstanding public transportation system, and the modern Münchner Messe complex, where CLEO®/Europe-EQEC 2023 and all Laser 2023 events will be held, is easily accessible from the airport, city center, and various parts of the city through U-Bahn and S-Bahn lines.

Munich's churches

Munich is well-known for its many churches, including:

Frauenkirche (Church of Our Lady)
Frauenplatz 1, Munich
Opening hours: 07:00-20:00.
It can be reached by all S-Bahn trains and U-Bahn lines 3/6 to Marienplatz.

Alter Peter (Church of St. Peter)
Rindermarkt 1, Munich
Climb the 299 steps of this parish church to enjoy a beautiful view of the Munich city center.
Opening hours: 7:30-19:00.
It can be reached by all S-Bahn trains and U-Bahn lines 3/6 to Marienplatz.

Heiliggeistkirche
Prälat-Miller-Weg 1, Munich
Opening hours: 09:00-20:00.
It can be reached by all S-Bahn trains and U-Bahn lines 3/6 to Marienplatz.

Munich's famous places

Marienplatz
The Marienplatz is named after the column of the Virgin Mary at its center. The place is famous for its carillon in the New Town Hall Tower, the largest carillon in Germany. It features near-lifesize figures performing the traditional Coopers' Dance and a jousting match. The Marienplatz is a central place for the city's Founding Festival, Fasching (carnival) celebrations, and the popular Christmas market. Major restaurants, cafes, and shops are in this area. Please note that shops are closed on Sundays.

Königsplatz
This Neo-Classical square, commissioned by Ludwig I, features the Propyläen gateway and the Glyptothek, a small but enchanting collection of Greek and Roman sculpture. It hosts an annual summer outdoor concert series.

Isartor (Isar Gate)
The most easterly of Munich's three remaining town gates, dating from the 14th century. Careful restoration has recreated its original dimensions and appearance. The Isar Gate accommodates the Valentin Museum.

Karlstor (Charles' Gate)
A westerly town gate from the 14th century. It was incorporated into the square known as "Stachus" (officially Karlsplatz) at the end of the 19th century. Today, it marks one end of Munich's primary pedestrian zone.

Sendlinger Tor (Sendlinger Gate)
Remaining towers of southerly fortifications from the 14th century.

Beer gardens

Nothing defines Munich more than its beer. You cannot talk about Munich without mentioning its beer culture. Today, the Munich breweries dispense 123 million gallons of beer annually, which is why many beer gardens are located throughout the city:

Augustiner-Bräustuben, Landsberger Straße 19
A large beer hall and restaurant, Augustiner-Bräustuben is one of those off-the-beaten-track places that's well worth the detour. Full of Bavarian charm, this beer hall has a warming interior, with high, amber ceilings and a stylish bar, adorned with copper and dark wood. Best of all is its jovial atmosphere, and the air is often bustling with loud German conversations, the hoppy smell of locally brewed Augustiner and, if you're lucky, an eruption of traditional singing.

Löwenbräukeller, Nymphenburger Strasse 2
The CLEO®/Europe-EQEC conference dinner will take place here on Wednesday, 28 June 2023. Home to another locally brewed beer, Löwenbräu, the Löwenbräukeller is a beloved beer hall, restaurant and beer garden. Known for its regular Bavarian music performances and traditional dances and events, it's a popular watering hole and restaurant. The large building also includes roof terraces, ideal for overlooking the nearby, lively beer garden, which is popular during the warmer months.

Hirschgarten, Hirschgarten 1
Located in the park that bears the same name, Hirschgarten beer garden and restaurant is where the locals and in-the-know visitors flock to during warmer months. With an impressive 8,000 seats, it's the largest beer garden in Bavaria and surrounded by greenery and lush lawns. Offering a menu of international and Bavarian treats, as well as huge, cold beers and a lively atmosphere, it's a great spot to enjoy traditional treats.

Augustiner Keller, Arnulfstraße 52
Augustiner Keller is a central, popular beer hall, complete with a large, traditional interior and a lively garden. The restaurant-pub boasts an impressive wooden ceiling, finely polished tables, hand-crafted timber chairs and a large stage area adorned with rows of curious hunting trophies. The menu features fantastic baked pretzels, perfectly roasted ribs, and high-quality, local Augustiner brews.

Munich's theaters and parks

Munich's vibrant theater scene captivates audiences with its world-class performances. From the grandeur of the National Theatre to the experimental productions at the Residenztheater, there's something for every taste. Immerse yourself in the city's rich cultural heritage and indulge in unforgettable theatrical experiences in Munich:

https://www.muenchen.de/en/events/theater-dance-operas/find-english-speaking-theatres-munich-here

Munich is very famous for its theaters, but also for its Olympic Park, located at Spiridon-Louis-Ring 21.

Getting there: U-Bahn line 3 to Olympiazentrum. see:

https://www.olympiapark.de/en

Munich is blessed with beautiful parks and serene lakes, offering tranquil escapes within the bustling city. The English Garden, one of the largest urban parks in the world, invites relaxation and leisurely strolls. The shimmering waters of Lake Starnberg and Lake Ammersee beckon visitors with their picturesque landscapes and recreational activities.

Munich's museums

Munich boasts a diverse array of museums, from the historic Bayerisches Nationalmuseum to the modern BMW Museum. Explore art, history, and science:

- Bayerisches Nationalmuseum
- BMW Museum
- Deutsches Museum
- Deutsches Museum Flugwerft Schleißheim
- Glyptothek
- Münchner Stadtmuseum
- Neue Pinakothek
- Villa Stuck

And many others, see:

https://www.muenchen.de/en/sights/museums

Hop on-hop off buses

In the double-decker buses of City Sightseeing, visitors to Munich can enjoy the open roof. During the hour-long city round trips, participants have a view of the best attractions that Munich offers. Explanations are given in eight different languages. Highlights and stops include the historic city center, the Main Station, Odeonsplatz, the Opera, Maximilian Street, the Food Market, Stachu, the Pinakotheken, Nymphenburg Castle, Neuhausen, Olympia Park, Schwabing, the English Garden, and Haidhausen.

Three tours are available that can be combined:
- City-Tour
- Nymphenburg-Olympia-Tour
- Schwabing-Tour

The tickets can also be used flexibly. They can be purchased online in advance (with a price reduction) or in the bus and are valid for one or even two days. The departures of all the tours start at the 'Bahnhofsplatz outside Elisenhof near the main railway station Munich. For further information, see:

https://www.citysightseeing-munich.com

Further information on Munich (available in 6 languages) is available at:
http://www.muenchen.de

SHORT COURSES

CLEO®/Europe EQEC 2023 will present ten short courses at an extra cost to be presented in parallel on Monday, Wednesday, Thursday and Friday. Each course is scheduled in two parts: Course Part I (1 hour 30 minutes), coffee break (30 minutes), Course Part II (1 hour 30 minutes). The courses are open to attendees of the World of Photonics Congress and Laser World of Photonics exhibition, subject to payment of the course fee. The short course material will only be available online.

The courses are designed for engineers, scientists, and graduate students with a basic understanding of optics and photonics, aiming to enhance their knowledge in specific technical domains.

The 2023 Short course topics include: High-Power Fiber Lasers, Optical Parametric Oscillators, Laser Beam Analysis, Propagation and Spatial Shaping Techniques, Practical Quantum Optics, Mid-infrared semiconductor lasers, Terahertz Measurements and their Applications, Nonlinear Crystal optics, Frequency Combs and Applications, Silicon Photonics and Finite Element Modelling Methods for Photonics.

Short Course Schedule

▸ **Monday Morning, June 26, 2023, Room 2, Hall B1 (B12), 8:30 - 12:00**

SH-3 Short course: Laser beam analysis, propagation, and spatial Shaping techniques

James Leger, *University of Minnesota, Minneapolis, USA*

▸ **Wednesday Morning, June 28, 2023, Room 2, Hall B1 (B12), 8:30 - 12:00**

SH-1 Short course: High-power fiber lasers

Andy Clarkson, *University of Southampton, United Kingdom*

▸ **Wednesday Morning, June 28, 2023, Room 5, Hall B2 (B22), 8:30 - 12:00**

SH-9 Short course: Silicon photonics

Dries Van Thourhout, *Ghent University, Belgium*

▸ **Wednesday Afternoon, June 28, 2023, Room 2, HALL B1 (B12), 14:00 - 17:30**

SH-7 Short course: Nonlinear crystal optics

Benoît Boulanger, *Institute Néel-CNRS, Grenoble, France*

▸ **Wednesday Afternoon, June 28, 2023, Room 5, HALL B2 (B22), 14:00 - 17:30**

SH-8 Short course: Frequency combs principles and applications

Thomas Udem, *Max Planck Institute of Quantum Optics, Garching, Germany*

▸ **Thursday Morning, June 29, 2023, Room 2, HALL B1 (B12), 8:30 - 12:00**

SH-2 Short course: Optical parametric oscillators

Majid Ebrahim-Zadeh, *ICFO, Castelldefels, Spain*

▸ **Thursday Morning, June 29, 2023, Room 5, HALL B2 (B22), 8:30 - 12:00**

SH-4 Short course: Practical quantum optics

Gerd Leuchs, *Max Planck Institute for the Science of Light, Erlangen, Germany*

▸ **Thursday Afternoon, June 29, 2023, Room 2, HALL B1 (B12), 14:00 - 17:30**

SH-5 Short course: Mid-infrared semiconductor lasers

Jérôme Faist, *ETH Zurich, Switzerland*

▸ **Thursday Afternoon, June 29, 2023, Room 5, HALL B2 (B22), 14:00 - 17:30**

SH-6 Short course: THz measurements and their applications

Daniel Mittleman, *Brown University, Providence, Rhode Island, USA*

▸ **Friday Afternoon, June 30, 2023, Room 12b, ICM, 14:00 - 17:30**

SH-10 Short course: Finite element modelling methods for photonics

Arti Agrawal, *University of Technology Sydney, Australia*

Further Short Course information, see: https://www.cleoeurope.org/short-courses/

NOTES

PLENARY TALKS

CLEO®/Europe 2023 Plenary Speaker

Monday, 16:00 - 17:30
Location: Room 1 ICM

PL-1 MON 16:00

From nonlinear optics to high-intensity laser physics

Donna Strickland, *University of Waterloo, Ontario, Canada*

Co-laureate of Nobel Prize in Physics in 2018 for the work on chirped pulse amplification

Biography

Donna Strickland is a professor in the Department of Physics and Astronomy at the University of Waterloo and is one of the recipients of the Nobel Prize in Physics 2018 for developing chirped pulse amplification with Gérard Mourou, her PhD supervisor at the time. They published this Nobel-winning research in 1985 when Strickland was a PhD student at the University of Rochester.
Strickland earned a B.Eng. from McMaster University and a PhD in optics from the University of Rochester. Strickland was a research associate at the National Research Council Canada, a physicist at Lawrence Livermore National Laboratory and a member of technical staff at Princeton University. In 1997, she joined the University of Waterloo, where her ultrafast laser group develops high-intensity laser systems for nonlinear optics investigations. She was named a 2021 Hagler Fellow of Texas A&M University and sits on the Growth Technology Advisory Board of Applied Materials.
Strickland served as the president of the Optica (formerly OSA) in 2013 and is a fellow of Optica, SPIE, the Royal Society of Canada and the Royal Society. She is an honorary fellow of the Canadian Academy of Engineering and the Institute of Physics, an international member of the US National Academy of Science and member of the Pontifical Academy of Science. Strickland was named a Companion of the Order of Canada.

Abstract

The laser increased the intensity of light that can be generated by orders of magnitude and thus brought about nonlinear optical interactions with matter. Chirped pulse amplification, also known as CPA, changed the intensity level by a few more orders of magnitude and helped usher in a new type of laser-matter interaction that is referred to as high-intensity laser physics. In this talk, I will discuss the differences between nonlinear optics and high-intensity laser physics. The development of CPA and why short, intense laser pulses can cut transparent material will also be included. I will also discuss future applications.

The plenary talk will be followed by a career event with Donna Strickland (Monday, 17:30 - 18:30, Room 4a ICM).

EQEC 2023 Plenary Speaker

Tuesday, 10:30 - 11:30
Location: Room 1 ICM

PL-2a TUE 10:30

Photonic machines for large-scale applications and fundamental physics

Claudio Conti, *Department of Physics, University Sapienza, Italy*

Biography

Claudio Conti is an associate professor at the Department of Physics of the University Sapienza in Rome. He was the director of the Institute of Complex Systems of the Italian National Research Council (ISC-CNR). Previously, he received the New Talent Grant from the Research Center Enrico Fermi and held a Humboldt fellowship at the Max Planck Institute for the Science of Light. Claudio Conti was the Principal Investigator of the European Research Council Grant "Light and Complexity" and the Principal Investigator of the Templeton Foundation Grant "Generalized Uncertainty Principle and the Photon."
Claudio Conti is a prolific author with over 250 articles published in renowned journals; he contributed to many events, delivering over 50 invited talks. His research interests encompass complex systems, machine learning, photonics, and nonlinear optics, leading to applications such as Ising machines and fundamental tests of quantum mechanics.

Abstract

Which is the simplest way to process information with light? If we use integrated optics, we need highly optimized fabrication steps for devices with many channels. If we use wavelength multiplexing, we need sophisticated modulators and expensive filters. But optics deals with beams of light, and there is no potential limit to the information density we can store in a beam of light. So, we can use holograms to exploit the three-dimensional information and demonstrate demanding computational tasks as natural language processing.

The EQEC plenary talk will be followed by the Award ceremony (Tuesday, 11:30 - 12:30, Room 1 ICM).

Opening and World of Photonics Plenary Session

Tuesday, 14:00 - 15:30
Location: Room 1 ICM

PL-3 TUE 14:00

Laser-driven inertial confinement fusion, power source of the future?

Tammy Ma, *Lawrence Livermore National Laboratory, Livermore, CA, USA*

Constantin L. Haefner, *Institute for Laser Technology, Aachen, Germany*

Abstract

Fusion ignition has been achieved at the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory. This experimental result, decades in the making, is a major scientific breakthrough for laser-driven inertial confinement fusion. This talk will present the experimental results and the many technological innovations that made this achievement possible, including advances in photonics. It will also place this achievement in the broader context of its significance to the scientific community. The implications of this achievement for future research in laser inertial confinement fusion as a sustainable and safe source of clean energy will also be discussed.

TUTORIAL TALKS

CLEO®/Europe Tutorial Talks

CG-2 TUE 16:00

Ultrafast physics in condensed matter

▸ **Tuesday, 16:00 - 17:30**
Location: *Room 6 Hall B3 (B32)*

Claus Ropers,
Max Planck Institute for Multidisciplinary Sciences, Göttingen, Germany

CG-2.1

Quantum-coherent Electron-Light Interactions in Electron Microscopy

This tutorial will introduce principles and applications of electron-light scattering in electron microscopy. An emphasis will be placed on quantum-coherent processes and recent studies of spontaneous and stimulated interactions of free-electron beams with photonic cavities.

CH-5 WED 08:30

Optical frequency combs

▸ **Wednesday, 8:30 - 10:00**
Location: *Room 14b ICM*

Kaoru Minoshima,
The University of Electro-Communications, Chofu, Japan

CH-5.1

Optical frequency comb applications beyond frequency metrology using versatile control of optical waves

Optical frequency comb provides powerful tools in broad area using its versatile phase controllability. In this tutorial, our recent works on various metrology applications such as highly functional spectroscopy, quantum optics, and imaging are presented.

CI-2 WED 10:30

Frequency combs

▸ **Wednesday, 10:30 - 12:00**
Location: *Room 6 Hall B3 (B32)*

Victor Torres Company,
Chalmers University of Technology, Gothenburg

CI-2.1

Microcombs for Optical Communications

This tutorial will give an overview of the enabling characteristics of microcombs in wavelength division multiplexing and coherent communication systems.

CA-7 WED 14:00

Power scaling

▸ **Wednesday, 14:00 - 15:30**
Location: *Room 13a ICM*

Andreas Tuennermann,
Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

CA-7.1

Prospects in power scaling of fiber lasers and amplifiers

The state of the art of science and technology in fiber lasers and amplifiers is reviewed. The prospects for future developments using advanced fiber designs in combination with modern laser and amplifier architectures are discussed.

EQEC Tutorial Talks

EB-3 MON 14:00

Quantum optics I

▸ **Monday, 14:00 - 15:30**
Location: *Room 8 Hall A1 (A12)*

Maciej Lewenstein,
Instituto de Ciencias Fotónicas, Castelldefels, Spain

EB-3.3

Attosecond Sciences, Quantum Optics and Quantum Information

In my tutorial I will discuss recent developments of attosecond science on the border between ultrafast laser science, quantum optics and quantum information.

ED-4 TUE 08:30

Cavity-Enhanced Precision Spectroscopy

▸ **Tuesday, 8:30 - 10:00**
Location: *Room 2 Hall B1 (B12)*

Shui-Ming Hu,
University of Science and Technology of China, Hefei, China

ED-4.3

Cavity-Enhanced Precision Spectroscopy of Molecules

Cavity-enhanced spectroscopy methods induce km-long molecule-light interaction path lengths and provide kW-power laser fields, which allow for high-precision spectroscopy of molecules, with broad applications in fundamental physics and beyond.

EF-1 WED 14:00

Complex fiber dynamics I

▸ **Wednesday, 14:00 - 15:30**
Location: *Room Osterseen ICM*

Stefan Wabnitz, *Sapienza University of Rome, Rome*

EF-1.1

Nonlinear Multimode Fiber Optics

This tutorial will present an overview of recent research progress in the field of nonlinear multimode fiber optics. Phenomena such as multimode solitons, geometric parametric instability and beam self-cleaning lead to new technological applications.

KEYNOTE TALKS

CLEO®/Europe Keynote Talks

CF-1 WED 08:30

Advances in attosecond technology and high order harmonic generation I

▸ **Monday, 8:30 - 10:00**
Location: *Room 1 Hall B1 (B11)*

Francesca Calegari, *CFEL-DESY, Hamburg, Germany*

CF-1.1

Ultrafast attosecond and few-fs sources for control of molecular reactivity at the electron time scale

Attosecond science offers formidable tools for investigating electronic processes. An overview on developments for compact few-femtosecond UV and attosecond VU-Vsoft-x ray sources, together with their application for studying charge migration in chiral molecules, is presented.

CK-2 WED 08:30

Plasmonic structures and components

▸ **Tuesday, 8:30 - 10:00**
Location: *Room 4a ICM*

Anatoly Zayats, *King's College London, London, United Kingdom*

CK-2.1

Nonlinear Optics with Nanoparticles and Metamaterials

Weak nonlinearity of conventional materials can be enhanced by their nanostructuring. We will overview recent developments and trends in engineering spectral and temporal response of coherent and incoherent optical nonlinearities with dielectric, plasmonic and hybrid nanoparticles, nanostructures and metamaterials.

CB-6 WED 14:00

Integrated photonics and frequency combs

▸ **Wednesday, 14:00 - 15:30**
Location: *Room 13b ICM*

Tobias J. Kippenberg, *EPFL, Lausanne, Switzerland*

CB-6.1

Ultra-low loss hybrid silicon nitride integrated photonics: from chipscale frequency combs, frequency agile lasers to Erbium amplifiers on chip

Recent advances allowed to create ultra-low-loss, meter-long waveguides in silicon nitride. I will review advances of this technology, from chipscale frequency combs, parametric amplifiers, ultra-narrow linewidth lasers with fiber laser-coherence, and erbium amplifiers on chip.

CC-2 THU 14:00

High power THz sources

▸ **Thursday, 14:00 - 15:30**
Location: *Room 1 Hall B1 (B11)*

Clara Saraceno, Samira Mansourzadeh, Tim Vogel, Celia Millon, Mohsen Khalili**,** *Ruhr University Bochum, Bochum, Germany*

CC-2.1

High power ultrafast moves into the Terahertz domain

We discuss latest advances in high average power laser driven THz sources, discuss limitations and present future applications.

EQEC Keynote Talks

EJ-1 MON 08:30

Simulating multi-mode and non-hermitian systems

▸ **Monday, 8:30 - 10:00**
Location: *Room 4a ICM*

Kestutis Staliunas,
UPC, Barcelona, Spain

EJ-1.1

Laser transverse patterns control by nonhermitian actions

The classical spatial pattern formation theory optical vortices, spatial solitons, optical turbulence in broad area lasers will be revised. New mechanisms of pattern control, in particular the turbulence control by nonhermitian background potentials, will be presented.

EG-1 MON 08:30

Nanoantennas and nanoconfinement

▸ **Monday, 8:30 - 10:00**
Location: *Room 4b ICM*

Jesper Moerk, Yi Yu, Evangelos Dimopoulos, Meng Xiong, Marco Saldutti, Gaoneng Dong, Matias Bundgaard-Nielsen, Kristian Seegert, Shih Lun Liang, Elizaveta Semenova, Kresten Yvind, *Technical University of Denmark, Kgs. Lyngby, Denmark*

EG-1.1

Semiconductor Nanolasers

A new generation of semiconductor nanolasers with ultralow thresholds and important applications in integrated photonics is emerging. The talk gives an overview of recent experimental and theoretical progress, highlighting the interesting physics and new opportunities.

ED-1 MON 08:30

Precision spectroscopy for fundamental science

▸ **Monday, 8:30 - 10:00**
Location: *Room 6 Hall B3 (B32)*

Vitaly Wirthl**,** Derya Taray, Omer Amit, Akira Ozawa, Fabian Schmid, Jorge Moreno, Johannes Weitenberg, Theodor Hänsch, **Thomas Udem**, *Max-Planck Institute of Quantum Optics, Garching, Germany*

ED-1.3

Laser Spectroscopy as a Probe for Physics Beyond the Standard Model

Precision spectroscopy of atomic hydrogen and other simple atomic systems is required for testing quantum electrodynamics, the determination of fundamental constants and to probe for physics beyond the Standard Model.

EF-4 THU 10:30

Spatiotemporal effects in optical systems

▸ **Thursday, 10:30 - 12:00**
Location: *Room 14a ICM*

Hui Cao, *Yale University, New Haven, USA*

EF-4.1

Physics and Application of Complex Lasers

A complex laser supports many spatio-temporal modes that interact nonlinearly with the gain material. We have controlled spatio-temporal dynamics of many-mode lasers and applied them to speckle-free imaging, holography and parallel ultrafast random number generation.

EA-6 FRI 08:30

Quantum optics in imaging

▸ **Friday, 8:30 - 10:00**
Location: *Room 3 ICM*

Osian Wolley[1],
Simon Mekhail[1],
Paul-Antonie Moreau[2,3],
Thomas Gregory[1],
Graham Gibson[1],
Gerd Leuchs[4,5],
Miles Padgett[1]

[1] *University of Glasgow, Glasgow, United Kingdom*
[2] *National Cheng Kung University, Tainan City, Taiwan,*
[3] *Center for Quantum Frontiers of Research and Technology, Tainan City, Taiwan*
[4] *Max Planck Institute for the Science of Light, Erlangen, Germany*
[5] *Friedrich-Alexander-Universität, Erlangen, Germany*

EA-6.1

Imaging at the single-photon limit using homodyne detection

Using homodyne detection, we obtain images in the short-wave infrared region of the spectrum with an illumination flux of order one photon per image pixel despite the camera having a noise floor one to two order of magnitude higher.

EE-2 FRI 08:30

Ultrafast processes in ionised media

▸ **Friday, 8:30 - 10:00**
Location: *Room 14c ICM*

Stefan Skupin, *Université de Lyon, Villeurbanne, France*

EE-2.1

Air Photonics

Interactions of ionizing ultrashort laser pulses in ambient air are frequently exploited in nonlinear photonics. We review major applications ranging from femtosecond filamentation and pulse compression to broadband THz generation and describe challenges and trends.

INVITED TALKS

Below you will find the invited speakers' programme indicating on which day and time the invited talk will begin. In order to not disturb the session, attendees wishing to participate are requested to respect the session times to attend these talks, as follows: From 08:30 to 10:00, from 10:30 to 12:00, from 14:00 to 15:30 or from 16:00 to 17:30.

Monday sessions from 08:30 to 10:00

CA-1.4 Monday, 9:15, Room 13a ICM

Broadband direct frequency down-conversion to wavelengths beyond 5 µm using wide-gap non-oxide crystals

Zsuzsanna Heiner, *Humboldt-Universität, Berlin, Germany*

CB-1.1 Monday, 8:30, Room 13b ICM

Recent progress of photonic-crystal surface-emitting lasers

Susumu Noda, *Kyoto University, Kyoto, Japan*

CD-1.1 Monday, 8:30, Room 14a ICM

Nonlinear optics in 3D χ(2) structures

Yong Zhang, *Nanjing University, Nanjing, China*

JSII-1.1 Monday, 8:30, Room Osterseen ICM

Why Photonic Technologies are Beneficial to Astronomical Instrumentation

Sylvain Veilleux, *University of Maryland, College Park, USA*

EB-1.1 Monday, 8:30, Room 8 Hall A1 (A12)

Quantum state engineering of macroscopic oscillators

Eugene S. Polzik, *Copenhagen University, Copenhagen, Denmark*

Monday sessions from 10:30 to 12:00

EJ-2.1 Monday, 10:30, Room 4a ICM

Exploring interacting photons and quantum states of light with atomic metasurfaces

Thomas Pohl, *Department of Physics and Astronomy, Aarhus, Denmark*

CA-2.1 Monday, 10:30, Room 13a ICM

Towards few-optical-cycle generation from Thulium / Holmium mode-locked lasers

Valentin Petrov, Weidong Chen, Li Wang, Yongguang Zhao, Zhongben Pan, Uwe Griebner, *Max Born Institute, Berlin, Germany*

JSII-2.1 Monday, 10:30, Room Osterseen ICM

Fibre transitions for astronomical applications

Kerrianne Harrington[1], Thomas Wright[1], Stephanos Yerolatsitis[1], Robert Harris[2], Tim Birks[1]

[1] University of Bath, Bath, UK
[2] Max-Planck-Institute for Astronomy, Heidelberg, Germany

EB-2.1 Monday, 10:30, Room 8 Hall A1 (A12)

Applying Kerr Squeezed Light to Interferometry

Nikolay Kalinin[1,2,4], Thomas Dirmeier[1,2], Arseny A. Sorokin[4], Elena A. Anashkina[4,5], Luis L. Sánchez -Soto[1,6], Joel F. Corney[7], **Gerd Leuchs**[1,3], Alexey V. Andrianov[4]

[1] Max Planck Institute for the Science of Light, Erlangen, Germany
[2] Friedrich-Alexander-Universität, Erlangen, Germany
[3] University of Ottawa, Ottawa, Canada
[4] Russian Academy of Sciences, Nizhny Novgorod, Russia
[5] Lobachevsky State University of Nizhny Novgorod, Nizhny Novgorod, Russia
[6] Universidad Complutense, Madrid, Spain
[7] University of Queensland, Brisbane, Australia

EG-2.3 Monday, 11:00, Room 4b ICM

Long-Lived Hot Electron dynamics via hyperbolic meta-antennas

Humeyra Caglayan, *Rakesh Dhama, Tampere University, Tampere, Finland*

CF-2.5 Monday, 11:30, Room 1 Hall B1 (B11)

Liquid crystals meet strong-field physics: first attempts of HHG in soft matter

Luise Becker[1], Andrea Annunziata[2,3], Patrick Friebel[1], Davide Faccialà[3], Caterina Vozzi[3], **Laura Cattaneo**[1]

[1] Max Planck Institute for Nuclear Physics, Heidelberg, Germany
[2] Politecnico di Milano, Milan, Italy
[3] Institute for Photonics and Nanotechnologies, Milan, Italy

Monday sessions from 14:00 to 15:30

CA-3.1 Monday, 14:00, Room 13a ICM

Low-Phonon-Energy Rare-Earth doped Laser Gain Materials: Crystals vs. Glasses

Ei Ei Brown[1], Zackery Fleischman[1], Jason McKay[1], Larry Merkle[1], Uwe Hommerich[2], Witold Palosz[3], Sudhir Trivedi[3], Mark Dubinskii1

[1] DEVCOM Army Research Laboratory, Adelphi, USA
[2] Hampton University, Hampton, USA
[3] Brimrose Technology Corporation, Sparks Glencoe, USA

CD-3.1 Monday, 14:00, Room 14a ICM

Nonlinear Photonics with Lithium Niobate

Marko Loncar, *Harvard University, Cambridge, USA*

JSII-3.1 Monday, 14:00, Room Osterseen ICM

What it takes to observe exoplanets with optical interferometry

Sylvestre Lacour, *Observatoire de Paris, Meudon, France*

CL-1.1 Monday, 14:00, Room 2 Hall B1 (B12)

Reconstructing brain tissue with light microscopy

Johann G. Danzl, *Institute of Science and Technology Austria, Klosterneuburg, Austria*

ED-3.1 Monday, 14:00, Room 6 Hall B3 (B32)

Precise Comb-based Time Transfer Over Long Distance Terrestrial Links

Emily D. Caldwell[1,2], Jean-Daniel Deschenes[3], Jennifer Ellis[1], William C. Swann[1], Benjamin K. Stuhl[4], Hugo Bergeron[3], Nathan R. Newbury[1], **Laura C. Sinclair**[1]

[1] National Institute of Standards and Technology, Boulder, USA
[2] University of Colorado, Boulder, USA
[3] Octosig Consulting; Quebec City, Canada

[4] *Space Dynamics Laboratory, North Logan, USA*

CF-3.2 Monday, 14:15, Room 1 Hall B1 (B11)

Sampling Mid-infrared Waveforms in Time and Space

Yangyang Liu[1], **Shima Gholam-Mirzaei**[2], Dipendra Khatri[1], Tran-Chau Truong[1], Andre Staudte[2], Paul Corkum[2], Michael Chini[1]
[1] *University of Central Florida, Orlando, USA*
[2] *National Research Council of Canada and University of Ottawa, Ottawa, Canada*

CB-2.3 Monday, 14:30, Room 13b ICM

The quest for ultraviolet vertical-cavity surface-emitting lasers

Åsa Haglund[1], Filip Hjort[1], Johannes Enslin[2], Michael Bergmann[1], Munise Cobet[2], Giulia Cardinali[2], Nando Prokop[2], Lars Persson[1], Estrella Torres[1], Sarina Graupeter[2], Massimo Grigoletto[2], Martin Guttmann[2], Luca Sulmoni[2], Neysha Lobo-Ploch[3], Tim Kolbe[3], Joachim Ciers[1], Tim Wernicke[2], Michael Kneissl[2,3]
[1] *Chalmers University of Technology, Gothenburg, Sweden*
[2] *Technische Universität Berlin, Berlin, Germany*
[3] *Ferdinand-Braun-Institut, Berlin, Germany*

Tuesday sessions from 08:30 to 10:00

EG-4.1 Tuesday, 8:30, Room 4b ICM

Many-body superradiance and dynamical symmetry breaking in waveguide QED

Ana Asenjo-Garcia, *Columbia University, New York, USA*

CB-3.1 Tuesday, 8:30, Room 13b ICM

Different phases of polariton lasers

Jiaqi Hu, Nathan Lydick, Kai Sun, **Hui Deng**, *University of Michigan, Ann Arbor, USA*

JSVI-1.1 Tuesday, 8:30, Room Osterseen ICM

Optophononic Engineering Using Semiconductor Nanostructures

Norberto Daniel Lanzillotti-Kimura, Martin Esmann, Anne Rodriguez, Priya Priya, Edson R. Cardozo de Oliveira, Chushuang Xiang, Omar Ortiz, Martina Morassi, Luc Le Gratiet, Isabelle Sagnes, Aristide Lemaitre, *Université Paris Saclay – CNRS, Palaiseau, France*

CG-1.1 Tuesday, 8:30, Room 6 Hall B3 (B32)

Femto- phono- magnetism

Sangeeta Sharma[1], J. K. Dewhurst[2]
[1] *Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany*
[2] *Max Planck Institute for micro-structure Physics, Halle, Germany*

CH-3.1 Tuesday, 8:30, Room 14b ICM

Trace gas absorption spectroscopy on a chip

Jana Jagerska[1], Marek Vlk[1], Jehona Salaj[1], Henock D. Yallew[1], Sebastian Alberti[1], Roman Zakoldaev[1], Jens Høvik[2], Astrid Aksnes[2]
[1] *UiT The Arctic University of Norway, Tromsø, Norway*
[2] *Norwegian University of Science and Technology, Trondheim, Norway*

EB-4.1 Tuesday, 8:30, Room 8 Hall A1 (A12)

Quantum computation and quantum simulation with strings of trapped Ca+ ions

Rainer Blatt, *University of Innsbruck, Innsbruck, Austria*

JSVI-1.2 Tuesday, 9:00, Room Osterseen ICM

Engineering thermal transport in low-dimensional systems

Yashpreet Kaur, Chaitanya Arya, Saeko Tachikawa, Aswathi K. Sivan, Giulio de Vito, Rahul Swami, Johannes Trautvetter, Diego de Matteis, Begoña Abad, **Ilaria Zardo**, *University of Basel, Basel, Switzerland*

CF-4. 3 Tuesday, 9:00, Room 1 Hall B1 (B11)

Arbitrary CEP Manipulation for Spatiotemporal Control of Sub-cycle Optical Vortex

Yu-Chieh Lin, Katsumi Midorikawa, Yasuo Nabekawa, *RIKEN Center for Advanced Photonics, Wako, Japan*

CB-3.4 Tuesday, 9:30, Room 13b ICM

The Berkeley Surface Emitting Laser (BerkSEL): a scale-invariant laser?

Boubacar Kante, *UC Berkeley, Berkeley, USA*

Tuesday sessions from 14:00 to 15:30

CM-5.1 Tuesday, 14:00, Room 13a ICM

Spatially and time resolved maps of transient nonequilibrium states in pulsed laser ablation in liquid from large-scale atomistic modelling

Chaobo Chen, **Leonid Zhigilei**, *University of Virginia, Charlottesville, USA*

CB-4.1 Tuesday, 14:00, Room 13b ICM

Monolithic integration of GaSb diode lasers on a silicon photonic circuit

Andres Remis[1], Michele Paparella[1,2], Laura Monge Bartolomé[1], Audrey Gilbert[1], Guilhem Boissier[1], Marco Grande[2], Alan Blake[4], Liam O'Faolain[3,4], Laurent Cerutti[1], Jean-Baptiste Rodriguez[1], Eric Tournié[1]
[1] *University of Montpellier, Montpellier, France*
[2] *Polytechnic University of Bari, Bari, Italy*
[3] *Munster Technological University, Cork, Ireland*
[4] *Tyndall National Institute, Cork, Ireland*

Tuesday sessions from 16:00 to 17:30

CA-5.1 Tuesday, 16:00, Room 13a ICM

A simple pathway to widely tunable single-frequency light using monolithic diamond Raman resonators

Eduardo Granados, *CERN, Geneva, Switzerland*

CH-4.1 Tuesday, 16:00, Room 14b ICM

Laser-based Sensing for Energy and Propulsion Sciences

Ronald K Hanson, *Stanford University, Stanford, USA*

JSVI-2.1 Tuesday, 16:00, Room Osterseen ICM

Massive search space optimization of thermal radiation metamaterials

Junichiro Shiomi, *The University of Tokyo, Tokyo, Japan*

CF-5.1 Tuesday, 16:00, Room 1 Hall B1 (B11)

Single-Shot CEP Change Detection in a Nanoantenna Network

Felix Ritzkowsky[1], Matthew Yeung[2], Engjell Bebeti[1], Thomas Gebert[3,4], Toru Matsuyama[3], Giulio Rossi[1], Roland Mainz[1,5], Huseyin

Cankaya[1,5], Philip Keathley[2], Franz Kärtner[1,5]

[1] *Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*

[2] *Massachusetts Inst. of Technology, Cambridge, USA*

[3] *Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany*

[4] *WiredSense GmbH, Hamburg, Germany*

[5] *Universität Hamburg, Hamburg, Germany*

CJ-1.1 Tuesday, 16:00, Room 7 Hall A1 (A11)

Advances in mode scaling and TMI suppression in high-power fibre lasers

Jeffrey Nicholson, Jose Pincha, Ishu Kansal, Robert Windeler, Eric Monberg, Vasily Lukonin, Anand Hariharan, Gregory Williams, Andrea Rosales-Garcia, Lalitkumar Bansal, David DiGiovanni, *OFS Laboratories, Somerset, USA*

CE-4.3 Tuesday, 16:30, Room 2 Hall B1 (B12)

Vibrations and Photophysics in White Light Emitting Two-Dimensional Metal Halide Perovskites

Roman Krahne[1], Balaji Dhanabalan[1], Beatriz Martin-Garcia[2], Davide Spirito[3], Sergey Artyukhin[1], Miao-Ling Lin[4], Yu-Chen Leng[4], Ping-Heng Tan[4], Seda Kutkan[1], Milena Arciniegas[1]

[1] *Istituto Italiano di Tecnologia, Genova, Italy*

[2] *CIC nanoGUNE, Donostia-San Sebastian, Spain*

[3] *IHP–Leibniz-Institut für innovative Mikroelektronik, Frankfurt (Oder), Germany*

[4] *Chinese Academy of Sciences, Beijing, China*

EG-5.5 Tuesday, 17:00, Room 4b ICM

Deep Ultraviolet Nanophotonics to enhance the sensitivity of autofluorescence spectroscopy on label-free proteins

Prithu Roy, Jean Benoit Claude, Jerome Wenger, *Aix Marseille Univ, Marseille, France*

Wednesday sessions from 08:30 to 10:00

CK-4.1 Wednesday, 8:30, Room 4a ICM

Photophysics of single color centers in silicon

Anaïs Dréau, *Laboratoire Charles Coulomb, Montpellier, France*

JSI-1.1 Wednesday, 8:30, Room 13b ICM

X-ray Transient Grating experiments at Free Electron Lasers

Cristian Svetina, *Instituto Madrileño de Estudios Avanzados en Nanociencia, Madrid, Spain*

CJ-2.1 Wednesday, 8:30, Room 7 Hall A1 (A11)

Coherently combined high power multicore fibers

Jens Limpert, *University Jena, Jena, Germany*

CI-1.3 Wednesday, 9:00, Room 6 Hall B3 (B32)

Optical Communications: A hollow future ahead?

Francesco Poletti, Greg Jasion, Eric Numkam Fokoua, Hesham Sakr, Ian Davidson, *University of Southampton, Southampton, United Kingdom*

Wednesday sessions from 10:30 to 12:00

JSIV-1.1 Wednesday, 10:30, Room 4b ICM

Plasmonic bimetallic metasurfaces for large-scale solar Hydrogen production

Emiliano Cortes, *University of Munich (LMU), Munich, Germany*

CA-8.1 Wednesday, 10:30, Room 13a ICM

High-Power Q-switched Near Infrared Cryogenic Lasers

Miftar Ganija, *Keiron Boyd, Jesper Munch, The University of Adelaide, Adelaide, Australia*

CD-8.1 Wednesday, 10:30, Room 14a ICM

Laser-guided lightning using kHz filamentation at 1030 nm

Aurélien Houard[1], Pierre Walch[1], Thomas Produit[2], Victor Moreno[2], Benoit Mahieu[1], Antonio Sunjerga[3], Clemens Herkommer[4], Amirhossein Mostajabi[3], Ugo Andral[2], Yves-Bernard André[1], Magali Lozano[1], Laurent Bizet[1], Malte C. Schroeder[2], Guillaume Schimmel[2], Michel Moret[2], Olivier Maurice[5], Bruno Esmiller[5], Knut Michel[4], Walter Haas[6], Thomas Metzger[4], Marcos Rubinstein[7], Farhad Rachidi[3], Vernon Cooray[3], André Mysyrowicz[1], Jérôme Kasparian[2,9], Jean-Pierre Wolf[2]

[1] *École Polytechnique, Palaiseau, France*

[2] *Université de Genève, Geneva, Switzerland*

[3] *École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*

[4] *TRUMPF Scientific Lasers GmbH + Co. KG, Unterföhring, Germany*

[5] *ArianeGroup, Les Mureaux, France*

[6] *Swisscom Broadcast AG, Bern, Switzerland*

[7] *University of Applied Sciences and Arts Western Switzerland, Yverdon-les-Bains, Switzerland*

[8] *Uppsala University, Uppsala, Sweden*

[9] *Université de Genève, Geneva, Switzerland*

Wednesday sessions from 14:00 to 15:30

JSI-3.1 Wednesday, 14:00, Room 1 ICM

Imaging ultrafast electron dynamics in isolated nanoparticles

Björn Senfftleben[1], Julian Zimmermann[1,2], Alessandro Colombo[2], Ehsan Hassanpour Yesaghi[2], Linos Hecht[2], Andreas Hoffmann[1], Martin Kretschmar[1], Katharina Kolatzki[2], Björn Kruse[3], Bruno Langbehn[5], Nils Monserud[1], Tamas Nagy[1], Mario Sauppe[1,2], Rico M. Tanyag[1,4], Johannes Tümmler[1], Anatoli Ulmer[4], Thomas Möller[4], Ingo Will[1], Thomas Fennel[3], Marc J.J. Vrakking[1], Arnaud Rouzée[1], Bernd Schütte[1], **Daniela Rupp**[1]

[1] *Max-Born-Institute Berlin, Berlin, Germany*

[2] *ETH Zürich, Zürich, Switzerland*

[3] *University of Rostock, Rostock, Germany*

[4] *TU Berlin, Berlin, Germany*

JSIV-2.1 Wednesday, 14:00, Room 4b ICM

Incandescent Metasurfaces

Jean-Jacques Greffet, *Université Paris-Saclay, Palaiseau, France*

CK-6.1 Wednesday, 14:00, Room 4a ICM

Lighting up the brain: Implantable neural probes using wafer-scale integrated photonics

Joyce Poon, *Max Planck Institute of Microstructure Physics, Halle (Saale), Germany*

CF-8.1 Wednesday, 14:00, Room 1 Hall B1 (B11)

Novel ultrafast laser technology for generating gigawatt-class isolated attosecond pulses

Eiji Takahashi, *RIKEN, Wako, Japan*

CI-3.1 Wednesday, 14:00, Room 6 Hall B3 (B32)

Graphene Plasmonics – A Beyond 100 GHz Technology

Juerg Leuthold, Stefan M. Koepfli, Ping Ma, Xinzhi Zhang, Michael Baumann, Shadi Nashashibi, Jasmin Smajic, Ueli Koch, Yuriy Fedoryshyn, *ETH Zurich, Zurich, Switzerland*

JSIV-2.3 Wednesday, 14:45, Room 4b ICM

Diffused light concentration for enhanced solar energy yield

Rebecca Saive, *Univ. of Twente, Enschede, Netherlands*

EF-1.2 Wednesday, 15:00, Room Osterseen ICM

Guided Brillouin interactions - from optical vortex isolators to extreme thermodynamics

Birgit Stiller, *Max Planck Institute for the Science of Light, Erlangen, Germany*

Wednesday sessions from 16:00 to 17:30

CK-7.1 Wednesday, 16:00, Room 4a ICM

Femtosecond-Laser Written Universal Photonic Processors

Francesco Ceccarelli[1], Ciro Pentangelo[2,1], Niki Di Giano, Riccardo Arpe[2,1], Simone Piacentini[2], Andrea Crespi[2,1], Roberto Osellame[1]

[1] *Consiglio Nazionale delle Ricerche, Milan, Italy*

[2] *Politecnico di Milano, Milan, Italy*

EH-1.1 Wednesday, 16:00, Room 4b ICM

Topological Phases of Spacetime Crystals

João Serra, **Mário Silveirinha**, *University of Lisbon, Lisbon, Portugal*

EF-2.1 Wednesday, 16:00, Room Osterseen ICM

Thermal Effects in Kerr-Microresonator Optical Frequency Combs

Tara Drake, Gabriel Colacion, Lala Rukh, Emilio Perez de Juan, Brandon Stone, *University of New Mexico, Albuquerque, USA*

Thursday sessions from 08:30 to 10:00

EH-2.1 Thursday, 8:30, Room 4b ICM

Ultrafast nanophotonics and opto-electronics: from all-optical switching based on metamaterial-cavity electrodynamics to plasmon-driven polaritonic chemistry

Nicolò Maccaferri, *Umeå University, Umeå, Sweden and University of Luxembourg, Luxembourg*

CH-9.1 Thursday, 8:30, Room 14b ICM

Ultrasensitive Concentration and Chirality Measurements Realized by Sub-Shot-Noise Absorption Spectroscopy Using Entangled Photon Pairs

Korenobu Matsuzaki, *Tahei Tahara, RIKEN, Wako, Japan*

JSI-5.1 Thursday, 8:30, Room Osterseen ICM

X-ray Induced Coulomb Explosion Imaging of Complex Molecules

Rebecca Boll, *European XFEL, Schenefeld, Germany*

Thursday sessions from 10:30 to 12:00

CK-9.1 Thursday, 10:30, Room 4a ICM

Optical Combs for High-Capacity Transmission and Energy-Optimization of Long-Haul Fiber Cables

Leif Oxenløwe, *Technical University of Denmark, Kgs. Lyngby, Denmark*

CC-1.1 Thursday, 10:30, Room 1 Hall B1 (B11)

THz Bandwidth Activation of Anharmonic Coupling in CdWO4

Megan Nielson, Brittany Knighton, Lauren Davis, Aldair Alejandro, Claire Rader, **Jeremy Johnson**, *Brigham Young University, Provo, USA*

Thursday sessions from 14:00 to 15:30

CG-5.5 Thursday, 15:00, Room 6 Hall B3 (B32)

Engineering optical Schrödinger "cat" and entangled states using intense laser-atom interactions

Paraskevas Tzallas, *Institute of Electronic Structure & Laser, Heraklion (Crete), Greece*

Thursday sessions from 16:00 to 17:30

CE-7.1 Thursday, 16:00, Room 7 Hall A1 (A11)

Post-2000 nonlinear optical materials and their characterization: data tables and best practices

Nathalie Vermeulen[1], Daniel Espinosa[2], Adam Ball[3], John Ballato[4], Philippe Boucaud[5], Georges Boudebs[6], Cecilia Campos[7], Peter Dragic[8], Anderson Gomes[7], Mikko Huttunen[9], Nathaniel Kinsey[3], Rich Mildren[10], Dragomir Neshev[11], Lazaro Padilha[12], Minhao Pu[13], Ray Secondo[4], Eiji Tokunaga[14], Dmitry Turchinovich[15], Jingshi Yan[11], Kresten Yvind[13], Ksenia Dolgaleva[2], Eric Van Stryland[16]

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[4] *Clemson University, Clemson, USA*

[5] *Université Côte d'Azur, Sophia-Antipolis, France*

[6] *Univ Angers, Angers, France*

[7] *Universidade Federal de Pernambuco, Recife, Brazil*

[8] *Univ. of Illinois at Urbana-Champaign, Urbana, USA*

[9] *Tampere University, Tampere, Finland*

[10] *Macquarie University, Sydney, Australia*

[11] *Australian National University, Canberra, Australia*

[12] *Univ. Estadual de Campinas, Sao Paulo, Brazil*

[13] *Technical University of Denmark, Lyngby, Denmark*

[14] *Tokyo University of Science, Tokyo, Japan*

[15] *Universität Bielefeld, Bielefeld, Germany*

[16] *University of Central Florida, Orlando, USA*

CG-6.3 Thursday, 16:30, Room 6 Hall B3 (B32)

Attosecond Interferometry

Nirit Dudovich, *Weizmann Institute of Science, Rehovot, Israel*

Friday sessions from 08:30 to 10:00

CJ-7.1 Friday, 8:30, Room 2 ICM

All soft glass fiber components and sources

Martin Rochette, *McGIll University, Montreal, Canada*

EI-1.1 Friday, 8:30, Room 4b ICM

Top-down exfoliation of 2D materials and creation of their artificial structures

Fang Liu, *Stanford University, Stanford, USA*

ED-5.1 Friday, 8:30, Room 12b ICM

Entanglement-enhanced frequency comparison of two optical atomic clocks

B. C. Nichol, R. Srinivas, D. P. Nadlinger, P. Drmota, D. Main, G. Araneda, C. J. Ballance, **D. M. Lucas**, *Oxford University, Oxford, UK*

JSIII-3.1 Friday, 8:30, Room 13a ICM

Motivation and challenges for applying photonic neuromorphic computing technologies

Bert Offrein, Elger Vlieg, Felix Hermann, Ludovico Carraria Martinotti, Folkert Horst, *IBM Research Europe - Zurich, Rueschlikon, Switzerland*

CD-11.1 Friday, 8:30, Room 13b ICM

Localized States in Nonlinear Topological Photonics

Daria Smirnova, *Australian National University, Canberra, Australia*

EJ-3.1 Friday, 8:30, Room 21 ICM

Complete computation of macroscopic high harmonic generation using artificial intelligence

José Miguel Pablos-Marín, Javier Serrano, Carlos Hernández-García, *Universidad de Salamanca, Salamanca, Spain*

EC-1.1 Friday, 8:30, Room 22a ICM

Topological photonics with cavity polaritons

Jacqueline Bloch, *Center for Nanoscience and Nanotechnology, Palaiseau, France*

CL-5.1 Friday, 8:30, Room Osterseen ICM

Unconventional SERS: from metal/plasmon-free to wearable/flexible SERS

Keisuke Goda, *The University of Tokyo, Tokyo, Japan*

CI-5.3 Friday, 9:00, Room 11 ICM

High-rate quantum key distribution over free-space links

Thomas Roger, Ravinder Singh, Chithrabhanu Perumangatt, Davide Marangon, Peter Raymond Smith, Mirko Sanzaro, Andrew Shields, *Toshiba Europe Ltd, Cambridge, UK*

EE-2.2 Friday, 9:15, Room 14c ICM

Ultrafast physics of Bessel beam interaction with solid dielectrics: dense plasma formation, second harmonic and THz radiation

Kazem Ardaneh, **Mostafa Hassan**, Benoit Morel, Luca Furfaro, Luc Froehly, Remo Giust, François Courvoisier, *University of Franche-Comté and CNRS, Besancon, France*

Friday sessions from 10:30 to 12:00

CJ-8.1 Friday, 10:30, Room 2 ICM

Omitting conventional saturable absorbers in mode-locked fibre lasers

Maria Chernysheva, Dennis C. Kirsch, *Leibniz Institute of Photonic Technology, Jena, Germany*

CC-5.1 Friday, 10:30, Room 5 ICM

Miniaturised terahertz photonic chips

Yazan Lampert[1], Francesco Bertot[1], Alexa Herter[2], Amirhassan Shams-Ansari[3], Alessandro Tomasino[1], Shima Rajabali[1], Marko Loncar[3], **Ileana-Cristina Benea-Chelmus**[1]

[1] *École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*

[2] *Eidgenoessische Technische Hochschule, Zurich, Switzerland*

[3] *Harvard University, Cambridge, USA*

CH-14.1 Friday, 10:30, Room 14b ICM

Imaging Circular Dichroism of Single Nanoparticles Using Photothermal Microscopy

Subhasis Adhikari, Patrick Spaeth, Michel Orrit, *Leiden University, Leiden, Netherlands*

JSIII-4.1 Friday, 10:30, Room 13a ICM

Photonic tensor core and convolution chip for machine learning acceleration

Volker Sorger, *George Washington University, Washington, USA*

EC-2.1 Friday, 10:30, Room 22a ICM

Three-dimensional topological light transport induced by lattice dislocations

Julius Beck[1], Eran Lustig[2], Lukas Maczewsky[1], Tobias Biesenthal[1], Matthias Heinrich[1], Zhaoju Yang[3], Yonatan Plotnik[2], Mordechai Segev[2], Alexander Szameit[1]

[1] *University Rostock, Rostock, Germany*

[2] *Technion – Israel Institute of Technology, Haifa, Israel*

[3] *Zhejiang University, Hangzhou, China*

EF-8.1 Friday, 10:30, Room 14a ICM

Symmetry breaking and zero modes in photonic crystal cavity arrays

Alejandro Martin Yacomotti, Kaiwen Ji, Melissa Hedir, Bruno Garbin, Juan Ariel Levenson, *Université Paris-Saclay, Palaiseau, France*

EE-3.1 Friday, 10:30, Room 14c ICM

Ultrafast Dynamics in Donor-Acceptor Prototype Molecules by XUV-IR Attosecond Spectroscopy

Federico Vismarra[1,2], Rocio Borrego-Varillas[2], Yingxuan Wu[1,2], Daniele Mocci[1,2], Francisco Fernández-Villoria[3,7], Lorenzo Colaizzi[1], Maurizio Reduzzi[1], Fabian Holzmeier[4], Laura Carlini[5], Paola Bolognesi[5], Robert Ritcher[6], Lorenzo Avaldi[5], Jesús González-Vázquez[7], Alicia Palacios[7], José Santos[3,8], Matteo Lucchini[1,2], Luis Bañares[3,8], Nazario Martin[3,8], Fernando Martin[3,7], Mauro Nisoli[1,2]

[1] *Politecnico di Milano, Milan, Italy*

[2] *IFN-CNR, Milan, Italy*

[3] *IMDEA-Nanoscience, Madrid, Spain*

[4] *Imec, Leuven, Belgium*

[5] *Istituto di Struttura della Materia-CNR (ISM-CNR), Rome, Italy*

[6] *Sincrotrone Trieste, Trieste, Italy*

[7] *Universidad Autónoma de Madrid, Madrid, Spain*

[8] *Universidad Complutense de Madrid, Madrid, Spain*

CL-6.2 Friday, 10:45, Room Osterseen ICM

Thermal wavefront shaping: Application in fluorescent microscopy

Hadrien M.L. Robert[1], Chang Liu[1], Nadja Rutz[2], Giulia Faini[1], Anis Aggoun[1], Filippo Del Bene[1], Gilles Tessier[1], Romain Quidant[2], Pascal Berto[1,3]

[1] *Sorbonne Université, Paris, France*

[2] *ETH Zürich, Switzerland*

[3] *Université Paris-cité, Paris, France*

EA-7.3 Friday, 11:00, Room 3 ICM

Graph States of Atomic Ensembles Entangled by Light

Eric Cooper, Philipp Kunkel, Avikar Periwal, **Monika Schleier-Smith**, *Stanford University, Stanford, USA*

Friday sessions from 14:00 to 15:30

CM-10.1 Friday, 14:00, Room 1 ICM

The switching cycle of Phase-Change Materials: Time-resolved diffraction after laser excitation

Peter Zalden, *European XFEL, Schenefeld, Germany*

CJ-9.1 Friday, 14:00, Room 2 ICM

Development of active fibres with nanostructured cores

Ryszard Buczynski[1,2], Marcin Franczyk[1], Dariusz Pysz[1], Jan Aubrecht[3], Grzegorz Stępniewski[1,2], Adam Filipkowski[1,2], Michal Kamrádek[3], Ivan Kasik3, Pavel Peterka[3]

[1] *Institute of Microelectronics and Photonics, Warsaw, Poland*

[2] *University of Warsaw, Warsaw, Poland*

[3] *Institute of Photonics and Electronics of the Czech Academy of Sciences, Prague, Czech Republic*

EI-3.1 Friday, 14:00, Room 4b ICM

Optomechanics of suspended magnetic van der Waals materials

Joanna Wolff, Loïc Moczko, Jérémy Thoraval, Michelangelo Romeo, Stéphane Berciaud, Arnaud Gloppe, *Université de Strasbourg, Strasbourg, France*

CC-6.1 Friday, 14:00, Room 5 ICM

Holographic THz Imaging by Fourier-Domain Detection with Feld-Effect Transistors, and the Quest for Phase Retrieval by Physics-Informed Deep Learning

Hui Yuan[1], Mingjun Xiang[1,2,3,4], Alvydas Lisauskas[1,5,6], Lingxiao Wang[2,3], Mark Thomson[1], Kai Zhou[2,3], **Hartmut Roskos**1

[1] *Goethe-Universität Frankfurt, Frankfurt am Main, Germany*

[2] *Frankfurt Institute of Advanced Studies, Frankfurt am Main, Germany*

[3] *Xidian-FIAS International Joint Research Center, Frankfurt am Main, Germany*

[4] *Xidian University, Xi'an, China*

[5] *Vilnius University, Vilnius, Lithuania*

[6] *Polish Academy of Sciences, Warsaw, Poland*

CE-10.1 Friday, 14:00, Room 12a ICM

Glass-based materials for (bio) photonic applications

Laeticia Petit, *Tampere University, Tampere, Finland*

JSIII-5.1 Friday, 14:00, Room 13a ICM

Photonic neuromorphic computing

Wolfram Pernice, *Heidelberg University, Heidelberg, Germany*

CH-15.1 Friday, 14:00, Room 14b ICM

Optical sensing in the brain with tapered optical fibers: from photoelectric free optrodes to implantable neuroplasmonics

Filippo Pisano[1], Antonio Balena[1], Barbara Spagnolo[1], Samuela Andriani[1,2], Marco Bianco[1], Di Zheng[1], Liam Collard[1], Rui Peixoto[3], Marco Grande[4], Manuel Valiente[5], Liset M De La Prida[6], Bernardo L Sabatini[3], Massimo De Vittorio[1,2], Ferruccio Pisanello[1]

[1] *Istituto Italiano di Tecnologia, Lecce, Italy*

[2] *Università del Salento, Lecce, Italy*

[3] *Harvard Medical School, Boston, USA*

[4] *Dipartimento di Ingegneria Elettrica e dell'Informazione Politecnico di Bari, Bari, Italy*

[5] *Spanish National Cancer Research Center, Madrid, Spain*

[6] *Instituto Cajal, CSIC, Madrid, Spain*

EA-8.2 Friday, 14:15, Room 3 ICM

Quantum engineering of light with an intracavity Rydberg superatom

Valentin Magro, Julien Vaneecloo, Sebastien Garcia, **Alexei Ourjoumtsev**, *PSL University, Paris, France*

Friday sessions from 16:00 to 17:30

CM-11.1 Friday, 16:00, Room 1 ICM

Laser Induced Forward transfer: Digital Additive Manufacturing solution for electronics

Ioanna Zergioti, *National Technical University of Athens, Athens, Greece*

EI-4.1 Friday, 16:00, Room 4b ICM

Lightshift of exciton and exciton-polarons in a 2D semiconductor

Bertrand Evrard, Takahiro Uto, Martin Kroner, Atac Imamoglu, *ETH Zurich, Zurich, Switzerland*

CE-11.1 Friday, 16:00, Room 12a ICM

Laser based 3D printing of fused silica glass

Michael Fokine, Taras Oriekhov, Chunxin Liu, *Nobula3D AB, Stockholm, Sweden*

JSIII-6.1 Friday, 16:00, Room 13a ICM

Scalable and autonomous photonic neural networks

Adria Grabulosa[1], Anas Skalli1, Johnny Moughames[1], Xavier Porte[2], James Lott[2], Stephan Reitzenstein[2], **Daniel Brunner**[1]

[1] *Université Franche-Comté, Besançon, France*

[2] *University of Strathclyde, Glasgow, United Kingdom*

CD-14.1 Friday, 16:00, Room 13b ICM

Fully On-chip Laser-integrated Quantum Source of Entangled Photon States

Hatam Mahmudlu[1], Raktim Haldar[1], Robert Johanning[1], Anahita Khodadad Kashi[1], Albert van Rees[2], Jörn P. Epping[2], Klaus-J. Boller[2], Michael Kues[1]

[1] *Leibniz University Hannover, Hannover, Germany*

[2] *University of Twente, Enschede, The Netherlands*

CH-16.1 Friday, 16:00, Room 14b ICM

Chemical sensing of trace gases and particulate matter with optical cavities

Weidong CHEN, *Université du Littoral Côte d'Opale, Dunkerque, France*

ONLINE DIGEST

The online digest (one-page summaries) will be accessible for two weeks beginning from the conference.
Download information at:

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ADDENDUM

The coming pages group the technical sessions. Last minute author/session chair changes can be downloaded from:

https://www.cleoeurope.org/wp-content/uploads/2023/06/CEE2023-ADDENDUM2.pdf

NOTES

CLEO®/Europe-EQEC 2023

2023 Conference of Lasers and Electro-Optics Europe & European Quantum Eletronics Conference

Monday, June 26 to Friday, June 30, 2023

Advance Programme (technical part)

(This page is just a stub to begin the following pages at an even number.)

Room 1 ICM

8:30 – 10:00

CM-1: Laser additive manufacturing I

Chair: Maria Farsari, FORTH, Institute of Electronic Structure and Laser, Heraklion, Crete

CM-1.1 MON 8:30

Wavelength independent laser direct writing 3D nanolithography of non-photosensitized SZ2080^{TM} hybrid polymer

A. Butkus[1], E. Skliutas[1], D. Ladika[2,3], D. Samsonas[1,4], V. Melissinaki[2], M. Vengris[1], M. Farsari[2], S. Juodkazis[5,6], and •M. Malinauskas[1]; [1]VU LRC, Vilnius, Lithuania; [2]IESL-FORTH, Heraklion, Greece; [3]UOC, Heraklion, Greece; [4]Light Conversion, Vilnius, Lithuania; [5]SUT, Hawthorn, Australia; [6]Tokyo Inst Technol, Tokyo, Japan

Wavelength independent femtosecond laser direct writing 3D nanolithography of non-photosensitized SZ2080^{TM} hybrid polymer is experimentally demonstrated. No wavelength or pulse durations are found to be restricting the photopolymerization, but rather influencing its dynamic fabrication range.

CM-1.2 MON 8:45

Multiphoton Lithography - Enabling a Novel Approach in Tissue Engineering Through Microfabrication

O. Kopinski-Grünwald[1,2], O. Guillaume[1,2], and •A. Ovsianikov[1,2]; [1]3D Printing and Biofabrication Group, Institute of Materials Science and Technology, TU Wien, Vienna, Austria; [2]Austrian Cluster for Tissue Regeneration (https://www.tissue-regeneration.at), Vienna, Austria

Multiphoton lithography (MPL) allows realization of complex 3D structures with unprecedented precision. In this contribution we present our recent data on a novel tissue engineering approach enabled by this technology.

Room 4a ICM

8:30 – 10:00

EJ-1: Simulating multi-mode and non-hermitian systems

Chair: Julien Javaloyes, University of the Balearic Islands, Palma de Mallorca, Spain

EJ-1.1 MON (Keynote) 8:30

Laser transverse patterns control by nonhermitian actions

•K. Staliunas; UPC, Barcelona, Spain

The classical spatial pattern formation theory (optical vortices, spatial solitons, optical turbulence) in broad area lasers will be revised. New mechanisms of pattern control, in particular the turbulence control by nonhermitian background potentials, will be presented.

Room 4b ICM

8:30 – 10:00

EG-1: Nanoantennas and nanoconfinement

Chair: Mathieu Mivelle, CNRS, Sorbonne University, Paris, France

EG-1.1 MON (Keynote) 8:30

Semiconductor Nanolasers

•J. Moerk, Y. Yu, E. Dimopoulos, M. Xiong, M. Saldutti, G. Dong, M. Bundgaard-Nielsen, K. Seegert, S.L. Liang, E. Semenova, and K. Yvind; DTU Electro, Technical University of Denmark, Kgs. Lyngby, Denmark

A new generation of semiconductor nanolasers with ultralow thresholds and important applications in integrated photonics is emerging. The talk gives an overview of recent experimental and theoretical progress, highlighting the interesting physics and new opportunities.

Room 13a ICM

8:30 – 10:00

CA-1: Mid-infrared lasers

Chair: Pavel Loiko, CIMAP, Université de Caen Normandie, France

CA-1.1 MON 8:30

Roadmap to Femtosecond Pulse Power/Energy-Scaling in Mid-Infrared Oscillator-Amplifier Laser Systems

•A. Rudenkov[1], V.L. Kalashnikov[1,4], E. Sorokin[2,3], M. Demesh[1], and I.T. Sorokina[1,3]; [1]Norwegian University of Science and Technology, Trondheim, Norway; [2]Photonics Institute, Vienna University of Technology, Vienna, Austria; [3]ATLA Lasers AS, Trondheim, Norway; [4]Facoltá di Ingegneria dell'Informazione, Sapienza Universitá di Roma, Roma, Italy

We suggest the prospective technique opening up a route towards extremely intense ultra-short pulses in the chirped-pulse oscillator-amplification mid-infrared systems.

CA-1.2 MON 8:45

Ce3+-Doped Selenide-Glass Lasers Tunable in the 4.5–5.6 μm Range

•P. Fjodorow[1], M. Frolov[2], Y. Korostelin[2], V. Kozlovsky[2], S. Leonov[2], Y. Skasyrsky[2], C. Schulz[1], B. Denker[3], B. Galagan[3], S. Sverchkov[3], V. Koltashev[4], V. Plotnichenko[4], M. Sukhanov[5], and A. Velmuzhov[5]; [1]EMPI, Institute for Energy and Materials Processes – Reactive Fluids, University of Duisburg-Essen, Duisburg, Germany; [2]P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia; [3]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; [4]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia, Dianov Fiber Optics Research Center, Moscow, Russia; [5]Devyatykh Institute of Chemistry of High-Purity

Room 13b ICM

8:30 – 10:00

CB-1: Photonic crystal lasers

Chair: Åsa Haglund, Chalmers University, Gothenburg, Sweden

CB-1.1 MON (Invited) 8:30

Recent progress of photonic-crystal surface-emitting lasers

•S. Noda; Kyoto University, Kyoto, Japan

Recent progress of photonic-crystal surface-emitting lasers are described: The brightness has now reached up to 1GWcm-2sr-1 even under CW condition, and a functionality to emit any beam patterns including "The Great Wave" has been achieved.

Room 14a ICM

8:30 – 10:00

CD-1: Frequency conversion I

Chair: Nathalie Vermeulen, Free university of Brussels, Belgium

CD-1.1 MON (Invited) 8:30

Nonlinear optics in 3D $\chi(2)$ structures

•Y. Zhang; Nanjing University, Nanjing, China

Benefiting from the developments of laser writing techniques, 3D $\chi(2)$ structures have been successfully fabricated, which provides a promising platform to investigate nonlinear optical phenomena such as efficient nonlinear beam shaping and nonlinear multiplexing holography.

Room 14b ICM

8:30 – 10:00

CH-1: Imaging through scattering media

Chair: Adrian Podoleanu, University of Kent, UK

CH-1.1 MON 8:30

Deterministic Terahertz Imaging through Scattering media

V. Kumar[1], •*V. Cecconi*[1,2], *L. Peters*[1,2], *L. Olivieri*[1,2], *J.S. Totero Gongora*[1,2], *A. Pasquazi*[1,2], *and M. Peccianti*[1,2]; [1]*Emergent Photonics Lab (EPic), Department of Physics and Astronomy, University of Sussex, BN1 9QH, Falmer, UK*; [2]*Emergent Photonics Research Centre, Department of Physics, School of Science, Loughborough University, LE11 3TU, Loughborough, UK*

We demonstrate deterministic broadband terahertz image reconstruction through scattering media via large area time-resolved field imaging and ghost-imaging-like retrieval of an orthogonal base representation of the scattering in terms of input illumination.

CH-1.2 MON 8:45

Delivering Broadband Light Deep into Diffusive Media

•*R. McIntosh*[1], *N. Bender*[2], *A. Yamilov*[3], *A. Goetschy*[4], *C.W. Hsu*[5], *H. Yilmaz*[6], *and H. Cao*[1]; [1]*Yale University, New Haven, USA*; [2]*Cornell University, Ithaca, USA*; [3]*Missouri University of Science and Technology, Rolla, USA*; [4]*ESPCI ParisTech, PSL Research University, CNRS, Institut Langevin, Paris, France*; [5]*University of Southern California, Los Angeles, USA*; [6]*Bilkent University, Ankara, Turkey*

We present a single wavefront that optimizes broadband optical energy delivery inside multiple-scattering media in an on-chip experiment by introducing the broadband deposition matrix and utilizing its maximal eigenvector. Applications include deep-tissue imaging and optogenetics.

Room Osterseen ICM

8:30 – 10:00

JSII-1: The photonic yield in astronomy

Chair: Lucas Labadie, University of Cologne, Köln, Germany

JSII-1.1 MON (Invited) 8:30

Why Photonic Technologies are Beneficial to Astronomical Instrumentation

•*S. Veilleux*; *University of Maryland, College Park, USA*

Photonic technologies allow to miniaturize and improve astronomical instrumentation. Photonic devices with capabilities exceeding those of conventional instruments will be described, followed by a discussion of promising avenues of research for the next decade.

Room 1 Hall B1 (B11)

8:30 – 10:00

CF-1: Advances in attosecond technology and high order harmonic generation I

Chair: Laura Cattaneo, Max-Planck-Institut Heidelberg, Germany

CF-1.1 MON (Keynote) 8:30

Ultrafast attosecond and few-fs sources for control of molecular reactivity at the electron time scale

•*F. Calegari*; *CFEL-DESY, Hamburg, Germany*

Attosecond science offers formidable tools for investigating electronic processes. An overview on developments for compact few-femtosecond UV and attosecond VUV/soft-x ray sources, together with their application for studying charge migration in chiral molecules, is presented.

Room 6 Hall B3 (B32)

8:30 – 10:00

ED-1: Precision spectroscopy for fundamental science

Chair: Piotr Wcislo, Nicolaus Copernicus University in Torun, Torum, Poland

ED-1.1 MON 8:30

First Observation of the 1S-2S Transition of Singly-Ionized Helium in an Atomic Beam

•*V. Barbé, E. Gründeman, A. Martinez de Velasco, M. Collombon, C. Roth, and K. Eikema*; *LaserLaB, Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

We report the first laser excitation, in an atomic beam, of the 1S – 2S two-photon transition of singly-ionized helium using near-infrared and extreme ultraviolet light, which is an important step towards precision spectroscopy of He+.

ED-1.2 MON 8:45

Comb-calibrated Raman Spectroscopy of Molecular Hydrogen

•*M. Lamperti*[1], *L. Rutkowski*[2], *D. Ronchetti*[3], *D. Gatti*[3], *R. Gotti*[4], *G. Cerullo*[3], *F. Thibault*[2], *H. Jóźwiak*[5], *S. Wójtewicz*[5], *P. Masłowski*[5], *P. Wcisło*[5], *D. Polli*[3], *and M. Marangoni*[3]; [1]*Department of Science and High Technology, University of Insubria, Como, Italy*; [2]*Univ Rennes, CNRS, IPR (Institut de Physique de Rennes), Rennes, France*; [3]*Dipartimento di Fisica - Politecnico di Milano and IFN-CNR, Milan, Italy*; [4]*Department of Electrical, Computer and Biomedical Engineering, Università degli studi di Pavia, Pavia, Italy*; [5]*Institute of Physics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University, Torun, Poland*

We determine the frequency of the

Room 7 Hall A1 (A11)

8:30 – 10:00

CE-1: Specialty optical fibres

Chair: Natalie Wheeler, University of Southampton, United Kingdom

CE-1.1 MON 8:30

Metal-Free Perovskite Optical Fibre

H.C.L. Tsui[1], *D. Sirbu*[1], *N. Alsaif*[1], *G. Tizzard*[2], *P. Docampo*[3], *and* •*N. Healy*[1]; [1]*Newcastle University, Newcastle, United Kingdom*; [2]*University of Southampton, Southampton, United Kingdom*; [3]*University of Glasgow, Glasgow, United Kingdom*

This paper will present a new fibre platform for nonlinear optics. A few-mode fibre with a metal-free perovskite core that has a wide bandgap of 5 eV and a second-order nonlinearity.

CE-1.2 MON 8:45

Toward low-loss mid-infrared Ga2O3-BaO-GeO2 optical fibers: Solving 30 years of high losses

•*T. Guérineau*[1], *S. Aouji*[1,2], *S. Morency*[1], *J.-l. Delarosbil*[1], *F. Calzavara*[2], *P. Larochelle*[1], *P. Labranche*[1], *J. Lapointe*[1], *S. Danto*[2], *T. Cardinal*[2], *E. Fargin*[2], *M. Bernier*[1], *R. Vallée*[1], *and Y. Messaddeq*[1]; [1]*Center for Optics, Photonics and Lasers, Québec, Canada*; [2]*Institut de Chimie de la Matière Condensée de Bordeaux, Bordeaux, France*

The development of robust high-Tg mid-infrared glass fibers made of germanium, gallium and barium oxides (BGG) is studied. We report the first BGG glass fiber with low losses down to 200 dB.km-1.

Room 8 Hall A1 (A12)

8:30 – 10:00

EB-1: Optomechanical and other quantum oscillators

Chair: Gerd Leuchs, Institute for the Science of Light, Erlangen, Germany

EB-1.1 MON (Invited) 8:30

Quantum state engineering of macroscopic oscillators

•*E.S. Polzik*; *Copenhagen University, Copenhagen, Denmark*

Generation of an entangled state of distant mechanical and atomic oscillators with applications to precision measurements will be presented. Progress towards generation of a Fock state of motion of a macroscopic object will be reported.

Room 1 ICM

CM-1.3 MON 9:00

Versatile tomographic volumetric additive manufacturing

•J. Madrid-Wolff, A. Boniface, F. Maitre, and C. Moser; Ecole Polztechnique Federale de Lausanne, Lausanne, Switzerland

Tomographic volumetric additive manufacturing is a novel fabrication method that allows to produce cm-scale devices in seconds. We report improvements to tomographic patterns calculation to extend the technique to larger objects and scattering photoresins.

CM-1.4 MON 9:15

Ultra-thin metasurfaces fabricated by two-photon polymerization

•G. Zyla[1], S. Papamakarios[2], O. Tsilipakos[3], D. Zografopoulos[4], M. Kafesaki[1], M. Farsari[1], and C. Soukoulis[1]; [1]IESL/FORTH, Institute Electronic Structure Laser/Foundation for Research and Technology-Hellas, Heraklion, Greece; [2]University of Crete, Heraklion, Greece; [3]National Hellenic Research Foundation, Athens, Greece; [4]Consiglio Nazionale delle Ricerche, (CNR-IMM), Rome, Italy

This work presents the potential of using maskless 3D printing by two-photon polymerization to fabricate photonic metamaterials with minimum interaction volume on several mm2. The printed metamaterial can be used for various THz applications.

Room 4a ICM

EJ-1.2 MON 9:15

Transient growth in non-Hermitian photonics

•K. Makris; ITCP-Physics Department, University of Crete, Heraklion, Greece; Institute of Electronic Structure and Laser (IESL)-FORTH, Heraklion, Greece

We study the counter-intuitive phenomenon of optical power growth in non-Hermitian Hatano-Nelson lattices, that exhibit a decaying eigenvalue spectrum. Singular value decomposition and pseudospectra methods are applied to calculate the magnitude of such transient growth.

Room 4b ICM

EG-1.2 MON 9:15

Performance of gallium phosphide nanoantennas from optimized design

•C. Vidal[1], B. Tilmann[2], S. Tiwari[3], T.V. Raziman[1], S. Maier[1,2,4], J. Wenger[3], and R. Sapienza[1]; [1]The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom; [2]Nano-Institute Munich, Department of Physics, Ludwig-Maximilians-University, Munich, Germany; [3]Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, Marseille, France; [4]chool of Physics and Astronomy, Monash University, Clayton, Australia

We fabricated GaP nanoantennas from an optimized design, measured their brightness enhancement and compared it with the calculated enhancement factor. We show that beyond design optimization, further performance improvement requires tailored fine-tuning.

Room 13a ICM

Substances of the Russian Academy of Sciences, Nizhny Novgorod, Russia

We review our recent achievements with room-temperature Ce-doped selenide-glass lasers, including up to 45 mJ of output energy with a slope efficiency of 25 %, tunability in the 4.5–5.6 μm spectral range, and Q-switched operation.

CA-1.3 MON 9:00

Comparison of Diode-Pumped Dy:KPC and Dy:PGS Lasers Operating above 4.4 μm

•P. Schlosser and V. Savitski; Fraunhofer UK Research Ltd., Glasgow, United Kingdom

This work compares laser performance of Dy:KPC and Dy:PGS crystals for quasi-cw pumping at 1710 nm emitting near 4.4 to 4.6 μm respectively. Experimental results are used to calculate Q-switched performance and optimized resonator configurations.

CA-1.4 MON (Invited) 9:15

Broadband direct frequency down-conversion to wavelengths beyond 5 μm using wide-gap non-oxide crystals

•Z. Heiner; Humboldt-Universität zu Berlin, Berlin, Germany

We present practical applications of novel sulfide nonlinear optical crystals (LiGaS2, BaGa4S7, and CdxHg1-xGa2S4) in the direct frequency down-conversion of 1 μm pump pulses and the resulting 100-kHz, ultrafast infrared OPA's based on these materials.

Room 13b ICM

CB-1.2 MON 9:00

InAs/GaAs quantum dot based distributed feedback laser arrays and photonic crystal lasers

•Y. Yu, Z. Yang, H. Zhong, and S. Yu; Sun Yat-sen University, Guangzhou, China

We developed a novel dielectric grating structure and high performance InAs/GaAs quantum dot (QD) based laterally coupled distributed-feedback laser arrays. Furthermore, we demonstrated continuous wave operated QD photonic crystal lasers with low-thresholds using miniaturized bound states in the continuum cavities.

CB-1.3 MON 9:15

Dual-mode lasing and beating oscillations in a microscopic laser based on electromagnetically induced transparency

•K. Seegert[1,2], Y. Yu[1,2], M. Heuck[1,2], and J. Mørk[1,2]; [1]Department of Electrical and Photonics Engineering, Technical University of Denmark , DK-2800 Lyngby, Denmark; [2]NanoPhoton - Center for Nanophotonics, DK-2800 Lyngby, Denmark

We propose and analyze a novel microscopic laser, that uses an EIT-resonance from a highly dispersive mirror to achieve stable dual-mode lasing, with a dynamically tunable beat note frequency.

Room 14a ICM

CD-1.2 MON 9:00

Large-Scale 3D Nonlinear Woodpile Photonic Crystals from Sol-Gel Derived Barium Titanate

•V.V. Vogler-Neuling[1,2], Ü.-L. Talts[1], R. Ferraro[1], H. Weigand[1], G. Finco[1], J. Winiger[3], P. Benedek[4], J. Kusch[5], A. Karvounis[1], V. Wood [4], J. Leuthold[3], and R. Grange[1]; [1]ETH Zurich, Department of Physics, Institute for Quantum Electronics, Optical Nanomaterial Group, Zurich, Switzerland; [2]Université de Fribourg, Adolphe Merkle Institute, Soft Matter Physics Group, Fribourg, Switzerland; [3]ETH Zurich, Department of Information Technology and Electrical Engineering, Institute for Electromagnetic Fields, Zurich, Switzerland; [4]ETH Zurich, Department of Information Technology and Electrical Engineering, Institute for Electronics, Zurich, Switzerland; [5]ETH Zurich, ScopeM, Zurich, Switzerland

The first bottom-up fabricated 3D nonlinear photonic crystal with periodicities of 1 μm and large surface areas of $5.3 \cdot 10^4$ μm^2 is demonstrated. The structures are fabricated with sol-gel derived barium titanate and soft-nanoimprint lithography.

CD-1.3 MON 9:15

Coherent difference frequency generation in nonlinear photonic crystals

•A. El Hassan, H. Vo Van Qui, and K. Gallo; KTH, Stockholm, Sweden

We report experimental results on difference frequency generation in 2D periodically poled lithium tantalate crystals pumped at 532nm and seeded at 1550 nm, yielding coherent DFG output beams around 800 nm with 96% visibility.

Room 14b ICM

CH-1.3 MON 9:00

10 MHz swept-source for optical coherence tomography at 1050 nm

•S. Grelet[1,2], P.B. Montague[1], and A. Podoleanu[2]; [1]NKT Photonics, Birkerød, Denmark; [2]University of Kent, Canterbury, United Kingdom

We present a design of a 10 MHz swept-source for optical coherence tomography, operating at 1050 nm. Based on low-noise supercontinuum dynamics and time stretch, this design could improve current speed and bandwidth limitations.

CH-1.4 MON 9:15

Mid-infrared OCT for non-destructive sub-surface inspection and in-line production monitoring

•C. Lapre[1], R.E. Hansen[1], C.R. Petersen[1,2], N.M. Israelsen[1,2], and O. Bang[1,2,3]; [1]DTU Electro, Department of Electrical and Photonics Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]NORBLIS ApS, Virum, Denmark; [3]NKT Photonics A/S, Birkerød, Denmark

OCT detection is well known in medical domain and biology research for its non-destructive imaging and spectroscopy measurement. In this presentation, I will highlight how mid-infrared OCT could be used in various industrial in-line detection.

Room Osterseen ICM

JSII-1.2 MON 9:00

PolyOculus: Low-Cost Photonics-Enabled Telescope Arrays

•S. Eikenberry[1,2,3], C. Moraitis[1,2,3], R. Amezcua-Correa[1], C. Warner[4], S. Yerolatsitis[1], D. Wright[2], H. Reale[1], J. Foran[1], N. Harmon[1], A. Akers[1], J. Rowe[1], K. Semmen[1], N. Salem[1], V. Pagliuca[1], T. Thomas[1], V. Miller[1], M. Bentz[5], A. Gonzalez[4], J. Harrington[3], N. Law[6], T. Maccarone[7], and R. Quimby[8]; [1]CREOL - University of Central Florida, Orlando, USA; [2]Physics Dept - University of Central Florida, Orlando, USA; [3]Planetary Sciences - University of Central Florida, Orlando, USA; [4]University of Florida, Gainesville, USA; [5]Georgia State University, Atlanta, USA; [6]University of Norht Carolina - Chapel Hill, Chapel Hill, USA; [7]Texas Tech University, Lubbock, USA; [8]San Diego State University, San Diego, USA

We present an overview of the PolyOculus approach - including photonic lantern couplers - and its potential scientific applications, particularly for time-domain astronomy and extreme precision radial velocity measurements.

JSII-1.3 MON 9:15

Creating a monolithic, low insertion loss, photonic chip for the FIRST instrument

•H.-D. Kenchingotn Goldsmith[1], E. Huby[1], K. Barjot[1], M. Lallement[1,2], G. Martin[2], S. Lacour[1], D. Rouan[1], S. Vievard[3], O. Guyon[3], V. Deo[3], C. Pham[4], C. Cassagnettes[4], and A. Billat[4]; [1]OBSERVATOIRE DE PARIS, Meudon, France; [2]Institut de Planétologie et d'Astrophysique de Grenoble , Grenoble, France; [3]National Astronomical Observatory of Japan (NAOJ), Hilo, USA; [4]TEEM photonics, Meylan, France

Photonic chips are improving sensitivity in astronomy instruments. The FIRST instrument will soon contain a completely monolithic

Room 1 Hall B1 (B11)

CF-1.2 MON 9:15

Generation of high-order vortex harmonics in solids through spin-orbit interaction of light

•K. Nagai, T. Okamoto, Y. Shinohara, H. Sanada, and K. Oguri; NTT Basic Research Laboratories, NTT Corporation, 3-1, Morinosato-Wakamiya, Atsugi-shi, Kanagawa 243-0198, Japan

We demonstrated the generation of high-order vortex harmonics in a bulk solid from Gaussian-like shaped circularly polarized ultrashort laser pulses utilizing spin-orbit interaction of light.

Room 6 Hall B3 (B32)

Q(1) line of the H_2 fundamental rovibrational band with uncertainty 20 times lower than previous experiments and 3 times lower than state-of-art theoretical calculations.

ED-1.3 MON (Keynote) 9:00

Laser Spectroscopy as a Probe for Physics Beyond the Standard Model

V. Wirthl, D. Taray, O. Amit, A. Ozawa, F. Schmid, J. Moreno, J. Weitenberg, T. Hänsch, and •T. Udem; Max-Planck Institute of Quantum Optics, Garching, Germany

Precision spectroscopy of atomic hydrogen and other simple atomic systems is required for testing quantum electrodynamics, the determination of fundamental constants and to probe for physics beyond the Standard Model.

Room 7 Hall A1 (A11)

CE-1.3 MON 9:00

Optical Properties of Thulium-Doped Glasses in Optical Fibres

M. Leich, S. Unger, A. Schwuchow, R. Müller, A.C. Pratiwi, J. Kobelke, A. Lorenz, and •M. Jäger; Leibniz Institute of Photonic Technology, Jena, Germany

Optical properties of Tm-doped fibres based on two different host glasses (silica-based and YAG-derived), are compared. As a result, an energy level scheme with all absorption and emission transitions is obtained with enhanced fluorescence lifetimes.

CE-1.4 MON 9:15

Optical fibre doped with YPO4:Pr3+ nanocrystals - glass powder doping technique for new laser transitions

•D. Dorosz[1], M. Kochanowicz[2], R. Valiente[3], A. Diego-Rucabado[3], N. Siñeriz-Niembro[3], M. Lesniak[1], J. Posseckardt[4], G.L. Jimenez[1], R. Müller[5], M. Lorenz[5], A. Schwuchow[5], M. Leich[5], K. Wondraczek[5], and M. Jäger[5]; [1]AGH University of Science and Technology, Krakow, Poland; [2]Bialystok University of Technology, Bialystok, Poland; [3]University of Cantabria, Santander, Spain; [4]Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Dresden, Germany; [5]Leibniz Institute of Photonic Technology, Jena, Germany

We developed new optical fibre with active YPO4:Pr3+ nanocrystals using glass powder doping technique. Luminescence of the nanocrystals in the fibre core and TEM/EDX analysis confirmed YPO4:Pr3+ survival during fibre drawing.

Room 8 Hall A1 (A12)

EB-1.2 MON 9:00

Quantum coherent control in pulsed waveguide optomechanics for photon-phonon entanglement via Brillouin scattering

•C. Zhu[1,2], J. Zhang[1,3], C. Wolff[4], and B. Stiller[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]University Erlangen-Nuremberg, Erlangen, Germany; [3]University of Science and Technology of China, Hefei, China; [4]University of Southern Denmark, Odense, Denmark

We present a Hamiltonian formalism for the time dynamics of backward Brillouin scattering in waveguides including quantum Langevin noise. We show its applications to photon-phonon entanglement via Brillouin scattering, phonon cooling and coherent information transfer.

EB-1.3 MON 9:15

Free rotation and optically driven spinning motion of a levitated nano-dumbbell

J. Zielinska, F. van der Laan, A. Norrman, M. Rimlinger, R. Reimann, L. Novotny, and •M. Frimmer; Photonics Laboratory, ETH Zurich, Zurich, Switzerland

We control the potential governing the angular orientation of an optically levitated nanoparticle by controlling the degree of polarization of the trapping light. This is an important step towards optically levitated torque sensors.

Room 1 ICM

CM-1.5 MON 9:30

Zeroth-order and vortex Bessel beams from single-mode fibers with 3D printed photonic structures

I. Reddy, A. Bertoncini, and •C. Liberale; King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

We present a 3D printed photonic structure designed to transform the fundamental mode of single-mode fibers into zeroth- and higher-order (vortex) Bessel beams, up to large topological charges.

CM-1.6 MON 9:45

1530nm fiber laser fabricated via additive manufacturing of silica gain fibers

P. Maniewski[1,2], •M. Brunzell[1], C. M. Harvey[1], L. Barrett[1], V. Pasiskevicius[1], F. Laurell[1], and M. Fokine[1]; [1]Department of Applied Physics, KTH Royal Institute of Technology, Stockholm, Sweden; [2]Optoelectronic Reseach Centre, University of Southampton, Southampton, United Kingdom

In this work, we demonstrate a mirrorless fiber laser operating at 1530 nm, based on a high-performance silica gain fiber, manufactured using laser-aided Additive Manufacturing.

Room 4a ICM

EJ-1.3 MON 9:30

A normal form for frequency combs and localized states in time-delayed Kerr-Gires-Tournois interferometers

•T. Seidel[1], J. Javaloyes[2], and S. Gurevich[1]; [1]Institute for Theoretical Physics & Center for Nonlinear Science (CeNoS), University of Münster, Schlossplatz 2, 48149 Münster, Germany; [2]Dpt. de Física, Universitat de les Illes Balears & IAC-3, Campus UIB, E-07122 Palma de Mallorca, Spain

We elucidate the mechanisms that underlie the formation of temporal localized states and frequency combs in vertical external-cavity Kerr-Gires-Tournois interferometers by performing a multiple time-scale analysis in the vicinity of the onset of optical bistability.

EJ-1.4 MON 9:45

Bayesian statistics for multimodal problems applied to emission spectra broadening of a single core/shell CdSe/CdS nanocrystal.

•D. Simonot, S. Huppert, M. Trassinelli, and A. Maître; Institut des Nanosciences de Paris, Paris, France

A model involving numerous unknown parameters is used to describes the spectral broadening of single core/shell nanocrystal. With a Markov Chain Monte Carlo Nested Sampling method we determine the posterior probability distribution of each parameter.

Room 4b ICM

EG-1.3 MON 9:30

Advances in Electron-Light Interactions for Probing Nanomaterials

•P.A.D. Gonçalves[1], F. Iyikanat[1], and F.J. García de Abajo[1,2]; [1]ICFO - The Institute of Photonics Sciences, Barcelona, Spain; [2]ICREA - Catalan Institution for Research and Advanced Studies, Barcelona, Spain

We show that free electrons can be used to retrieve the quantum response from nanostructured materials, including quantum nonlocal effects in nanoplasmonics and atomic-scale spectroscopy of defects in atomically thin materials.

EG-1.4 MON 9:45

Ultrafast non-classical light sources based on single InAs/GaAs quantum dot embedded in a hybrid plasmonic nanopillar cavity

T. Hakkarainen[1], •A. Chellu[1], S. Bej[2], H. Hulkkonen[2], R. Hytönen[1], H. Rekola[3], T. Uusitalo[1], H. Kahle[1], P. Karvinen[3], T. Niemi[2], and M. Guina[1]; [1]Optoelectronics Research Centre (ORC), Physics Unit, Tampere University, Tampere, Finland; [2]Nanophotonics group, Physics Unit, Tampere University, Tampere, Finland; [3]Institute of Photonics, University of Eastern Finland, Joensuu, Finland

We demonstrate an ultrafast Purcell-enhanced single photon source based on individual InAs/GaAs quantum dots embedded in a deeply subwavelength hybrid plasmonic-GaAs nanopillar cavity.

Room 13a ICM

CA-1.5 MON 9:45

Generation of Multicolor Pulse Bursts for Pumping Long-Wave Infrared Optical Parametric Amplifiers

•R. Jutas[1], J. Roman[1], I. Astrauskas[1], P. Polynkin[2], E. Kaksis[1], T. Floery[1], J. Kolenda[3], T. Bartulevicius[3], K. Michailovas[3], A. Michailovas[3,4], A. Baltuska[1,4], and A. Pugzlys[1,4]; [1]Photonics Institute, TU Wien, Wien, Austria; [2]College of Optical Sciences, The University of Arizona, Tucson, USA; [3]Ekspla Ltd., Vilnius, Lithuania; [4]Center for Physical Sciences & Technology, Vilnius, Lithuania

Pulse-bursts from Nd:YAG amplifier are converted into angularly separated multicolour pulses in KTA-based parametric amplifier. Energy of all eight generated 2100-nm pulses can be transferred to a single LWIR pulse in non-collinearly pumped ZGP OPCPA.

Room 13b ICM

CB-1.4 MON 9:30

Ultrashort pulse generation using cavity-dumping in a Fano laser

•G. Dong[1,2], J. Mørk[1,2], and Y. Yu[1,2]; [1]DTU Electro, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]NanoPhoton – Center for Nanophotonics, Technical University of Denmark, Kgs. Lyngby, Denmark

Ultrashort pulse (~1 ps) can be generated in a microscopic Fano laser through cavity-dumping even in the presence of a long carrier lifetime in nanocavity.

CB-1.5 MON 9:45

Operating characteristics of surface-emitting quantum cascade lasers using photonic crystals with low-symmetric pillars

•S. Saito[1], R. Hashimoto[1], K. Kaneko[1], T. Kakuno[1], S. Okuma[1], H. Tanimura[2], S. Takagi[2], Y. Yao[3], N. Ikeda[3], T. Kuroda[3], Y. Sugimoto[3], T. Mano[3], and K. Sakoda[3]; [1]Corporate Manufacturing Engineering Center, Toshiba Corporation, Yokohama, Japan; [2]School of Engineering, Tokyo University of Technology, Hachioji, Japan; [3]Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan

We fabricated quantum cascade lasers with photonic crystal of low-symmetric pillars as unit cell. We have achieved an optical output of 50mW in single-mode and over 1W in multi-mode in 4μm wavelength region.

Room 14a ICM

CD-1.4 MON 9:30

High Sensitivity Active Imaging at 2 μm Using Upconversion Detection

•R. Demur, A. Grisard, E. Lallier, and L. Leviandier; Thales Research & Technology, Palaiseau, France

We present an upconversion active imaging system at 2 μm with outdoor images acquisition using a double-pulsed fiber laser architecture. We benefit from the use of a high sensitivity CMOS camera to detect infrared images.

CD-1.5 MON 9:45

Infrared upconversion imaging based on membrane silicon metasurface

•Z. Zheng[1], L. Huang[2,3], D. Smirnova[4], K. Zangeneh Kamali[4], A. Yousefi[1], F. Deng[5], R. Camacho-Morales[4], C. Ying[1], A. Miroshnichenko[2], D. Neshev[4], M. Rahmani[1], and L. Xu[1]; [1]Nottingham Trent University, Nottingham, United Kingdom; [2]University of New South Wales, Canberra, Australia; [3]East China Normal University, Shanghai, China; [4]The Australian National University, Canberra, Australia; [5]Hong Kong University of Science and Technology, Hongkong, China

We experimentally converted the invisible near-infrared images to visible based on the third-harmonic generation process by designing a silicon membrane metasurface supporting symmetry-protected bound states in the continuum.

Room 14b ICM

CH-1.5 MON 9:30

Label-Free Three-Photon Deep Imaging with High Power Femtosecond Yb-Fiber Laser

A. Fernandez, A. Classen, N.K. Josyula, P. Straight, and •A. Verhoef; Texas A&M University, College Station, USA

We demonstrate simultaneous multicolor two- and three-photon imaging of bacterial filaments using a single high-power femtosecond Yb-fiber laser. Our experiments demonstrate the superior signal-to-background ratio obtainable with three-photon imaging deep below the sample surface.

CH-1.6 MON 9:45

Experimental Characterizing The Complex Light Scattering Properties of Finite Objects By Mutual Scattering

•A. Rates, M.D. Truong, A. Lagendijk, and W.L. Vos; University of Twente,Complex Photonic Systems (COPS), MESA + Institute for Nanotechnology, Enschede, Netherlands

We study the light scattering properties of finite objects using Mutual Scattering. We modulate the phase and angle of two incident beams and measure light extinction. This permits full complex scattering characterization of finite objects.

Room Osterseen ICM

chip with low loss in the visible spectrum. The selection between high and low index chips is discussed.

JSII-1.4 MON 9:30

A Near-infrared, on-chip Astrophotonic Spectrograph with a Resolving Power of 40,000

•P. Gatkine[1], N. Jovanovic[1], G. Sercel[2], J. Jewell[3], J.K. Wallace[3], and D. Mawet[1]; [1]California Institute of Technology, Pasadena, USA; [2]California State University, Los Angeles, USA; [3]Jet Propulsion Laboratory, Pasadena, USA

We present an on-chip astrophotonic spectrograph using thin(200 nm) SiN platform. This spectrograph has a peak resolving power of 40,000, size of 2cmx2cm, and operates over a broadband (1250-1650 nm).

JSII-1.5 MON 9:45

Demonstration of Photonic Correlation of GHz Signals for 10.6 um Astronomical Heterodyne Interferometry

•T. ALLAIN[1,2], G. BOURDAROT[3], C. SIRTORI[2], and J.-P. BERGER[1]; [1]Univ. Grenoble Alpes, CNRS, IPAG, Grenoble, France; [2]Laboratoire de Physique de l'Ecole Normale Supérieure, ENS, Université PSL, CNRS, Sorbonne Université, Université de Paris, Paris, France; [3]Max-Planck-Institut für Extraterrestrische Physik (MPE), Garching bei München, Germany

In the context of mid-infrared astronomical heterodyne interferometry, we demonstrate the photonic correlation of two GHz signals originating from the heterodyne beating of a 10.6 um local oscillator and a science channel on two detectors.

Room 1 Hall B1 (B11)

CF-1.3 MON 9:30

Isolated Attosecond Pulse Generation Driven by Spatio-Temporal Pulse Reshaping in a Semi-infinite Gas Cell

•F. Vismarra[1,2], D. Mocci[1], L. Colaizzi[1], M.F. Galán[3], V.W. Segundo[3], R. Boyero-García[3], J. Serrano[3], E. Conejero Jarque[3], M. Pini[1,2], L. Mai[1], Y. Wu[1,2], M. Reduzzi[1,2], M. Lucchini[1,2], H.J. Wörner[4], C.L. Arnold[5], J. San Román[3], C. Hernández-García[3], M. Nisoli[1,2], and R. Borrego-Varillas[2]; [1]Department of Physics, Politecnico of Milano, Milano, Italy; [2]IFN-CNR, Milano, Italy; [3]Departamento de Física Aplicada, University of Salamanca, Salamanca, Spain; [4]Laboratorium fur Physikalische Chemie, ETH Zurich,, Zurich, Switzerland; [5]Department of Physics, Lund University, Lund, Sweden

Isolated attosecond pulses have been generated in a semi-infinite cell filled with noble gases by taking advantage of spatio-temporal reshaping of 3.8-fs driving pulses. The interplay between HHG and IR reshaping is investigated with simulations.

CF-1.4 MON 9:45

High repetition rate, high photon flux VUV source

•A. Omoumi[1,2,3], M. Natile[2], E. Papalazarou[3], Y. Zaouter[2], M. Hanna[1], T. Auguste[4], P. Georges[1], and M. Marsi[3]; [1]Laboratoire Charles Fabry, Paris, France; [2]Amplitude, Pessac, France; [3]Laboratoire de Physique des Solides , Orsay, France; [4]Laboratoire Interactions Dynamiques et Lasers, Gif-sur-Yvette, France

We report a vacuum ultraviolet laser source based on the ninth harmonic of a high-power ytterbium femtosecond laser. An in-depth analysis of phase-matching and efficiency of the process will be presented.

Room 6 Hall B3 (B32)

ED-1.4 MON 9:45

Enhanced sensitivity to bosonic ultralight dark matter from acetylene transitions between near-degenerate vibrational modes

•F.L. Constantin; Laboratoire PhLAM, CNRS UMR 8523, Villeneuve d'Ascq, France

Fourier-transform microwave spectroscopy of a transition of $^{12}C_2H_2$ with enhanced sensitivity to the proton-electron mass ratio (μ) variation may constrain a fractional variation of μ at the 10^{-12} level in 1 s.

Room 7 Hall A1 (A11)

CE-1.5 MON 9:30

Multimode Fluoroindate Optical Fiber Coupler

•F. Anelli[1], A. Annunziato[1], V. Portosi[1], S. Cozic[2], S. Poulain[2], P. Le Pays Du Teilleul[2], and F. Prudenzano[1]; [1]Department of Electrical and Information Engineering, Politecnico di Bari, Bari, Italy; [2]Le Verre Fluoré, Bruz, France

A 2×2 coupler based on multimode fluoroindate optical fibers is fabricated and characterized for the first time. The experimental results show the possibility to manufacture fused optical fiber components for use in the mid-infrared spectrum.

CE-1.6 MON 9:45

Highly focused photonic nanojet by molded high curvature fiber micro-lenses

•T. Hajj[1,2], A. Guessoum[3], G. Chabrol[1,4], N.-E. Demagh[3], and S. Lecler[1,2]; [1]ICube, Université de Strasbourg, CNRS, 67412 Illkirch, France; [2]INSA Strasbourg, 67 000 Strasbourg, France; [3]Laboratoire d'Optique Appliqu´ee, IOMP, Ferhat Abbas University, 19 000 Setif, Algeria; [4]Icam Strasbourg-Europe, 67 300 Schiltigheim, France

Highly focused beams out of single mode fibers are made possible by high curvature molded microlenses deposited on their cores. The technique also works for non-silica and multicore fibers making it a very promising one.

Room 8 Hall A1 (A12)

EB-1.4 MON 9:30

Miniaturized crossed beam optical dipole trap for compact atom-based quantum sensors

•M. Christ[1,2], C. Zimmermann[1], O. Anton[2], and M. Krutzik[1,2]; [1]Ferdinand-Braun-Institut, Berlin, Germany; [2]Humboldt-Universität zu Berlin, Berlin, Germany

We present our development and qualification efforts towards compact and mobile physics packages of quantum sensors, including a micro-integrated 1064 nm crossed-beam optical dipole trap, UHV-compatible miniaturized optic systems and prospects of additive manufacturing methods.

EB-1.5 MON 9:45

In situ optomechanical mode tuning engineered using an integrated MEMS varactor for enhancing efficiency of microwave-to-optical quantum transduction

•A. Khurana, P. Jiang, and K.C. Balram; University of Bristol, Bristol, United Kingdom

We show that the acoustic-optic modulation in an optomechanical cavity can be tuned with an integrated MEMS varactor within an impedance matching network, designed to enhance the efficiency of microwave-to-optical signal transduction in piezoelectric optomechanical platforms.

Room 1 ICM

10:30 – 12:00

CM-2: Laser semiconductor processing

Chair: Stefan Nolte, Friedrich Schiller University Jena, Germany

CM-2.1 MON 10:30

Single Femtosecond Laser Pulse induced Amorphization, Re-crystallization and Native Oxide Removal at Silicon Wafer Surfaces

•J. Bonse[1], C. Florian[1,2], D. Fischer[1], K. Freiberg[3], M. Duwe[4], M. Sahre[1], S. Schneider[4], A. Hertwig[1], J. Krüger[1], U. Beck[1], and A. Undisz[5]; [1]Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany; [2]Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain; [3]Friedrich-Schiller-Universität Jena, Jena, Germany; [4]Park Systems GmbH, Göttingen, Germany; [5]Technische Universität Chemnitz, Chemnitz, Germany

Single femtosecond laser pulse induced amorphization, re-crystallization and native oxide layer removal at silicon wafer surfaces of different crystal orientation is studied via spectroscopic imaging ellipsometry, atomic force microscopy, and high-resolution transmission electron microscopy.

CM-2.2 MON 10:45

Ultra-High Space-Time Localization of Laser Energy for 3D Fabrication inside Semiconductors

•A. Wang[1], P. Salter[1], D. Grojo[2], and M. Booth[1]; [1]Department of Enineering Science, University of Oxford, Oxford, United Kingdom; [2]Aix-Marseille Université, CNRS, LP3, UMR7341, 13288, Marseille, France

By using spatially or temporally shaped laser pulses, we obtain high laser energy density at the focal spot that successfully crosses the damage threshold, thus opening new possibilities for fabricating 3D embedded devices inside semiconductors.

Room 4a ICM

10:30 – 12:00

EJ-2: Computational photonics at the light-matter interface

Chair: Fabian Maucher, University of the Balearic Islands, Palma de Mallorca, Spain

EJ-2.1 MON (Invited) 10:30

Exploring interacting photons and quantum states of light with atomic metasurfaces

•T. Pohl; Department of Physics and Astronomy, Aarhus, Denmark

This talk will explore different approaches to realize strong effective photon-photon interactions via extended regular arrangements of individual quantum emitters. Potential applications of the presented settings will also be discussed.

Room 4b ICM

10:30 – 12:00

EG-2: Metasurfaces

Chair: Jesper Moerk, Technical University of Denmark, Lyngby, Denmark

EG-2.1 MON 10:30

All-optical steering of light upconversion by nonlinear metasurfaces through coherent control

A. Di Francescantonio[1], A. Zilli[1], D. Rocco[2], F. Conti[1], V. Vinel[3], A. Borne[3], M. Morassi[4], A. Lemaitre[4], P. Biagioni[1], L. Duò[1], C. De Angelis[2], G. Leo[3], M. Finazzi[1], and •M. Celebrano[1]; [1]Physics Department, Politecnico di Milano, Milano, Italy; [2]Department of Information Engineering, University of Brescia, Brescia, Italy; [3]Laboratoire Matériaux et Phénomènes Quantiques, Université de Paris, Paris, France; [4]CNRS - Centre de nanosciences et de Nanotechnologie, Université Paris Saclay, Paris, France

We achieve all-optical switching of the upconverted light in periodic dielectric metasurfaces through a $\omega + 2\omega$ pump scheme. Exploiting the pump pulse delay as tuning knob, upconversion is switched between diffraction orders with an efficiency >90%

EG-2.2 MON 10:45

Optical Parametric Metamaterials – Frequency Mixing, Frequency Combs and Control of Brownian Motion

•T. Liu[1], J. Li[1,2], V. Raskatla[1], J.-Y. Ou[1], K. MacDonald[1], and N. Zheludev[1,2]; [1]University of Southampton, Southampton, United Kingdom; [2]Nanyang Technological University, Singapore, Singapore

Nano-opto-mechanical metamaterials on semiconductor nanomembranes are a perfect platform for parametric optical devices, frequency mixing and optical comb generation, and fundamental

Room 13a ICM

10:30 – 12:00

CA-2: Ultrafast lasers at 2 μm and beyond

Chair: Weidong Chen, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, China

CA-2.1 MON (Invited) 10:30

Towards few-optical-cycle generation from Thulium / Holmium mode-locked lasers

•V. Petrov, W. Chen, L. Wang, Y. Zhao, Z. Pan, and U. Griebner; Max Born Institute, Berlin, Germany

Essential requirements and properties of Tm- and Ho-doped laser materials for successful operation in the sub-100-fs pulse regime near 2 μm are discussed and more recent mode-locking laser results will be summarized.

Room 14a ICM

10:30 – 12:00

CD-2: Frequency conversion II

Chair: Yong Zhang, Nanjing University, China

CD-2.1 MON 10:30

Free-Space Quasi-Phase Matching

•N. Kovalenko, V. Hariton, K. Fritsch, and O. Pronin; Helmut Schmidt University, Hamburg, Germany

The first proof-of-concept experimental demonstration of $\chi(2)$-based multipass nonlinear conversion is presented. The free space true phase-matching and quasi-phase matching can be realized with nearly all types of nonlinear materials.

CD-2.2 MON 10:45

Multipass Spectral Broadening of Spatially Chirped Pulses

•A. Imani[1], P.A. Carpeggiani[1], E. Kaksis[1], D. Popmintchev[1], T. Popmintchev[1,2], A. Pugzlys[1], and A. Baltuska[1]; [1]Photonics Institute, TU Wien, Gußhausstraße 25-29, Vienna, Austria; [2]University of California San Diego, Physics Department, and Center for Advanced Nanoscience., La Jolla, USA

We propose a method to overcome the energy handling limit in a fixed-geometry multipass gas-SPM pulse scheme by a simple modification of the grating-pair compressor in a

Room 14b ICM

10:30 – 11:45

CH-2: AI for optical sensing

Chair: Sivankutty Siddharth, PhLAM, Lille, France

CH-2.1 MON 10:30

Deep Ensemble Learning and Transfer Learning Methods for Classification of Senescent Cells in Nonlinear Optical Microscopy Images

•F. Manetti[1], S. Sorrentino[1], A. Bresci[1], F. Vernuccio[1], C. Ceconello[1], S. Ghislanzoni[2], I. Bongarzone[2], R. Vanna[3], G. Cerullo[1,3], and D. Polli[1,3]; [1]Department of Physics, Politecnico di Milano, P.zza Leonardo da Vinci 32, 20133, Milan, Italy; [2]IRCCS Istituto Nazionale dei Tumori Foundation, Via Venezian 1, 20133, Milan, Italy; [3]CNR-Institute for Photonics and Nanotechnologies (IFN-CNR), P.zza Leonardo Da Vinci 32, 20133, Milan, Italy

Image classification using Deep Ensemble Learning and Transfer Learning is performed on nonlinear optical microscopy data to differentiate proliferating cancer cells from senescent ones, a peculiar phenotype following an anti-cancer treatment responsible for tumour relapse.

CH-2.2 MON 10:45

Metrology System Based on Metasurface Implementation of Artificial Inteligence

•A. Burguete-Lopez, M. Makarenko, Q. Wang, F. Getman, and A. Fratalocchi; King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

We present a metrology system for thin film measurements that employs artificial intelligence implemented in metasurfaces. We show initial results on the performance and fabrication of this system.

Room Osterseen ICM

10:30 – 12:00

JSII-2: Manipulating astronomical signals with photonics and future challenges I

Chair: Robert R. Thomson, Heriot Watt University, Edinburgh, United Kingdom

JSII-2.1 MON (Invited) 10:30

Fibre transitions for astronomical applications

•K. Harrington[1], T. Wright[1], S. Yerolatsitis[1], R. Harris[2], and T. Birks[1]; [1]University of Bath, Bath, United Kingdom; [2]Max-Planck-Institute for Astronomy, Heidelberg, Germany

Using an optical fibre transition, we present an all-fibre wavefront sensor for local tip-tilt of a wavefront. It has applications within adaptive optics and we present a validation case to show its applicability to astronomy.

Room 1 Hall B1 (B11)

10:30 – 12:00

CF-2: Advances in attosecond technology and high order harmonic generation II

Chair: Caterina Vozzi, Consiglio Nazionale delle Ricerche, Milan, Italy

CF-2.1 MON 10:30

Bright, high-frequency, circularly polarized structured attosecond pulses

•A. de las Heras[1], N.J. Brooks[2], B. Wang[2], I. Binnie[2], J. San Román[1], L. Plaja[1], H.C. Kapteyn[2], M.M. Murnane[2], and C. Hernández-García[1]; [1]Universidad de Salamanca, Salamanca, Spain; [2]JILA - Department of Physics, University of Colorado and NIST, Boulder, USA

We demonstrate the generation of bright circularly polarized structured attosecond pulses through high harmonic generation. The implementation of a rotating polarization grating along the azimuthal focal plane allows for high brightness and extended photon energies towards the soft x-rays.

CF-2.2 MON 10:45

1.7-cycle intense pulse source for MHz attosecond pulse generation

•T. Okamoto[1], K. Nagai[1], Y. Kunihashi[1], Y. Shinohara[1], H. Sanada[1], M.-C. Chen[2], and K. Oguri[1]; [1]NTT Basic Research Laboratories, Kanagawa, Japan; [2]National Tsing Hua University, Hsinchu, Taiwan

We present MHz operation of 1.7-cycle intense pulses (35 μJ) by compressing 80-W Yb:KGW laser pulses via the multi-plate continuum method.

Room 6 Hall B3 (B32)

10:30 – 12:00

ED-2: Direct comb spectroscopy

Chair: Markku Vainio, Helsinki University, Helsinki, Finland

ED-2.1 MON 10:30

Dual-comb spectroscopy from the UV to VUV

J. McCauley[1], Y. Zhang[1,2], R. Weeks[1], M. Phillips[1], and •R.J. Jones[1]; [1]Wyant College of Optical Sciences, University of Arizona, Tucson, USA; [2]Department of Physics, University of Arizona, Tucson, USA

We demonstrate ultraviolet dual-comb spectroscopy on laser-produced plasmas using the 4th harmonic from Yb fiber systems. We extend this capability towards the vacuum ultraviolet by utilizing intra-cavity high harmonic generation to measure atomic absorption spectra.

ED-2.2 MON 10:45

Near-Ultraviolet Frequency-Agile Dual-Comb Spectroscopy

•B. Xu[1], T.W. Hänsch[1,2], and N. Picqué[1]; [1]Max-Planck Institute of Quantum Optics, Garching, Germany; [2]Ludwig-Maximilian University of Munich, Munich, Germany

Near-ultraviolet dual-comb absorption spectroscopy is reported at 390 nm with photon-counting and shot-noise limited signal-to-noise ratio. The repetition frequencies and center frequency of the dual-comb system can be changed at will.

Room 7 Hall A1 (A11)

10:30 – 11:45

CE-2: Hollow core optical fibres

Chair: Stavros Pissadakis, FORTH, Heraklion, Greece

CE-2.1 MON 10:30

Development of Next Generation UV-Visible, Single-Mode, Hollow-core Optical Fibers

•I. Davidson, G. Jackson, T. Kelly, T. Varghese, G. Jasion, N. Wheeler, D. Richardson, and F. Poletti; University of Southampton, Southampton, United Kingdom

We report on the development of a new generation of broadband, UV-Visible guiding, single-mode, hollow-core optical fibers, via a novel fabrication approach, that offer performance levels comparable to commercial solid-core single-mode fibers.

CE-2.2 MON 10:45

The stadium fibre: a novel anti-resonant hollow-core fibre

•L.R. Murphy, J.M. Stone, T.A. Birks, J.C. Knight, and D. Bird; University of Bath, Bath, United Kingdom

We report novel anti-resonant hollow-core fibre with "stadium" resonators, which are radially elongated compared to tubular resonators. We simulate that elongating the resonators reduces confinement loss by a factor of ten and fabricate the fibre.

Room 8 Hall A1 (A12)

10:30 – 12:00

EB-2: Quantum interferometry

Chair: Maria Chekhova, MPL, Erlangen, Germany

EB-2.1 MON (Invited) 10:30

Applying Kerr Squeezed Light to Interferometry

N. Kalinin[1,2,4], T. Dirmeier[1,2], A.A. Sorokin[4], E.A. Anashkina[4,5], L.L. Sánchez-Soto[1,6], J.F. Corney[7], •G. Leuchs[1,2,3], and A.V. Andrianov[4]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Friedrich-Alexander-Universität , Erlangen, Germany; [3]Nexus for Quantum Technologies, University of Ottawa, Ottawa, Canada; [4]Institute of Applied Physics of RAS, Nizhny Novgorod, Russia; [5]Lobachevsky State University , Nizhny Novgorod, Russia; [6]Facultad de Física, Universidad Complutense, Madrid, Spain; [7]University of Queensland, Brisbane, Australia

The optical Kerr effect in fibers can be used for robust squeezed light generation. Here we demonstrate, for the first time, interferometer sensitivity enhancement beyond the shot noise limit using a third order nonlinearity.

NOTES

Room 1 ICM

CM-2.3 MON 11:00

Through-Silicon Ultrafast Laser Welding

•*M. Chambonneau[1], Q. Li[1], M. Blothe[1], and S. Nolte[1,2]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Abbe Center of Photonics, Albert-Einstein-Str. 15, 07745 Jena, Germany, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Albert-Einstein-Str. 7, 07745 Jena, Germany, Jena, Germany*

We demonstrate through-silicon ultrafast laser welding by determining and precompensating the nonlinear focal shift in the filamentation regime in silicon for optimizing the energy deposition at the interface between metals and silicon.

CM-2.4 MON 11:15

Gap materials drilling with femtosecond laser in GHz-burst mode

•*I. Manek-Hönninger[1], P. Balage[1], G. Bonamis[2], C. Hönninger[2], and J. Lopez[1]; [1]Université de Bordeaux-CNRS-CEA CELIA UMR5107, Talence, France; [2]Amplitude, Pessac, France*

We report novel results on top-down percussion drilling with a GHz-burst mode femtosecond laser in different gap materials including glasses, crystals and silicon. We studied the drilling rates and reachable hole dimensions.

Room 4a ICM

EJ-2.2 MON 11:00

Modeling Surface Enhanced Raman Scattering: a Novel Fully Atomistic QM/Classical Approach

•*T. Giovannini, P. Lafiosca, L. Nicoli, and C. Cappelli; Scuola Normale Superiore, Pisa, Italy*

We present a novel fully atomistic approach to model the surface-enhanced Raman spectra of molecular system, described quantum-mechanically, adsorbed on graphene and metal nanoparticles, treated by means of a classical electromagnetic method.

EJ-2.3 MON 11:15

Simple modeling of weak ultrashort photonic wavepackets using quantum-classical correspondence principle

•*I. Babushkin, S. Bose, P. Rübeling, O. Melchert, A. Demircan, M. Kues, and U. Morgner; Leibniz University, Hannover, Germany*

We consider photons, interacting with refractive index steps created by strong pulses in waveguides with complex dispersion. We show that evolution equations in such cases can be determined uniquely via the quantum-classical correspondence principle.

Room 4b ICM

studies of coupling between thermal excitations in metamaterials and their optical properties.

EG-2.3 MON (Invited) 11:00

Long-Lived Hot Electron dynamics via hyperbolic meta-antennas

•*H. Caglayan and R. Dhama; Tampere University, Tampere, Finland*

The tunable absorption band of hyperbolic meta-antenna control and modify the lifetime of the plasmon-induced hot electrons with enhanced excitation efficiency ins the near-infrared region and also broadens the utilization of the visible/NIR spectrum.

Room 13a ICM

CA-2.2 MON 11:00

0.5-μJ, 328-fs KLM Ho:YAG Thin-Disk Oscillator at 2.1 μm

•*S. Tomilov, Y. Wang, W. Yao, M. Hoffmann, and C. Saraceno; Ruhr-Universität Bochum, Bochum, Germany*

We report on a 2-μm, 328-fs Kerr-Lens-modelocked Ho:YAG thin-disk oscillator with an output power of 14 W, corresponding to a pulse energy of 0.5 μJ, representing almost two-fold improvement in comparison with state-of-the-art 2-μm KLM results.

CA-2.3 MON 11:15

Bulk Supercontinuum Generation for Ultra-CEP-Stable Single-Cycle Pulses at 2.2 μm

•*P. Steinleitner[1], M. Kowalczyk[1,2,3], N. Nagl[1,2], N. Karpowicz[1], V. Pervak[2], A. Głuszek[4], A. Hudzikowski[4], J. Sotor[4], F. Krausz[1,2,3], K.F. Mak[1], and A. Weigel[1,3]; [1]Max-Planck-Institut für Quantenoptik, Garching, Germany; [2]Fakultät für Physik, Ludwig-Maximilians-Universität München, Garching, Germany; [3]Center for Molecular Fingerprinting, Budapest, Hungary; [4]Laser & Fiber Electronics Group, Faculty of Electronics, Photonics and Microsystems, Wrocław University of Science and Technology, Wrocław, Poland*

We present the generation of ultrastable single-cycle pulses at 2.2 μm from a Kerr-lens-modelocked 22.9-MHz Cr:ZnS oscillator by supercontinuum generation in TiO2. The system features carrier-envelope-phase stabilization with a residual phase jitter of 5.9 mrad.

Room 14a ICM

standard CPA. A proof of concept is demonstrated for 2.5-mJ 1030-nm pulses.

CD-2.3 MON 11:00

Towards a versatile photonic platform with 2D Materials grown on Exposed-Core Fibers

•*G.Q. Ngo[1], E. Najafidehaghani[2], S. Khazaee[3], M.P. Siems[1], A. George[2], A. Tuniz[4], H. Ebendorff-Heidepriem[5], A. Turchanin[2], M. Schmidt[6], and F. Eilenberger[7]; [1]Institute of Applied Physics, Friedrich Schiller University Jena , Albert-Einstein-Str. 15, 07745 Jena , Germany; [2]Institute of Physical Chemistry, Friedrich Schiller University Jena, Lessingstrasse 10, 07745 Jena, Germany; [3]Institute of Solid State Theory and Optics, Friedrich Schiller University Jena, Max-Wien-Platz 1, 07743 Jena, Germany; [4]University of Sydney, School of Physics, Physics Road, Camperdown NSW 2006, Australia; [5]Institute for Photonics and Advanced Sensing, University of Adelaide , Adelaide SA 5005, Australia; [6]Leibniz Institute for Photonic Technology IPHT, Albert-Einstein-Str. 13, 07745 Jena, Germany; [7]Fraunhofer-Institute for Applied Optics and Precision Engineering IOF, Albert-Einstein-Str. 7, 07745 Jena, Germany*

We introduce a versatile photonic platform, where two-dimensional semiconductors are conformally grown on the core of microstructured exposed-core fibers to enable second-harmonic generation, third-harmonic generation, in-fiber exciton excitation, photoluminescence collection, and real-time gas sensing.

CD-2.4 MON 11:15

Novel Coercive Field Engineering Method for Short Period KTiOPO4

•*L. Barrett, A. Zukauskas, F. Laurell, and C. Canalias; Royal Institute of Technology (KTH), Stockholm, Sweden*

Room 14b ICM

CH-2.3 MON 11:00

Compressive Sensing Enhanced by Machine Learning

•*W. Li[1], K. Abrashitova[1], G. Osnabrugge[1], and L.V. Amitonova[1,2]; [1]Advanced Research Center for Nanolithography (ARCNL), Amsterdam, Netherlands; [2]LaserLaB, Department of Physics and Astronomy, Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

We propose and experimentally demonstrate fast super-resolution imaging technique bringing together compressive sensing, multimode fiber imaging & machine learning. A generative adversarial network improves image quality and noise robustness in the fiber imaging system.

CH-2.4 MON 11:15

Digital Holographic Microscopy applied to 3D Computer Microvision by using Deep Neural Networks

•*J.E. Brito Carcaño, S. Cuenat, B. Ahmad, P. Sandoz, R. Couturier, and M. Jacquot; Université de Franche-Comté, SUPMICROTECH-ENSMM, CNRS, Institut FEMTO-ST, Besançon, France*

We present new results in 3D reconstruction trajectories at video-rate with high level range-to-resolution ratio for microrobotics and automated microscopy applications by combining digital holography, computer microvision approaches and new generations of deep neural networks.

Room Osterseen ICM

JSII-2.2 MON 11:00

Lithium Niobate-on-Insulator for Integrated Near-to Mid-infrared Interferometry

•G. Li[1], G. Finco[1], A. Maeder[1], D. Pohl[1], F. Kaufmann[1], M.M. Ballester[2], J. Faist[2], A.M. Glauser[3], S.P. Quanz[3], and R. Grange[1]; [1]ETH Zurich, Department of Physics, Institute for Quantum Electronics, Optical Nanomaterial Group, 8093 Zürich, Switzerland; [2]ETH Zurich, Department of Physics, Institute for Quantum Electronics, Quantum Optoelectronics Group, 8093 Zürich, Switzerland; [3]ETH Zurich, Department of Physics, Institute of Particle Physics and Astrophysics, 8093 Zürich, Switzerland

We successfully demonstrated an on-chip Fourier transform infrared spectrometer on lithium niobate-on-insulator working in near-infrared. We also extended our design of integrated interferometry to mid-infrared to be potentially used in astrophysics.

JSII-2.3 MON 11:15

An arrayed waveguide grating for astronomical spectroscopy in the near infrared

•O. Pfuhl, V. Gopinath, S. Lévêque, S. Lewis, and N. Hubin; European Southern Observatory, Garching, Germany

We present the development and verification of an arrayed waveguide grating chip, working in the astronomical J-band with a spectral resolution of 10,000 for the application in astronomical spectrographs.

Room 1 Hall B1 (B11)

CF-2.3 MON 11:00

Point-spread function reduction through high-harmonic generation deactivation

•K. Murzyn[1], L. Guery[1], Z. Nie[1], M. van der Geest[1], and P.M. Kraus[1,2]; [1]Advanced Reseach Center for Nanolithography, Amsterdam, Netherlands; [2]LaserLaB, Department of Physics and Astronomy, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

This work demonstrates the working principle of a super-resolution microscope utilizing high-harmonic generation in solids. This novel experimental technique can extract the band structure as well as phase transitions of correlated materials on a nanometer-scale.

CF-2.4 MON 11:15

A simplified method for the characterization of extreme-ultraviolet pulses down to the attosecond regime

•N. Di Palo[1], G.L. Dolso[1], G. Inzani[1], B. Moio[1], F. Medeghini[1], R. Borrego-Varillas[2], M. Nisoli[1,2], and M. Lucchini[1,2]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]Institute of Photonics and Nanotechnologies, IFN-CNR, Milano, Italy

We present STRIPE, a novel method for the reconstruction of ultrashort extreme-ultraviolet pulses down to the attosecond regime based on two-colour photoemission measurements, demonstrating its superior performances with respect to other established retrieval algorithms.

Room 6 Hall B3 (B32)

ED-2.3 MON 11:00

Cavity-enhanced frequency comb spectroscopy in a supersonic jet

•R. Dubroeucq[1], Q. Le Mignon[1], N. Suas-David[1], S. Kassi[2], R. Georges[1], and L. Rutkowski[1]; [1]Univ. Rennes, CNRS, IPR (Institut de Physique de Rennes) - UMR 6251, Rennes, France; [2]Univ. Grenoble Alpes, CNRS, LIPhy, Grenoble, France

We demonstrate Fourier transform spectroscopy of acetylene in a supersonic jet with an optical frequency comb. The acquired spectra achieve high frequency precision limited by the comb stability and consecutive measurements could be efficiently averaged.

ED-2.4 MON 11:15

High Accuracy Line Lists of CH_4 and H_2CO in the 8 μm Range from Optical Frequency Comb Fourier Transform Spectroscopy

M. Germann[1], A. Hjältén[1], V. Boudon[2], C. Richard[2], J. Tennyson[3], S. Yurchenko[3], I.E. Gordon[4], C. Pett[5], I. Silander[1], K. Krzempek[6], A. Hudzikowski[6], A. Głuszek[6], G. Soboń[6], and •A. Foltynowicz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Laboratoire ICB, UMR 6303 CNRS/Université Bourgogne Franche-Comté, Dijon Cedex, France; [3]Department of Physics and Astronomy, University College London, London, United Kingdom; [4]Center for Astrophysics, Harvard and Smithsonian, Atomic and Molecular Physics Division, Cambridge, USA; [5]Department of Chemistry, Umeå University, Umeå, Sweden; [6]Faculty of Electronics Photonics and Microsystems, Wroclaw University of Science and Technology, Wroclaw, Poland

We measure line positions of

Room 7 Hall A1 (A11)

CE-2.3 MON 11:00

Geometrical Deformation Effects on Loss and Modal Content in Hollow-Core Tube-Lattice Fibers

•F. Melli[1], E. Soli[1], L. Rosa[1], K. Vasko[2], F. Benabid[2], and L. Vincetti[1]; [1] Department of Engineering "Enzo Ferrari", University of Modena and Reggio Emilia, Modena, Italy; [2]GPPMM Group, XLIM Institute, CNRS UMR 7252, University of Limoges, Limoges, France

Effects of geometrical deformations due to the fabrication process on propagation loss and modal content in Hollow-Core Tube-Lattice Fibres are numerically investigated by applying two different approaches: overlap integral at discontinuities and coupled mode theory

CE-2.4 MON 11:15

Distributed measurement of hollow-core fibre gas filling and venting via optical time-domain reflectometry

•E. Elistratova, T.W. Kelly, I.A. Davidson, H. Sakr, T.D. Bradley, A. Taranta, F. Poletti, R. Slavik, P. Horak, and N.V. Wheeler; University of Southampton, Southampton, United Kingdom

We present distributed measurements of the gas flow dynamic inside a hollow-core nested antiresonant nodeless fibre via optical time-domain reflectometry and validate them with a simplified circular capillary gas flow model.

Room 8 Hall A1 (A12)

EB-2.2 MON 11:00

Quantum nonlinear interferometry vs induced coherence

N. Gemmell[1], •E. Pearce[1], Y. Ma[1], J. Florez[1], C. Phillips[1], M. Kim[1], R. Oulton[1], and A. Clark[2]; [1]Imperial College London, London, United Kingdom; [2]Bristol University, Bristol, United Kingdom

Here we provide - for the first time – a direct comparison between the two possible modalities of quantum sensing with undetected photons: induced coherence and nonlinear interferometry, using both an experimental and theoretical model.

EB-2.3 MON 11:15

Scanning Quantum Interference across the Unbroken PT-Symmetric Phase

•F. Klauck, T. Wolterink, M. Heinrich, and A. Szameit; Institute of Physics, University of Rostock, Rostock, Germany

Losses in PT-symmetric systems inevitably change the quantum correlations of interfering photons. We study the impact of increased loss on the two-photon correlation in lossy couplers and observe the corresponding changes in Hong-Ou-Mandel dip visibility.

NOTES

Room 1 ICM

CM-2.5 MON 11:30

Nanosecond Laser-Induced Micro-Modifications in Bulk of Crystal Silicon

•*V. Kadan[1,2], S. Pavlova[4], A. Bek[1,3], Y. Aydin[1], I. Blonskyi[2], and I. Pavlov[1,2,3]; [1]Department of Physics, Middle East Technical University, Ankara, Turkey; [2]Institute of Physics of the NAS of Ukraine, Kyiv, Ukraine; [3]Center for Solar Energy Research and Applications, Middle East Technical University, Ankara, Turkey; [4]FiberLAST Fiber Lazer Sistemleri ve Teknolojileri A.Ş., Ankara, Turkey*

Local micro-modification produced by 1550 nm-wavelength ns-laser in c-Si in a wide range of energies, durations, repetition rates, and writing speeds is studied. We found dependency of the refractive index change on pulse duration.

CM-2.6 MON 11:45

Inscription and Characterization of Transversely Written Waveguides in Silicon with Picosecond Laser Pulses

•*M. Blothe[1], M. Chambonneau[1], A. Alberucci[1], N. Alasgarzade[1], and S. Nolte[1,2]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Abbe Center of Photonics, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Center of Excellence in Photonics, Jena, Germany*

We demonstrate the transverse in-

Room 4a ICM

EJ-2.4 MON 11:30

Quantum optics tensor networks in time for the design of nonlinear photonic devices

•*Q.M.B. Palmer[1], J.C. Adcock[1], W.J. Munro[2], and J.W. Silverstone[1]; [1]University of Bristol, Quantum Engineering Technology Labs, Bristol, United Kingdom; [2]NTT Basic Research Laboratories & Research Center for Theoretical Quantum Physics, Kanagawa, Japan*

We employ time evolving block decimation to simulate nonlinear quantum optics in time. From this we can extract photon spatial, temporal and spectral information of the underlying quantum state with applications in single photon sources.

EJ-2.5 MON 11:45

Quantum phases of bosonic chiral molecules in helicity lattice

F. Isaule, R. Bennett, and •J.B. Götte; School of Physics and Astronomy, University of Glasgow, Glasgow, United Kingdom

We reveal the existence of polarizing quantum phases for the enantiomers of cold, interacting chiral molecules in an optical helicity lattice by means of an extended Bose-Hubbard model.

Room 4b ICM

EG-2.4 MON 11:30

Light-to-sound conversion in silicon nanodrums

•*V. Kornienko, T. Koskinen, and I. Tittonen; Aalto University, Helsinki, Finland*

We investigate opto-acoustic conversion in tailored periodic nanostructures on silicon with an optical pump-probe set-up. We demonstrate the impact of the optical and acoustic resonances on the properties of the excited acoustic pulse.

EG-2.5 MON 11:45

Dynamic Dielectric Metasurfaces Based on Lattice Resonances: Tuning and Switching Effects via Superstrate-to-Substrate Dielectric Contrast

•*I. Allayarov[1,2,3], A. Evlyukhin[3,4], D.J. Roth[5], B. Chichkov[3,4], A. Zayats[5], and A. Cala Lesina[1,2,3]; [1]Institute of Transport and Automation Technology, Leibniz University Hannover, Garbsen, Germany; [2]Hannover Centre for Optical Technologies, Leibniz University Hannover, Hannover, Germany; [3]Cluster of Excellence PhoenixD, Leibniz University Hannover, Hannover, Germany; [4]Institute of Quantum Optics, Leibniz University Hannover, Hannover, Germany;*

Room 13a ICM

CA-2.4 MON 11:30

1.2-ps SESAM mode-locked Tm:LiYF4 laser at 2.31 μm

A. Tyazhev[1], M. Gaulke[2], •P. Loiko[3], J. Heidrich[2], M. Golling[2], L. Guillemot[3], T. Godin[1], P. Camy[3], U. Keller[2], and A. Hideur[1]; [1]CORIA UMR6614, CNRS-INSA-Université de Rouen, Normandie Université, Saint Etienne du Rouvray, France; [2]ETH Zurich, Department of Physics, Institute for Quantum Electronics, Zurich , Switzerland; [3]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France

A Tm:LiYF4 laser upconversion-pumped by 1043-nm Yb-fiber laser is mode-locked by a GaSb-based SESAM. It delivers 1.2-ps pulses at 2308 nm with an output power of 252 mW at a repetition rate of 114.5 MHz.

CA-2.5 MON 11:45

Single-cavity Dual-comb 2.36-μm Cr:ZnS Laser

•*A. Barh, A. Nussbaum-Lapping, M. Gaulke, M. Golling, C.R. Phillips, and U. Keller; ETH Zürich, Zürich, Switzerland*

The first single-cavity SESAM-modelocked dual-comb Cr:ZnS laser operating at 2.36 μm is presented. At 242 MHz, an average power over 200 mW per comb and a pulse duration close to 200 fs is achieved.

Room 14a ICM

We demonstrate a new, reliable method for short period QPM structures in KTP, through coercive field engineering via Ba2+/K+ indiffusion. We show that this method is compatible with waveguide implementation without compromising the domain structure.

CD-2.5 MON 11:30

Spontaneous Parametric Down Conversion in Orientation-Patterned Gallium Phosphide Waveguides at Telecom Wavelength

•*A. Marceau[1,2], S. Colmbrié[1], I. Ghorbel[1], I. Sagnes[2], A. De Rossi[1], K. Panzas[2], and A. Grisard[1]; [1]Thales Research & Technology, Palaiseau, France; [2]Centre de Nanosciences et de Nanotechnologies, Palaiseau, France*

Spontaneous parametric down conversion is presented in a new promising platform : Orientation-Patterned Gallium Phosphide (OP-GaP). Spectral measurements on the generated pairs in the telecom range is performed in addition to coincidence between polarization correlated pairs.

CD-2.6 MON 11:45

Wavelength Conversion of 32GBaud 16QAM Signal Without Preamplifiers Using Ultra-low-loss Compact Integrated Silicon Nitride Nonlinear Photonic Waveguides

•*P. ZHAO, Z. He, V. Shekhawat, M. Karlsson, and P.A. Andrekson; Chalmers University of Technology, GOTHENBURG, Sweden*

We present the wavelength conversion of single-polarization coherent signal beyond 100 Gbps using a compact integrated Si3N4 nonlinear

Room 14b ICM

CH-2.5 MON 11:30

Towards whispering-gallery-resonance photonic learning machine

•*D. D'Ambrosio[1], M. Capezzuto[1], S. Avino[1], A. Giorgini[1], P. Malara[1], D. Pierangeli[2], C. Conti[2], and G. Gagliardi[1]; [1]Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica (INO), Pozzuoli, Italy; [2]Consiglio Nazionale delle Ricerche, Institute for Complex Systems (ISC-CNR), Roma, Italy*

A novel neuromorphic photonic scheme based on a spatial light modulator and a whispering-gallery mode resonator is demonstrated. The proposed setup is both feasible for automatic alignment applications and for machine learning classification tasks

Room Osterseen ICM

JSII-2.4 MON 11:30

18 GHz Ultraviolet Astrocomb via Chip-Integrated Harmonic Generation

•M. Ludwig[1], F. Ayhan[2], T. Voumard[1], T. Wildi[1], M.A. Gaafar[1], D. Grassani[3], E. Obrzud[3], T. Schmidt[4], F. Bouchy[4], L.G. Villanueva[2], V. Brasch[5], and T. Herr[1,6]; [1]Deutsches Elektron-Synchrotron DESY, Hamburg, Germany; [2]Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland; [3]Centre Suisse d'Electronique et Microtechnique SA (CSEM, Neuchâtel, Switzerland; [4]Department of Astronomy, University of Geneva, Chemin des Maillettes 51, Versoix, Switzerland; [5]Q.ant GmbH, Stuttgart, Germany; [6]Physics Department, Universität Hamburg, Hamburg, Germany

We present an electro-optic astrocomb at 18 GHz repetition rate centered at 390 nm via on-chip cascaded harmonic generation covering more than 8000 lines spanning across 150 THz.

JSII-2.5 MON 11:45

Mid-IR SWIFTS : a miniature integrated spectrometer in the L-band

•M. Bonduelle[1], G. Martin[1], A. Morand[2], N. Courjal[3], R. Salut[3], and L. Robert[3]; [1]IPAG , Grenoble, France; [2]IMEP-LAHC, Grenoble, France; [3]FEMTO-ST, Besançon, France

We are presenting a new miniature spectrometer in the Mid-InfraRed (L-band) using the SWIFTS (Stationary Wave Integrated Fourier Transform Spectrometer) Gabor

Room 1 Hall B1 (B11)

CF-2.5 MON (Invited) 11:30

Liquid crystals meet strong-field physics: first attempts of HHG in soft matter

L. Becker[1], A. Annunziata[2,3], P. Friebel[1], D. Facciala[3], C. Vozzi[3], and •L. Cattaneo[1]; [1]Max Planck Institute for Nuclear Physics, Heidelberg, Germany; [2]Physics Department, Politecnico di Milano, Milano, Italy; [3]National Research Council (CNR), Institute for Photonics and Nanotechnologies, Milano, Italy

We present preliminary results of HHG spectroscopy in 8CB smectic A liquid crystal under different geometries and temperature, using a single colour pumping scheme in the mid-IR wavelength with subsequent detection in the NIR-visible range.

Room 6 Hall B3 (B32)

methane and formaldehyde with sub-MHz accuracy using Fourier transform spectroscopy based on a compact 8 μm comb source and use them to refine theoretical models of these molecules.

ED-2.5 MON 11:30

Mid-IR optical frequency comb Fourier transform spectroscopy using an antiresonant hollow-core fiber

•D. Tomaszewska-Rolla[1], P. Jaworski[1], D. Wu[2,3], F. Yu[2,3], A. Foltynowicz[4], G. Soboń[1], and K. Krzempek[1]; [1]Laser & Fiber Electronics Group, Wroclaw University of Science and Technology, Wroclaw, Poland; [2]Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences, Hangzhou , China; [3]Key Laboratory of Materials for High Power Laser, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Shanghai, China; [4]Department of Physics, Umeå University, Umeå, Sweden

We show the first demonstration of gas detector based on an optical frequency comb using an antiresonant hollow-core fiber gas absorption cell, which is capable of measuring molecules with transition lines in the mid-infrared region.

ED-2.6 MON 11:45

Dual-comb spectroscopy in the water-transparent 8-12 μm region

•L. Moretti[1], M. Walsh[2], D. Gatti[1], M. Lamperti[3], J. Genest[2], A. Farooq[4], and M. Marangoni[1]; [1]Dipartimento di Fisica - Politecnico di Milano and IFN-CNR, Lecco, Italy; [2]Centre d'optique, photonique et laser, Université Laval, Québec City, Québec, Canada; [3]Department of Science and High Technology, University of Insubria, Como, Italy; [4]King Abdullah University for Science and Technology (KAUST),

Room 7 Hall A1 (A11)

CE-2.5 MON 11:30

Enhancing the Optical Properties of Hollow Core Fibre Gas Cells by Selective Core Pressurisation

•S. Pradhan, T.W. Kelly, I.A. Davidson, P. Horak, and N.V. Wheeler; Optoelectronics Research Centre, University of Southampton, Southampton SO17 1BJ, Southampton, United Kingdom

We fabricate a hermetically-sealed hollow-core fibre-based gas cell, where the core is filled with a higher gas pressure than the cladding to enhance optical performance. Measurements over time indicate no degradation due to gas permeation.

Room 8 Hall A1 (A12)

EB-2.4 MON 11:30

Post-Selection Free Franson Interference of Hyperentangled Quantum States

•K. Lozano-Mendez[1], S. Sharma[1], and F. Steinlechner[1,2]; [1]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [2]Abbe Center of Photonics, Friedrich-Schiller-University Jena, Jena, Germany

A post-selection free scheme for measuring time-energy entanglement based on optical interference and photon pairs simultaneously entangled in polarization and time-energy was implemented, yielding high visibility values of 96.6% .

EB-2.5 MON 11:45

Self-stabilized optical phase sensor based on nonlinear interferometer

•R. Dalidet, A. Martin, G. Sauder, S. Tanzilli, and L. Labonté; Université Côte d'Azur, CNRS, Institut de physique de Nice, France, Nice, France

We report an optical phase sensor, enaling to perform a high-precision measurement in a self-stabilized way. We highlight the performance of our system by measuring the second and the third order of dispersion.

NOTES

Room 1 ICM	Room 4a ICM	Room 4b ICM	Room 13a ICM	Room 14a ICM	Room 14b ICM
scription of optical waveguides in the bulk of silicon using picosecond laser pulses		[5]*Department of Physics and London Centre for Nanotechnology, King's College London, London, United Kingdom* We present a new practical strategy for dynamic manipulation of optical metasurfaces response via the superstrate-to-substrate dielectric contrast.		photonic waveguide, without additional optical amplification of the signal and idler waves for the first time.	

Room 4a ICM

12:00 – 12:52

PP-1: Early-stage researcher (ESR) session - Poster pitches I

Chair: Emiliano Descrovi, European Optical Society, Palaiseau, France

PP-1.1 MON (Poster pitch of CA-P.6) 12:00

Alexandrite Lasers Operating with High-power Blue-diode-pumping

•*H. Xiao, X. Jiang, and M. Damzen*; *Imperial College London, London, United Kingdom*

We have demonstrated a blue-diode pumped Alexandrite laser with the highest power to date and performed a full characterisation and analysis of laser performance and prospects of blue as an alternative to red diode pumping.

PP-1.2 MON (Poster pitch of CA-P.21) 12:04

High average power amplification of femtosecond pulses based on Yb: CaYAlO4 crystal

•*C. Bai[1], W. Tian[1], G. Wang[1], L. Zheng[1], X. Tian[1], Y. Yu[1], X. Xu[3], Z. Wei[2], and J. Zhu[1]*; [1]*Xidian University, Xi'an 710071, China*; [2]*Chinese Academy of Sciences, Beijing 100190, China*; [3]*Jiangsu Normal University, Xuzhou 221116, China*

In this report, we demonstrated the direct amplification with the Yb:CALYO crystal for the first time. The amplifier delivered amplified pulses with the average powers of 55.4 W and pulse duration of 166 fs.

PP-1.3 MON (Poster pitch of CB-P.1) 12:08

Dual-wavelength DFB Laser Based on Four Phase-shifts Sections and Equivalent Chirp Technology for Millimeter-wave Generation

•*B. Yuan[1], Y. Fan[1], S. Zhu[1], Y. Zhang[2], J. Marsh[1], and L. Hou[1]*; [1]*University of Glasgow, Glasgow, United Kingdom*; [2]*Nanjing University of Posts and Telecommuinications, Nanjing, China*

A monolithic dual-wavelength DFB laser based on four phase-shifts sections and equivalent chirp is demonstrated. A 61.2 GHz RF signal is observed by beating the two optical signals in a photodetector.

PP-1.4 MON (Poster pitch of CB-P.2) 12:12

Analysis of ultra-low frequency noise external cavity diode laser-systems for optical ion clocks

•*N. Kolodzie[1,2], I. Mirgorodskiy[1], C. Nölleke[1], and P.O. Schmidt[2,3]*; [1]*TOPTICA Photonics AG, Gräfelfing, Germany*; [2]*Physikalisch-Technische Bundesanstalt, Braunschweig, Germany*; [3]*Institut für Quantenoptik, Leibniz Universität Hannover, Hannover, Germany*

We investigate the characteristics of two different diode based ultra-low noise lasers for quantum applications. Differences in operation are analysed both experimentally and theoretically, and advantages and disadvantages of each system-type are discussed.

PP-1.5 MON (Poster pitch of CD-P.2) 12:16

Efficient Generation of Vacuum-Ultraviolet Light in an Ultracompact Setup for Applications in Molecular and Nuclear Spectroscopy

•*M. Seitz[1], J. Al-Nuwaider[2], F. Belli[3], L. Silletti[1], V. Wanie[1], F. Calegari[1,4], and A. Trabattoni[1,2]*; [1]*Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*Institute of Quantum Optics, Hannover, Germany*; [3]*Heriot-Watt University, School of Engineering and Physical Sciences, Edinburgh, United Kingdom*; [4]*Physics Department, Universität Hamburg, Hamburg, Germany*

This contribution presents an innovative and efficient vacuum ultraviolet light source, employing consecutive nonlinear frequency conversion in nonlinear crystals and up-conversion in a hollow core fiber via four-wave mixing.

PP-1.6 MON (Poster pitch of CH-P.4) 12:20

Deeply Sub-wavelength 2D Optical Metrology with Superoscillatory Light

•*Y. Wang[1], J.-K. So[2], E.A. Chen[2], C. Rendón-Barraza[2], B. Wang[2], G. Adamo[2], E. Plum[1], K. MacDonald[1], J.-Y. Ou[1], and N. Zheludev[1,2]*; [1]*Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom*; [2]*Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore, Singapore*

We demonstrate optical metrology for two-dimensional sub-wavelength objects with resolution beyond $\lambda/50$ via deep learning-enabled analysis of light scattering from target objects illuminated by the phase singularity of superoscillatory structured light.

PP-1.7 MON (Poster pitch of CH-P.8) 12:24

Optical Localization of Nanoparticles in Sub-Rayleigh Clusters

•*B. Wang[1], Y. Li[2], E.A. Chan[1], G. Adamo[1], B. An[2], Z. Shen[1], and N.I. Zheludev[1,3]*; [1]*Centre for Disruptive Photonic Technologies, The Photonics Institute, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, Singapore*; [2]*Artificial Intelligence Research Institute, School of Computer Science and Engineering, Nanyang Technological University, Singapore, Singapore*; [3]*Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom*

By deep learning analysis of diffraction patterns of light scattered on sub-wavelength nano-holes clustered within Rayleigh distance, we retrieve their positions with high accuracy breaking the diffraction limit of optical resolution.

PP-1.8 MON (Poster pitch of CM-P.4) 12:28

Tailoring the optical response of 3D-printed photonic crystals using Aluminum Zinc Oxide

•*D. Ladika[1,2], A. Theodosi[1], O. Tsilipakos[3], A. Klini[1], P. Loukakos[1], M. Kafesaki[1,2], M. Farsari[1], and D. Gray[1]*; [1]*IESL-FORTH,Nik. Plastira 100, 70013 , Heraklion,Crete, Greece*; [2]*Department of Materials Science and Technology, 70013, University of Crete, Heraklion,Crete, Greece*; [3]*National Hellenic Research Foundation (N.H.R.F.), 48 Vassileos Constantinou Avenue, 11635, Athens, Greece*

The extraordinary optical properties of the Epsilon Near Zero material, Aluminum Zinc Oxide will be studied in three dimensions, by deposing it on 3D photonic crystals, which are responsive in the Telecommunication Spectrum.

PP-1.9 MON (Poster pitch of CM-P.5) 12:32

In-depth jet dynamics investigations of femtosecond laser bioprinting

•*B. Kreidl[1], J. Zhang[2], S. Niehren[2], H. Clausen-Schaumann[1], S. Sudhop[1], and H.P. Huber[1]*; [1]*Lasercenter, Department of Applied Sciences and Mechatronics, Munich University of Applied Sciences HM, Lothstrasse 34, 80335, München, Germany*; [2]*Molecular Machines & Industries, Breslauer Strasse 2, 85386, Eching, Germany*

In-depth investigations of jet dynamics in previously developed femtosecond laser bioprinting allow precise control over the transfer process, enabling printing resolutions of <42±3 μm and single cell deposition accuracy of <15 μm.

PP-1.10 MON (Poster pitch of EF-P.4) 12:36

Programmable THz-range comb multiplication using a feedback-controlled multi-wavelength laser

•*S. Abdollahi, P. Marin-Palomo, M. Ladouce, and M. Virte*; *Brussels Photonics Team (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium*

We demonstrate all-optical THz-range comb multiplication based on a feedback-controlled on-chip multi-wavelength laser. Varying the phase of the signal fed back to the laser we clone the injected comb to offset frequencies up to 1.3THz.

PP-1.11 MON (Poster pitch of EJ-P.1) 12:40

Squeezed light source on lithium niobate on insulator for GKP generation without periodic poling

•*T.N. Arge, R.R. Domeneguetti, J.S. Neergaard-Nielsen, T. Gehring, and U.L. Andersen*; *Center for Macroscopic Quantum States (bigQ) Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark*

In this work we present simulations and novel ideas for generating squeezed light on a Lithium Niobate on Insulator platform for continous variable quantum computa-

Room Osterseen ICM

technology. The chosen material is Lithium Niobate, thus allowing for integrated active beam combination.

Room 1 Hall B1 (B11)

Room 6 Hall B3 (B32)

Physical Science and Engineering Division, Thuwal, Saudi Arabia
We demonstrate fast dual-comb spectroscopy in the mid-IR region with a figure of merit in excess of 10^7 $Hz^{0.5}$ as a tool for investigation of non-repetitive phenomena related to the chemical kinetics in combustion processes.

Room 7 Hall A1 (A11)

Room 8 Hall A1 (A12)

NOTES

Room 4a ICM

tion. We focus on purity and indistinguishability of the source.

PP-1.12 MON (Poster pitch of JSII-P.2) 12:44

OPA! The Original PolyOculus Array for Mt. Laguna Observatory

•*C. Moraitis*[1,5], *S. Eikenberry*[1,5], *R. Amezcua-Correa*[1], *S. Yerolatsitis*[1], *C. Warner*[3], *D. Wright*[2], *H. Reale*[1], *J. Foran*[1], *A. Akers*[1], *J. Rowe*[1], *K. Semmen*[1], *V. Pagliuca*[1], *T. Thomas*[1], *N. Salem*[1], *V. Miller*[1], *N. Harmon*[1], *M. Bentz*[4], *A. Gonzalez*[3], *J. Harrington*[5], *N. Law*[6], *T. Maccarone*[7], *and R. Quimby*[8]; [1]*College of Optics and Photonics (CREOL), University of Central Florida, Orlando, FL, USA*; [2]*Department of Physics, University of Central Florida, Orlando, FL, USA*; [3]*Department of Astronomy, University of Florida, Gainesville, FL, USA*; [4]*Georgia State University, Atlanta, GA, USA*; [5]*Planetary Sciences Group, Department of Physics, University of Central Florida, Orlando, FL, USA*; [6]*University of North Carolina - Chapel Hill, Chapel Hill, NC, USA*; [7]*Texas Tech University, Lubbock, TX, USA*; [8]*San Diego State University, San Diego, CA, USA*

The OPA project, the Original PolyOculus Array, is a seven-pack telescope array that uses the PolyOculus technology to create a large-area-equivalent telescope for spectroscopy by combining the light of each small telescope via photonic lantern

PP-1.13 MON (Poster pitch of JSIV-P.2) 12:48

Photo-Electrochemical Imaging of Ultrathin Single-Crystalline Gold Micro-Flakes

•*M. Sabzehparvar, P. Feurstein, F. Kiani, and G. Tagliabue*; *École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*

We study photo-induced activity of gold micro-flakes of different thicknesses using light-assisted scanning electrochemical microscopy. Our work aims to reveal dependencies on thickness and wavelength for photocatalytic activity and stability, and the possible edge effects.

NOTES

Room 1 ICM

14:00 – 15:30

CM-3: Temporal and spatial beam shaping for laser processing I

Chair: Alexandre Mermillod-Blondin, Max-Born-Institute Berlin, Germany

CM-3.1 MON 14:00

Microexplosions in bulk sapphire driven by simultaneously spatially and temporally focused femtosecond laser beams

W. Cheng[1], Z. Wang[2], X. Liu[3], A. Rudenko[1], Y. Cheng[2,4], and •P. Polynkin[1]; [1]College of Optical Sciences, University of Arizona, Tucson, USA; [2]State Key Laboratory of High Field Laser Physics, Shanghai Institute of Optics and Fine Mechanics (SIOM), Chinese Academy of Sciences, Shanghai, China; [3]Aerospace Information Research Institute, Chinese Academy of Sciences, Beijing, China; [4]School of Physics and Electronic Sciences, East China Normal University, Shanghai, China

We show by simulations that peak pressures inside ultrafast-laser-driven microexplosions in sapphire are limited by ~250GPa, two orders of magnitude below earlier estimates. We use SSTF focusing as a potential route toward overcoming this limitation.

CM-3.2 MON 14:15

Taming Laser Wavefronts for Advanced Multiphoton Polymerization

•M. Manousidaki[1], A. Kyriakakis[2], K. Misdanitis[2], D.G. Papazoglou[1,2], M. Farsari[1], and S. Tzortzakis[1,2,3]; [1]IESL-FORTH, Heraklion, Greece; [2]Materials Science and Technology Department, University of Crete, Heraklion, Greece; [3]Art & Science, Texas A&M University at Qatar, Doha, Qatar

Taming Laser Wavefronts can surpass the limitations of the conventional single point-by-point and time-consuming 3D printing. Advanced light shaping accelerates the fabrication by Multi-photon Poly-

Room 4a ICM

14:00 – 15:30

CK-1: Lithium niobate and silica systems

Chair: Stéphane Clemmen, Ghent University, Belgium

CK-1.1 MON 14:00

High Extinction Ratio Thermo-optic Switch On Thin Film Lithium Niobate With Fast Rise Times

•A. Maeder, F. Kaufmann, G. Finco, J. Kellner, R.J. Chapman, and R. Grange; Optical Nanomaterial Group, Institute for Quantum Electronics, Department of Physics, ETH Zurich, Zurich, Switzerland

We present a thermo-optically controlled switch on the lithium niobate-on-insulator platform. We measured extinction ratios up to 36 dB, power consumptions below 50 mW and fast rise times of 1.7 μs using overdrive voltage signals.

CK-1.2 MON 14:15

Wavelength meter on thin film lithium niobate based on superconducting single photon detectors

•A. Prencipe, S. Gyger, M.A. Baghban, J. Zichi, K.D. Zeuner, T. Lettner, L. Schweickert, S. Steinhauer, A.W. Elshaari, K. Gallo, and V. Zwiller; KTH Royal Institute of Technology, Stockholm, Sweden

We demonstrate a waveguide-integrated wavelength-meter based on superconducting single photon detectors on thin film lithium niobate waveguides. The device exhibits a sensitivity of -5e-3 counts/nm for wavelengths around 1550 nm.

Room 4b ICM

14:00 – 15:30

EG-3: Optoelectronics and light-electron interactions

Chair: Mathieu Mivelle,CNRS, Sorbonne university, Paris, France

EG-3.1 MON 14:00

Ultrastrong light matter interaction at the single element level

•E. Jöchl[1], M. Barra Burrillo[2], S. Rajabali[1], M. Beck[1], J. Faist[1], and G. Scalari[1]; [1]ETH Zürich, Zürich, Switzerland; [2]CIC NanoGUNE, Donostia-San Sebastian, Spain

To potentially uncover new states of matter we investigate the light matter interaction of single metamaterial cavities ultrastrongly coupled to different systems. These include electrically depleted quantum wells and high quality monolayer hBN-graphene stacks.

EG-3.2 MON 14:15

Photocurrent nanoimaging of structural and spin-momentum locking chiralities in topological insulators

•A. Dubrovkin[1,2], G. Adamo[1,2], L. Wang[3], Q.J. Wang[1,2,4], N. Zheludev[1,2,5], and C. Soci[1,2,4]; [1]Centre for Disruptive Photonic Technologies, TPI, Nanyang Technological University, 637371 Singapore, Singapore, Singapore; [2]School of Physical and Mathematical Sciences, Nanyang Technological University, 637371 Singapore, Singapore, Singapore; [3]RMIT University, Department of Physics, School of Applied Sciences, Melbourne, VIC 3000, Australia, Melbourne, Australia; [4]School of Electrical and Electronic Engineering, Nanyang Technological University, 639798 Singapore, Singapore, Singapore; [5]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, SO17 1BJ, UK, Southampton, UK

Room 13a ICM

14:00 – 15:30

CA-3: Novel laser materials

Chair: Federico Pirzio, University of Pavia, Italy

CA-3.1 MON (Invited) 14:00

Low-Phonon-Energy Rare-Earth doped Laser Gain Materials: Crystals vs. Glasses

•E.E. Brown[1], Z. Fleischman[1], J. McKay[1], L. Merkle[1], U. Hommerich[2], W. Palosz[3], and S. Trivedi[3]; [1]DEVCOM Army Research Laboratory, Adelphi, USA; [2]Hampton University, Hampton, USA; [3]Brimrose Technology Corporation, Sparks Glencoe, USA

We present a comparative spectroscopic study of RE3+ (Dy3+, Ho3+, Er3+) doped low-phonon fluoride (BaF2, NaYF4) and chloride (CsCdCl3, CsPbCl3) single crystals, as well as Ga-Ge based chalcogenide (S, Se) glasses, with the emphasis on their respective mid-IR transitions.

Room 13b ICM

14:00 – 15:30

CB-2: Surface-emitting lasers

Chair: Susumu Noda, Kyoto University, Japan

CB-2.1 MON 14:00

2.04-μm single and dual-comb modelocked InGaSb-MIXSEL

•M. Gaulke[1], J. Heidrich[1], N. Huwyler[1], M. Schuchter[1,2], M. Golling[1], A. Barh[1], and U. Keller[1]; [1]Department of Physics, Institute for Quantum Electronics, ETH Zürich, Zürich, Switzerland; [2]Optoelectronics Research Centre, Physics Unit, Faculty of Engineering and Natural Sciences, Tampere University, Tampere, Finland

We present an InGaSb-MIXSEL operating at 2035 nm in single and dual-comb operation. In single-comb operation we obtained 1.5-ps pulses with an average output power of 27 mW at 3.9 GHz repetition rate.

CB-2.2 MON 14:15

Recent developments on MECSELs: Multi-type quantum well gain structures for widely tunable continuous wave operation and a non-resonant sub-cavity design

•H. Kahle[1,2], P. Rajala[2], P. Tatar-Mathes[2], and M. Guina[2]; [1]Institute for Photonic Quantum Systems (PhoQS), Center for Optoelectronics and Photonics Paderborn, and Department of Physics, Paderborn University, Warburger Straße 100, Paderborn, Germany; [2]Optoelectronics Research Centre (ORC), Physics Unit / Photonics, Faculty of Engineering and Natural Science, Tampere University,

Room 14a ICM

14:00 – 15:30

CD-3: Integrated nonlinear photonics

Chair: Nathalie Vermeulen,Vrije Universiteit Brussel, Belgium

CD-3.1 MON (Invited) 14:00

Nonlinear Photonics with Lithium Niobate

•M. Loncar; Harvard University, Cambridge, USA

I will discuss recent progress with thin film lithium niobate photonic platform, focusing on applications in nonlinear photonics.

Room Osterseen ICM

14:00 – 15:30

JSII-3: Manipulating astronomical signals with photonics and future challenges II

Chair: Lucas Labadie, University of Cologne, Köln, Germany

JSII-3.1 MON (Invited) 14:00

What it takes to observe exoplanets with optical interferometry

•S. Lacour; Observatoire de Paris, Meudon, France

I will present the lessons learned from the GRAVITY interferometer, focusing on the science case of exoplanet detection. I will show how photonics were crucial to enable this.

Room 1 Hall B1 (B11)

14:00 – 15:30

CF-3: Complex pulses and their characterization

Chair: Haim Suchowski, Tel Aviv University, Israel

CF-3.1 MON 14:00

Electro-Optic Sampling of Femtosecond Electric-Field Transients Generated in a Synchronously-Pumped Optical Parametric Oscillator

•H. Kempf[1], F. Breuning[1], A. Muraviev[2], K. Vodopyanov[2], and A. Leitenstorfer[1]; [1]Department of Physics and Center for Applied Photonics, University of Konstanz, Konstanz, Germany; [2]CREOL, College of Optics and Photonics, University of Central Florida, Orlando, USA

We generate intense and phase-locked mid-infrared waveforms pumping a divide-by-two optical parametric oscillator with a passively phase-stable Er:fiber source. Few-femtosecond near-infrared probes sensitively resolve the octave-wide electric-field traces of these transients in electro-optic sampling.

CF-3.2 MON (Invited) 14:15

Sampling Mid-infrared Waveforms in Time and Space

Y. Liu[1], •S. Gholam-Mirzaei[2], D. Khatri[1], T.-C. Truong[1], A. Staudte[2], P. Corkum[2], and M. Chini[1]; [1]University of Central Florida, Orlando, USA; [2]National Research Council of Canada and University of Ottawa, Ottawa, Canada

We demonstrate that multiphoton excitation in a CMOS image sensor can be used as a sub-cycle temporal gate, allowing the measurement of the full space, time, and polarization state of structured mid-infrared laser waveforms.

Room 2 Hall B1 (B12)

14:00 – 15:30

CL-1: Brain imaging

Chair: Kenneth K. Y. Wong, The University of Hong Kong, China

CL-1.1 MON (Invited) 14:00

Reconstructing brain tissue with light microscopy

•J.G. Danzl; Institute of Science and Technology Austria, Klosterneuburg, Austria

Brain tissue constitutes an extremely complex and dense arrangement of neurons, forming the information-processing network underlying all brain function. I will present our developments of optical super-resolution technologies to decode brain tissue architecture and dynamics.

Room 6 Hall B3 (B32)

14:00 – 15:30

ED-3: Frequency references and transfer

Chair: Piotr Maslowski, Nicolaus Copernicus University in Torun, Torum, Poland

ED-3.1 MON (Invited) 14:00

Precise Comb-based Time Transfer Over Long Distance Terrestrial Links

E.D. Caldwell[1,2], J.-D. Deschenes[3], J. Ellis[1], W.C. Swann[1], B.K. Stuhl[4], H. Bergeron[3], N.R. Newbury[1], and •L.C. Sinclair[1]; [1]National Institute of Standards and Technology, Boulder, USA; [2]Department of Electrical, Energy and Computer Engineering, University of Colorado, Boulder, USA; [3]Octosig Consulting, Quebec City, Canada; [4]Space Dynamics Laboratory, North Logan, USA

We present a quantum-limited approach to frequency comb-based optical time transfer. Operating at nearly the quantum-limit, we demonstrate femtosecond synchronization of 300-km distant optical timescales with received powers of only a few hundred femtowatts.

Room 7 Hall A1 (A11)

14:00 – 15:30

CE-3: Optical materials: Structures

Chair: Argyro Klini, IESL, FORTH, Heraklion, Greece

CE-3.1 MON 14:00

Covalent Organic Framework with Polarization Dependence for Ultrafast Pulse generation

•H.-S. Wang[1], A.F.M.E. Mahdy[2], S.-W. Kuo[2], G.-R. Lin[3], and C.-K. Lee[1]; [1]Department of Photonics, National Sun Yat-sen University, Kaohsiung, Taiwan; [2] Department of Materials and Optoelectronic Science, National Sun Yat-Sen University, Kaohsiung, Taiwan; [3]Graduate Institute of Photonics and Optoelectronics and Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan

We successfully generate mode-locked pulses at 1.5μm using a unique covalent–organic framework (COF)-based SA with polarization dependence, showcasing the potential of COFs as a promising platform in ultrafast photonics applications.

CE-3.2 MON 14:15

High-Precision Measurement of Birefringent Mode Splitting in an Ultrastable High-Finesse Optical Cavity with Crystalline Mirrors

•M. Prinz[1], M. Bober[2], D. Charczun[2], P. Morzyński[2], M. Narożnik[2], L.W. Perner[1], G.-W. Truong[3], G.D. Cole[3], O.H. Heckl[1], and P. Masłowski[2]; [1]Christian Doppler Laboratory for Mid-IR Spectroscopy and Semiconductor Optics, Faculty Center for Nano Structure Research, Faculty of Physics, University of Vienna, Vienna, Austria; [2]Institute of Physics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University, Toruń, Poland;

Room 8 Hall A1 (A12)

14:00 – 15:30

EB-3: Quantum optics I

Chair: Eugene S. Polzik, Niels Bohr Institute, København, Danemark

EB-3.1 MON 14:00

Generation and parallel manipulation of frequency entangled qubits from a 21 GHz Silicon-On-Insulator micro-resonator

•A. Henry[1,2], D. Fioretto[2], L. Proccopio[3], S. Montfray[4], F. Boeuf[4], L. Vivien[2], E. Cassan[2], C. Ramos[2], K. Bencheikh[2], I. Zaquine[1], and N. Belabas[2]; [1]Telecom Paris, PALAISEAU, France; [2]C2N, PALAISEAU, France; [3]Weizmann Institute of Science, Tel Aviv, Israel; [4]STMicro-electronics, Crolles, France

We leverage on 21-GHz free spectral range microring resonators for broadband generation of frequency-bin entangled photons. We use electro-optics devices to manipulate the generated states. We demonstrate an application of this system for quantum communication.

EB-3.2 MON 14:15

A Franson interferometer for broadband frequency-entangled photon pairs

•L. Matheis, S. Gstir, G. Weihs, and R. Keil; Universität Innsbruck, Innsbruck, Austria

We realised a Franson interferometer for narrow- (4.2 nm) and broadband (100 nm) frequency-entangled photon pairs. In the broadband case, dispersion altered the shape of the interference pattern, which arises from two distinct types of dispersive influences.

Room 1 ICM

merization, of complex, high-resolution, and large-scale microstructures for versatile applications.

CM-3.3 MON 14:30

Volumetric modification of shaped and dual wavelength ultrashort laser pulses in fused silica

•*M. Zukerstein*[1], *V. Zhukov*[1,2,3], *and N. Bulgakova*[1]; [1]*HiLASE Centre, Institute of Physics ASCR, Dolni Brezany, Czech Republic*; [2]*Federal Research Center for Information and Computational Technologies, Novosibirsk, Russia*; [3]*Novosibirsk State Technical University, Novosibirsk, Russia*

In this experimental and theoretical work, we show the effect of different wavelengths and pulse shapes on volumetric modification in fused silica. The results can be important for the purposes of laser writing processes.

CM-3.4 MON 14:45

Laser machining of sub-micrometric-pitch structures with a truncated ultrafast Bessel beam in the bulk of fused silica

•*S. Datta, R. Clady, O. Utéza, and N. Sanner*; *LP3, Marseille, France*

We demonstrate in-volume laser-fabrication of dense periodic structures in bulk fused silica in femtosecond ablation regime. Using a length-controlled Bessel beam, regular arrangements of nanochannels stacked with a pitch down to 0.7 μm are demonstrated.

Room 4a ICM

CK-1.3 MON 14:30

Engineered dispersion measurements in LiNbO3 nanophotonic wires

•*H.R. Fergestad*[1], *W. Hänsel*[2], *A. Kordts*[2], *A. Prencipe*[1], *R. Holzwarth*[2], *and K. Gallo*[1]; [1]*KTH Royal Institute of Technology, Stockholm, Sweden*; [2]*Menlo Systems GmbH, Martinsried, Germany*

We engineer and measure group velocity dispersion (GVD) in lithium niobate nanophotonic waveguides. Using dual comb spectroscopy, we measure GVD at telecom wavelength for both TE00 and TM00 guided modes showing good agreement with simulations.

CK-1.4 MON 14:45

Low-loss compact lithium niobate photonic integrated circuits

•*Y. Gao, F. Lei, M. Girardi, R. Van Laer, V. Torres-Company, and J. Schröder*; *Department of Microtechnology and Nanoscience (MC2), Chalmers University of Technology, Gothenburg, Sweden*

We demonstrated a compact fully-etched lithium niobate platform with mean propagation losses down to 8.4 dB/m. The highest Q/V micro-ring resonator and highest repetition rate soliton microcomb in LN have been demonstrated.

Room 4b ICM

Understanding the nanoscale behavior of helicity-dependent photocurrents is important to understand light-matter interaction in structured topological materials. Here we report direct nanoimaging of the distribution of circular polarization dependent surface currents on nanostructured topological insulators.

EG-3.3 MON 14:30

Coulomb-correlated multi-electron states generated by nanotip photoemission

•*R. Haindl*[1,2], *A. Feist*[1,2], *T. Domröse*[1,2], *M. Möller*[1,2], *J.H. Gaida* [1,2], *S.V. Yalunin*[1,2], *and C. Ropers*[1,2]; [1]*Max Planck Institute for Multidisciplinary Sciences, Göttingen, Germany*; [2]*4th Physical Institute - Solids and Nanostructures, Georg-August-Universität Göttingen, Göttingen, Germany*

Femtosecond photoemission from a nanoscale field emitter generates few-electron pulses characterized by event-based spectroscopy. The Coulomb-mediated final two-electron state exhibits a pair energy of about 2 eV, facilitating nanoscale electron probing with sub-Poissonian beam statistics.

EG-3.4 MON 14:45

Atomic Fluctuations and Light Emission in Electrically Excited Plasmonic Nanojunction

•*S.P. Amirtharaj, X. Zhiyuan, and C. Galland*; *École polytechnique fédérale de Lausanne, Lausanne, Switzerland*

We demonstrate overbias light emission from electrically driven self-assembled molecular junctions. We further investigate atomic fluctuations in the metal-molecule interface via simultaneous light emission spectroscopy and conductance measurements.

Room 13a ICM

CA-3.2 MON 14:30

Tm:CALGO: Spectroscopy and Laser Operation at 2.32 μm

•*H. Dupont*[1], *P. Loiko*[2], *Z. Pan*[3], *H. Chu*[3], *D. Li*[3], *L. Giordano*[4], *B. Viana*[4], *A. Hideur*[5], *L. Guillemot*[2], *A. Braud*[2], *P. Camy*[2], *P. Georges*[1], *and F. Druon*[1]; [1]*Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, Palaiseau, France*; [2]*CIMAP, UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, 6 Boulevard Maréchal Juin, Caen, France*; [3]*School of Information Science and Engineering, Shandong University, Qingdao, China*; [4]*Chimie ParisTech, PSL University, CNRS, Institut de Recherche de Chimie Paris, 11 rue Pierre et Marie Curie, Paris, France*; [5]*CORIA UMR6614, CNRS-INSA-Université de Rouen, Normandie Université, Avenue de l'université, Saint Etienne du Rouvray, France*

We achieved laser emission at 2.3 μm using a Tm:CALGO crystal. To have a deeper understanding of the process, we have performed spectroscopic measurements and examined different pumping methods, including direct and upconversion pumping.

CA-3.3 MON 14:45

Tm,Ho:(Y,Sc)2O3 ceramic laser at ~2.1 μm

•*K. Eremeev*[1], *P. Loiko*[1], *R. Maksimov*[2,3], *V. Shitov*[2], *V. Osipov*[2], *P. Camy*[1], *and A. Braud*[1]; [1]*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France*; [2]*Institute of Electrophysics, Ural Branch of the Russian Academy of Sciences, Ekaterinburg, Russia*; [3]*Ural Federal University named after the first President of Russia B. N. Yeltsin, Ekaterinburg, Russia*

Tm3+,Ho3+-codoped yttria-

Room 13b ICM

Kor-keakoulunkatu 3, Tampere, Finland

MECSELs have experienced rapid progress during the last years. The most important recent progress, like continuous wave broadband tuning ($\Delta\lambda > 86\,\mathrm{nm}$ around $\lambda_0 = 985\,\mathrm{nm}$) and anti-resonant gain membrane design will be discussed.

CB-2.3 MON (Invited) 14:30

The quest for ultraviolet vertical-cavity surface-emitting lasers

•*Å. Haglund*[1], *F. Hjort*[1], *J. Enslin*[2], *M. Bergmann*[1], *M. Cobet*[2], *G. Cardinali*[2], *N. Prokop*[2], *L. Persson*[1], *E. Torres*[1], *S. Graupeter*[2], *M. Grigoletto*[2], *M. Guttmann*[2], *L. Sulmoni*[2], *N. Lobo-Ploch*[3], *T. Kolbe*[3], *J. Ciers*[1], *T. Wernicke*[2], *and M. Kneissl*[2,3]; [1]*Chalmers University of Technology, Gothenburg, Sweden*; [2]*Technische Universität Berlin, Berlin, Germany*; [3]*Ferdinand-Braun-Institut, Berlin, Germany*

We will summarize state-of-the-art results and focus on our method to simultaneously achieve high-reflectivity mirrors and cavity length control by electrochemical etching and show the first steps towards an electrically driven ultraviolet vertical-cavity surface-emitting laser.

Room 14a ICM

CD-3.2 MON 14:30

High-Efficiency Second Harmonic Generation in Heterogeneously-Integrated Periodically-Poled Lithium Niobate on Silicon Nitride

•*T. Vandekerckhove*[1,2], *T. Vanackere*[1,2], *J. De Witte*[1], *I. Luntadila Lufungula*[1], *E. Vissers*[1], *G. Roelkens*[1], *S. Clemmen*[1,2], *and B. Kuyken*[1]; [1]*Ghent University, Ghent, Belgium*; [2]*Universite Libre de Bruxelles, Brussels, Belgium*

CMOS-compatible photonic platforms such as silicon nitride lack a $\chi^{(2)}$ nonlinearity. We heterogeneously integrate periodically-poled lithium niobate on silicon nitride through a back-end micro-transfer printing process and achieve second harmonic generation with 2500 %/Wcm^2 efficiency.

CD-3.3 MON 14:45

Terahertz physics with thin-film lithium niobate - custom-tailored generation and sensitive detection on-chip

•*A. Herter*[1], *A. Shams-Ansari*[2], *F.F. Settembrini*[1], *H.K. Warner*[2], *J. Faist*[1], *M. Loncar*[2], *and I.-C. Benea-Chelmus*[3]; [1]*ETH Zürich, Institue of Quantum Electronics, Zurich, Switzerland*; [2]*Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA*; [3]*EPF Lausanne, Hybrid Photonics Laboratory, Lausanne, Switzerland*

We present integraded nonlinear

Room Osterseen ICM

JSII-3.2 MON 14:30

Towards the development of the self-calibrating nulling interferometry beam combiner for the VLTI visitor instrument ASGARD to detect exoplanets

•*S. Ahmed[1,2], S. Gross[2], M. Withford[2], D. Defrère[3], and L. Labadie[1]; [1]University of Cologne, Köln, Germany; [2]Macquarie University, Sydney, Australia; [3]KU Leuven, Leuven, Belgium*

Using 3D ultrafast laser inscription, an achromatic behavioural beam combining device is being developed for the NOTT of ASGARD/VLTI visiting instrument using self-calibrating 4-telescope nulling interferometry technique for the high-contrast exoplanet detection in the mid-infrared (3.5-4.0~μm).

JSII-3.3 MON 14:45

Ultrafast Laser Inscription of Achromatic Phase Shifters

•*G. Douglass[1,2], T. Klinner-Teo[3], E. Arcadi[2], M.J. Withford[2], B. Norris[3], P. Tuthill[3], M.-A. Martinod[3], O. Guyon[4], and S. Gross[1,2]; [1]School of Engineering, Macquarie University, Sydney, Australia; [2]School of Mathematics, Macquarie University, Sydney, Australia; [3]Sydney Institute for Astronomy, School of Physics, University of Sydney, Sydney, Australia; [4]National Astronomical Observatory of Japan, Subaru Telescope, Hawaii, USA*

Using ultrafast laser inscription a

Room 1 Hall B1 (B11)

CF-3.3 MON 14:45

Temporal Characterization of Sub-3-fs, μJ-level Deep UV Pulses Generated by Resonant Dispersive Wave Emission

•*M. Pini[1,2], F. Cappenberg[1], L. Colaizzi[1], F. Vismarra[1,2], M. Lucchini[1,2], A. Crego[2], C. Brahms[3], J. Travers[3], R. Borrego Varillas[2], M. Reduzzi[1], and M. Nisoli[1,2]; [1]Department of Physics, Politecnico di Milano, Milan, Italy; [2]Institute for Photonics and Nanotechnologies, IFN-CNR, Milan , Italy; [3]School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom*

Room 2 Hall B1 (B12)

CL-1.2 MON 14:30

Implantable Nanophotonic Neural Probes with 3D-Printed Microfluidics

•*X. Mu[1,2], F.-D. Chen[1,2], K.M. Dang[1], M.G.K. Brunk[1], J. Li[1], H. Wahn[1], A. Stalmashonak[1], P. Ding[1,2], X. Luo[3], G.-Q. Lo[3], J.K.S. Poon[1,2], and W.D. Sacher[1]; [1]Max Planck Institute of Microstructure Physics, Halle (Saale), Germany; [2]Department of Electrical and Computer Engineering, University of Toronto, Toronto, Canada; [3]Advanced Micro Foundry Pte. Ltd., Singapore, Singapore*

We present implantable nanophotonic neural probes with integrated silicon nitride photonic waveguide grating emitters and 3D-printed microfluidic channels. Simultaneous light and fluid delivery from the neural probes is demonstrated.

CL-1.3 MON 14:45

Out-of-Plane Focusing Grating on Implantable Neural Probes for Spatially Targeted Optogenetic Stimulation

•*T. Xue[1,2], A. Stalmashonak[1], P. Ding[1,2], W. Sacher[1], and J. Poon[1,2]; [1]Max Planck Institute of Microstructure Physics, Halle, Germany; [2]Department of Electrical and Computer Engineering, University of Toronto, Toronto, Canada*

We demonstrate an implantable neural probe with gratings for out-of-plane focusing in fixed brain tissue for spatially precise optogenetic experiments. A mini-

Room 6 Hall B3 (B32)

ED-3.2 MON 14:30

Fully-digital implementation of a Doppler cancellation technique for local ultra-stable frequency dissemination

•*M. Matusko, I. Ryger, G. Goavec-Merou, J. Millo, C. Lacroûte, É. Carry, J.-M. Friedt, and M. Delehaye; FEMTO-ST, Besancon, France*

We demonstrate a fully-digital setup for local frequency dissemination over optical fiber with instabilities in the 1E-18 range and implement a novel characterization method that does not require access to the remote fiber end.

ED-3.3 MON 14:45

Hertz Level Dual Polarization Brillouin Fiber Laser

•*J. Lampen[1], P. Li[1], J. Jiang[1], A. Rolland[2], and M. Fermann[1]; [1]Imra America Inc., Ann Arbor, USA; [2]Boulder Research Labs, Imra America Inc., Longmont, USA*

We demonstrate a dual polarization Brillouin fiber laser with approximately 1 Hz intrinsic linewidth, suitable for self-referenced temperature sensing at the 20 nK level for operation with record short- and long-term frequency stability.

Room 7 Hall A1 (A11)

[3]Thorlabs Crystalline Solutions, Santa Barbara, CA, USA

We report temperature-resolved high-precision measurements of birefringent cavity mode shifts of an ultrastable high-finesse optical cavity with substrate-transferred crystalline supermirrors in the near-infrared wavelength range, by mapping the cavity modes with an optical frequency comb.

CE-3.3 MON 14:30

Nanostructured optical coatings for spatial filtering and polarization control

•*L. Grineviciute[1], J. Nikitina[1], C. Babayigit[3], D. Gailevičius[2], and K. Staliunas[4]; [1]Center for Physical Sciences and Technology, Vilnius, Lithuania; [2]Vilnius University, Vilnius, Lithuania; [3]University of California, Irvine, USA; [4]ICREA, Barcelona, Spain*

Proposed 1D and 2D photonic structures, based on dielectric single- and multi-layers, can be considered as a promising component for intracavity spatial filtering and polarization control even in high power microlasers

CE-3.4 MON 14:45

First demonstration of Type-A femtosecond-written Volume Bragg Gratings using a Gaussian-Bessel laser beam

•*J. Harb[1], L. Talbot [2], Y. Petit[1,3], M. Bernier[2], and L. Canioni[1]; [1]University of Bordeaux, CNRS, CEA, CELIA, UMR 5107, 351 Cours de la Libération, 33405 Talence, Cedex, France; [2]Centre d'Optique, Photonique et Laser (COPL), Université Laval, Québec City, Québec G1V0A6, Canada; [3]University of Bordeaux, CNRS, ICMCB, UMR 5026, 87 avenue du Dr. A. Schweitzer, 33608 Pessac,*

Room 8 Hall A1 (A12)

EB-3.3 MON (Tutorial) 14:30

Attosecond Sciences, Quantum Optics and Quantum Information

•*M. Lewenstein; Instituto de Ciencias Fotónicas, Castelldefels, Spain; ICREA, Barcelona, Spain*

I my tutorial i will discuss recent developments of attosecond science on the border between ultrafast laser science, quantum optics and quantum information

Room 1 ICM

CM-3.5 MON 15:00

Writing chiral nanostructures inside silica with polarization-engineered Bessel beams

•*M. Hassan*[1], *J. Lu*[2], *B. Poumellec*[2], *M. Lancry*[2], *and F. Courvoisier*[1]; [1]*FEMTO-ST Institute, Univ. Franche-Comte and CNRS, Besancon, France*; [2]*Institut de Chimie Moléculaire et des Matériaux d'Orsay, Université Paris Saclay, Orsay, France*

We exploit space varying birefringent waveplates in combination with Bessel beam to shape the polarization of a femtosecond laser along the optical path. This allows us inscribing nanostructures in silica with chiral optical properties.

Room 4a ICM

CK-1.5 MON 15:00

Tailoring guided-wave Fano resonances in LiNbO3 nanophotonic wires

•*T. Li, A. Prencipe, and K. Gallo*; *KTH Royal Institute of Technology, Stockholm, Sweden*

We demonstrate with theory and experiment, Bragg grating nanowires in thin film lithium niobate that give rise to engineerable Fano resonances at telecom C-band, enabled by the TE-TM mode coupling via their longitudinal field components.

Room 4b ICM

EG-3.5 MON 15:00

Efficient and Continuous Carrier-Envelope Phase Control for Terahertz Lightwave-Driven Scanning Probe Microscopy

•*J. Allerbeck*[1], *J. Kuttruff*[2], *L. Bobzien*[1], *L. Huberich*[1], *M. Tsarev*[2], *and B. Schuler*[1]; [1]*Empa - Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland*; [2]*University of Konstanz, Konstanz, Germany*

Frustrated internal reflection enables precise and efficient THz phase control for ultrafast scanning tunneling microscopy, allowing state-selective investigation of quantum dynamics with picosecond time and atomic spatial resolution at multi-MHz repetition rate.

Room 13a ICM

scandia transparent ceramic was prepared by solid-state vacuum sintering at 1750 °C. The ceramic laser generated 291 mW at 2.09 μm with 54.3% slope efficiency. The laser wavelength was tuned over 1937.6–2128.0 nm.

CA-3.4 MON 15:00

Power Limits of Compact Ho^{3+}:YAG Laser Resonators With Homogeneously Doped and Segmented Crystals

•*K. Goth*[1,2], *M. Griesbeck*[1], *M. Rupp*[1,2], *M. Eitner*[1], *M. Eichhorn*[1,2], *and C. Kieleck*[1]; [1]*Fraunhofer IOSB (Institute of Optronics, System Technologies and Image Exploitation), Ettlingen, Germany*; [2]*Institute of Control Systems, Karlsruhe Institute of Technology, Karlsruhe, Germany*

We present Ho^{3+}:YAG laser resonators with a homogeneously doped and a segmented crystal and investigate them concerning their power limitation while maintaining an excellent beam quality. A maximum output power of 57.6 W is reached with the homogeneous crystal.

Room 13b ICM

CB-2.4 MON 15:00

VCSELs with integrated surface gratings for polarization dynamics above 65 GHz

•*N. Manrique-Nieto*[1], *M. Lindemann*[1], *N. Jung*[1], *T. Pusch*[2], *R. Michalzik*[2], *M.R. Hofmann*[1], *and N.C. Gerhardt*[1]; [1]*Photonics and Terahertz Technology, Ruhr-Universitat Bochum, Bochum, Germany*; [2]*Inst. of Functional Nanosystems, Ulm University, Ulm, Germany*

Polarization dynamics above 65 GHz were observed in current-driven VCSELs with birefringent surface gratings after optical spin injection. The results demonstrate the potential of surface grating spin-VCSELs for high-bandwidth polarization-based optical datacom.

Room 14a ICM

THz generation and detecton on thin-film lithium niobate. The arrangement of THz antennas and waveguide design allow control over the generated THz waveform, while the on-chip confinement enhances the interaction of the mixing fields.

CD-3.4 MON 15:00

Generation and engineering of polarization entangled photons from a lithium niobate nonlinear metasurface

•*J. Ma, J. Zhang, Y. Jiang, T. Fan, M. Parry, D. N. Neshev, and A. A. Sukhorukov*; *The Australian National University, Canberra, Australia*

We reveal that an ultrathin lithium niobate metasurface with multiplexed metagratings featuring different orientations allows the engineering of bi-photon polarization states and optically controllable generation of arbitrary polarization qutrits, overcoming the limitations of current sources.

Room Osterseen ICM

≈2 mm long 180° differential achromatic phase shifter was fabricated in borosilicate glass, that exhibits a measured phase shift of 171 ± 6° between 1440-1640 nm.

JSII-3.4 MON 15:00

Development of a Fiber Connectorized Ultrafast Laser Inscribed 2 Telescope Beam Combiner for the CHARA Telescope array

•A. Benoit[1], J. Siliprandi[1], D.G. MacLachlan[1], C.A. Ross[1], T.K. Sharma[2], L. Labadie[2], K. Madhav[3], A.S. Nayak[3], A.N. Dinkelaker[3], M.M. Roth[3], E. Pedretti[4], T.A. ten Brummelaar[5], N.J. Scott[5], V. Coudé du Foresto[6], and R.R. Thomson[1]; [1]SUPA, Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]I. Physikalisches Institut der Universität zu Köln, Zülpicher Strasse 77, Cologne, Germany; [3]Leibniz-Institut für Astrophysik Potsdam, An der Sternwarte 16, Postdam, Germany; [4]UKRI STFC Rutherford Appleton Laboratory, Chilton, United Kingdom; [5]Center for High Angular Resolution Astronomy, Georgia State University, Atlanta, USA; [6]LESIA of Paris Observatory/CNRS/UPMC/Univ. Paris Diderot, Paris, France

We report on the complete design and fabrication of an efficient fiber-connectorized 2-telescope K-band integrated-optics beam combiner manufactured using ultrafast laser inscription in combination with selective chemical etching to produce high contrast interferometric visibility.

Room 1 Hall B1 (B11)

We demonstrate the generation of sub-3 fs UV pulses obtained by Resonant Dispersive Wave emission in gas-filled Hollow Core Fibers, tuneable between 230 and 430 nm and characterized using an all-in-vacuum Self-Diffraction FROG technique.

CF-3.4 MON 15:00

An in-situ method for the reconstruction of ultrashort and ultrabroadband synthesized light transients

•M. Kubullek[1,2], F. Scheiba[1,2], M.A. Silva-Toledo[1,2], R.E. Mainz[1,2], G.M. Rossi[1,2], and F.X. Kärtner[1,2]; [1]Center for Free-Electron Laser Science CFEL, Deutsches Elektronen Syncrotron DESY, Hamburg, Germany; [2]Physics Department and The Hamburg Centre for Ultrafast Imaging (CUI), Hamburg, Germany

We present a method for full in-situ characterization of the electric field waveform from a parametric waveform synthesizer by third-order cross-correlation of the underlying few-cycle pulses in a noble gas target.

Room 2 Hall B1 (B12)

mum beam waist of 4.3μm×5.2μm (FWHM) at a wavelength of 488nm was achieved.

CL-1.4 MON 15:00

Biophotonic platform for detection of hallmarks of Alzheimer's disease via combined microfluidics and nanofunctionalized fiber sensors

D. Santano Rivero[1], L. Zu[2], J. Xie[2], P. Liu[2], X. Zhang[2], L. Shi[2], A.B. Socorro Leránoz[1], I.R. Matias[1], A. Giannetti[3], F. Baldini[3], E. Santamaría[4], J. Fernández-Irigoyen[4], K. Li[5], W. Bi[6], D. van den Hove[7], I. Del Villar[1], T. Guo[2], and •F. Chiavaioli[3]; [1]Public University of Navarra, Electrical and Electronic Engineering Dept. and Institute of Smart Cities (ISC), Pamplona, Spain; [2]Jinan University, Institute of Photonics Technology, Guangzhou, China; [3]National Research Council of Italy (CNR), Institute of Applied Physics "Nello Carrara", Sesto Fiorentino, Italy; [4]Public University of Navarra, Navarrabiomed, Hospital Universitario de Navarra (HUN), Pamplona, Spain; [5]Jilin University, Key Laboratory of Bionic Engineering of Ministry of Education, Jilin, China; [6]The First Affiliated Hospital of Jinan University, Department of Neurology, Guangzhou, China; [7]Maastricht University, Department of Psychiatrie & Neuropsychologie, Maastricht, Netherlands

The combination of nanomaterials, microfluidics and suitably-functionalized optical fiber sensors enables the detection of Alzheimer's disease hallmarks in complex biofluids with detection limit below 10-12 M, hereby having potential in early diagnosis and personalized medicine.

Room 6 Hall B3 (B32)

ED-3.4 MON 15:00

Ultrastable Femtosecond Frequency Combs for Precision Measurements in the Time and Frequency Domain

•S.R. Hutter[1], A. Seer[2], T. Koenig[1], R. Herda[2], D. Hertzsch[1], H. Kempf[1], R. Wilk[2], and A. Leitenstorfer[1]; [1]Department of Physics and Center for Applied Photonics, Konstanz, Germany; [2]Toptica Photonics AG, Gräfelfing, Germany

We study the noise properties of modelocked fiber lasers systematically varying pump power and intracavity dispersion. Our insights lead to tailor-designed femtosecond frequency combs featuring quantum-limited optical linewidths below 1 kHz over ultrabroadband spectral ranges.

Room 7 Hall A1 (A11)

Cedex, France

To our knowledge, we report the first Type-A Volume Bragg grating inscribed in silver-containing phosphate glasses using Gaussian-Bessel beam. Diffraction efficiency of 95% at 632.8 nm was achieved indicating a strong refractive-index modulation of 1.78x10^-3.

CE-3.5 MON 15:00

Polarization-dependent photoluminescence in ZnO-ZnWO4 eutectic

•E. Petronijevic[1], M. Tomczyk[2,3], A. Belardini[1], P. Osewski[4], P. Piotrowski[2,3], M. Centini[1], G. Leahu[1], R. Li Voti[1], D.A. Pawlak[2,3,4], C. Sibilia[1], and M.C. Larciprete[1]; [1]Univesità di Roma La Sapienza, SBAI Department, Rome, Italy; [2]Centre of Excellence ENSEMBLE3, Warsaw, Poland; [3]Department of Chemistry, University of Warsaw, Warsaw, Poland; [4]Łukasiewicz Research Network – Institute of Microelectronics and Photonics, Warsaw, Poland

We investigate emission properties of self-organized ZnO-ZnWO4 eutectic, made of ZnO lamellae in biaxial ZnWO4 matrix. The refractive index matching in the microstructured composite leads to strong polarization dependence in both excitation and generated photoluminescence.

Room 8 Hall A1 (A12)

Room 1 ICM

CM-3.6 MON 15:15

Bessel beam dielectric cutting with femtosecond laser in GHz-burst mode

•*P. Balage[1], J. Lopez[1], G. Bonamis[2], C. Hönninger[2], and I. Manek-Hönninger[1]; [1]Université de Bordeaux-CNRS-CEA, CELIA UMR 5107, Bordeaux, France; [2]Amplitude, Pessac, France*

We report, for the first time up to our knowledge, on the use of a Bessel beam with a femtosecond laser operating in GHz-burst mode for cutting of glasses and sapphire.

Room 4a ICM

CK-1.6 MON 15:15

Far-field petahertz sampling of plasmonic fields

•*K.-F. Wong[1,2], W. Li[3,4], Z. Wang[3,4], V. Wanie[2], E. Månsson[2], D. Höing[1,5], J. Blöchl[3,4], T. Nubbemeyer[3,4], A. Trabattoni[2,6], H. Lange[1,5], F. Calegari[1,2], and M.F. Kling[3,4,7]; [1]The Hamburg Centre for Ultrafast Imaging, Hamburg, Germany; [2]Center for Free-Electron Laser Science, Hamburg, Germany; [3]Max Planck Institute of Quantum Optics , Munich, Germany; [4]Ludwig-Maximilians-Universität München, Munich, Germany; [5]Institute of Physical Chemistry Universität Hamburg, Hamburg, Germany; [6]Institute of Quantum Optics Leibniz Universität Hannover, Hannover, Germany; [7]SLAC National Accelerator Laboratory Stanford University, Menlo Park, USA*

We demonstrate the realtime observation of linear plasmonic fields by optical field sampling. Our findings also demonstrate the ability to manipulate the spectral properties of ultrashort laser pulses by plasmonic samples.

Room 4b ICM

EG-3.6 MON 15:15

Effect of the Gouy-phase on field-induced transport across a nanojunction

•*A. Rossetti[1], M. Ludwig[2,3], A. Leitenstorfer[2], and D. Brida[1]; [1]University of Luxembourg, Luxembourg, Luxembourg; [2]University of Konstanz, Konstanz, Germany; [3]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*

Carrier-envelope-phase stable single-cycle laser pulses are employed to coherently control field-induced current across a nanojunction. Scanning the sample position along the focus, the effect of the Gouy phase on the transport process is investigated

Room 13a ICM

CA-3.5 MON 15:15

Growth and efficient 1 μm laser operation of Yb-doped mixed sesquioxides

•*A. Uvarova, P. Eckhof, L. Hülshoff, P. Wegener, S. Kalusniak, and C. Kränkel; Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany*

We report on the Czochralski- and micro-pulling-down growth and laser operation of Yb^{3+}-doped (Sc$_x$Y$_{1-x}$)$_2$O$_3$ single-crystals. The crystals were characterized spectroscopically. In laser experiments, we obtained 1.2 W of output power at 89% of slope efficiency.

Room 13b ICM

CB-2.5 MON 15:15

Single-frequency 2 μm GaSb-based VECSEL for quantum-frequency-converter pumping

•*S. Adler, P. Holl, E. Diwo-Emmer, A. Bächle, and M. Rattunde; Fraunhofer Institute for Applied Solid State Physics IAF, Freiburg, Germany*

Design and improvements of narrow linewidth VECSEL modules based on the (AlGaIn)(AsSb) material system with 2 μm emission wavelength for quantum frequency conversation are shown

Room 14a ICM

CD-3.5 MON 15:15

Towards two-photon-absorption-free hybrid silicon nitride waveguides reaching silicon Kerr nonlinearity

•*M. Dyatlov[1,2], K. Stoll[3], P. Delaye[4], J. Hu[3], S. Serna[3,5], L. Vivien[2], and N. Dubreuil[1]; [1]LP2N, Institut d'Optique Graduate School, Université de Bordeaux, CNRS, Talence, France; [2]Centre de Nanosciences et de Nanotechnologies, Université Paris-Saclay, CNRS, Palaiseau, France; [3]Materials Science and Engineering Department, Massachusetts Institute of Technology , 77 Massachusetts Avenue, Cambridge, MA, USA; [4]Laboratoire Charles Fabry, Institut d'Optique Graduate School, Université Paris-Saclay, CNRS, Palaiseau, France; [5]Bridgewater State University, Physics and Photonics and Optical Engineering Department, Bridgewater, MA, USA*

A highly-nonlinear hybrid silicon nitride waveguide with GeSbS cladding showing no TPA is reported, enriching possibilities for the integrated optical circuits development. We demonstrate such an increase in nonlinear index with a highly-accurate method.

Room 1 ICM

16:00 – 17:30

PL-1: CLEO/Europe 2023 Plenary

Chair: Rachel Grange, ETH Zurich, Switzerland and Crina Cojocaru, Universitat Politecnica de Catalunya, Barcelona, Spain

PL-1.1 MON (Plenary) 16:00

From Nonlinear Optics to High-Intensity Laser Physics

•*D. Strickland; University of Waterloo, Waterloo, Canada*

In this talk, I will discuss the differences between nonlinear optics and high-intensity laser physics. The development of CPA and why short, intense laser pulses can cut transparent material will also be included.

Move to Room 4a to meet with Donna Strickland (Career event for PhD students)

Room 4a ICM

17:30 – 18:30

PL-C: Career event with Donna Strickland

Chair: Marian Marciniak, National Institute of Telecommunications, Warsaw, Poland ; Crina Cojocaru, Universitat Politecnica de Catalunya, Barcelona, Spain

PL-C.break1 MON 17:30

PhD students wanting to interact with Donna Strickland about career are cordially invited. Registration mandatory.

•*D. Strickland; University of Waterloo, Waterloo, Canada*

Room Osterseen ICM

JSII-3.5 MON 15:15

A Metasurface-based Scalar Vortex Phase Mask Design

•*L. König[1], O. Absil[1], N. Desai[2], D. Mawet[2], S. Palatnick[3], and M. Millar-Blanchaer[3]; [1]STAR Institute, University of Liège, Liège, Belgium; [2]California Institute of Technology, Pasadena, USA; [3]University of California at Santa Barbara, Santa Barbara, USA*

We propose a metasurface-based implementation of the scalar vortex phase mask for high contrast imaging using square nanoposts and show that it is a promising approach to the challenge of achromatizing the scalar vortex coronagraph.

Room 1 Hall B1 (B11)

CF-3.5 MON 15:15

Ultrashort laser vector pulses characterization with amplitude swing

•*C. Barbero, B. Alonso, and Í.J. Sola; Grupo de investigación en Aplicaciones del Láser y Fotónica, Salamanca, Spain*

Ultrashort laser vector pulses, i.e., those exhibiting time-varying polarization, are interesting in many scientific fields. We completely reconstruct those pulses using the amplitude swing technique, which has a simple, robust, and versatile scheme.

Room 2 Hall B1 (B12)

CL-1.5 MON 15:15

Transcranial diffuse correlation imaging of cerebral blood flow microcirculation in rodent models

•*E. Zherebtsov[1], M. Kaakinen[2], A. Sdobnov[1], O. Sieryi[1], T. Myllylä[1,3], A. Bykov[1], and I. Meglinski[1,4]; [1]Optoelectronics and Measurement Techniques Unit, University of Oulu, Oulu, Finland; [2]Centre for Cell-Matrix Research, University of Oulu, Oulu, Finland; [3]Health Sciences and Technology Unit, University of Oulu, Oulu, Finland; [4]College of Engineering and Physical Sciences, Aston University, Birmingham, United Kingdom*

We present a transcranial visualization of cerebral blood flow using diffuse correlation spectroscopy and laser speckle contrast imaging, which was validated in phantom studies and in vivo in murine models.

Room 6 Hall B3 (B32)

ED-3.5 MON 15:15

Thin Cell Spectroscopy at Telecommunication Wavelengths: Towards Acetylene based Compact Frequency References

G. Garcia Arellano, •H. Mouhanna, F. DuBurck, B. Darquié, D. Bloch, I. Maurin, and A. Laliotis; Laboratoire de Physique des Lasers, Villetaneuse, France

We probe rovibrations of acetylene, confined inside a thin-cell of micrometric thickness, at telecommunication wavelengths. Molecular confinement at the wavelength scale allows for linear, high-resolution spectroscopy making thin-cells attractive platforms for compact frequency referencing applications.

Room 7 Hall A1 (A11)

CE-3.6 MON 15:15

Core-Shell Halide Perovskite Nanocubes for Low-threshold Lasing Applications

•*S. Khan[1,2], M. Mohammadi[1], S.B. Anantharaman[1], and M.C. Lemme[1,2]; [1]AMO GmbH,Otto-Blumenthal Straße 25, 52074 Aachen, Germany, Aachen, Germany; [2]RWTH Aachen University, Templergraben 55, 52062 , Aachen, Germany*

Here, in-situ formation of perovskite nanocubes during spin coating from different halide compositions is investigated. The core-shell heterojunctions in CsPbBr3/CsPbBr3–xClx nanocubes will be presented alongside their optical properties, which open new routes for low threshold lasing applications.

Room 8 Hall A1 (A12)

NOTES

13:00 – 14:00

CA-P: CA Poster session

CA-P.1 MON

Difference Frequency Generation in $BaGa_4Se_7$, $LiGaSe_2$, and $LiGaS_2$ Tunable in a 5 - 13 μm Range with Output Energy up to 100 μJ Pumped by 1.03 μm, 1.8 ps Laser

•M. Jelínek[1], M. Frank[1], V. Kubeček[1], O. Novák[2], J. Huynh[2], M. Cimrman[1,2], M. Chyla[2], M. Smrž[2], and T. Mocek[2]; [1]Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Prague, Czech Republic; [2]HiLASE Centre, FZU - Institute of Physics of the Czech Academy of Sciences, Prague, Czech Republic

We present difference frequency generation in $BaGa_4Se_7$, $LiGaSe_2$, and $LiGaS_2$ tunable in a spectral range from 5 to 13 μm pumped by a picosecond 1μm-laser

CA-P.2 MON

Instability study of a high-power, high repetition rate fs-OPCPA driven tunable femtosecond UV source for FEL seeding.

•T. Lang, M. Kazemi, J. Zheng, S. Hartwell, N.-P. Hoang, E. Ferrari, L. Schaper, and I. Hartl; Deutsches Elektronen Synchrotron DESY, Hamburg, Germany

We present a start-to-end simulation of our highly-efficient, broadly-tunable, OPCPA-based UV laser system for FEL seeding, predicting the system performance regarding tunability, beam-quality, stability and pointing based on measured CPA-pump laser and white-light seeder fluctuations.

CA-P.3 MON

MW-peak and Watt-average Power LED-Pumped Nd:YAG Laser

X.-L. Ho, M.-H. Wu, and •Y.-C. Huang; Institute of Photonics Technologies, National TsingHua University, Hsinchu, Taiwan

We report the generation of 3.5-MW peak power and 4.5-W average power in Q-switched and quasi-CW operation modes respectively, from a LED-pumped Nd:YAG laser.

CA-P.4 MON

Buried Depressed-Cladding Waveguides Fabricated in RE3+:CLNGG Laser Crystals using Direct Laser Writing Technique

•G. Croitoru[1], I. Anghel[2], F.-M. Voicu[1], M. Greculeasa[1], A. Broasca[1], L.-M. Gheorghe[1], and N. Pavel[1]; [1]National Institute for Laser, Plasma and Radiation Physics, Solid-State Quantum Electronics Laboratory, Magurele, Romania; [2]National Institute for Laser, Plasma and Radiation Physics, Nonlinear Optics and Photonics Laboratory, Magurele, Romania

Depressed-cladding waveguides were inscribed in 0.7-at.% Nd:Ca3Li0.275Nb1.775Ga2.95O12 (Nd:CLNGG) and 4.3-at.% Yb:CLNGG crystals using direct-writing technique with a femtosecond-laser beam. Laser emission at 1.06 and 1.03 μm was obtained, under the pump with fiber-coupled diode lasers.

CA-P.5 MON

Comparison of Self-Seeded Perfluorooctane SBS-Compressor Configurations for Obtaining High-Energy 90 ps Pulses

A. Černeckytė, •P. Mackonis, and A.M. Rodin; Center for Physical Sciences and Technology, Vilnius, Lithuania

Self-seeding configurations of a perfluorooctane SBS-compressor with a double-pass phase-conjugated Nd:YAG amplifier provide up to 50 mJ, 94 ps output pulses from 2 mJ, 1.1 ns input. These pulses are suitable for dermatology and interference patterning.

CA-P.6 MON

Alexandrite Lasers Operating with High-power Blue-diode-pumping

•H. Xiao, X. Jiang, and M. Damzen; Imperial College London, London, United Kingdom

We have demonstrated a blue-diode pumped Alexandrite laser with the highest power to date and performed a full characterisation and analysis of laser performance and prospects of blue as an alternative to red diode pumping.

CA-P.7 MON

μ-PD-grown Tm,Ho-doped Multicomponent Garnets for Diode-pumped 2.1 μm Lasers

•J. Šulc[1], M. Němec[1], J. Pejchal[2], J. Havlíček[2,3], H. Jelínková[1], M. Nikl[2], and K. Nejezchleb[3]; [1]Czech Technical University in Prague, FNSPE, Prague, Czech Republic; [2]Institute of Physics AS CR, Division of Solid State Physics, Prague, Czech Republic; [3]Crytur, Ltd. Turnov, Turnov, Czech Republic

Set of new multicomponent garnets doped by Tm^{3+} and Ho^{3+} was grown using μ-PD method. In case of Tm,Ho:GLAG, Tm,Ho:GSAG, and Tm,Ho:LSAG lasing at 2.1 μm under 0.8 μm diode pumping was successfully demonstrated.

CA-P.8 MON

Electro-optically Q-switched Er:YLF laser at 2.8 μm

•R. Svejkar, D. Popelova, J. Sulc, D. Vyhlidal, M. Nemec, and H. Jelinkova; Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czech Republic

Pockels cell electro-optically Q-switched Er:YLF laser emitting at 2.8 μm was tested with 10 kHz repetition rate. The shortest generated pulses have 76 ns and pulse energy 56 μJ with corresponding peak power 0.72 kW.

CA-P.9 MON

Comparison of Ho:YLF and Ho:CaF_2 for Single Pass Amplification of 2 ps Pulses at 2065 nm

•M. Jelínek[1], M. Frank[1], V. Kubeček[1], Z. Zhonghan[2], D. Jiang[2], and L. Su[2]; [1]Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Prague, Czech Republic; [2]Key Laboratory of Transparent and Opto-functional Inorganic Materials, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai, China

Single pass amplification in an amplifier based on Ho:YLF or Ho:CaF_2 crystal operating at wavelength of 2065 nm seeded by 2ps pulses is presented.

CA-P.10 MON

Spectral and laser properties of cryogenically cooled Tm,Gd:SrF2 crystal

•K. Veselský[1], M. Jelínek[1], V. Kubeček[1], J. Šulc[1], H. Jelínková[1], Y. Wang[2,3], Z. Zhang[2], and L. Su[2,3]; [1]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czech Republic; [2]State Key Laboratory of High Performance Ceramics and Superfine Microstructure, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai, China; [3]Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing, China

Temperature dependence (300 – 78 K) of spectral and laser properties of a novel Tm,Gd:SrF2 crystal was investigated. A broad absorption spectrum and very long lifetime was observed. Laser slope efficiency of 69 % was achieved at 1868 nm.

CA-P.11 MON

Gain-Switched Ti:Sapphire Microchip Laser: Spectroscopic and Laser Characteristics within 5-300 K temperature range

•M. Fibrich[1,2], J. Šulc[1], and H. Jelínková[1]; [1]Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering , Prague, Czech Republic; [2]Extreme Light Infrastructure ERIC, ELI Beamlines Facility, Dolní Břežany, Czech Republic

Temperature influence on spectroscopic as well as lasing properties of the gain-switched Ti:Sapphire microchip laser are described in detail within 5-300 K crystal temperature range.

CA-P.12 MON

Amplification of a Pulsed Laser Source with a Compact Wedged Thin-Disk Amplifier

•R.-A. Lorbeer, B. Ewers, C. Santek, M. Augsburger, D. Keil, J. Speiser, and T. Dekorsy; German Aerospace Center (DLR), Institute of Technical Physics, Stuttgart, Germany

Solid state lasers as e.g. thin-disk lasers allow to achieve high average power and high pulse energies for short and ultra-short pulses. Here we investigate the amplification of short laser-pulses with our compact wedged-thin-disk amplifier.

CA-P.13 MON

5 kHz, 6.5 mJ Yb:CaYAlO4 dual-crystal regenerative amplifier

•g. wang[1], w. tian[1], c. bai[1], y. yu[1], x. xu[3], z. wei[2], and j. zhu[1]; [1]Xidian University, Xi'an, China; [2]Institute of Physics, Chinese Academy of Sciences, Beijing, China; [3]Jiangsu Normal University, Xuzhou, China

This paper reports on a dual-crystal Yb:CALYO regenerative amplifier that delivering laser outputs with a pulse energy of 5.3 mJ, a compressed pulse duration of 187 fs, and a repetition rate of 5 kHz.

CA-P.14 MON

Versatile Ultrashort Pulse Laser Tunable up to Nanosecond Range

•T. Bartulevičius[1], M. Lipnickas[1], K. Madeikis[1], R. Burokas[1,2], and A. Michailovas[1,2]; [1]Ekspla, Vilnius, Lithuania; [2]Center for Physical Sciences and Technology, Vilnius, Lithuania

A versatile active fiber loop technology enabled GHz burst operation mode and pulse duration tuning from a few hundred femtoseconds even up to the nanosecond range in the single industrial-grade 30 W-level average power femtosecond laser.

CA-P.15 MON

Experimental and numerical analysis of thermal aberrations in Nd:YVO_4 laser amplifiers

•M. Schneewind[1,2], P. Booker[1,2], S. Spiekermann[1], P. Weßels[1,2], J. Neumann[1,2], and D. Kracht[1,2]; [1]Laser Zentrum Hannover e.V., Hanover, Germany; [2]Cluster of Excellence QuantumFrontiers, Hanover, Germany

The power-dependent wavefront distortions in Nd:YVO_4 amplifiers were analyzed with a Shack-Hartman sensor and a Zernike-polynomial decomposition. The experimental analysis was complemented by numerical simulations based on split-step Fourier propagation with excellent agreement.

CA-P.16 MON

Iterative 3D modeling of pulse generation in end-pumped Ho3+:YAG laser resonators utilizing active Q-switching

•M. Rupp[1,2], K. Goth[1,2], M. Eichhorn[1,2], and C. Kieleck[1]; [1]Fraunhofer Institute of Optronics, System Technologies and Image Exploitation, Ettlingen, Germany; [2]Institute of Control Systems, Karlsruhe Institute of Technology, Karls-

ruhe, Germany

In this work we present a highly accurate model for simulating Q-switched laser resonators based on a beam propagation method algorithm. The model is validated with an experimental Ho3+:YAG resonator setup and shows excellent agreement.

CA-P.17 MON

Laser Photon Statistics caused by Outcoupling and Losses

•*M. Eichhorn; Fraunhofer IOSB, Ettlingen, Germany; Karlsruhe Institute of Technology, Karlsruhe, Germany*

The effect of a laser output coupler being a beam-splitter is introduced and its implication on photon statistics is investigated for the first time, leading to non-Poisson statistics at low additional losses.

CA-P.18 MON

Polarized mid-infrared emission properties of Er3+ and Ho3+ ions in YAlO3

•*S. Normani[1], P. Loiko[1], G. Zin Elabedine[2], R.M. Solé[2], X. Mateos[2], A. Braud[1], W. Chen[3], V. Petrov[3], D. Sun[4], P. Zhang[5], and P. Camy[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]Universitat Rovira i Virgili (URV), Tarragona, Spain; [3]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [4]Anhui Institute of Optics and Fine Mechanics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, Hefei, China; [5]Jinan University, Guangzhou, China*

Polarized stimulated-emission cross-sections for mid-infrared emissions of Er3+(4I11/2→4I13/2) and Ho3+(5I6→5I7) in orthorhombic YAlO3 are determined, well matching recent results on ~3-μm laser operation. The peak σSE is 1.44×10-20 cm2 at 3015 nm (Ho3+) for E||c.

CA-P.19 MON

Spectroscopy and Laser Operation of Yb:LuGG Crystal at Cryogenic temperatures

S. Slimi[1], •V. Jambunathan[2], G. Zin Elabedine[1], H. Yu[3], H. Zhang[3], W. Chen[4], R. Maria Solé[1], M. Aguiló[1], F. Díaz[1], M. Smrz[2], T. Mocek[2], and X. Mateos[1]; [1]Universitat Rovira i Virgili (URV), Física i Cristal·lografia de Materials (FiCMA), Marcel·lí Domingo 1, E-43007 , Tarragona, Spain; [2]HiLASE Centre, Institute of Physics of the Czech Academy of Sciences, Za Radnicí 828, 252 , Dolní Břežany, Czech Republic; [3]State Key Laboratory of Crystal Materials, Shandong University, 250100, Jinan, China; [4]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, 350002 , Fujian, China

We present the spectroscopic and laser characteristics of Yb: LuGG garnet crystal at cryogenic temperatures. At 80 K, a maximum output power of 15.28 W was achieved pumped by a VBG stabilized 969 nm diode.

CA-P.20 MON

Fabrication and spectroscopy of high-quality Tm3+-doped germanate glass for 2 μm laser emission

•*M. Segura[1], D. Pugliese[2], M. Ceballos[1], F. Diaz[1], M. Aguilo[1], X. Mateos[1], N. Boetti[3], and J. Lousteau[4]; [1]Universitat Rovira i Virgili, Tarragona, Spain; [2]Politecnico di Torino and RU INSTM, Turin, Italy; [3]LINKS Foundation, Turin, Italy; [4]Politecnico di Milano, Milan, Italy*

A high-quality Tm-germanate glass was fabricated with homogeneous ion distribution. Spectroscopic characterization for pump and laser transitions as well as preliminary results on laser generation at 2 μm are reported.

CA-P.21 MON

High average power amplification of femtosecond pulses based on Yb: CaYAlO4 crystal

•*C. Bai[1], W. Tian[1], G. Wang[1], L. Zheng[1], X. Tian[1], Y. Yu[1], X. Xu[3], Z. Wei[2], and J. Zhu[1]; [1]Xidian University, Xi'an 710071, China; [2]Chinese Academy of Sciences, Beijing 100190, China; [3]Jiangsu Normal University, Xuzhou 221116, China*

In this report, we demonstrated the direct amplification with the Yb:CALYO crystal for the first time. The amplifier delivered amplified pulses with the average powers of 55.4 W and pulse duration of 166 fs.

CA-P.22 MON

Temporal Contrast Improvement at ELI-NP

•*O. Chalus[1], C. Derycke[1], M. Zhan[2], A. Guggenmos[2], S. Steinke[3], and I. Dancus[4]; [1]Thales LAS France, Elancourt, France; [2]UltraFast Innovations GmbH, Garching, Germany; [3]MARVEL FUSION GmbH, Munich, Germany; [4]Extreme Light Infrastructure - Nuclear Physics, IFIN-HH, Magurele, Romania*

Improvements to HPLS led to removal of pre-pulses and significant reduction of the pedestal in the contrast. A direct measurement of thirteen orders of magnitude contrast performed on a PW laser for the first time.

CA-P.23 MON

Investigation of Fractional Thermal Load in Cryogenically Operated Yb:YLF and Yb:YAG Lasers

•*M. Kilinc[1,2], U. Demirbas[1], J. Thesinga[1], M. Kellert[1], M. Pergament[1], and F.X. Kärtner[1,2,3]; [1]Center for Free-Electron Laser Science CFEL, Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22607, Hamburg, Germany; [2]Physics Department, University of Hamburg, Luruper Chaussee 149, 22761, Hamburg, Germany; [3]The Hamburg Centre for Ultrafast Imaging, Luruper Chaussee 149, 22761, Hamburg, Germany*

We have directly measured the pump-induced fractional thermal load (FTL) in cryogenically operated Yb:YAG and Yb:YLF lasers to the first time, and found that FTL is 1.5 and 1.7 times of quantum defect limit, respectively.

CA-P.24 MON

LIDT Evaluation of Bonded Crystals for J-class Energy System

•*A. Kausas[1] and T. Taira[2]; [1]Institute for Molecular Science, Okazaki, Japan; [2]RIKEN SPring-8 Center, Sayocho, Japan*

In this work, the laser induced damage threshold was measured for crystals bonded by surface activated bonding. By use of sub-ns Nd:YAG/Cr:YAG passively Q-switched laser at 1064 nm, crystals like sapphire, Nd:YAG and quartz were evaluated.

13:00 – 14:00

CB-P: CB Poster session

CB-P.1 MON

Dual-wavelength DFB Laser Based on Four Phase-shifts Sections and Equivalent Chirp Technology for Millimeter-wave Generation

•*B. Yuan[1], Y. Fan[1], S. Zhu[1], Y. Zhang[2], J. Marsh[1], and L. Hou[1]; [1]University of Glasgow, Glasgow, United Kingdom; [2]Nanjing University of Posts and Telecommuinications, Nanjing, China*

A monolithic dual-wavelength DFB laser based on four phase-shifts sections and equivalent chirp is demonstrated. A 61.2 GHz RF signal is observed by beating the two optical signals in a photodetector.

CB-P.2 MON

Analysis of ultra-low frequency noise external cavity diode laser-systems for optical ion clocks

•*N. Kolodzie[1,2], I. Mirgorodskiy[1], C. Nölleke[1], and P.O. Schmidt[2,3]; [1]TOPTICA Photonics AG, Gräfelfing, Germany; [2]Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; [3]Institut für Quantenoptik, Leibniz Universität Hannover, Hannover, Germany*

We investigate the characteristics of two different diode based ultra-low noise lasers for quantum applications. Differences in operation are analysed both experimentally and theoretically, and advantages and disadvantages of each system-type are discussed.

CB-P.3 MON

Monolithic Optical Injection Locking DFB Lasers Based on Four Phase-Shifts Sampling Sections

•*Y. Fan[1], Y. Zhang[2], Y. Sun[1], B. Yuan[1], J. Marsh[1], and L. Hou[1]; [1]James Watt School of Engineering, University of Glasgow, Glasgow, United Kingdom; [2]College of Optical Engineering, Nanjing University of Posts and Telecommunications, Nanjing, China*

A monolithic optical injection locking DFB laser based on four phase-shifted sampling gratings is demonstrated. Precise lasing wavelength control and a higher grating coupling coefficient can be achieved.

CB-P.4 MON

Controlling transverse modes in Quantum Cascade Laser Frequency Combs using radio-frequency injection

•*S. Dal Cin[1], F. Pilat[1], A. Konecny[1], N. Opacak[1], G. Strasser[1,2], and B. Schwarz[1]; [1]Institute for Solid State Electronics, TU Wien, Vienna, Austria; [2]Zentrum für Mikro- und Nanostrukturen, TU Wien, Vienna, Austria*

We present the observation of controlled lateral mode switching in a two section, RF-modulation optimized, 12μm broad ridge FP-QCL. The mode switching is induced by strong RF modulation close to the free-running repetition frequency.

CB-P.5 MON

Qualification of Semiconductor Optical Amplifiers for Space-Borne Laser Modules

•*K. Häusler, J. Baumann, A. Bawamia, H. Wenzel, A. Maaßdorf, J. Fricke, J.E. Boschker, J. Glaab, A. Knigge, A. Wicht, and G. Tränkle; Ferdinand-Braun-Institut, Berlin, Germany*

Laser modules for wavelength-stabilized narrow linewidth single-mode emission at 1064nm and 767nm were manufactured and subjected to qualification for space applications. For 1064nm modules the reliability exceeds 99% over 10,000 hours at 500mW optical power.

CB-P.6 MON

Wiener-Filter Enhanced Estimation of the Intrinsic Laser Linewidth From Delayed Self-Heterodyne Beat Note Measurements

•*M. Kantner and L. Mertenskötter; Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, Germany*

We present a novel method to estimate of the intrinsic laser linewidth from self-heterodyne beat note measurements even at strong detector noise. Our method yields an artifact-free reconstruction of the frequency noise power spectral density.

CB-P.7 MON

From coherence to incoherence in harmonic mode-locked lasers

•*T. Seidel*[1], *S. Gurevich*[1], *and J. Javaloyes*[2]; [1]*Institute for Theoretical Physics & Center for Nonlinear Science (CeNoS), University of Münster, Schlossplatz 2, 48149 Münster, Germany;* [2]*Dpt. de Física, Universitat de les Illes Balears & IAC-3, Campus UIB, E-07122 Palma de Mallorca, Spain*

We demonstrate that the pulses formed in an harmonically mode-locked laser are not necessarily coherent and that multiple frequency combs shifted in frequency may coexist. The laser may wander between such states, thereby impacting coherence.

CB-P.8 MON

Optical Injection-Induced Timing Jitter Reduction in Gain-Switched 1550-nm Discrete Mode Semiconductor Laser

M. Duque Gijon[1], *A. Quirce*[2], *J. Tiana-Alsina*[3], •*A. Valle*[2], *and C. Masoller*[1]; [1]*Departament de Fisica, Universitat Politecnica de Catalunya, Barcelona, Spain;* [2]*Instituto de Fisica de Cantabria (IFCA), Universidad de Cantabria-CSIC, Santander, Spain;* [3]*Departament de Fisica Aplicada, Universitat de Barcelona, Barcelona, Spain*

We have investigated the effect of optical injection on the timing jitter observed in gain-switched single-mode discrete mode lasers. Jitter reductions larger than 80 % over a 42 GHz detuning range are obtained.

CB-P.9 MON

Coupled mode-locked VECSEL cavities with a shared gain medium

•*J.V. Moloney, S. Tsouassis, and R.J. Jones*; *Wyant College of Optical Sciences, University of Arizona, Tucson, USA*

We demonstrate a coupled V-cavity semiconductor disk laser outputting two GHz mode-locked pulse trains while drawing gain from separated spectral regions. Cavity angle dictates spectral separation making this a potential candidate for dual-comb GHz spectroscopy

CB-P.10 MON

Towards AlGaInP-VECSELs with a grating waveguide structure

P. Gierss[1], *A. Ćutuk*[1], *M. Leyzner*[2], *U. Brauch*[2], *M. Abdou Ahmed*[2], •*M. Jetter*[1], *T. Graf*[2], *and P. Michler*[1]; [1]*Institut für Halbleiteroptik und Funktionelle Grenzflächen, University of Stuttgart, Stuttgart, Germany;* [2]*Institut für Strahlwerkzeuge, University of Stuttgart, Stuttgart, Germany*

The thermally imposed performance limits of traditional VECSELs can be overcome by introducing a grating waveguide structure into the design. We report on its fabrication and characterization for a red-emitting semiconductor laser structure.

CB-P.11 MON

Fiber-coupled tapered amplifier in a hermetic 14-pin butterfly package emitting 3 W at 780 nm and more than 2.5 W at 850 nm

•*H. Thiem, D. Brauda, M. Schütz, B. Globisch, and M. Malach*; *EAGLEYARD Photonics GmbH, Berlin, Germany*

We present miniaturized fiber-coupled tapered amplifiers at 780 nm and 850 nm with high output power and collimated output for applications in spectroscopy and quantum technology. The SMSR is > 50 dB and the M^2 <2.

CB-P.12 MON

Quantum Cascade Laser active region modification toward efficient integration with Photonic Integrated Circuits

•*K. Pierściński, D. Pierścińska, G. Sobczak, K. Pieniak, A. Broda, A. Kuźmicz, and P. Gutowski*; *Łukasiewicz Resorach Network - Institute of Microelectronics and Photonics, Warsaw, Poland*

In this work we focus on hybrid horizontal integration of QCL with passive waveguides fabricated in Ge-on-Si wafer. Some modifications of laser chips were investigated and will be presented in this work.

CB-P.13 MON

Piecewise continuous tuning of an integrated tunable laser based on an intra-cavity AMZI filter

•*M. Skënderas*[1], *P. Marin-Palomo*[1], *S.W. Jolly*[1,2], *and M. Virte*[1]; [1]*Brussels Photonics (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium;* [2]*OPERA-Photonique, Universite Libre de Bruxelles, Bruxelles, Belgium*

We investigate the tunability of a laser with an intra-cavity asymmetric Mach-Zehnder interferometer (AMZI). We demonstrate a piece-wise continuous tuning by taking advantage of the coupling between amplitude and phase in the AMZI response.

CB-P.14 MON

Investigation of bent DBR-RW Laser Diodes emitting at 785 nm

•*L.S. Theurer, J.-P. Koester, A. Müller, J. Fricke, M. Maiwald, B. Sumpf, A. Knigge, and G. Tränkle*; *Ferdinand-Braun-Institut (FBH), Berlin, Germany*

An experimental investigation of the losses in GaAs-based DBR-RW diode lasers containing straight and bent waveguides is presented. This includes the effects of the curvature of the different S-bends on the electro-optical and spectral behavior.

CB-P.15 MON

Q-switched semiconductor lasers as sources for optical frequency comb generation

•*P. López-Querol, C. Quevedo-Galán, A. Pérez-Serrano, J.M. García Tijero, and I. Esquvias*; *CEMDATIC–E.T.S.I. Telecomunicación, Universidad Politécnica de Madrid, Madrid, Spain*

In this contribution we study and simulate the behaviour of a four section DBR laser under Q-switching operation, generating broad optical frequency combs (202 GHz within 10 dB) with a low repetition frequency (100 MHz).

CB-P.16 MON

Identification of lasing modes of photonic-crystal surface-emitting lasers by polarization dependence of the far-field pattern: an application of the k-p perturbation theory

•*K. Sakoda*[1], *Y. Yao*[1,2], *N. Ikeda*[1], *T. Kuroda*[1], *Y. Sugimoto*[1], *T. Mano*[1], *H. Koyama*[1], *R. Hashimoto*[3], *K. Kaneko*[3], *T. Kakuno*[3], *S. Ookuma*[3], *R. Togawa*[3], *H. Ohno*[3], *and S. Saito*[3]; [1]*National Institute for Materials Science, Tsukuba, Japan;* [2]*University of Tsukuba, Tsukuba, Japan;* [3]*Toshiba Corporation, Yokohama, Japan*

We formulated a k-p perturbation theory for the polarization dependence of the far-field pattern of the photonic-crystal surface-emitting lasers, and successfully identified the resonance mode of our quantum cascade lasers with photonic-crystal cavities.

CB-P.17 MON

Bandwidth broadening from vertical strain coupling effect in chirped stacked InAs/InGaAsP quantum dash lasers

•*G. Chen and X. Zhang*; *Concordia University, Montreal, Canada*

By taking advantage of the vertical strain coupling effect, the output bandwidth of chirped stacked Qdash laser can be improved by adjusting the stacking sequence which provides a new strategy for the design of the broadband devices.

CB-P.18 MON

Modal Gain and Cross-Saturation Effects on the Switching Capabilities of an Integrated Multi-Wavelength Laser

•*M. Ladouce, P. Marin-Palomo, and M. Virte*; *Brussels Photonics Team (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium*

We identify key multi-wavelength laser parameters enabling mode switching based on phase-controlled optical feedback. Performing random parameter space sampling we categorize the range of values leading to switching and contrast them with experimental data.

CB-P.19 MON

Abrupt transition to coherent emission in a semiconductor laser with optical feedback

•*M. Duque Gijón*[1], *C. Masoller*[1], *and J. Tiana-Alsina*[2]; [1]*Departament de Fisica, Universitat Politecnica de Catalunya, Terrassa, Spain;* [2]*Department de Fisica Aplicada, Facultat de Fisica, Universitat de Barcelona, Barcelona, Spain*

We use the speckle contrast technique to show experimentally that, in a semiconductor laser with optical feedback, the transition to coherent emission varies from smooth to abrupt as the amount of feedback increases.

CB-P.20 MON

Waveguide width dependence of reliability in GaAs-based laser diodes

•*A.K. Sünnetçioğlu, K. Ebadi, and A. Demir*; *Bilkent University, UNAM - Institute of Materials Science and Nanotechnology, Ankara, Turkey*

Despite much higher heat load densities, low waveguide width laser diodes demonstrate superior characteristics in terms of reliability and temperature. We demonstrate the effect of waveguide width on reliability with experiment and simulation.

CB-P.21 MON

Integration of QCLs in photonic platforms - thermal considerations

•*D. Pierścińska, K. Pierściński, G. Sobczak, K. Chmielewski, K. Michalak, A. Kuźmicz, and P. Gutowski* ; *Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland*

This paper focuses on the thermal aspects of a single emitter QCLs as well as multi-spectral QCLs integrated on silicon-based platform. The experimental and numerical investigation of temperature distributions of integrated multi emitter QCLs are presented.

CB-P.22 MON

On-chip multi-wavelength lasers for all-optical THz signal processing

•*P. Marin-Palomo, S. Abdollahi, M. Ladouce, and M. Virte*; *Brussels Photonics Team (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium*

Using a multi-wavelenght laser monolithically integrated with an optical feedback control loop, we demonstrate selective filtering and amplification with a gain above 15 dB of an optical signal comprising two narrow lines separated by 1.3 THz.

13:00 – 14:00

CM-P: CM Poster session

CM-P.1 MON

Formation Dynamics Of Periodic Surface Patterns In Ge Induced By UV Nanosecond Laser Pulses

M. Alvarez-Alegria[1,2], C. Ruiz de Galarreta[1], and •J. Siegel[1]; [1]Laser Processing Group, Instituto de Óptica, IO-CSIC, Madrid, Spain; [2]Instituto de Física Interdisciplinar y Sistemas Complejos, IFISC (CSIC-UIB), Palma de Mallorca, Spain

We have employed single interfering excimer laser pulses to imprint homogenous diffraction gratings in crystalline Germanium. The formation dynamics have been investigated with nanosecond time-resolved optical diffraction, yielding the quantitative evolution of the surface topography.

CM-P.2 MON

3D-printed scaffolds via Multi-photon Polymerization for Peripheral Nervous System Regeneration

•A. Kordas[1,2], P. Manganas[1], M. Farsari[1], and A. Ranella[1]; [1]IESL/FORTH, N.Plastira 100, 70013, Heraklion, Greece; [2]Department of Materials Science and Technology, University of Crete, Heraklion, Greece

A novel scaffold fabricated with Multi-Photon Polymerization that provided topographical cues for the culture of two cell lines is reported. Cell behavior was monitored for the system's possible application to Peripheral Nervous System Regeneration.

CM-P.3 MON

3D Injectable Mechanical Metamaterials for Tissue Engineering Applications

•S. Skrepetos[1,2], A. Ranella[1], and M. Farsari[1]; [1]IESL/FORTH, Heraklion, Greece; [2]Department of Materials Science and Technology, Heraklion, Greece

Extraordinary 3D injectable mechanical metamaterials are being reported. Fabricated by an organic – inorganic photosensitive resin through Multiphoton Lithography (MPL) and then characterized via 3D modeling and indentation.

CM-P.4 MON

Tailoring the optical response of 3D-printed photonic crystals using Aluminum Zinc Oxide

•D. Ladika[1,2], A. Theodosi[1], O. Tsilipakos[3], A. Klini[1], P. Loukakos[1], M. Kafesaki[1,2], M. Farsari[1], and D. Gray[1]; [1]IESL-FORTH,Nik. Plastira 100, 70013 , Heraklion,Crete, Greece; [2]Department of Materials Science and Technology, 70013, University of Crete, Heraklion,Crete, Greece; [3]National Hellenic Research Foundation (N.H.R.F.), 48 Vassileos Constantinou Avenue, 11635, Athens, Greece

The extraordinary optical properties of the Epsilon Near Zero material, Aluminum Zinc Oxide will be studied in three dimensions, by deposing it on 3D photonic crystals, which are responsive in the Telecommunication Spectrum.

CM-P.5 MON

In-depth jet dynamics investigations of femtosecond laser bioprinting

•B. Kreidl[1], J. Zhang[2], S. Niehren[2], H. Clausen-Schaumann[1], S. Sudhop[1], and H.P. Huber[1]; [1]Lasercenter, Department of Applied Sciences and Mechatronics, Munich University of Applied Sciences HM, Lothstrasse 34, 80335, München, Germany; [2]Molecular Machines & Industries, Breslauer Strasse 2, 85386, Eching, Germany

In-depth investigations of jet dynamics in previously developed femtosecond laser bioprinting allow precise control over the transfer process, enabling printing resolutions of <42±3 µm and single cell deposition accuracy of <15 µm.

CM-P.6 MON

Unravelling the transient complex refractive index change of aluminium after ultrashort pulse laser irradiation

J. Winter[1], •D. Redka[1,2], J. Minár[2], M. Schmidt[3], and H.P. Huber[1]; [1]Lasercenter, Department of Applied Sciences and Mechatronics, Munich University of Applied Sciences HM, Lothstr. 34, Munich, Germany; [2]New Technologies-Research Center, University of West Bohemia, Univerzitní 8, Plzen, Czech Republic; [3]Lehrstuhl für Photonische Technologien, Friedrich-Alexander-Universität Erlangen-Nürnberg, Konrad-Zuse-Straße 3-5, Erlangen, Germany

Pump-probe ellipsometry and simulations are used to examine the dynamics of ultrashort pulse laser ablation of aluminum. Our material model predicts transient temperature and density variations, aiding in the understanding of issues of laser micro-machining.

CM-P.7 MON

Double-Pulse Laser Modification of Transparent Materials: Energy Coupling and Plasma Shielding

M. Zukerstein[1], V. Zhukov[1,2,3], and •N. Bulgakova[1]; [1]HiLASE Centre of the Institute of Physics of the Czech Academy of Sciences, Dolni Brezany, Czech Republic; [2]Federal Research Center for Information and Computational Technologies, Novosibirsk, Russia; [3]Novosibirsk State Technical University, Novosibirsk, Russia

Volumetric modification of glass by two successive laser pulses was studied experimentally and numerically. A weak pre-pulse followed by a more energetic pulse is favorable for enhanced modification. The role of self-trapped excitons is discussed.

CM-P.8 MON

Wavelength Dependence of Energy Transfer from Femtosecond Laser Double Pulse to Silicon

•E. Gushiken, M. Tani, and K.L. Ishikawa; School of Engineering, The University of Tokyo, Tokyo, Japan

With calculations based on the time-dependent density functional theory, we have found the efficient energy transfer to Silicon from the femtosecond laser double pulse which has a short-wavelength first pulse and long-wavelength second pulse.

CM-P.9 MON

Nanostructured Back Surface Amorphization of Silicon with Picosecond Infrared Laser Pulses

•M. Blothe[1], M. Chambonneau[1], and S. Nolte[1,2]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Abbe Center of Photonics, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Center of Excellence in Photonics, Jena, Germany

We demonstrate back surface silicon amorphization with picosecond Bessel beams. Ring-like and continuous modifications are observed by optical and electron microscopy. Raman spectroscopy reveals a full allotropic change. Regular polarization-dependent nanostructures are detected.

CM-P.10 MON

Nanolayered Natural Mineral Muscovite - Single fs Laser Pulse Interaction: A Tool To Uncover Material Variability

•D.M. Kane[1], S. Awasthi[2,3], A. Fuerbach[2], and D.J. Little[2]; [1]Australian National University, Canberra, Australia; [2]Macquarie University, Sydney, Australia; [3]University of Connecticut, Storrs, USA

Single femtosecond laser pulse interaction studies on high quality muscovite show the impact of nanolayered structure, mineral water content, and detailed chemical composition. Micro-shaping outcomes reflect and give insight into the mineral and its variation.

CM-P.11 MON

Spiraling optical vortices in Tornado Waves

•A. Brimis[1,3], K.G. Makris[1,3], and D.G. Papazoglou[1,2]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), Herakleion, Greece; [2]Department of Material Science and Technology, University of Crete, Herakleion, Greece; [3]ITCP, Department of Physics, University of Crete, Herakleion, Greece

Tornado waves are generated using a discrete number of optical vortices to modulate the phase of a ring-Airy beam. In this novel generation scheme, vortices and high intensity lobes follow a coupled accelerating spiraling trajectory.

CM-P.12 MON

3D microstructures of TiO2 for applications in photocatalysis

I. Syngelakis[1,2], C. Aivalioti[1,2], E. Aperathitis[1], G. Kenanakis[1], S. Tzortzakis[1,2], •A. Klini[1], and M. Farsari[1]; [1]IESL/FORTH, Heraklion, Greece; [2]Department of Materials Science and Technology, University of Crete, Heraklion, Greece

In this study we demonstrate the fabrication of complex three-dimensional (3D) microstructures of TiO2 Nanorods (NRs) and their photocatalytic performance. The proposed fabrication scheme applies Laser based techniques (MPL and PLD), as well as pyrolysis and ACG.

CM-P.13 MON

The contribution has been withdrawn.

CM-P.14 MON

Femtosecond inscription of Type-A Volume Bragg Gratings in silver-containing phosphate glasses

J. Harb[1], L. Talbot[2], Y. Petit[1,3], M. Bernier[2], and •L. Canioni[1]; [1]University of Bordeaux, CNRS, CEA, CELIA, UMR 5107, 351 Cours de la Libération, 33405 Talence, Cedex, France; [2]Centre d'Optique, Photonique et Laser (COPL), Université Laval, Québec G1V0A6, Canada; [3]University of Bordeaux, CNRS, ICMCB, UMR 5026, 87 avenue du Dr. A. Schweitzer, 33608 Pessac, Cedex, France

Here, we report Type-A Volume Bragg gratings (VBGs) in silver-containing phosphate glasses using the light-sheet and the phase-mask approaches. Those techniques open the avenue for the high throughput inscription of VBGs for industrial applications.

CM-P.15 MON

Ultrafast Laser Surface Functionalization and Route to Industrial Applications

•X. Sedao, L. Leggio, and T. Fournel; Laboratory Hubert Curien, UMR 5516 CNRS, Jean Monnet University, University of Lyon, Saint-Étienne, France

Ultrafast laser surface functionalization can be applied for photonics, wetting and bio-engineering. When large and freeform surface is in question, an intelligent, precise and lightweight vision system capable of addressing laser head is essential.

CM-P.16 MON

Laser-Assisted Nanosynthesis of Fluorescent Carbon Nanocomposites with Variable Plasmonic Properties

•Y.V. Ryabchikov; HiLASE Center, Institute of Physics of the Czech Academy of Sciences, Prague, Czech Republic

This research highlights new achievements on ultrafast laser nanosynthesis of multi-modal semiconductor nanocomposites with adaptable plasmonic properties due to variable chemical content for their further applications in optical nanothermometry, bioimaging and biosensing.

CM-P.17 MON

Standardized Material Characterization of Two-Photon Polymerized Materials on the Macroscopic Scale

•*F. Chalupa-Gantner*[1], *T. Koch*[2], *J. Puchhammer*[1], *M. Lunzer*[3], *and A. Ovsianikov*[1]; [1]*3D Printing and Biofabrication Group, Institute of Materials Science and Technology, TU Wien , Vienna, Austria*; [2]*Research Group for Structural Polymers, Institute of Materials Science and Technology, TU Wien, Vienna, Austria*; [3]*UpNano GmBH, Vienna, Austria*

Substantial improvements in the throughput of 2PP permit to close the gap to other additive manufacturing technologies in the meso- and macro-range. Those advances demand materials suitable for up-scaled 2PP, and standardized mechanical material testing.

CM-P.18 MON

Ultrashort Laser-induced Nano/microstructuring of Metallic Anode Coated by Carbon Nanoparticles for Li-ion Cells and Supercapacitors

•*I. Gnilitskyi*[1,2,3], *C. Leonardi*[4], *P. Medaglia*[4], *R. Pezzilli*[4], *G. Prestopino*[4], *L. Rizzo*[3,5], *and S. Bellucci*[3]; [1]*"NoviNano Lab" LLC, Lviv, Ukraine*; [2]*Department of Applied Physics and Nanoscience, Lviv Polytechnic National University, Lviv, Ukraine*; [3]*INFN, Frascati, Italy*; [4]*Department of Industrial Engineering, University of Rome Tor Vergata, Rome, Italy*; [5]*Università degli studi di Cassino e del Lazio , Rome, Italy*

Substrate modification by femtosecond laser-induced periodic surface structures has improved the cyclic resistance of metallic electrodes, also owing to the enhancement of the adhesion of carbon-based nanoparticles.

CM-P.19 MON

Simulating Ultrashort-Pulsed Laser Ablation of Dielectrics with Rate-Equation Models and Electric-Field Propagation

•*P.S. Sneftrup, S.H. Møller, and P. Balling*; *Aarhus University, Aarhus, Denmark*

We present a model of ultrashort-pulse laser ablation of dielectrics combining a rate-equations model and finite-difference time-domain propagation. We compare this model with previous methods of propagation by simulating observables in ablation experiments.

CM-P.20 MON

Laser-synthesis of 2D TMD nanoribbons

•*A. Kalganova, A. Averchenko, O.A. Abbas, I. Salimon, E. Zharkova, P.G. Lagoudakis, and S. Mailis*; *Center for Photonic Science and Engineering (CPhSE), Skolkovo Institute of Science and Technology, Moscow, Russia*

We present the production of MoS2, WS2, nanoribbons with extremely high aspect ratio, by direct interferometric patterning of single source precursor films, using visible laser radiation. The patterning process is followed by a material-synthesis step.

CM-P.21 MON

Bacterial attachment on large area two-photon polymerised scaffolds with different nanostructured surfaces

Y.M. Somorin[1,2], *N. Farid*[1], *and* •*G.M. O'Connor*[1]; [1]*National Centre for Laser Applications, School of Natural Sciences, University of Galway, Galway, Ireland*; [2]*Irish Photonic Integration Centre (IPIC), Tyndall National Institute, Cork, Ireland*

This study investigated the interaction of Staphylococcus aureus and Pseudomonas aeruginosa with two-photon polymerised scaffolds with different nanostructured surfaces. Smooth-surface scaffolds had fewer bacteria attached and gold-coated scaffolds had 85 – 98% reduction in bacteria attachment.

CM-P.22 MON

Eigenmode-based analysis of the multiple-temperature model

•*H. Katow*[1] *and K. Ishikawa*[1,2]; [1]*Photon Science Center, Graduate School of Engineering, The University of Tokyo, Tokyo, Japan*; [2]*Department of Nuclear Engineering and Management, Graduate School of Engineering, The University of Tokyo, Tokyo, Japan*

We developed an eigenmode-based analysis for the multiple temperature model. We report universal properties valid for any choice of parameters and system compositions, and a counterintuitive phenomenon where the lattice temperature exceeds electron temperature.

CM-P.23 MON

Spiraling polarization structures

•*A. Brimis*[1,3], *K.G. Makris*[1,3], *and D.G. Papazoglou*[1,2]; [1]*Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), Herakleion, Greece*; [2]*Department of Material Science and Technology, University of Crete, Herakleion, Greece*; [3]*ITCP, Department of Physics, University of Crete, Herakleion, Greece*

Polarization structures can be produced by the suitable superposition of polarized states of light that carry orbital angular momentum. Such structures follow a spiral trajectory, while their transverse profile depends on the choice of superimposed light.

CM-P.24 MON

Indium Tin Oxide Ultrafast Ablation: From Electron Dynamics to Fine Crater Structure

•*G.E. Hallum*[1,2], *D. Kürschner*[2], *S. Vogel*[2], *W. Schulz*[2], *and H.P. Huber*[1]; [1]*Munich University of Applied Sciences, Munich, Germany*; [2]*RWTH Aachen University, Aachen, Germany*

Indium tin oxide ablation is observed with pump-probe microscopy. Rate equations, fit to the reflectivity, estimate the free electron density and absorptivity. Correlations are drawn between atomic force microscopy, absorbed energy, and observed ablation dynamics.

CM-P.25 MON

Femtosecond laser writing of a Fabry-Perot cavity in a Polarizing Maintaining fiber: towards an all-fibered photonic cell for future atom cooling applications

•*A. Abou Khalil*[1], *M. Berisset*[1], *L. Gibert*[1], *C. Pierre*[1], *M.J. Milla*[1], *T. Billotte*[2], *F. Amrani*[3], *M. Popenda*[3], *F. Gérôme*[2], *B. Debord*[2], *F. Benabid*[2], *and M. Castaing*[1]; [1]*ALPhANOV, 33400 Talence, France*; [2]*GPMM Groupe, XLIM Institute, CNRS UMR 7252, 87060 Limoges, France*; [3]*GLOphotonics, 87060 Limoges, France*

Femtosecond laser writing of HR FBGs in Polarizing Maintaining fiber to create a Fabry-Perot cavity in a hollow core fiber as a first step towards an all-fibered photonic cell for future alkali atom cooling applications.

CM-P.26 MON

Mass Spectrometric Study of the Plasma Plume Produced by Picosecond Laser Ablation of a CrFeCoNiMn High Entropy Alloy

•*O. Gatsa, M. Flimelova, and A. Bulgakov*; *HiLASE Centrum, Institute of Physics CAS, Za Radnici 828, 252 41 Dolni Brezany, Czech Republic*

The composition and expansion dynamics of plasma plumes produced by picosecond laser ablation of three different types of CrFeCoNiMn High Entropy Alloy targets in vacuum are investigated by time-of-flight mass spectrometry.

CM-P.27 MON

Nanoscale Control of Surface Machining with a fs-UV interference approach

•*D. Gailevicius, D. Stonytė, A. Butkutė, and D. Paipulas*; *Vilnius University Laser Research Center, Vilnius, Lithuania*

Pulsed femtosecond UV interference patterning of difficult-to-process transparent dielectric materials provides pristine and periodic sub-micrometer features, focusing on fused silica, sapphire and YAG.

CM-P.28 MON

Improving Adhesive Properties on the Plastic Surface by Femtosecond Laser Treatment

•*A. Zhuravlov*[1,2], *V. Barvinska*[1,2], *A. Andrushchak*[1], *and I. Gnilitskyi*[1,2]; [1]*NoviNano Lab LLC, Lviv, Ukraine*; [2]*Department of Applied Physics and Nanomaterials Science, Lviv Polytechnic National University, Lviv, Ukraine*

In this paper, we used femtosecond laser to form anisotropic and isotropic surface modification on Teflon. Adhesion properties of laser-modified Teflon surface were studied and discussed.

CM-P.29 MON

Photothermal processing of commercial polymers under high frequencies femtosecond laser irradiation

A. Pérez[1], •*D. Puerto*[1,2], *M.G. Ramirez*[1,2], *G. Nájar*[1], *J. Francés*[1,2], *S. Gallego*[1,2], *A. Márquez*[1,2], *I. Pascual*[1,3], *and A. Beléndez*[1,2]; [1]*I.U. Física Aplicada a las Ciencias y las Tecnologías, Universidad de Alicante, Sant Vicent del Raspeig, Spain*; [2]*Dept. Física, Ingeniería de Sistemas y Teoría de la Señal, Universidad de Alicante, Sant Vicent del Raspeig, Spain*; [3]*Dept. Óptica, Farmacología y Anatomía, Universidad de Alicante, Sant Vicent del Raspeig, Spain*

We investigate the response of three commercial polymer (PVC, PET, and PP) under irradiation with high frequency (until 1 MHz) femtosecond (450 fs) multi-pulse (N = 30-100) laser at λ=515 and 1030 nm (2.9 J/cm2).

CM-P.30 MON

Surface Structure Modelling for Laser-Assisted Reduction of SEY

•*A. Din, R. Uren, S. Wackerow, and A. Abdolvand*; *University of Dundee, Dundee, United Kingdom*

We propose a model capable of predicting energy-dependent electron response of surfaces with their geometry after laser irradiation. The model offers insights into why the structures are effective at reducing secondary electron yield.

CM-P.31 MON

3D micro-optical elements by multiphoton lithography and nano-imprinted patterns using high laser induced damage threshold photoresists

E. Kabouraki[1], •*V. Melissinaki*[1], *A. Yadav*[2], *A. Melninkaitis*[3,4], *K. Tourlouki*[5], *T. Tachtsidis*[5], *N. Kehagias*[5,6], *G.D. Barmparis*[7], *D.G. Papazoglou*[1,8], *E. Rafailov*[2], *and M. Farsari*[1]; [1]*IESL/FORTH, Heraklion, Greece*; [2]*Optoelectronics and Biomedical Photonics Group, AIPT, Aston University, Birmingham, United Kingdom*; [3]*Laser Research Center, Vilnius University, Vilnius, Lithuania*; [4]*Lidaris Ltd, Vilnius, Lithuania*; [5]*Nanotypos, Thessaloniki, Greece*; [6]*NCSR Demokritos, Institute of Nanoscience and Nanotechnology, Athens,* *Greece; [7]Physics Department, University of Crete, Heraklion, Greece; [8]Materials Science and Technology Department, University of Crete, Heraklion, Greece*

New organic inorganic hybrid photoresists that exhibit enhanced laser-induced damage threshold are presented here. These photoresists were used for the fabrication of micro-optical elements (MOEs) using multiphoton lithography (MPL) as well as for nano-imprint lithography.

CM-P.32 MON

Laser Powder Bed Fusion thermal monitoring using optical fiber sensors: *in situ* measurements and modelling

•A. Lerner[1,2], Y. Anquetin[3], J. Gaspar[3], Q. Pouille[4], A. Ladaci[4], Y. Corre[5], G. Bouwmans[2], and G. Laffont[1]; [1]Université Paris-Saclay, CEA, List, F-91120, Palaiseau, France; [2]Univ. Lille, CNRS, UMR 8523 – PhLAM – Physique des Lasers Atomes et Molécules, F-59000, Lille, France; [3]Aix Marseille Univ, CNRS, IUSTI, Marseille, France; [4]Université Paris-Saclay, CEA, Service d'Études Analytiques et de Réactivité des Surfaces, 91191, Gif-sur-Yvette, France; [5]CEA, Institute for Research on Fusion by Magnetic confinement, 13108 Saint-Paul-Lez-Durance, France

We performed temperature measurements in a part manufactured by Laser Powder Bed Fusion using optical fiber sensors. A simplified model of the process was developed, and the experimental measurements are compared to simulated temperature values.

CM-P.33 MON

Self-Hydrophobization of Femtosecond Laser-Textured Patterns on Aluminium Surfaces

O. Myronyuk[1], D. Baklan[1], and •A.M. Rodin[2]; [1]Igor Sikorsky Kyiv Polytechnic Institute, Kyiv, Ukraine; [2]Center for Physical Sciences and Technology, Vilnius, Lithuania

The spontaneous liquid-repellency and its stability have been studied as a function of fractal-like nanopatterns and microgrooves on an aluminum surface textured with a femtosecond laser.

13:00 – 14:00

ED-P: ED Poster session

ED-P.1 MON

A compact cold atom gravimeter utilizing a grating magneto optical trap

S. Seo[1], J.H. Lee[1], S.-B. Lee[1], S.E. Park[1], M.H. Seo[1], J. Park[2], S. Lee[1], H.-G. Hong[1], and •T.Y. Kwon[1]; [1]Korea Research Institute of Standards and Science, Daejeon, South Korea; [2]National NanoFab Center, Daejeon, South Korea

We present a compact atomic gravimeter based on the atom interferometer that uses a gMOT. The grating parameter is optimized by applying a machine learning algorithm to the Monte Carlo simulation of our experimental setup.

ED-P.2 MON

A Comb-calibrated Raman Spectrometer for High-accuracy Measurements of Quadrupole Transitions in Gases

•M. Lamperti[1], L. Rutkowski[2], D. Gatti[3], R. Gotti[4], L. Moretti[3], D. Polli[3], G. Cerullo[3], and M. Marangoni[3]; [1]Department of Science and High Technology, University of Insubria, Como, Italy; [2]Univ Rennes, CNRS, IPR (Institut de Physique de Rennes)-UMR 6251, Rennes, France; [3]Dipartimento di Fisica - Politecnico di Milano and IFN-CNR, Milan, Italy; [4] Department of Electrical, Computer and Biomedical Engineering, Università degli studi di Pavia, Pavia, Italy

We present a comb-calibrated coherent Raman spectrometer for the measurement of quadrupole transitions of hydrogen-like molecules. The spectrometer reaches an uncertainty lower than 100 kHz on the frequency axis.

ED-P.3 MON

Towards a robust and stand-alone ultra-stable laser system based on a 124 K Si resonator with an instability of 4×10^{-17}

•S. Herbers[1], J. Yu[1], L. Anders[1], J. Kawohl[1], M. Misera[1], T. Legero[1], K. Hanhijärvi[2], A. Wallin[2], T. Lindvall[2], T. Fordell[2], and U. Sterr[1]; [1]Physikalisch-Technische Bundesanstalt, Hannover, Germany; [2]Teknologian tutkimuskeskus VTT Oy - Mittatekniikan keskus (MIKES), Espoo, Finland

To make a state-of-the art laser system self-contained and robust for continuous operation, a closed cycle cooling system was designed. The robustness to ambient seismic noise was increased by adding low-frequency feedback and feedforward corrections.

ED-P.4 MON

Cavity-Enhanced Frequency-Comb-Based Optical-Optical Double-Resonance Spectrometer

•A. Rosina[1], V. Silva de Oliveira[1], I. Silander[1], A. Hjältén[1], L. Rutkowski[2], G. Soboń[3], K.K. Lehmann[4], and A. Foltynowicz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Université de Rennes, CNRS, IPR (Institut de Physique de Rennes), Rennes, France; [3]Faculty of Electronics, Photonics and Microsystems, Wrocław University of Science and Technology, Wrocław , Poland; [4]Departments of Chemistry and Physics, University of Virginia, Charlottesville, USA

We demonstrate an improved optical-optical double-resonance spectrometer based on a 3.3 μm CW pump and a 1.67 μm cavity-enhanced comb probe for detection of sub-Doppler hot-band transitions in the $3\nu_3 \leftarrow \nu_3$ range of methane.

ED-P.5 MON

Impurity-Free Gas Recycling System for an XUV Frequency Comb

•L. Guth[1,2], J.-H. Oelmann[1,2], T. Heldt[1,2], J. Nauta[1,3], N. Lackmann[1], N. Griesbach[1], T. Pfeifer[1], and J.R. Crespo López-Urrutia[1]; [1]Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany; [2]Heidelberg Graduate School for Physics, Heidelberg, Germany; [3]Department of Physics, Swansea University, Swansea, United Kingdom

We present a gas recycling system for High Harmonic Generation processes. The system operates in a closed-loop, with high purity, at pressures up to 200 bar, and with a recycling rate of over 95 percent.

ED-P.6 MON

A robust low-phase noise frequency comb

•T. Puppe, C. Tresp, S. Mueller, A. Seer, P. Thoumany, and R. Wilk; TOPTICA Photonics AG, Munich, Germany

A new locking scheme for a frequency comb based on difference-frequency generation combines the low-phase noise by locking to an optical reference with long-term stability via a GPS disciplined RF-oscillator.

ED-P.7 MON

Stability improvement of a fiber-based frequency reference at 1.5 μm using an original detection technique for interference cancellation

•V. Roncin[1], J. Hrabina[2], L. Pravdova[2], and F. Du-Burck[1]; [1]Laboratoire de Physique des Lasers, C.N.R.S./Université Sorbonne Paris Nord, Villetaneuse, France; [2]Institute of Scientific Instruments, Czech Academy of Sciences, Brno, Czech Republic

The signal is detected at a frequency that does not modulate the interference fringes superimposed on the error signal in order to improve the stability of a fiber-based frequency standard at 1.5 μm.

ED-P.8 MON

Attention Mechanisms for Broadband Feature Prediction for Electromagnetic and Photonic Applications

M. Soroush[1], •E. Simsek[1], G. Moille[2,3], K. Srinivasan[2], and C.R. Menyuk[1]; [1]University of Maryland Baltimore County, Baltimore, USA; [2]National Institute of Standards and Technology (NIST), Gaithersburg, USA; [3]Joint Quantum Institute, NIST/University of Maryland, College Park, USA

Different neural network architectures are used to predict the coupling quality factor of microring resonators across broad spectral bandwidths. Attention mechanisms perform the best. Neural networks can significantly reduce the computation time during optimization studies.

ED-P.9 MON

Tunable Polarization-Multiplexed Single-Cavity Dual-Comb

•A. Rodriguez Cuevas, H. J. Kbashi, D. Stoliarov, and S. Sergeyev; Aston Institute of Photonic Technologies, College of Engineering and Physical Sciences, Aston University, B4 7ET, Birmingham, United Kingdom

A dual-comb laser based on Er-doped fibre laser and mode-locked by carbon nanotubes is stable over 6 hours and can be separated with an extinction ratio of 19 dB, potentially being use in polarimetric LIDAR.

13:00 – 14:00

EJ-P: EJ Poster session

EJ-P.1 MON

Squeezed light source on lithium niobate on insulator for GKP generation without periodic poling

•T.N. Arge, R.R. Domeneguetti, J.S. Neergaard-Nielsen, T. Gehring, and U.L. Andersen; Center for Macroscopic Quantum States (bigQ) Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark

In this work we present simulations and novel ideas for generating squeezed light on a Lithium Niobate on Insulator platform for continous variable quantum computation. We focus on purity and indistinguishability of the source.

EJ-P.2 MON

Temporal localized states and square-waves in semiconductor micro-resonators with strong time-delayed feedback

•E.R. Koch[1], T.G. Seidel[1], J. Javaloyes[2], and S.V. Gurevich[1,3]; [1]Institute for Theoretical Physics, University

of Münster, Münster, Germany; [2]*Departament de Física, Universitat de les Illes Balears & IAC-3, Palma de Mallorca, Spain*; [3]*Center for Nonlinear Science (CeNoS), University of Münster, Münster, Germany*

We investigate dynamics of temporal localized states in injected micro-resonators containing a quantum-well nonlinearity. A normal form partial differential equation is derived to investigate the role of second and third order dispersion on their emergence.

EJ-P.3 MON

Fast computation method to characterize the propagation dynamics of Ultrashort Laser Pulses

•*E. Franco, J.A. Rodrigo, and Ó. Martínez-Matos*; *Universidad Complutense de Madrid, Facultad de Ciencias Físicas, Madrid, Spain*

We propose a fast numerical GPU-based algorithm to describe the spatio-temporal propagation of ultrashort laser pulses in paraxial approximation. The numerical results for femtosecond Curved-Shaped Laser pulses focused along arbitrary trajectories are analyzed in detail.

EJ-P.4 MON

Modelling of Gaussian and Bessel laser beams sharp focused into complex tissue-like scattering medium with the Helmholtz equation approximation

Y. Kistenev[1,2], •*I. Meglinski*[3,4], *and A. Bulygin*[1,2]; [1]*Tomsk State University, Tomsk, Russia*; [2]*V.E. Zuev Institute of Atmospheric Optics of Siberian Branch of the Russian Academy of Sciences, Tomsk, Russia*; [3]*University of Oulu, Oulu, Finland*; [4]*Aston University, Birmingham, UK*

A comparative analysis of the sharp focused Gaussian and Bessel laser beams within the turbid tissue-like scattering medium is performed utilising unidirectional Helmholtz equation approximation.

EJ-P.5 MON

Coexistence of collapsed-snaking-related dark and bright Kerr localized states

•*E.K. Akakpo*[1], *M. Haelterman* [1], *F. Leo*[1], *and P. Parra-Rivas*[1,2]; [1]*OPERA-photonics, Universit libre de Bruxelles, Bruxelles, Belgium*; [2]*Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni, Sapienza Universitá di Roma, Roma, Italy*

We study the formation and stability of dissipative bright and dark localized states emerging in Kerr cavities including second- and fourth-order dispersion. We show that these states undergo collapsed snaking.

EJ-P.6 MON

Multiplexed spatially-focused localisation of light in adipose biological tissues

•*A. Bykov*[1], *V. Tuchin*[2], *and I. Meglinski*[1,3]; [1]*University of Oulu, Oulu, Finland*; [2]*Saratov State University, Saratov, Russia*; [3]*Aston University, Birmingham, United Kingdom*

We report the observation of a new type of natural spatially-resolved longitudinal multi-spot focusing localisation of light within adipose tissues, where the cascade of individual adipocytes act as an ensemble of micro-scale lenses.

EJ-P.7 MON

GPU-Accelerated Full-Field Modelling of Highly Dispersive Ultrafast Optical Parametric Oscillators

•*S.C. Robarts, D.T. Reid, and R.A. McCracken*; *Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom*

We demonstrate GPU-accelerated modelling of ultrafast optical parametric oscillators via the nonlinear envelope equation, with 1071x improvement in execution time, enabling the exploration of large time-bandwidth product systems such as highly-dispersive or chirped-pumped cavities.

EJ-P.8 MON

Square-Wave Generation in Vertical External-Cavity Kerr-Gires-Tournois Interferometers

•*E.R. Koch*[1], *T.G. Seidel*[1], *S.V. Gurevich*[1,3], *and J. Javaloyes*[2]; [1]*Institute for Theoretical Physics, University of Münster, Münster, Germany*; [2]*Departament de Física, Universitat de les Illes Balears & IAC-3, Palma de Mallorca, Spain*; [3]*Center for Nonlinear Science (CeNoS), University of Münster, Münster, Germany*

We investigate the mechanisms of square-wave formation in vertical external-cavity Kerr-Gires-Tournois Interferometers. We provide a simple analytical approximation for the plateau values and we demonstrate that square-waves can emerge in a homoclinic snaking scenario.

EJ-P.9 MON

Laser heating and amorphous Si crystallization in composites "amorphous silicon/gold film/quartz substrate"

•*A. Fedotov*[1], *I. Dadenkov*[1], *Y. Tsitavets*[1], *Y. Shafarevich*[1], *and O. Fedotova*[2]; [1]*Belarusian State University, Minsk, Belarus*; [2]*Scientific-Practical Materials Research Centre, NAS Belarus, Minsk, Belarus*

We study numerically a process of laser heating of nanocomposites in configuration "amorphous silicon film/Au film/quartz substrate" by short pulses and establish that the gold layer may uniformize the distribution of heat increasing the quality of crystallized silicon

EJ-P.10 MON

Plane-wave Expansion based Modelling of Linear and Non-Linear Response of Resonant Metasurfaces under Realistic Excitation Conditions

•*L.K. A.S., J. Deka, R. Biswas, and V. Raghunathan*; *Indian Institute of Science, Bangalore, India*

We report a unified plane-wave expansion method to model linear and nonlinear optical characteristics of resonant metasurfaces considering arbitrary excitation angular profile. Good agreement is obtained between the model and experimentally obtained sum-frequency generation spectra.

13:00 – 14:00

JSII-P: JSII Poster session

JSII-P.1 MON

Six-Telescope Ultrafast Laser Inscribed Beam Combiner for Stellar Interferometry in the J-Band

•*A.N. Dinkelaker*[1], *S. Smarzyk*[1], *A.S. Nayak*[1,2], *S. Piacentini*[3,4], *G. Corrielli*[4], *R. Osellame*[4], *E. Pedretti*[5], *M.M. Roth*[1], *and K. Madhav*[1]; [1]*Leibniz-Institut für Astrophysik Potsdam (AIP), Potsdam, Germany*; [2]*Institut für Angewandte Physik, Friedrich-Schiller-Universität Jena, Jena, Germany*; [3]*Dipartimento di Fisica - Politecnico di Milano, Milano, Italy*; [4]*Istituto di Fotonica e Nanotecnologie (IFN) - CNR, Milano, Italy*; [5]*UKRI STFC Rutherford Appleton Laboratory, Chilton, United Kingdom*

We have fabricated a six-telescope near-infrared discrete beam combiner (DBC) for stellar interferometry in the J-band using ultrafast laser inscription (ULI). For laboratory characterization, we populate the visibility-to-pixel-matrix and identify the complex visibility.

JSII-P.2 MON

OPA! The Original PolyOculus Array for Mt. Laguna Observatory

•*C. Moraitis*[1,5], *S. Eikenberry*[1,5], *R. Amezcua-Correa*[1], *S. Yerolatsitis*[1], *C. Warner*[3], *D. Wright*[2], *H. Reale*[1], *J. Foran*[1], *A. Akers*[1], *J. Rowe*[1], *K. Semmen*[1], *V. Pagliuca*[1], *T. Thomas*[1], *N. Salem*[1], *V. Miller*[1], *N. Harmon*[1], *M. Bentz*[4], *A. Gonzalez*[3], *J. Harrington*[5], *N. Law*[6], *T. Maccarone*[7], *and R. Quimby*[8]; [1]*College of Optics and Photonics (CREOL), University of Central Florida, Orlando, FL, USA*; [2]*Department of Physics, University of Central Florida, Orlando, FL, USA*; [3]*Department of Astronomy, University of Florida, Gainesville, FL, USA*; [4]*Georgia State University, Atlanta, GA, USA*; [5]*Planetary Sciences Group, Department of Physics, University of Central Florida, Orlando, FL, USA*; [6]*University of North Carolina - Chapel Hill, Chapel Hill, NC, USA*; [7]*Texas Tech University, Lubbock, TX, USA*; [8]*San Diego State University, San Diego, CA, USA*

The OPA project, the Original PolyOculus Array, is a seven-pack telescope array that uses the PolyOculus technology to create a large-area-equivalent telescope for spectroscopy by combining the light of each small telescope via photonic lantern

JSII-P.3 MON

Study of optimized photonic building blocks and functions in electro-optic mid-infrared lithium niobate waveguides for astrophotonic applications

•*G. Martin*[1], *M. Bonduelle*[1], *R. Salut*[2], *L. Robert*[2], *and N. Courjal*[2]; [1]*IPAG, Grenoble, France*; [2]*FEMTO ST, Besançon, France*

In order to develop new photonic based astronomical instruments, optimized mid infrared waveguides and functions in electro-optical lithium niobate material have been conceived and fabricated. The characterization results on these samples will be presented.

NOTES

Room 1 ICM

8:30 – 10:00

CM-4: Temporal and spatial beam shaping for laser processing II

Chair: Francois Courvoisier, Université de Franche-Comté, FEMTO-ST Institute, CNRS, France

CM-4.1 TUE 8:30

High aspect ratio nanopillars fabricated by a single pulse of ultrafast Bessel beam

•V.V. Belloni, M. Hassan, L. Furfaro, L. Froehly, C. Billet, R. Giust, and F. Courvoisier; FEMTO-ST Institute, Besancon, France

Radially and azimuthally polarized Bessel beams present a hollow cylindrical focus. Used in single femtosecond illumination, they can produce positive structures up to 15 μm high with a sub-micron diameter by matter ejection.

CM-4.2 TUE 8:45

Conductive Microelectrode Generation in Diamond Using Pulsed Bessel Beams

•A. Kuriakose[1,2], A. Chiappini[3], B. Sotillo[4], A. Britel[5], P. Apra[5], F. Picollo[5], and O. Jedrkiewicz[1]; [1]IFN-CNR, Udr di Como, Como, Italy; [2]Dipartimento di Scienza e Alta Tecnologia, Università dell'Insubria, Como, Italy; [3]Istituto di Fotonica e Nanotecnologie (IFN)-CNR, CSMFO and FBK-CMM, Trento, Italy; [4]Department of Materials Physics, Faculty of Physics, Complutense University of

Room 4a ICM

8:30 – 10:00

CK-2: Plasmonic structures and components

Chair: Humeyra Caglayan, Tampere University, Finland

CK-2.1 TUE (Keynote) 8:30

Nonlinear Optics with Nanoparticles and Metamaterials

•A. Zayats; King's College London, London, United Kingdom

Weak nonlinearity of conventional materials can be enhanced by their nanostructuring. We will overview recent developments and trends in engineering spectral and temporal response of coherent and incoherent optical nonlinearities with dielectric, plasmonic and hybrid nanoparticles, nanostructures and metamaterials.

Room 4b ICM

8:30 – 10:00

EG-4: Ultrastrong light matter interactions and nonlinear optics

Chair: Mathieu Mivelle, CNRS, Sorbonne university, Paris, France

EG-4.1 TUE (Invited) 8:30

Many-body superradiance and dynamical symmetry breaking in waveguide QED

•A. Asenjo-Garcia; Columbia University, New York, USA

I will discuss the many-body decay of extended collections of two-level systems, and focus on the situation where they are all coupled to a one-dimensional photonic reservoir.

Room 13a ICM

8:30 – 10:00

CA-4: Polarization effects and structured laser beams

Chair: Ammar Hideur, CORIA, Université de Rouen Normandie, France

CA-4.1 TUE 8:30

Radially polarized ceramic Yb:Lu2O3 thin-disk laser

•D. Didychenko, S. Esser, F. Beirow, T. Graf, and M. Abdou Ahmed; Institut für Strahlwerkzeuge, University of Stuttgart, Pfaffenwaldring 43, 70569 Stuttgart, Germany

We report on generation of radially polarized beam in a ceramic Yb:Lu2O3 thin-disk oscillator. An output power and optical efficiency of 175W and 39.7% were respectively achieved. A degree of radial polarization >93% is obtained.

CA-4.2 TUE 8:45

Phase-locked dual polarization frequency combs in Yb:YAG

•H. Akagla, G. Loas, M. Vallet, and M. Brunel; Univ Rennes, CNRS, Institut FOTON–UMR 6082, Rennes, France

An experimental demonstration of a fully phase-locked dual polarization pulsed passively mode-locked Yb:YAG solid-state laser was achieved. Two frequency combs are associated to the two orthogonal polarization resulting in adjustable pulsed polarization sequences.

Room 13b ICM

8:30 – 10:00

CB-3: Novel semiconductor laser concepts

Chair: Marco Gaulke, ETH, Zürich, Switzerland

CB-3.1 TUE (Invited) 8:30

Different Phases of Polariton Lasers

J. Hu, N. Lydick, K. Sun, and •H. Deng; University of Michigan, Ann Arbor, USA

We will discuss phase separation in a polariton condensate, between a quasi-BEC without long-range order and a BKT-like phase with quasi-long range order, due to the interplay of nonlinearity and pumping, thermalization and decay.

Room 14a ICM

8:30 – 10:00

CD-4: Specialty fibers

Chair: Goery Genty, Tampere University, Finland

CD-4.1 TUE 8:30

Intra-Modal Phase-Sensitive Four-Wave Mixing in a Few-Mode Fiber

•V. Gaudillat[1], M. Barbier[1], L. Bramerie[1], M. Gay[1], M. Bigot-Astruc[2], P. Sillard[2], Y. Dumeige[1], and C. Peucheret[1]; [1]Univ Rennes, CNRS, FOTON - UMR 6082, Lannion, France; [2]Prysmian Group, Haisnes, France

We experimentally demonstrate intra-modal signal/idler-degenerate phase-sensitive four-wave mixing in two LP modes (LP01 and LP11) of a 2-km long step-index 4-mode fiber.

CD-4.2 TUE 8:45

Low-Threshold Green-Pumped Ultraviolet Resonant Dispersive-Wave Emission in Small-Core Anti-Resonant Hollow-Fibre

•M. Sabbah[1], K. Harrington[2], R. Mears[2], C. Brahms[1], A. Alisauskas[1], L.R. Murphy[1], S. Yerolatsitis[2], W.J. Wadsworth[2], J.C. Knight[2], J.M. Stone[2], R.R. Thomson[1], T.A. Birks[2], and J.C. Travers[1]; [1]School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]Centre for Photonics and Photonic Materials, Depart-

Room 14b ICM

8:30 – 10:00

CH-3: On-chip optical sensing

Chair: Florenta Costache, Fraunhoffer IPMS Dresden, Germany

CH-3.1 TUE (Invited) 8:30

Trace gas absorption spectroscopy on a chip

•J. Jagerska[1], M. Vlk[1], J. Salaj[1], H.D. Yallew[1], S. Alberti[1], R. Zakoldaev[1], J. Høvik[2], and A. Aksnes[2]; [1]UiT The Arctic University of Norway, Tromsø, Norway; [2]NTNU, Trondheim, Norway

We report on sensitive trace gas spectroscopy using nanophotonic waveguides with extraordinarily large air confinement factors. Methane and isotope-specific CO2 detection down to 300 and 30 ppb, respectively, were achieved with only 1 cm2 chips.

Room Osterseen ICM

8:30 – 10:00

JSVI-1: NanophoXonics, optomechanical systems and thermal transport

Chair: Roberto Li Voti, Sapienza Università di Roma, Dept SBAI, Roma, Italy

JSVI-1.1 TUE (Invited) 8:30

Optophononic Engineering Using Semiconductor Nanostructures

•N.D. Lanzillotti-Kimura, M. Esmann, A. Rodriguez, P. Priya, E.R. Cardozo de Oliveira, C. Xiang, O. Ortiz, M. Morassi, L. Le Gratiet, I. Sagnes, and A. Lemaitre; Université Paris Saclay – CNRS – Centre de Nanosciences et de Nanotechnologies C2N, Palaiseau, France

We design and experimentally study a series of nanophononic devices based on planar and micropillar resonators, including Fabry-Perot and topological cavities. The structures are based on superlattices designed to confine light and sound simultaneously.

Room 1 Hall B1 (B11)

8:30 – 10:00

CF-4: Complex pulse shaping and characterization

Chair: Matteo Negro, Cambridge raman imaging, Milano, Italy

CF-4.1 TUE 8:30

Programmable spatiotemporal control of femtosecond laser pulses focused along arbitrary trajectories

•E. Franco, Ó. Martínez-Matos, and J.A. Rodrigo; Universidad Complutense de Madrid, Facultad de Ciencias Físicas, Madrid, Spain

We present a theoretical framework and experimental setup that allows straightforward engineering of structured ultrashort light pulses with control of its peak intensity velocity, time delay, and pulse phase along arbitrary 3D trajectories.

CF-4.2 TUE 8:45

Demonstration of kilometer propagation of space-time wave packets

•L. Hall[1], M. Romer[1], B. Turo[1], T. Hayward[2], R. Menon[2], and A. Abouraddy[1]; [1]University of Central Florida, Orlando, USA; [2]University of Utah, Salt Lake City, USA

For the first time, we observe a propagation invariant space-time wave packet propagating under turbulent conditions with an initial beam size of 2 and 8 mm. This result outperforms the equivalent Gaussian beam by 100x.

Room 2 Hall B1 (B12)

8:30 – 10:00

ED-4: Cavity-enhanced precision spectroscopy

Chair: Marco Marangoni, Politecnico di Milano, Milano, Italy

ED-4.1 TUE 8:30

Measurement and Assignment of Hot-Band Methane Transitions Using Cavity-Enhanced Comb-Based Double-Resonance Spectroscopy

•V. Silva de Oliveira[1], I. Silander[1], A. Hjältén[1], A. Rosina[1], L. Rutkowski[2], G. Soboń[3], O. Axner[1], K.K. Lehmann[4], and A. Foltynowicz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Université de Rennes, CNRS, IPR (Institut de Physique de Rennes), Rennes, France; [3]Faculty of Electronics, Photonics and Microsystems, Wrocław University of Science and Technology, Wrocław, Poland; [4]Departments of Chemistry and Physics, University of Virginia, Charlottesville, USA

We use optical-optical double-resonance spectroscopy with a cavity-enhanced comb probe to measure transitions from high excited rotational levels in the $3\nu_3 \leftarrow \nu_3$ range of methane and assign them using combination differences and intensity ratios.

ED-4.2 TUE 8:45

Sensitive Fourier-transform cavity ring down spectroscopy based on a near-infrared frequency comb

R. Dubroeucq[1], D. Charczun[2], P. Masłowski[2], and •L. Rutkowski[1]; [1]Univ Rennes, CNRS, IPR (Institut de Physique de Rennes)-UMR 6251, Rennes, France;

Room 6 Hall B3 (B32)

8:30 – 10:00

CG-1: Ultrafast magnetic fields and anisotropy

Chair: Cord Arnold, Lund University, Lund, Sweden

CG-1.1 TUE (Invited) 8:30

Femto- phono- magnetism

•S. Sharma[1] and J.K. Dewhurst[2]; [1]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [2]Max Planck Institute for micro-structure physics, Halle, Germany

Using a parameter free ab-initio approach to treating ultrafast light-matter interactions I will show that selective excitation of optical phonon modes exert a strong influence on femtosecond demagnetisation, offering a new route to light-controlled-femto-magnetism.

Room 7 Hall A1 (A11)

8:30 – 10:00

EA-1: Fundamental quantum optics

Chair: Fabian Maucher, University of the Balearic Islands,Palma, Spain

EA-1.1 TUE 8:30

High-Efficiency, Ultra-Broadband, and Low-Noise Quantum Memory in Atomic Barium Vapor

•K. Shinbrough[1,2], B.D. Hunt[1,2], S. Park[3], K. Oolman[1,2], T. Loveridge[1,2], J.G. Eden[3], and V.O. Lorenz[1,2]; [1]Department of Physics, University of Illinois, Urbana-Champaign, USA; [2]IQUIST, University of Illinois, Urbana-Champaign, USA; [3]Department of Electrical and Computer Engineering, University of Illinois Urbana-Champaign, Urbana, USA

We demonstrate record storage efficiency, bandwidth, and noise performance simultaneously in a collisionally broadened barium vapor quantum memory, operating in the ultrabroadband (>100 GHz) regime.

EA-1.2 TUE 8:45

Will a single two-level atom simultaneously scatter two photons?

L. Masters, X. Hu, M. Cordier, G. Maron, L. Pache, A. Rauschenbeutel, M. Schemmer, and •J. Volz; Humboldt-Universität zu Berlin, Berlin, Germany

Here we experimentally demonstrate that, by spectrally rejecting the coherently scattered component of the fluorescence of a single two-level atom, the remaining light consists of photon pairs that have been simultaneously scattered by the atom.

Room 8 Hall A1 (A12)

8:30 – 10:00

EB-4: Quantum computation I

EB-4.1 TUE (Invited) 8:30

Quantum computation and quantum simulation with strings of trapped Ca+ ions

•R. Blatt; University of Innsbruck, Institute for Experimental Physics, Innsbruck, Austria; Austrian Academy of Science, Institute for Quantum Optics and Quantum Information, Innsbruck, Austria

The state-of-the-art of the Innsbruck trapped-ion quantum computer is briefly reviewed. We present an overview on the available quantum toolbox and discuss the scalability of the approach.

NOTES

Room 1 ICM

Madrid, Madrid, Spain; [5]Department of Physics and "NIS" Inter-departmental Centre, University of Torino, Torino, Italy

Top-notch quality, in-bulk conductive graphitic microelectrodes with a very small resistivity of 0.04 Ω cm are fabricated perpendicular to the surface of a 500 μm thick monocrystalline CVD diamond sample using pulsed Bessel beams.

CM-4.3 TUE 9:00

Ultrafast Laser Writing with Pulse Temporal Contrast Control

•H. Wang, Y. Lei, G. Shayeganrad, and P. Kazansky; Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

Nanostructuring of silica glass are controlled by temporal contrast of femtosecond laser pulses. Nanopore-based birefringent modification is created with pulse contrast of 107, while stronger nanograting-based modification is observed with reduced contrast of 103

Room 4a ICM

Room 4b ICM

EG-4.2 TUE 9:00

Ultrafast Dynamics of Molecular Polaritons in Photoswitch Nanoantennas

J. Kuttruff[1], M. Romanelli[2], E. Pedrueza-Villalmanzo[3], J. Allerbeck[4], J. Fregoni[5], V. Saavedra-Becerril[6], J. Andreasson[6], D. Brida[7], A. Dmitriev[3], S. Corni[2], and •N. Maccaferri[8]; [1]University of Konstanz, Konstanz, Germany; [2]University of Padova, Padova, Italy; [3]University of Gothenburg, Gothenburg, Sweden; [4]Empa, Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland; [5]Universidad Autónoma de Madrid, Madrid, Spain; [6]Chalmers University of Technology, Gothenburg, Sweden; [7]University of Luxembourg, Luxembourg, Luxembourg; [8]Umeå University, Umeå, Sweden

We study ultrafast dynamics of photocromic molecules both weakly and strongly coupled to plasmonic nanoantennas. Experiments, verified by quantum modelling, reveal sub-ps collapse of molecular polaritons to intramolecular dynamics induced by interaction with the plasmons.

Room 13a ICM

CA-4.3 TUE 9:00

Higher-order Visible Vortex Modes from a Pr3+:YLF Laser Source Under Intracavity Spherical Aberration

•A.S. Rao[1,2,3], T. Morohashi[1], W. R. Kerridge-Johns[4], and T. Omatsu[1,2]; [1]Graduate School of Engineering, Chiba University, Chiba, Japan; [2]Molecular Chirality Research Centre, Chiba University, Chiba, Japan; [3]Institute for Advanced Academic Research, Chiba University, Chiba, Japan; [4]Photonics Group, Imperial College London, London, United Kingdom

We report on the direct generation of higher-order LG modes at 640 nm (LG0,±31) and 607 nm (LG0,±17) wavelengths directly from a Pr3+:YLF laser, which utilises the presence of strong intra-cavity spherical aberration.

Room 13b ICM

CB-3.2 TUE 9:00

Bose-Einstein condensation of photons in a vertical-cavity surface-emitting laser

•M. Pieczarka[1], M. Gębski[2], A. Piasecka[1], M. Wasiak[2], and T. Czyszanowski[2]; [1]Department of Experimental Physics, Faculty of Fundamental Problems of Technology, Wrocław University of Science and Technology, Wrocław, Poland; [2]Photonics Group, Institute of Physics, Lodz University of Technology, Lodz, Poland

We demonstrate signatures of Bose-Einstein condensation of photons in a vertical-cavity surface-emitting laser. We present condensation and standard lasing depending on the relative detuning between the cavity and the quantum well resonances in different devices.

Room 14a ICM

ment of Physics, University of Bath, Claverton Down, Bath, United Kingdom

We demonstrate tunable deep-ultraviolet pulses pumped with just several tens of nJ at 515 nm through resonant dispersive wave emission in a 6 μm core-diameter argon-filled anti-resonant hollow-core fibre.

CD-4.3 TUE 9:00

Four-Wave Mixing Enhancement in a Yb-doped Photonic Crystal Fiber

•B. Krawczyk[1], A. Kudlinski[2], R. Battle[1], R. Murray[1], and T. Runcorn[1]; [1]Femtosecond Optics Group, Department of Physics, Imperial College, London, United Kingdom; [2]Universite de Lille, CNRS, UMR 8523-PhLAM–Physique des Lasers Atomes et Molecules, Lille, France

We present a novel Yb-doped PCF and demonstrate that amplification of FWM pump pulses through stimulated emission increases the generated anti-Stokes power, providing a promising route to increasing conversion efficiencies beyond non-rare-earth-doped FWM PCFs.

Room 14b ICM

CH-3.2 TUE 9:00

Integrated photonics for high-precision optical sensors

•P. Beck[1,2], L. Wynne[3], S. Iadanza[4,5], L. O'Faolain[4,5], S.A. Schulz[3], and P. Banzer[1,2,6]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Institute of Optics, Information and Photonics, Department of Physics, Friedrich-Alexander-University Erlangen-Nuremberg, Erlangen, Germany; [3]School of Physics and Astronomy, SUPA, University of St Andrews, St. Andrews, United Kingdom; [4]Centre for Advanced Photonics & Process Analysis, Munster Technological University, Cork, Ireland; [5]Tyndall National Institute, Cork, Ireland; [6]Institute of Physics, University of Graz, Graz, Austria

We present a photonic integrated platform suitable for various types of high-precision measurements. We demonstrate measurement of displacements with a resolution of 7.2nm and discuss the possible application of probing tightly focused vector beams.

Room Osterseen ICM

JSVI-1.2 TUE (Invited) 9:00

Engineering thermal transport in low-dimensional systems

Y. Kaur[1], C. Arya[1], S. Tachikawa[1], A. K. Sivan[1], G. de Vito[1], R. Swami[1], J. Trautvetter[1], D. de Matteis[1], B. Abad[1], and •I. Zardo[1,2]; [1]Department of Physics, University of Basel, Basel, Switzerland; [2]Swiss Nanoscience Institute, University of Basel, Basel, Switzerland

In this talk, we present our achievements on engineering and probing of phononic properties and thermal transport in nanowires. We also discuss challenges and progresses in the measurement of thermal conductivity of nanostructures and low dimensional systems.

Room 1 Hall B1 (B11)

CF-4.3 TUE (Invited) 9:00

Arbitrary CEP Manipulation for Spatiotemporal Control of Sub-cycle Optical Vortex

•Y.-C. Lin, K. Midorikawa, and Y. Nabekawa; Attoseconds Science Research Team, RIKEN Center for Advanced Photonics, 2-1 Hirosawa, Wako, Saitama, Japan

This study shows spatiotemporal control of an arbitrarily carrier-envelope phase controllable, over-octave bandwidth vortex source with a wavelength range of 0.9-2.4 μm and a pulse duration of 4.7 fs, corresponding to 0.9 cycles at the carrier wavelength of 1.54 μm.

Room 2 Hall B1 (B12)

[2]Institute of Physics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University, Grudziadzka 5, Torun, Poland

We perform Fourier transform cavity ring down spectroscopy of CO using a high finesse cavity and an optical frequency comb. The new stabilization setup allows averaging the broadband spectra and reaching a high absorption sensitivity.

ED-4.3 TUE (Tutorial) 9:00

Cavity-Enhanced Precision Spectroscopy of Molecules

•S.-M. Hu; University of Science and Technology of China , Hefei, China

Cavity-enhanced spectroscopy methods induce km-long molecule-light interaction path lengths and provide kW-power laser fields, which allow for high-precision spectroscopy of molecules, with broad applications in fundamental physics and beyond.

Room 6 Hall B3 (B32)

CG-1.2 TUE 9:00

Nonlinear Light-Induced Attosecond Magnetization Dynamics in Non-Magnetic Materials

O. Neufeld, •N. Tancogne-Dejean, U. De Giovannini, H. Hübener, and A. Rubio; Max Planck Institute for the Structure and Dynamics of Matter and Center for Free-Electron Laser Science, Hamburg, Germany

We predict that cascaded nonlinear-optical processes in solids can convert sub-cycle light-induced electronic currents to transient magnetism, generating the fastest magnetic response to date of ~500 attoseconds, paving the way to new regimes of magnetism.

Room 7 Hall A1 (A11)

EA-1.3 TUE 9:00

Catching quantum jumps through heterodyne monitoring of a thermal drive

•G. Hennin[1,2] and H. Carmichael[1,2]; [1]University of Auckland, Auckland, New Zealand; [2]Dodd Walls Centre, Dunedin, New Zealand

The coherence of an atomic quantum jump triggered by a thermal drive is recovered by continuously monitoring the system emissions using heterodyne detection.

Room 8 Hall A1 (A12)

EB-4.2 TUE 9:00

Non-Adiabatic Holonomic Quantum Gates

•V. Neef, J. Pinske, M. Heinrich, S. Scheel, and A. Szameit; Institut for Physics, University of Rostock, Rostock, Germany

We present non-adiabatic holonomic quantum gates and a quantum algorithm, paving the way towards noise-resilient quantum computing in integrated quantum optics. Their topologically protected functionalities are realized solely by means of non-Abelian geometric phases.

NOTES

Room 1 ICM

CM-4.4 TUE 9:15

Adjustable focal zone beam shaping by using custom spatially variable waveplates aimed for laser micromachining

•E. Nacius[1,2], O. Ulčinas[2], J. Minkevičius[1], S. Orlov[1], and V. Jukna[1,3]; [1]Center for Physical Sciences and Technology, Vilnius, Lithuania; [2]Workshop of Photonics, Vilnius, Lithuania; [3]Laser Research Center, Vilnius University, Vilnius, Lithuania

Spatially variable waveplates with omitted central part are implemented to transform the beam intensity distribution at the focal zone. Such way vector beams with unique intensity distribution patterns can be created suitable for laser micromachining.

CM-4.5 TUE 9:30

Spatially Shaped Femtosecond Laser Pulses for Micromachining of Materials with Dielectric Microlenses

•C. Florian[1,2] and J. Siegel[1]; [1]Consejo Superior de Investigaciones Cientificas, Madrid, Spain; [2]Universität Kassel, Kassel, Germany

Spatially shaped femtosecond laser pulses are used for laser-machining of silicon using a direct-laser write system in combination with dielectric microspheres. By tailoring the beam wavefront, size and shape of the imprinted pattern are modified.

Room 4a ICM

CK-2.2 TUE 9:15

Plasmonic Nanostructures for Improved Photodetection

•D. Cristea, R. Tomescu, P. Obreja, and V. Anastasoaie; National Institute for Research and Development in Microtechnologies – IMT Bucharest, Voluntari, Romania

We present the fabrication and characterization of two types of plasmonic-enhanced photodetectors: hot-cariers-based Schottky silicon photodetectors with responsivity up to 50mA/W in SWIR and solution-processed photodetectors with embedded nanoparticles, having high responsivity (0.4...1mA/W) from UV to SWIR.

CK-2.3 TUE 9:30

Fast Electrical Modulation of Single Plasmonic Nano-Rod Resonance

L. Zurak, J. Meier, R. Kullock, B. Hecht, and •T. Feichtner; Nano-Optics and Biophotonics Group, Experimentelle Physik 5, JMU Würzburg, Würzburg, Germany

We charge an electrically contacted nano particle made from gold. Its resonance can thus be shifted with up to 50 kHz on the order of 10^{-4}. To explain the experimental results, a quantum description of the metal surface is needed.

Room 4b ICM

EG-4.3 TUE 9:15

Multi-Octave Deep-Strong Light-Matter Coupling of Multiple Modes

•J. Mornhinweg[1,2], L. Diebel[1], M. Halbhuber[1], V. Zeller[1], J. Riepl[1], T. Inzenhofer[1], D. Bougeard[1], R. Huber[1], and C. Lange[2]; [1]Department of Physics, University of Regensburg, Regensburg, Germany; [2]Department of Physics, TU Dortmund University, Dortmund, Germany

Non-resonant, deep-strong coupling of multiple matter and light modes allows for record strength coupling equivalent to $\Omega_R/\omega_c = 3.19$ with a spectrum spanning 6 octaves and over 10 intertwined polaritons, resulting in a virtual photon population >1.

EG-4.4 TUE 9:30

Polarization Vortex-Driven Third-Harmonic Generation in a Single Vertically-Aligned Semiconductor Nanowire

•S. Annurakshita[1], H. Mäntynen[2], Y. Tamashevich[1], L. Kallioniemi[1], X. Zang[3], N. Anttu[2,4], M. Ornigotti[1], H. Lipsanen[2], and G. Bautista[1]; [1]Photonics Laboratory, Physics Unit, Tampere University, Tampere, Finland; [2]Department of Electronics and Nanoengineering, Aalto University, Espoo, Finland; [3]Department of Applied Physics, Aalto University, Espoo, Finland; [4]Physics, Faculty of Science and Engineering, Åbo Akademi University, Turku, Finland

Room 13a ICM

CA-4.4 TUE 9:15

Orange, red and deep red optical vortex mode operation in Pr3+:fiber laser

•Y. Yoneda[1,2], W. R. Kerridge-Johns[3], S.R. Allam[2], Y. Fujimoto[1], and T. Omatsu[2]; [1]Chiba Institute of Technology, Chiba, Japan; [2]Graduate School of Engineering Chiba University, Chiba, Japan; [3]Photonics Group, The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom

We demonstrate, for the first time, ultracompact visible vortex fiber laser based on a Pr3+:fiber with control of a 3-color (orange, red, and deep red) and handedness of the vortex mode.

CA-4.5 TUE 9:30

Pump-polarization dependence of the bipolarization emission in ytterbium lasers

•H. Akagla[1], N. Chapron[1], P. Lehoux[1], G. Loas[1], P. Loiko[2], A. Benayad[2], P. Camy[2], M. Vallet[1], and M. Brunel[1]; [1]Univ Rennes, CNRS, Institut FOTON–UMR 6082, Rennes, France; [2]Centre de recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, Caen, France

Pump polarization orientation is used to control the relative powers of two linear, orthogonally polarized, eigenstates in isotropic Yb lasers.

Room 13b ICM

CB-3.3 TUE 9:15

Quasi PT-symmetric design for single-mode high-power edge-emitting semiconductor lasers

•B. Olyaeefar[1], E. Şeker[1], S. Şengül[1], K. Dadashi[1], M.H. Teimourpour[2], R. El-Ganainy[2,3], and A. Demir[1]; [1]UNAM - Institute of Materials Science and Nanotechnology, Bilkent University, Ankara, Turkey; [2]Department of Physics, Michigan Technological University, Houghton, Michigan, USA; [3]Henes Center for Quantum Phenomena, Michigan Technological University, Houghton, Michigan, USA

Quasi PT-symmetry concept, with reduced operational sensitivity, is introduced to selectively filter the high-order mode in high-power edge-emitting lasers. Single-mode beam emission at high powers above 400mW is demonstrated experimentally.

CB-3.4 TUE (Invited) 9:30

The Berkeley Surface Emitting Laser (BerkSEL): a scale-invariant laser?

•B. Kante; UC Berkeley, Berkeley, USA

I will discuss a scalable aperture that solves the six decade optics challenge of single apertures scaling. I will discuss the physics of the discovery that we named Berkeley Surface Emitting Laser (BerkSEL)

Room 14a ICM

CD-4.4 TUE 9:15

Experimental study of the structural dependence of backward Brillouin gain in solid-core photonic crystal fibres

•G. Ji[1], W. He[2,3], Y. Zheng[4], R. Yin[4], X. Jiang[2], P. Russell[2], and M. Pang[1,2]; [1]State Key Laboratory of High Field Laser Physics and CAS Center for Excellence in Ultra-intense Laser Science, Shanghai Institute of Optics and Fine Mechanics (SIOM), CAS, Shanghai, China; [2]Russell Centre for Advanced Lightwave Science, SIOM-H, CAS, Hangzhou, China; [3]Innovation and Integration Center of New Laser Technology, SIOM, CAS, Shanghai, China; [4]iFibre Optoelectronics Technology co. ltd., Ningbo, China

The Brillouin gain is systematically studied in photonic crystal fibres with wavelength-scale cores and large air-filling fractions. For pumping at 1.55 μm, it is found to peak at a core diameter of ~2 μm.

CD-4.5 TUE 9:30

Few-cycle, high power, high repetition rate Yb laser source based on multi-dimensional solitary states in hollow-core fibers

•A. Longa[1], L. Arias [1], G. Jargot[1], A. Pomerleau[1], P. Lassonde[1], G. Fan[1,2], R. Safaei[3], P.B. Corkum[3], F. Boschini[1], H. Ibrahim[1], and F. Légaré[1]; [1]Institut National d la recherche scientifique, Centre Énergie Matériaux et Télécommunications, Montréal, Canada; [2]The Hamburg Centre for Ultrafast Imaging CUI, Universität Hamburg, Hamburg, Germany; [3]Department of Physics, University of Ottawa, Ottawa, Canada

Room 14b ICM

CH-3.3 TUE 9:15

Flip-chip Integration of Mid-infrared Lab-on-a-chip for Gas Sensing

•M. Piotrowski, R. Szedlak, J. Fuchsberger, G. Marschick, B. Hinkov, and B. Schwarz; Institute of Solid State Electronics, Technical University of Vienna, Vienna, Austria

Heterogeneous integration of a mid-infrared lab-on-a-chip for gas sensing, consisting of quantum or interband cascade lasers and respective detectors, together with a fully suspended waveguiding membrane with an interaction path length in centimetre range.

CH-3.4 TUE 9:30

Silicon nitride 1D photonic crystal cavity Hybrid Laser for Refractive Index sensing in liquid and gaseous media

•T. Oliveira[1,2], S. Iadanza[1,2], J.H. Mendoza-Castro[3], M. Grande[3], and L. O'Faolain[1,2]; [1]Tyndall National Institute, Cork, Ireland; [2]Munster Technological University, Cork, Ireland; [3]Politecnico di Bari, Bari, Italy

In this work we show the employment of a novel design of silicon nitride 1D photonic crystal (PhC) cavity in hybrid external cavity laser (HECL) configuration for optical sensing applications, with very low-detection limits.

Room Osterseen ICM

JSVI-1.3 TUE 9:30

Long-Range Surface Plasmon-Polaritons in Bilayer Graphene as Efficient Thermal Energy Carriers

•Y. Kosevich, J. Ordonez-Miranda, M. Nomura, and S. Volz; Institute of Industrial Science, The University of Tokyo, Tokyo, Japan

Long-range surface plasmon-polaritons can be supported by bilayer graphene due to its interplane polarizability. Long-range surface plasmon-polaritons in bilayer graphene are proposed as efficient thermal energy carriers with long propagation length and high group velocity.

Room 1 Hall B1 (B11)

CF-4.4 TUE 9:30

Ultrashort pulse characterization over octave spanning spectral range in visible-IR using amplitude swing

•M. López-Ripa, Í.J. Sola, and B. Alonso; Grupo de Aplicaciones del Láser y Fotónica (ALF), Universidad de Salamanca, Salamanca, Spain

We demonstrate the capability of amplitude swing to characterize ultrashort laser pulses at different spectral regions over an octave spanning in visible-IR without significant modifications. Thus, it can ease the applications of tunable laser sources.

Room 2 Hall B1 (B12)

Room 6 Hall B3 (B32)

CG-1.3 TUE 9:15

Fourier-Limited Few-Cycle Attosecond Pulses from High-Order Harmonic Generation Assisted by an Ultraintense Ultrafast Magnetic Field

•R. Martín-Hernández[1], H. Hu[2], A. Baltuska[2], L. Plaja[1], and C. Hernández-García[1]; [1]Universidad de Salamanca, Salamanca, Spain; [2]Technische Universität Wien, Vienna, Austria

We propose a high-order harmonic generation configuration assisted by strong magnetic fields, generated from two counter-propagating high-power lasers. Our results demonstrate that near Fourier-limited, chirp-free, few-cycle attosecond pulses are generated in the water window.

CG-1.4 TUE 9:30

Anisotropic High Harmonic Generation in Wide Band-gap Dielectrics

•H. Allegre[1], K. Kowalczyk[1], A. Wyatt[2], E. Springate[2], J. Marangos[1], J. Tisch[1], and M. Matthews[1]; [1]Imperial College London, London, United Kingdom; [2]Central Laser Facility, Harwell, United Kingdom

We present polarisation dependent harmonics generated from crystalline samples, MgO, CaF2 and Al2O3 at 780 nm. We show that each sample present a specific symmetry depending on its crystal structure and lattice layout.

Room 7 Hall A1 (A11)

EA-1.4 TUE 9:15

Emergent equilibrium and quantum criticality in systems with two-photon drive and dissipation

•V.Y. Mylnikov, S.O. Potashin, G.S. Sokolovskii, and N.S. Averkiev; Ioffe Institute, St. Petersburg, Russia

We study nonequilibrium dissipative phase transition of the optical oscillator with two-photon drive and dissipation. Quantum criticality is considered at the critical point, and we obtain emergent equilibrium away from it.

EA-1.5 TUE 9:30

Multi-Mode Frequency Filtered Photon Correlations of a Driven Three-Level Atom

•J. Ngaha[1,2] and H. Carmichael[1,2]; [1]The University of Auckland, Auckland, New Zealand; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand

We have developed a novel approach to calculating frequency filtered photon correlations. In this work we demonstrate its effectiveness when applied to a three-level ladder-type atom driven at two-photon resonance.

Room 8 Hall A1 (A12)

EB-4.3 TUE 9:15

A quantum-bit encoding converter

•B.E. Asenbeck[1], T. Darras[1], G. Guccione[2], A. Cavaillès[3], A. Boyer[1], H. Le Jeannic[1], and J. Laurat[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-Université PSL, Collège de France, Paris, France; [2]Centre for Quantum Computation and Communication Technology, The Australian National University, Canberra, Australia; [3]LightOn, Paris, France

We demonstrate an optical qubit converter, enabling the faithful conversion of quantum information from discrete- to continuous-variable qubits. The classical limit of conversion is exceeded, demonstrating an essential path to scale up quantum technology infrastructures.

EB-4.4 TUE 9:30

Analog-Digital Hybrid Computations with Trapped Ions

•N.M. Linke; Duke Quantum Center, Duke University, Durham NC, USA; Joint Quantum Institute, University of Maryland, College Park, USA

The motional modes of trapped ions represent an underused quantum resource that can encode bosonic degrees of freedom for efficient quantum simulation. In combination with gates they can create a powerful analog-digital hybrid quantum machine.

NOTES

Room 1 ICM

CM-4.6 TUE 9:45

Galaxy-shaped vortex surface relief formation by illumination of orthogonal Laguerre-Gaussian modes

•*D. Suzuki[1], A. Tomita[1], A. Vallés[1,2,3], K. Miyamoto[1,2], and T. Omatsu[1,2]; [1]Graduate School of Science and Engineering, Chiba University, Chiba, Japan; [2] Molecular Chirality Research Center, Chiba University, Chiba, Japan; [3]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Barcelona, Spain*

We present the first demonstration of the relief with multiple spiral arms, named ”galaxy-shaped surface relief,” in an azo-polymer film by employing petal beam formed of the superposition of positive and negative Laguerre-Gaussian modes.

Room 4a ICM

CK-2.4 TUE 9:45

Polariton Smith-Purcell emission

•*L. Prelat[1], E.J.C. Dias[1], and J. García de Abajo[1,2]; [1]ICFO-Institut de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; [2]ICREA-Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We theoretically study the coupling between free electrons and polaritons mediated by a single small scatterer, as well as polariton Smith-Purcell emission assisted by scatterer arrays, obtaining the conditions to maximize electron–polariton coupling

Room 4b ICM

We demonstrate the use of cylindrical vector beams to probe unambiguously the third-harmonic generation from a single vertically-aligned GaAs nanowire. The implications of the technique in high contrast imaging are shown.

EG-4.5 TUE 9:45

Nonlinear photoluminescence in gold thin films

•*Á. Rodríguez Echarri[1], F. İyikanat[1], S. Boroviks[2,3], N.A. Mortensen[2,4,5], J.D. Cox[2,4,5], and F.J. García de Abajo[1,6]; [1]ICFO - The institute of Photonic Sciences, BARCELONA, Spain; [2]Center for Nano Optics, University of Southern Denmark, Odense, Denmark; [3]Nanophotonics and Metrology Laboratory, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [4]Danish Institute for Advanced Study, University of Southern Denmark, Odense, Denmark; [5]POLIMA – Center for Polariton-driven Light–Matter Interactions, University of Southern Denmark, Odense, Denmark; [6]ICREA – Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We investigate nonlinear photoluminescence in crystal-quality gold thin films using rigorous ab initio theory supported by experimental measurements to reveal the importance of ultrafast electronic heat transport in the nonlinear optical response.

Room 13a ICM

Experimental observations in Yb:YAG and Yb:CaF$_2$ are in full agreement with a two-mode rate-equation model.

CA-4.6 TUE 9:45

Dynamic control of MEXEL micro laser modes using a spatially modulated pump

•*G. Kontenis[1], D. Gailevičius[1], and K. Staliūnas[1,2,3]; [1]Laser Research Center, Vilnius, Lithuania; [2]ICREA, Passeig Lluís Companys, Barcelona, Spain; [3]UPC, Dep. de Fisica, Rambla Sant Nebridi, Terrassa (Barcelona), Spain*

We demonstrate the formation of various micro-laser modes by shaping the pump beams spatial intensity profile. We dynamically tune the generated laser beams shape by application of a programmable Spatial Light Modulator.

Room 13b ICM

Room 14a ICM

We demonstrate pulse compression from 300 fs down to 17 fs up to 20 kHz using multidimensional solitary states in a hollow-core fiber filled with molecular gas in differential pressure to mitigate thermal effects.

CD-4.6 TUE 9:45

Kuramoto transition in harmonically mode-locked soliton fibre laser based on optoacoustic interaction in PCF

•*X. Wang[1,2], W. He[3,4], X. Jiang[3], X. Zhang[1,2], Q. Huang[2], X. Chang[2], and M. Pang[1,2,3]; [1]Department of Optics and Optical Engineering, University of Science and Technology of China, Hefei, China; [2]State Key Laboratory of High Field Laser Physics and CAS Center for Excellence in Ultra-intense Laser Science, Shanghai Institute of Optics and Fine Mechanics (SIOM), Chinese Academy of Sciences (CAS), Shanghai, China; [3]Russell Centre for Advanced Lightwave Science, SIOM and SIOM-H, CAS, Hangzhou, China; [4]Innovation and Integration Center of New Laser Technology, SIOM, CAS, Shanghai, China*

We report observations and analytical modelling of the self-organization process of a harmonically mode-locked fibre laser based on enhanced optoacoustic interactions in PCF, in which sinusoidal acoustic interaction between solitons leads to Kuramoto transition.

Room 14b ICM

CH-3.5 TUE 9:45

Near-IR detection using Photothermal Actuation of Guided-Mode Resonance MEMS Structures in Germanium

•*P. Rao, D. Rout, and S.K. Selvaraja; Indian Institute of Science, Bangalore, India*

We design and demonstrate near-infrared detection exploiting the photothermal and mechanical properties of a suspended Ge-based one-dimensional guided-mode-resonance (GMR) structure. This is the first demonstration of photothermal actuated photodetection using a GMR.

Room Osterseen ICM

JSVI-1.4 TUE 9:45

Ultrafast Nano Generation of Acoustic Waves in Water: Thermophone versus Mechanophone

M. Diego[1,2], M. Gandolfi[3,4], S. Giordano[5], A. Casto[1], F.M. Belussi[6], A. Crut[1], F. Vialla[1], S. Roddaro[7], M. Fasano[6], F. Vallée[1], P. Maioli[1], N. Del Fatti[1,8], and •F. Banfi[1]; [1]Université de Lyon, CNRS, Université Claude Bernard Lyon 1, Institut Lumière Matière, Villeurbanne, France; [2]Institute of Industrial Science, The University of Tokyo, Tokyo, Japan; [3]C.N.R-INO, Brescia, Italy; [4]Department of Information Engineering, Università di Brescia, Brescia, Italy; [5]Université de Lille, CNRS, Centrale Lille, Université Polytechnique Hauts-de-France, Institut d'Electronique de Microélectronique et de Nanotechnologie, Lille, France; [6]Politecnico di Torino, Department of Energy, Torino, Italy; [7]Dipartimento di Fisica "E. Fermi", Università di Pisa, Pisa, Italy; [8]Institut Universitaire de France, Paris, France

The photothermoacoustic launching mechanisms of water-immersed nanotransducers are investigated upon tuning the Kapitza resistane and the laser pulse duration. Activation of the mechanophone effect allows launching high frequency acoustic waves while mimimizing water's temperature increase.

Room 1 Hall B1 (B11)

CF-4.5 TUE 9:45

Direct Reconstruction of Two Ultrashort Pulses Based on Non-Interferometric Frequency-Resolved Optical Gating

•B. Seifert[1,2], R. Rojas-Aedo[1,2], R.A. Wheatley[1,2], and D. Hidalgo-Rojas[1,2]; [1]Facultad de Física, Pontificia Universidad Católica de Chile, Santiago, Chile; [2]ANID – Millennium Science Initiative Program – Millennium Institute for Research in Optics, Santiago, Chile

We describe a non-interferometric ultrashort-pulse measurement technique based on frequency-resolved optical gating (FROG) with which pulses can be reconstructed directly, i.e. non-iteratively. Only two slightly different FROG spectrograms are measured.

Room 2 Hall B1 (B12)

Room 6 Hall B3 (B32)

CG-1.5 TUE 9:45

Generation of topological chiral light for robust enantiosensitive detection using structured beams

•N. Mayer[1], D. Ayuso[2], E. Pisanty[3], M. Ivanov[1,2,4], and O. Smirnova[1,5]; [1]Max-Born-Institut, Berlin, Germany; [2]Imperial College London, London, United Kingdom; [3]King's College London, London, United Kingdom; [4]Humboldt Universität zu Berlin, Berlin, Germany; [5]Technische Universität Berlin, Berlin, Germany

Combining tailored multicolor structured beams we create light that displays chirality in time with spatially-varying handedness, leading to robust and highly sensitive chiro-optical responses with topological properties in chiral molecules.

Room 7 Hall A1 (A11)

EA-1.6 TUE 9:45

Autoheterodyne Characterisation for Narrowband Photon-Pair Purity

•V. Prakash[1], A. Sierant [2], and M. Mitchell[2,3]; [1]Center for Quantum Technologies, Singapore, Singapore; [2]ICFO-Institut de Ciencies Fotoniques, Castelldefels, Spain; [3]ICREA– Institucio Catalana de Recerca i Estudis Avancats, Barcelona, Spain

We report on a quantum-interference based technique to characterise very narrowband photon-pairs (≤ MHz bandwidth) by high-resolution mapping of their frequency sum and difference spectra. This also enables quantifying their entanglement state and spectral purities.

Room 8 Hall A1 (A12)

EB-4.5 TUE 9:45

Experimental Study of Tunable Interactions Between Optically-Trapped Circular Rydberg Atoms

•P. Méhaignerie, Y. Machu, A. Durán-Hernández, J.-M. Raimond, M. Brune, and C. Sayrin; Kastler Brossel Laboratory, CNRS, ENS-Université PSL, Sorbonne Université, Paris, France

This work presents the first experimental characterization of tunable interactions between circular Rydberg atoms, using novel optical engineering techniques.

NOTES

Room 1 ICM

10:30 – 11:30

PL-2a: EQEC 2023 Plenary talk

Chair: Julien Javaloyes, University of the Balearic Islands, Spain

PL-2a.1 TUE (Plenary) 10:30

Photonic Machines for Large-scale Applications and Fundamental Physics

•*C. Conti; Department of Physics, University Sapienza, Rome, Italy*

Which is the simplest way to process information with light? By spatial modulation, we demonstrate combinatorial optimization and natural language processing at the largest scale. Novel computational paradigms open the road to new physics and applications with photonics.

11:30 – 12:30

PL-2b: Award ceremony

Chair: Lukas Gallman, ETH Zurich, Switzerland & Aleksandra Foltynowicz, Umeå University, Sweden

Room 1 ICM

14:00 – 15:30

PL-3: World of Photonics Plenary

PL-3.1 TUE (Plenary) 14:00

Laser-driven inertial confinement fusion, power source of the future?

•*C.L. Haefner[1] and T. Ma[2]; [1]Institute for Laser Technology, Aachen, Germany; [2]Lawrence Livermore National Laboratory (LLNL), Livermore, CA, USA*

Fusion ignition has been achieved at the National Ignition Facility at LLNL. This experimental result is a major scientific breakthrough for laser-driven inertial confinement fusion. This talk presents the experimental results and technological innovations that made this achievement possible.

Room 13a ICM

14:00 – 15:30

CM-5: Modelling of laser-induced processes

Chair: Nadezhda Bulgakova, Institute of Physics of the Czech Academy of Sciences, Prague, Czech republic

CM-5.1 TUE (Invited) 14:00

Spatially and time resolved maps of transient nonequilibrium states in pulsed laser ablation in liquid from large-scale atomistic modeling

C. Chen and •L. Zhigilei; University of Virginia, Charlottesville, USA

Spatially and time-resolved maps of transient nonequilibrium states and channels of nanoparticle formation in pulsed laser ablation in liquid are obtained based on the results of large-scale atomistic simulations.

CM-5.2 TUE 14:30

Enhanced Energy Absorption and Electron Excitation in Crystalline Silicon Induced by Two-Color Intense Femtosecond Laser Pulses

•*M. Tani, K. Sasaki, Y. Shinohara, and K.L. Ishikawa; The University of Tokyo, Tokyo, Japan*

First principles simulation shows the energy transfer from laser to crystalline silicon is dramatically enhanced by mixing IR and UV femtosecond pulses. The dominant mechanism is increase in electron excitation rate assisted by IR component.

Room 13b ICM

14:00 – 15:30

CB-4: Photonic integration I

Chair: Kamil Pierściński, Łukasiewicz Institute of Microelectronics and Photonics, Ożarów Mazowiecki, Poland

CB-4.1 TUE (Invited) 14:00

Monolithic integration of GaSb diode lasers on a silicon photonic circuit

•*A. Remis[1], M. Paparella[1,2], L. Monge Bartolomé[1], A. Gilbert[1], G. Boissier[1], M. Grande[2], A. Blake[4], L. O'Faolain[3,4], L. Cerutti[1], J.-B. Rodriguez[1], and E. Tournié[1]; [1]IES, University of Montpellier, C.N.R.S., F-34000 Montpellier, France; [2]Department of Electrical and Information Engineering, Polytechnic University of Bari, 4 Via E. Orabona, IT-70126 Bari, Italy; [3]Center for Advanced Photonics and Process Analysis, Munster Technological University, Bishopstown, IR-T12P928 Cork, Ireland; [4]Tyndall National Institute, Lee Maltings Complex, Dyke Parade, IR-T12R5CP Cork, Ireland*

We report the monolithic integration of mid-infrared GaSb diode lasers on a Si photonic circuit with around 10% of light coupled into SiN waveguides. This successful demonstration paves the way to fully integrated photonic chips.

CB-4.2 TUE 14:30

A numerical and experimental butt-coupling analysis of GaSb diode laser grown on Silicon photonic integrated circuit

•*M. Paparella[1,2], A. Remis[1], L. Monge Barolome[1], J.-B. Rodriguez[1], L. Cerutti[1], M. Grande[2], L. O'Faolain[3,4], and E. Tournié[1]; [1]IES, University of Montpellier, CNRS, Montpellier , France; [2]Department of Electrical and Information engineering, Polytechnic University of Bari, Bari, Italy; [3]Centre for Advanced Photonics and Process Analysis, Munster Technological University, Cork, Ireland; [4]Tyndall National Institute, Cork, Ireland*

In this work, we model and experimentally demonstrate the optical coupling between a GaSb diode lasers epitaxially grown on Silicon butt-coupled to passive waveguides. We identify the coupling limits and suggest approaches to mitigate them.

Room 14a ICM

14:00 – 15:30

CD-5: Supercontinuum generation

Chair: Christelle Monat, Ecole Centrale Lyon, France

CD-5.1 TUE 14:00

Supercontinuum Spanning 2.8 Octaves in 4H-Silicon-Carbide Waveguides

•*L. Deniel[1], M.A. Guidry[2], D.M. Lukin[2], K.Y. Yang[2], J. Yang[2], J. Vučković[2], T.W. Hänsch[1], and N. Picqué[1]; [1]Max Planck Institute of Quantum Optics, Garching, Germany; [2]E. L. Ginzton Laboratory, Stanford University, Stanford, USA*

A supercontinuum spanning from 0.5 to 3.5 μm is generated in dispersion-engineered silicon-carbide waveguides from 70-fs, 0.19 nJ near-infrared pulses. Low pulse energy and smooth spectral envelope open up new opportunities for frequency comb spectroscopy.

CD-5.2 TUE 14:15

Tailored Periodically-Poled Lithium Niobate Waveguides for Highly Efficient Broadband Supercontinuum Generation

•*F. Ayhan[1], M. Ludwig[2], E. Obrzud[3], D. Grassani[3], V. Brasch[4], T. Herr[2], and L.G. Villanueva[1]; [1]École Polytechnique Fédérale de Lausanne (EPFL), 1015 Lausanne, Switzerland; [2]Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22607 Hamburg, Germany; [3]Centre Suisse d'Electronique et Microtechnique SA (CSEM), 2002 Neuchâtel, Switzerland; [4]Q.ant GmbH, Handwerkstraße 29, 70565 Stuttgart, Germany*

Using optimized poling patterns and tailored nonlinear processes, we demonstrate very efficient and broadband supercontinuum generation in integrated lithium niobate waveguides. The spectra reach the UV and show the great potential of such light sources.

CD-5.3 TUE 14:30

Genetic algorithm spectral shaping of supercontinuum over 1550-2000 nm

•*M. Hary[1,2], L. Salmela[1], J.M. Dudley[2], and G. Genty[2]; [1]Photonics Laboratory, Tampere University, Tampere, Finland; [2]Université de Franche-Comté, Institut FEMTO-ST, Besançon, France*

We use a genetic algorithm to simultaneously optimize the intensity in multiple wavelength bands of a supercontinuum from 1550 to 2000 nm. The enhancement factor varies from 5 to 20 and increases for longer wavelengths.

Room 1 ICM

[redacted]

Room 13a ICM

CM-5.3 TUE 14:45

Ionisation dynamics, damage conditions and surface patterning in fused silica irradiated with Mid-Infrared femtosecond pulses

•G. Tsibidis[1,2] and E. Stratakis[1,3]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Greece; [2]Department of Material Science, University of Crete, Heraklion, Greece; [3]Department of Physics, University of Crete, Heraklion, Greece

To elucidate the material response to irradiation with mid-IR laser sources, a consistent analysis of the interaction of long wavelength femtosecond pulses with dielectric materials is presented

CM-5.4 TUE 15:00

Laser-induced symmetry breaking in energy absorption of silicon induced by intense femtosecond laser pulse

J. Sladek[1,2], Y. Levy[1], and •T. Derrien[1]; [1]HiLASE Centre - Institute of Physics (AS CR), Dolni Brezany, Czech Republic; [2]Faculty of Nuclear Sciences and Physical Engineering - Czech Technical University in Prague, Prague, Czech Republic

Experimental measurements of damage by femtosecond laser irradiation of silicon were prepared as function of crystal's orientation angle with polarization. Quantum simulations agree with experiments and reveal a symmetry breaking in the crystal's optical response.

CM-5.5 TUE 15:15

Three-Temperature Modeling of Laser Excitation in Silicon and Parametric Dependence of Damage Threshold

•P. Venkat[1] and T. Otobe[1,2]; [1] Kansai Photon Science Institute, National Institutes for Quantum Science and Technology, Kizugawa (Kyoto), Japan; [2]Photon Science Center, The University of Tokyo, Bunkyo-ku (Tokyo), Japan

Laser excitation in silicon is studied using three-temperature model (1D-3TM). Calculated damage thresholds are found to be in reasonable agreement with experimental data. Effect of laser and target parameters on damage threshold is also presented.

Room 13b ICM

CB-4.3 TUE 14:45

Photonic integration of continuous-wave quantum cascade lasers with distinct active regions for multi-species gas sensing

•D. Burghart, K. Zhang, A. Koeninger, G. Boemh, and M.A. Belkin; Technische Universität München, Walter Schottky Institut and Department of Electrical and Computer Engineering, Garching, Germany

We report the photonic integration of two continouswave quantum cascade lasers with distinct active regions by homogeneous integration on InP. The two colors are further multiplexed to a single output by a passive evanescent coupler.

CB-4.4 TUE 15:00

Toward complex GaAs PIC-based laser sources

•J.-P. Koester, O. Brox, H. Wenzel, J. Fricke, P. Della Casa, A. Maaßdorf, and A. Knigge; Ferdinand-Braun-Institut (FBH), Berlin, Germany

We report on the progression from simple Fabry-Pérot-like diode lasers toward complex GaAs PIC-based laser sources. This development is illustrated by the results of a widely-tunable sampled-grating laser and a dual-wavelength laser.

CB-4.5 TUE 15:15

Realisation of Multi-Mode Reflector Lasers for Integrated Photonics

•F.T. Albeladi[1,2], S.-J. Gillgrass[1], J. Nabialek[1], P. Mishra[1], R. Forrest[1], T.R. Albeladi[1,3], C. Allford[1], M. Tang[4], H.-Y. Liu[4], S. Shutts[1], and P.M. Smowton[1]; [1]School of Physics and Astronomy, Cardiff University, Cardiff, United Kingdom; [2]Physics Department, Faculty of Science, University of Jeddah, Jeddah, Saudi Arabia; [3] Physics And Astronomy Department, Faculty of Science, King Saud University, Riyadh, Saudi Arabia; [4]Department of Electrical Engineering, University College London, London, United Kingdom

InAs quantum dot multi-mode-interference-reflector (MMIR) lasers with threshold current densities 40% of those of cleaved-cleaved ridge waveguide lasers of the same cavity length show promise as small footprint sources for integrated photonics.

Room 14a ICM

CD-5.4 TUE 14:45

High-Power Ultra-Flat Supercontinuum Generation by Pumping Molecular Gas-Filled Hollow-Core Fibres in the Green

•A. Lekosiotis, B. Plosz, F. Belli, and J.C. Travers; Heriot-Watt University, Edinburgh, United Kingdom

We report the generation of high-power Raman-based ultra-flat supercontinuum spanning from the ultraviolet to the near-infrared (350-1600 nm) by pumping gas-filled hollow-core anti-resonant fibres in the normal dispersion region at 515 nm.

CD-5.5 TUE 15:00

Enhancing Mid-Infrared Supercontinuum Generation at Low Pump Power in SiGe Waveguides

•V. Turpaud[1], N. Koompai[1], T.H.N. Nguyen[1], Y. Yang[1], J. Frigerio[2], J.-R. Coudevylle[1], D. Bouville[1], C. Alonso-Ramos[1], E. Herth[1], L. Vivien[1], G. Isella[2], and D. Marris-Morini[1]; [1]Centre de Nanosciences et de Nanotechnologies, CNRS, Univ. Paris-Saclay, 91120 Palaiseau, France; [2]L-NESS, Dipartimento di Fisica, Politecnico di Milano, Polo di Como, 22100 Como, Italy

We experimentally demonstrate a sub-150 μW average pump power supercontinuum generation in the mid-infrared, ranging from 4 to 10.5 μm wavelength, using low loss, highly nonlinear graded-index Ge-rich SiGe waveguides and dispersion management along the propagation.

CD-5.6 TUE 15:15

Shaped Supercontinuum as a Neural Network Computing Element

K. Lee and •M. Fermann; IMRA America, Inc., Ann Arbor, USA

We incorporate shaped supercontinuum generation into a neural network. We are able to perform classification and autoencoding tasks by phase shaping the seed pulse and measuring the broadened spectrum.

Room 1 ICM

16:00 – 17:30

CM-6: Laser volume processing

Chair: Leonid Zhigilei, University of Virginia, USA

CM-6.1 TUE 16:00

Femtosecond-Laser Assisted Selective Etching of Microchannels in Lithium Niobate

•*D. Nwatu, D. Kip, and K. Hasse; Faculty of Electrical Engineering, Helmut Schmidt University, Hamburg, Germany*

We report on fs-laser assisted selective etching of microchannels in x-cut $LiNbO_3$. Up to 1 cm long microchannels with 10 μm diameter were etched along the optical axis within 7 days using HF(40%) acid.

CM-6.2 TUE 16:15

Selective Laser Etching Dependence on Radiation Wavelength and Etchant for Crystalline Materials

•*A. Butkute, R. Sirutkaitis, D. Gailevicius, D. Paipulas, and V. Sirutkaitis; Vilnius University, Laser Research Center,*

Room 4a ICM

16:00 – 17:30

CK-3: Resonant structures and cavities

Chair: Emiliano Descrovi, Politecnico di Torino, Italy

CK-3.1 TUE 16:00

Enhancing the sensitivity of silicon photonic ultrasound sensors by optimizing the stiffness of polymer cladding

•*R.T. Erdogan[1], G.A. Filonenko[2], S.J. Picken[3], P.G. Steeneken[1], and W.J. Westerveld[1]; [1]Department of Precision and Microsystems Engineering, Delft University of Technology, Delft, Netherlands; [2]Department of Materials Science and Engineering, Delft University of Technology, Delft, Netherlands; [3]Advanced Soft Matter, Delft University of Technology, Delft, Netherlands*

We investigate polymer claddings to enhance the sensitivity of silicon photonic ultrasound sensors. We theoretically study the effect of the polymer's stiffness and experimentally demonstrate the enhancement of sensitivity by decreasing polymer stiffness.

CK-3.2 TUE 16:15

Nonlocal Microcapillary Fibre Sensing Platform

•*G. Gardosi and M. Sumetsky; Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom*

In our proof-of-concept experiment, we determine

Room 4b ICM

16:00 – 17:30

EG-5: Single emitters

Chair: Nicolò Maccaferri, Umeå University, Sweden

EG-5.1 TUE 16:00

Detection of single ions in a nanoparticle coupled to a fibre cavity

C. Deshmukh[1], E. Beattie[1], B. Casabone[1], •S. Grandi[1], D. Serrano[2], A. Ferrier[2], P. Goldner[2], D. Hunger[3], and H. de Riedmatten[1,4]; [1]ICFO - Institut de Ciencies Fotoniques, Castelldefels, Spain; [2]Chimie ParisTech, PSL University, CNRS, Paris, France; [3]Karlsruher Institut fur Technologie, Physikalisches Institut, Karlsruhe, Karlsruhe, Germany; [4]ICREA - Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain

We report the detection of single erbium ions in a nanoparticle placed in a fiber cavity. We report a maximum Purcell factor of 123, as well as saturation of collected counts and an antibunching curve from a single spectral feature.

EG-5.2 TUE 16:15

Quantum Imaging Using Entangled Photon Pairs from Nonlinear Metasurfaces

J. Ren, •J. Ma, J. Zhang, and A. Sukhorukov; Australian National University, Canberra, Australia

Room 13a ICM

16:00 – 17:30

CA-5: Diamond lasers and frequency converters

Chair: Christian Kraenkel, Leibniz-Institut für Kristallzüchtung, Berlin, Germany

CA-5.1 TUE (Invited) 16:00

A simple pathway to widely tunable single-frequency light using monolithic diamond Raman resonators

•*E. Granados; CERN, GENEVE, Switzerland*

We demonstrate a simple method for generating precisely tunable, single-frequency nanosecond pulses using integrated diamond resonators, suitable for high-resolution spectroscopy, sensing, and quantum optics. We measure accurately transitions in Samarium ions as a proof of its performance.

Room 13b ICM

16:00 – 17:30

CB-5: Photonic integration II

Chair: Cristina Rimoldi, Politecnico di Torino, Italy

CB-5.1 TUE 16:00

Tunable Hybrid-Integrated Diode Laser at 637 nm

•*L. Winkler[1,2], K. Gerritsma[1], A. van Rees[1], P. Schrinner[3], M. Hoekman[3], R. Dekker[3], P. van der Slot[1], C. Nölleke[2], and K.-J. Boller[1]; [1]University of Twente, Enschede, Netherlands; [2]TOPTICA Photonics AG, Gräfelfing, Germany; [3]LioniX International BV, Enschede, Netherlands*

We present a hybrid-integrated SiN extended cavity diode laser with an emission wavelength of 637 nm, the shortest reported for such a laser so far. It provides a record-high mode-hop free tuning range of 43 GHz.

CB-5.2 TUE 16:15

Narrow linewidth ring lasers for integrated optical gyroscopes

•*S. Stopiński[1,2,3], A. Bieniek[1], S. Latkowski[4], and R. Piramidowicz[1,2,3]; [1]Warsaw University of Technology, Institute of Microelectronics*

Room 14a ICM

16:00 – 17:30

CD-6: Mid-IR applications

Chair: Haim Suchowski, Tel Aviv University, Israel

CD-6.1 TUE 16:00

High Conversion Efficiency Broadband Femtosecond Mid-IR Optical Parametric Generation at 10 MHz

•*. Sukeert[1], S. Pizzurro[2], A. Esteban-Martín[3], R. Gotti[2], L. Carrà[4], G. Piccino[4], A. Agnesi[2], F. Pirzio[2], C.K. Suddapalli[5], and M. Ebrahim-Zadeh[1,6]; [1]ICFO-The Institute of Photonic Sciences, Castelldefels, Spain; [2]Dipartimento di Ingegneria Industriale e dell'Informazione, Università di Pavia, Pavia, Italy; [3]Departament d'Òptica i Optometria i Ciències de la Visió, Universitat de València, Burjassot, Spain; [4]Bright Solutions Srl, Cura Carpignano, Italy; [5]Tata Institute of Fundamental Research Hyderabad, Hyderabad, India; [6]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain*

We report on the generation of broadband mid-IR radiation by exploiting single-pass group-velocity-matched optical parametric generation of femtosecond pulses with high conversion efficiency in a 42-mm-long MgO:PPLN crystal at 10 MHz.

CD-6.2 TUE 16:15

Broadband MIR wavelength conversion in a tapered silicon core fiber

•*D. Wu[1], T. Saini[1], S. Sun[1], M. Huang[1], L. Shen[2], T. Hawkins[3], J. Ballato[3], and A.C. Peacock[1]; [1]Optoelectronics Research*

Room 14b ICM

16:00 – 17:30

CH-4: Field applications

Chair: Meritxell Vilaseca, Universitat Politecnica de Catalunya, Terrassa, Barcelona, Spain

CH-4.1 TUE (Invited) 16:00

Laser-based Sensing for Energy and Propulsion Sciences

•*R.K. Hanson; Stanford University, Stanford, USA*

In this Julius Springer Prize lecture, I review several laser-based sensor and spectroscopic techniques developed at Stanford for the advancement of energy and propulsion technologies.

Room Osterseen ICM

16:00 – 17:30

JSVI-2: Radiative heat transfer, thermoelectrics & thermochromics, SPP

Chair: Sebastian Volz, CNRS, The University of Tokyo, Japan

JSVI-2.1 TUE (Invited) 16:00

Massive search space optimization of thermal radiation metamaterials

•*J. Shiomi*; *The University of Tokyo, Tokyo, Japan*

We will report recent progresses in applying materials informatics to optimize thermal radiation metamaterials, particularly in the scope of extending it to massive search space, and discuss the capability and remaining challenges for further development.

Room 1 Hall B1 (B11)

16:00 – 17:30

CF-5: Carrier-envelope phase metrology and applications

CF-5.1 TUE (Invited) 16:00

Single-Shot CEP Change Detection in a Nanoantenna Network

•*F. Ritzkowsky*[1], *M. Yeung*[2], *E. Bebeti*[1], *T. Gebert*[3,4], *T. Matsuyama*[3], *G. Rossi*[1], *R. Mainz*[1,5], *H. Cankaya*[1,5], *P. Keathley*[2], *and F. Kärtner*[1,5]; [1]*Deutsches Elektronen Synchrotron, Hamburg, Germany*; [2]*Massachusetts Institute of Technology, Cambridge, USA*; [3]*Max Planck for the Structure and Dynamics of Matter, Hamburg, Germany*; [4]*WiredSense GmbH, Hamburg, Germany*; [5]*Universität Hamburg, Hamburg, Germany*

We report on the single-shot carrier-envelope phase change detection in nanoantenna networks. With a two-cycle mid-infrared pulse we generate sub-cycle electron currents in ~1000 antennas simultaneously, achieving a carrier-envelope phase dependent amplitude of 3000 e.

Room 2 Hall B1 (B12)

16:00 – 17:30

CE-4: Emission materials

Chair: Nadège Courjal, University of Franche-Comté, FEMTO-ST, Besançon, France

CE-4.1 TUE 16:00

CTH:YAG laser crystal as a spontaneous incoherent source in the SWIR

L. Lopez, P. Pichon, F. Druon, P. Georges, and •*F. Balembois*; *Université Paris-Saclay, Institut d'Optique Graduate School, Centre National de la Recherche Scientifique, Laboratoire Charles Fabry, Palaiseau, France*

CTH:YAG luminescent concentrator pumped by a Ce:YAG is demonstrated as an incoherent source centered at 2100 nm with a bandwidth of 300 nm. It is more than 20 times brighter spectrally than SWIR LEDs.

CE-4.2 TUE 16:15

Deterministic Fabrication of Fluorescent Nanostructures Exhibiting Magnetic dipolar Transitions

•*M. Rikers*[1,2,5], *A. Bashiri*[1,2], *A. Barreda*[1,2], *M. Steinert*[2], *D.-Y. Choi*[5], *T. Pertsch*[2,3,4], *and I. Staude*[1,2,4]; [1]*Institute of Solid-State Physics, Friedrich Schiller University Jena, Jena, Germany*; [2]*Institute of Applied*

Room 6 Hall B3 (B32)

16:00 – 17:30

CG-2: Ultrafast physics in condensed matter

Chair: Matteo Lucchini, Politecnico di Milano, Milano, Italy

CG-2.1 TUE (Tutorial) 16:00

Quantum-coherent Electron-Light Interactions in Electron Microscopy

•*C. Ropers*; *Max Planck Institute for Multidisciplinary Sciences, Göttingen, Germany*

This tutorial will introduce principles and applications of electron-light scattering in electron microscopy. An emphasis will be placed on quantum-coherent processes and recent studies of spontaneous and stimulated interactions of free-electron beams with photonic cavities.

Room 7 Hall A1 (A11)

16:00 – 17:30

CJ-1: Transverse mode instability in fiber lasers and amplifiers

Chair: Nicoletta Haarlammert, Fraunhofer IOF, Jena, Germany

CJ-1.1 TUE (Invited) 16:00

Advances in mode scaling and TMI suppression in high-power fibre lasers

•*J. Nicholson, J. Pincha, I. Kansal, R. Windeler, E. Monberg, V. Lukonin, A. Hariharan, G. Williams, A. Rosales-Garcia, L. Bansal, and D. DiGiovanni*; *OFS Laboratories, Somerset, USA*

We present results from new Yb-doped fibres designed with increased higher-order mode loss. The fibres have high transverse mode-instability threshold, while simultaneously maintaining large mode-field diameter, allowing for high power operation with reduced optical nonlinearities.

Room 8 Hall A1 (A12)

16:00 – 17:30

EB-5: Quantum key distribution

Chair: Fabian Steinlechner, University of Jena, Germany

EB-5.1 TUE 16:00

Device-independent quantum key distribution using entangled atoms

•*T. van Leent*[1,2], *W. Zhang*[1,2], *R. Garthoff*[1,2], *K. Redeker*[1,2], *F. Fertig*[1,2], *Y. Zhou*[1,2], *P. Malik*[1,2], *R. Schwonnek*[3,4], *S. Eppelt*[1,2], *W. Rosenfeld*[1,2], *V. Scarani*[5,6], *C.C.-W. Lim*[4,5], *and H. Weinfurter*[1,2,7]; [1]*Fakultät für Physik, LMU Munich, Germany*; [2]*Munich Center for Quantum Science and Technology (MCQST), Munich, Germany*; [3]*Naturwiss.-Techn. Fakultät, Universität Siegen, Germany*; [4]*Department of Electrical & Computer Engineering, National University of Singapore, Singapore*; [5]*Centre for Quantum Technologies, National University of Singapore, Singapore*; [6]*Department of Physics, National University of Singapore, Singepore*; [7]*MPQ, Garching, Germany*

Here we present a device-independent quantum key distribution system that enables for secure key exchange between two users 400 m apart based on event-ready entanglement of single-atom quantum memories.

EB-5.2 TUE 16:15

Combining quantum cryptographic primitives with highly-efficient cold-atom-based quantum memory

•*H. Mamann*[1], *T. Nieddu*[1], *M. Bozzio*[2], *F. Hoffet*[3], *F. Garreau de Loubresse*[1], *E. Diamanti*[4], *A. Urvoy*[1], *and J.*

NOTES

VILNIUS, Lithuania

In this work, we present research on crystalline microprocessing by using femtosecond radiation-induced SLE. We provide a comparison between various processing protocols and demonstrate structure formation out of crystalline material.

CM-6.3 TUE 16:30

Integrated glass chips for XUV radiation generation and manipulation

•R. Martínez Vázquez[1], A.G. Ciriolo[1], G. Crippa[1,2], M. Devetta[1], D. Faccialà[1], P. Barbato[1,2], S. Vovla[1,2], K.A.A.M. Abedin[2], V. Tosa[3], L. Poletto[4], C. Vozzi[1], R. Osellame[1], and S. Stagira[2]; [1]National Research Council (CNR), Institute for Photonics and Nanotechnologies, Milan, Italy; [2]Politecnico di Milano, Physics Department, Milan, Italy; [3]National Institute for R&D of Isotopic and Molecular Technologies, Cluj-Napoca, Romania; [4]National Research Council (CNR), Institute for Photonics and Nanotechnologies, Padova, Italy

We present an integrated glass platform fabricated by FLICE, composed of a HHG-chip and a filter for generated XUV radiation. Following hollow core waveguide concept, we obtain high photon fluxes and bandwidth non-limited XUV-filtering.

the position of the water edge moving along the section of microcapillary fibre containing a 2 mm long SNAP (surface nanoscale axial photonics) microresonator by monitoring the microresonator spectrum.

CK-3.3 TUE 16:30

Active Clad Microring Laser with Diffraction Grating for Mutual Coupling of Radial Direction Mode and WGM

•J. Chen[1], A. Nasir[1], A. Abazi[2,3], A. Eich[2,3], Y. Tomishige[1], H. Takeda[1], Y. Mikami[1], N. Tate[1], Y. Oki[1], C. Schuck[2,3], and H. Yoshioka[1]; [1]Kyushu University, Fukuoka, Japan; [2]University of Münster, Münster, Germany; [3]Center for Soft Nano Science, Münster, Germany

We fabricated active clad microring lasers with a diffraction grating and did the optical characterization. WGM and radial mode coexist, and the radial mode can be modulated by adjusting the grating depth and period.

We present a combined quantum ghost and scanning imaging protocol allowing 2D imaging with 1D detector array, enabled by strong spatial correlations and tunable emission angle of entangled photon pairs emitted from ultrathin nonlinear metasurfaces.

EG-5.3 TUE 16:30

Spontaneous Parametric Down-Conversion in Transition Metal Dichalcogenides

M.A. Weissflog[1], •A. Fedotova[1,2], Y. Tang[3], B. Laudert[1], F. Abtahi[1], S. Shradha[1,4], S. Shinde[1], S. Saravi[1], I. Staude[1,2], T. Pertsch[1,5], F. Setzpfandt[1,5], Y. Lu[3], and F. Eilenberger[1,5]; [1]Institute of Applied Physics, Abbe Center of Photonics, University Jena, Germany; [2]Institute of Solid State Physics, University Jena, Germany; [3]School of Engineering, College of Science and Computer Science, The Australian National University, Canberra, Australia; [4]Institute for Condensed Matter Physics, Technical University of Darmstadt, Germany; [5]Fraunhofer-Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

In this work we experimentally demonstrate spontaneous parametric down-conversion in transition metal dichalchogenides. Using 3R-MoS$_2$ stacks with thickness 278 nm excited at 788 nm wavelength we generate photon-pairs in the telecom range.

CA-5.2 TUE 16:30

High-power cavity-enhanced diamond Brillouin laser: a theoretical and experimental study

•D. Jin[1,2], Y. Wang[1,2], Z. Lu[1,2], R. P. Mildren[3], and Z. Bai[1,2,3]; [1]Center for Advanced Laser Technology, Hebei University of Technology, Tianjin, China; [2]Hebei Key Laboratory of Advanced Laser Technology and Equipment, Tianjin, China; [3]MQ Photonics Research Centre, Department of Physics and Astronomy, Macquarie University, NSW, Australia

This paper experimentally and theoretically investigated the continuous-wave resonantly pumped Brillouin lasers. The experimental results of the ring cavity diamond Brillouin laser show the first Stokes output consistent with the theoretical predictions.

and Optoelectronics, Warsaw, Poland; [2]LightHoouse Sp. z o.o., Lublin, Poland; [3]VIGO Photonics S.A., Ożarów Mazowiecki, Poland; [4]Eindhoven University of Technology, Eindhoven, Netherlands

We present an InP-based integrated ring laser using AWG and AMZIs as wavelength filters, with the linewidth of 307 kHz. The laser design is optimized for application in ring laser gyroscope system.

CB-5.3 TUE 16:30

High-speed Direct Modulation on III-V-on-SOI Distributed Feedback lasers with intrinsic electro-optical bandwidth over 20 GHz

•A. Souleiman[1,2], D. Néel[2], N. Vaissiere[2], V. Ramez[3], C. Besancon[2], S. Malhouitre[3], K. Merghem[1], J. Decobert[2], K. Hassan[3], D. Bitauld[2], B.-e. Benkelfat[1], and J.M. Ramirez[2]; [1]SAMOVAR, Télécom Sud-Paris, Institut Polytechnique de Paris, Palaiseau, France; [2]III-V Lab, Palaiseau, France; [3]Univ. Grenoble Alpes, CEA, LETI, Grenoble, France

We present a high-speed III-V-on-SOI DFB lasers with backside Bragg gratings. The laser has achieved an intrinsic 3 dB modulation bandwidth of 21 GHz in the C-band, allowing for direct modulation at a high speed of 32 Gb/s.

Centre, University of Southampton, Southampton, United Kingdom; [2]Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, China; [3]COMSET, Department of Materials Science and Engineering, Clemson University, Clemson, USA

Broadband MIR wavelength conversion via four-wave mixing is demonstrated using a dispersion-engineered tapered silicon core fibre. A bandwidth of 690nm with a maximum conversion efficiency of -23dB is achieved when pumped at 2.0um.

CD-6.3 TUE 16:30

Pump tuning of a microresonator mid-infrared $\chi^{(2)}$ OPO and microcomb generation at 3.1 μm with CdSiP$_2$

N. Amiune[1], K. Zawilski[2], P. Schunemann[2], A. Kordts[3], R. Holzwarth[3], K. Buse[1,4], and •I. Breunig[1,4]; [1]Laboratory for Optical Systems, Department of Microsystems Engineering - IMTEK, University of Freiburg, Germany; [2]BAE Systems, Inc., Nashua, NH, USA; [3]Menlo Systems GmbH, Martinsried, Germany; [4]Fraunhofer Institute for Physical Measurement Techniques, Freiburg, Germany

With a CdSiP$_2$ microresonator, we demonstrate laser light tunable from 2.3 to 4.1 μm wavelength pumped by a compact telecom diode laser. The same device generates a MIR frequency comb when operated at degeneracy.

CH-4.2 TUE 16:30

Two-Photon Dual-Comb LiDAR for Multi-Target Ranging

•H. Wright[1], A.J.M. Nelson[1], N.J. Weston[2], and D.T. Reid[1]; [1]Heriot-Watt University, Edinburgh, United Kingdom; [2]Renishaw Plc, Edinburgh, United Kingdom

We demonstrate two-photon dual-comb LiDAR achieving simultaneous dynamic ranging to three moving targets driven by sinusoidal, triangular and square waveforms at 0.1 Hz frequency. For stationary targets, we show averaging to sub-μm precisions in 500 ms.

Room Osterseen ICM

JSVI-2.2 TUE 16:30

Plasmon Thermal Conductance and Thermal Conductivity of Metallic Nanofilms

•J. Ordonez-Miranda[1], Y. Kosevich[2], B.J. Lee[3], M. Nomura[4], and S. Volz[5]; [1]CNRS, The University of Tokyo, Tokyo, Japan; [2]Institute of Industrial Science, The University of Tokyo, Tokyo, Japan; [3]Department of Mechanical Engineering,Korea Advanced Institute of Science and Technology, Daejeon, South Korea; [4]Institute of Industrial Science, The University of Tokyo, Tokyo, Japan; [5]CNRS, The University of Tokyo, Tokyo, Japan

The thermal conductance and thermal conductivity of surface plasmon-polaritons propagating along a metallic nanofilm deposited on a substrate are quantified and analyzed, as functions of the film thickness, length, and temperature.

Room 1 Hall B1 (B11)

CF-5.2 TUE 16:30

Direct CEP Stabilization of a high-repetition rate, few-cycle OPCPA chain with a single feedback loop, employing a Stereo-ATI

•D. Hoff[1,2], S. Mikaelsson[1], C. Guo[1], A. L'Huillier[1], C.L. Arnold[1], and M. Gisselbrecht[1]; [1]Department of Physics, Lund University, Lund, Sweden; [2]Single Cycle InstrumentsUG (hb) & Co. KG, Jena, Germany

We present the direct stabilization of the CEP of a few-cycle, high-repetition rate OPCPA laser by employing a Stereo-ATI pulsemeter for single-shot detection of the CEP at full OPCPA repetition rate and feedback to the oscillator.

Room 2 Hall B1 (B12)

Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany; [3]Fraunhofer-Institute of Applied Optics and Precision Engineering IOF, Jena, Germany; [4]Max Planck School of Photonics, Jena, Germany; [5]Research School of Physics, Australia National University, Canberra, Australia

Here we present a new two-step electron beam lithography method for the deterministic localization of fluorescent emitters, featuring magnetic dipolar transition. This is a critical step in experimentally studying light-matter interaction on the nanoscale.

CE-4.3 TUE (Invited) 16:30

Vibrations and Photophysics in White Light Emitting Two-Dimensional Metal Halide Perovskites

•R. Krahne[1], B. Dhanabalan[1], B. Martin-Garcia[2], D. Spirito[3], S. Artyukhin[1], M.-L. Lin[4], Y.-C. Leng[4], P.-H. Tan[4], S. Kutkan[1], and M. Arciniegas[1]; [1]Italian Institute of Technology, Genoa, Italy; [2]CIC nanoGUNE, San Sebastian, Spain; [3]IHP–Leibniz-Institut für innovative Mikroelektronik, Frankfurt (Oder), Germany; [4]State Key Laboratory of Superlattices and Microstructures, IOS, Chinese Academy of Sciences, Beijing, China

The symmetries of the phonons in low-dimensional perovskites are investigated by angle-resolved Raman spectroscopy and correlated with structural and optical properties. This elucidates the relation of lattice distortions to phonons and electron-phonon coupling.

Room 6 Hall B3 (B32)

Room 7 Hall A1 (A11)

CJ-1.2 TUE 16:30

Power Scaling Limits of Diffraction-limited Fibre Amplifiers Considering Transverse Mode Instability

•L. Dong, J. Ballato, and J. Kolis; Clemson University, Clemson, USA

An empirical TMI threshold formula is used to analyse the power-scaling of ytterbium-doped fibre amplifiers. This work serves as a useful extension to earlier works and shines new light on optimal fibre and amplifier designs.

Room 8 Hall A1 (A12)

Laurat[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-PSL, Collège de France, Paris, France; [2]Faculty of Physics, University of Vienna, VCQ, Vienna, Austria; [3]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Barcelona, Spain; [4]LIP6, CNRS, Sorbonne Université, Paris, France

We experimentally performed a quantum cryptographic protocol, taking advantage of our high-efficiency and high-fidelity quantum memory based on cold atoms.

EB-5.3 TUE 16:30

Daylight quantum key distribution in a free-space channel using entangled photons emitted by a quantum dot device

F. Basso Basset[1], M. Valeri[1], J. Neuwirth[1], E. Polino[1], M. Rota[1], D. Poderini[1], C. Pardo[1], •G. Rodari[1], E. Roccia[1], S. Covre da Silva[2], G. Ronco[1], N. Spagnolo[1], A. Rastelli[2], G. Carvacho[1], F. Sciarrino[1], and R. Trotta[1]; [1]Department of Physics, Sapienza University of Rome, Rome, Italy; [2]Institute of Semiconductor and Solid State Physics, Johannes Kepler University, Linz, Austria

In this word, we implemented an entanglement-based quantum key distribution across an urban 270m-long free-space optical link during daylight. This task has been accomplished for the first time using a quantum dot device.

NOTES

Room 1 ICM

CM-6.4 TUE 16:45

Micromachining of transparent solids with few-cycle laser pulses

•*J.R. C. Andrade[1], P. Sneftrup[2], V. de Michele[3], L. Rammelt[1], P. Jürgens[1], M. Vrakking[1], T. Nagy[1], and A. Mermillod-Blondin[1]; [1]Max-Born-Institut, Berlin, Germany; [2]Department of Physics and Astronomy, Aarhus University, Aarhus, Denmark; [3]Univ-Lyon, Laboratoire Hubert Curien (LabHC), Saint-Etienne, France*

We present type I modifications in fused silica using 1.5 cycle laser pulses (3.6 fs, center wavelength 710 nm) and compare them to those induced by typical Ti:Sapphire 50 fs pulses.

CM-6.5 TUE 17:00

Femtosecond Bessel Beams for the efficient generation of volume diffraction gratings in glass

•*J. Fantova[1,2], A. Rodriguez[1,2], G. Garcia-Mandayo[1,2], and S.M. Olaizola[1,2]; [1]CEIT-Basque Research and Technology Alliance (BRTA), San Sebastian, Spain; [2]Universidad de Navarra, Tecnun, San Sebastian, Spain*

Using femtosecond Bessel Beams, volume diffraction gratings were generated within three different glass substrates of high refractive index change, yielding optical elements of up to 70% combined first order diffraction efficiency.

Room 4a ICM

CK-3.4 TUE 16:45

Improving the accuracy of electron spectroscopy using calibration with a photonic integrated circuit-based microresonator

•*B. Weaver[1], A. Sapozhnik[1], P. Cattaneo[1,2], A. Raja[1,3], Y. Yang[1,3], R. Wang[1,3], F. Carbone[1], T. Kippenberg[1,3], and T. LaGrange[1]; [1]Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; [3]Center for Quantum Science and Engineering, Lausanne, Switzerland*

We present a new method for calibrating electron energy loss spectrometers using a photonic integrated circuit-based microresonator. The technique's precision is better than previous methods, enabling ultraprecise spectroscopy of chemical shifts.

CK-3.5 TUE 17:00

Near-ultraviolet high-Q whispering-gallery-modes microresonators for laser frequency stabilization

G. Perin, Y. Dumeige, P. Féron, and •S. Trebaol; Univ Rennes, CNRS, Institut FOTON - UMR 6082, Lannion, France

We report a study on high-Q whispering gallery mode microsphere at 420 nm. Q factor up to 10^8 is reported. Pound-Drever-Hall stabilization of a diode laser on a whispering gallery mode is demonstrated.

Room 4b ICM

EG-5.4 TUE 16:45

Direct Observation of the Origin of Spectral Diffusion in Colloidal Quantum Dots

•*R. Tenne, F. Conradt, V. Bezold, V. Wiechert, and A. Leitenstorfer; Department of Physics and Center for Applied Photonics, University of Konstanz, Konstanz, Germany*

Although spectral fluctuations pose severe limitations on the usability of quantum emitters, their cause is not entirely clear. We present a direct observation that spectral diffusion in colloidal quantum dots results from stochastic electric-fields

EG-5.5 TUE (Invited) 17:00

Deep Ultraviolet Nanophotonics to enhance the sensitivity of autofluorescence spectroscopy on label-free proteins

•*P. Roy, J.B. Claude, and J. Wenger; Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, AMUTech, Marseille, France*

We developed a new label-free method for detecting single proteins in DUV range using optical horn antenna, improving signal and allowing detection of single tryptophan level, opening up study of a wide range of proteins.

Room 13a ICM

CA-5.3 TUE 16:45

Diode-assisted, continuous-wave, nitrogen-vacancy centre diamond laser system

•*L. Lindner[1], F. Hahl[1], T. Luo[1], G.N. Antonio[1], X. Vidal[1], M. Rattunde[1], T. Ohshima[2], M. Capelli[3], B.C. Gibson[4], A.D. Greentree[4], R. Quay[1], and J. Jeske[1]; [1]Fraunhofer Institute for Applied Solid State Physics IAF, Freiburg, Germany; [2]National Institutes for Quantum Science and Technology (QST), Takasaki, Japan; [3]School of Science, RMIT University, Melbourne, Australia; [4]ARC Centre of Excellence for Nanoscale Bio-Photonics, School of Science, RMIT University, Melbourne, Australia*

We present a diode-assisted continuous-wave laser system based on nitrogen vacancy centres in diamond for high-sensitivity laser threshold magnetometry. The linear cavity comprising an antireflective coated red laser diode and an NV-diamond shows lasing behaviour.

CA-5.4 TUE 17:00

Proof-of-principle demonstration of a diamond Raman amplifier at $>1.5\mu m$

•*P. Julien[1], V. Savitski[2], Ł. Dziechciarczyk[1], G. Demetriou[1], and A. Kemp[1]; [1]University of Strathclyde, Glasgow, United Kingdom; [2]Fraunhofer Centre for Applied Photonics, Glasgow, United Kingdom*

We report a maximum amplification factor of 1.4 from a novel diamond master oscillating power amplifier at the eye-safe range and the current progress towards the optimisation of this setup.

Room 13b ICM

CB-5.4 TUE 16:45

Frequency Agile Hybrid Si_3N_4 -MEMS Photonic Integrated Circuit Based Laser

•*A. Voloshin[1,2,3], A. Bancora[1,2,3], G. Lihachev[2,3], V. Snigirev[2,3], H. Tian[4], J. Riemensberger[2,3], V. Shadymov[2,3], A. Siddharth[2,3], A. Attanasio[4], R.N. Wang[2,3], S. Bhave[4], and T. Kippenberg[2,3]; [1]DeepLight SA, Lausanne, Switzerland; [2]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [3]Center of Quantum Science and Engineering (EPFL), Lausanne, Switzerland; [4]OxideMEMS Lab, Purdue University, West Lafayette, USA*

We demonstrate double-ring Vernier laser with fast linear frequency tuning of 2.5 GHz at 100 kHz and wavelength switching with 7 ns rise time using silicon nitride photonic chip with monolithically integrated PZT actuator.

CB-5.5 TUE 17:00

Low loss InP U-bend gain waveguides for hybrid integration with silicon photonics

•*H. Tuorila[1], J. Viheriälä[1], J.-W. Lee[2], M. Harjanne[2], M. Cherchi[2], T. Aalto[2], and M. Guina[1]; [1]Tampere University, Tampere, Finland; [2]VTT Technical Research Centre of Finland, Espoo, Finland*

We present a low loss U-bend InP travelling wave semiconductor optical amplifier designed for improved control of the high precision alignment required for hybrid integration with silicon photonics platforms. Analysis on U-bend structure and the hybrid integration are presented.

Room 14a ICM

CD-6.4 TUE 16:45

Mid-IR All-Optical Poling in Silicon Nitride Waveguides

•*O. Yakar[1], C. Lafforgue[1], A. Ayan[1], J. Faugier-Tovar[2], P. Chausse[3], C. Petit-Etienne[3], E. Pargon[3], Q. Wilmart[2], and C.-S. Brès[1]; [1]Ecole Polytechnique Fédérale de Lausanne, Photonic Systems Laboratory (PHOSL), STI-IEL, Station 11, Lausanne, Switzerland; [2]Univ. Grenoble Alpes, CEA, LETI, Grenoble, France; [3]3Grenoble Alpes, CNRS, CEA/LETI-Minatec, Grenoble INP, LTM, Grenoble, France*

We report the inscription of quasi-phase-matching gratings for second harmonic generation through all-optical poling in the mid-infrared wavelengths enabled by silicon-rich silicon nitride waveguides that was not possible by stoichiometric silicon nitride waveguides.

CD-6.5 TUE 17:00

Coherently driven active resonator frequency combs in the mid-infrared

•*D. Kazakov[1], T. Letsou[1,2], M. Piccardo[1,3], M. Beiser[4], L. Columbo[5,6], M. Brambilla[7], F. Prati[8], L. Lugiato[8], M. Pushkarsky[9], D. Caffey[9], T. Day[9], B. Schwarz[1,4], and F. Capasso[1]; [1]Harvard University, Cambridge, USA; [2]Massachusetts Institute of Technology, Cambridge, USA; [3]Fondazione Istituto Italiano di Tecnologia, Milan, Italy; [4]TU Vienna, Vienna, Austria; [5]Politecnico di Torino, Turin, Italy; [6]CNR-Istituto di Fotonica e Nanotecnologie, Bari, Italy; [7]Universit'a e Politecnico di Bari, Bari, Italy;*

Room 14b ICM

CH-4.3 TUE 16:45

Noninvasive quantitative assessment of collagen degradation in parchments by polarization-resolved SHG microscopy

•*G. Galante[1,2], M. Schmeltz[1], S. Heu-Thao[2], L. Robinet[2], M.-C. Schanne-Klein[1], and G. Latour[1,3]; [1]Laboratoire d'Optique et Biosciences, CNRS, Inserm, Ecole Polytechnique, Institut Polytechnique de Paris, Palaiseau, France; [2]Centre de Recherche sur la Conservation, CNRS, MNHN, Ministère de la Culture, Paris, France; [3]Université Paris-Saclay, Gif-sur-Yvette, France*

Polarization-resolved second harmonic generation (P-SHG) is a modality to extract quantitative information about the organization of fibrillar collagen. P-SHG is used to characterize the degradation of collagen within historical parchment.

CH-4.4 TUE 17:00

QCL-based FMCW ranging and free-space optical communication in the mid-infrared

•*B. Martin[1,2], P. Feneyrou[3], E. Rodriguez[2], T. Bonazzi[2], D. Gacemi[2], N. Berthou[1], A. Martin[3], and C. Sirtori[2]; [1]Thales SIX France, Gennevilliers, France; [2]Laboratoire de Physique de l Ecole normale Superieure, Paris, France; [3]Thales research and technology, Palaiseau, France*

We demonstrate the first results of QCL-based FMCW ranging in the mid-infrared. Thanks to state-of-the-art quantum devices, we performed precise outdoor ranging up to 30 m, and

Room Osterseen ICM

JSVI-2.3 TUE 16:45

Ab initio calculations of the thermoelectric phonon drag effect in semiconductor nanostructures

R. Sen, N. Vast, and •J. Sjakste; Laboratoire des Solides Irradiés, CEA-DRF-IRAMIS, École Polytechnique, CNRS UMR 7642, Institut Polytechnique de Paris, Palaiseau, France

In order to understand the phonon drag effect at the nanoscale, we have studied, using density functional theory and the linearized Boltzmann Transport Equation, the effect of direction-dependent nano-structuring on the Seebeck coefficient of silicon.

JSVI-2.4 TUE 17:00

Advances in Photothermal Science and Techniques: a route for NDT from Macro to Nanoscale

•R. Li Voti, G. Leahu, E. Petronijevic, M.C. Larciprete, A. Belardini, M. Centini, and C. Sibilia; Sapienza Univesità di Roma, Department of Basic and Applied Science for Engineering, Rome, Italy

Recent advances for non-destructive evaluation and testing of chiral materials, ordered/disordered nanowires/spheres by photothermal techniques are summarized. IR radiometry is introduced to measure the thermal property at a nanoscopic scale

Room 1 Hall B1 (B11)

CF-5.3 TUE 16:45

Spectral coherence properties of continuum generation in bulk crystals under spatial phase fluctuations

•B. Maingot[1,2], G. Chériaux[1], N. Forget[2], and A. Jullien[1]; [1]Institut Physique de Nice, Valbonne, France; [2]Fastlite, Antibes, France

The stability of the phase difference between two white-light continua, generated from the same 180-fs pulses at 1035 nm, is assessed by a modified Bellini-Hänsch interferometer. The impact of spatial phase fluctuations on spectral phase is quantified.

CF-5.4 TUE 17:00

Carrier-Envelope Offset Frequency Characterization of a 100 MW-Level Thin-Disk Oscillator

•Y. Kopp, S. Goncharov, G. Hehl, and O. Pronin; Helmut Schmidt University, Hamburg, Germany

The detection and characterization of the carrier-envelope offset frequency of a 100 MW-level Kerr-lens mode-locked thin-disk oscillator is presented. The carrier-envelope phase stabilization of this oscillator is on the way.

Room 2 Hall B1 (B12)

CE-4.4 TUE 17:00

Ce:LYSO, from scintillator to solid-state lighting as a blue luminescent concentrator

L. Lopez[1], P. Pichon[1], P. Loiseau[2], B. Viana[2], R. Mahiou[3], F. Druon[1], P. Georges[1], and •L. Lopez[1]; [1]Université Paris-Saclay, Institut d'Optique Graduate School, Centre National de la Recherche Scientifique, Laboratoire Charles Fabry, Palaiseau, France; [2]Université PSL, Chimie ParisTech, CNRS, Institut de Recherche de Chimie Paris, Paris, France; [3]Université Clermont Auvergne, CNRS, Clermont Auvergne INP, ICCF, Clermont-Ferrand, France

Room 6 Hall B3 (B32)

CG-2.2 TUE 17:00

Light-Driven Attosecond Photoinjection in Germanium

•G. Inzani[1], L. Adamska[2], A. Eskandari-asl[3], N. Di Palo[1], G.L. Dolso[1], B. Moio[1], L.J. D'Onofrio[2], A. Lamperti[4], A. Molle[4], R. Borrego-Varillas[5], M. Nisoli[1,5], S. Pittalis[2], C.A. Rozzi[2], A. Avella[3,6,7], and M. Lucchini[1,5]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]CNR - Istituto Nanoscienze, Modena, Italy; [3]Dipartimento di Fisica "E. R. Caianiello", Università degli Studi di Salerno, Fisciano (SA), Italy; [4]CNR - IMM, Unit of Agrate Brianza, Agrate Brianza (MB), Italy; [5]Institute for Photonics and Nanotechnolo-

Room 7 Hall A1 (A11)

CJ-1.3 TUE 16:45

Polarization Dependence of Transverse mode Instability in Yb-doped LMA PM Fibers

•G. Palma-Vega[1,2], D. Häßner[1], S. Kuhn[1], J. Nold[1], F. Möller[1], C. Jáuregui[2], A. Tünnermann[1,2], N. Haarlammert[1], and T. Schreiber[1]; [1]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [2]Institute of Applied Physics, Friedrich-Schiller University, Jena, Germany

We investigate the dependence of transverse mode instabilities on the linear input polarization angle in a PM fiber amplifier. A mitigation strategy by detuning the polarization angle from the slow-axis of the fiber is presented.

CJ-1.4 TUE 17:00

Transverse Mode Instabilities in kW-class Tm-doped Fiber Amplifier

•F. Möller, T. Lühder, B. Yildiz, C. Schmittner, T. Walbaum, and T. Schreiber; Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

We present a monolithic, beam-combinable Tm fiber amplifier at 2036 nm with an output power of >800 W in a 25/400 μm fiber geometry. The pump wavelength-dependent TMI threshold will be investigated.

Room 8 Hall A1 (A12)

EB-5.4 TUE 16:45

A continuous-variable quantum secure direct communication protocol with squeezed states

•I. Paparelle[1], F. Mousavi[2,3], F. Scazza[2,3], M. Paris[4], A. Bassi[2], and A. Zavatta[5]; [1]Ecole Normale Supérieure , Paris, France; [2]Università degli Studi di Trieste, Trieste, Italy; [3]Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche, Trieste, Italy; [4]Università degli Studi di Milano, Milano, Italy; [5]Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche, Firenze , Italy

We propose a novel continuous-variable quantum secure direct communication protocol, investigate its security, implement it via coherent and squeezed states through the optical fiber, and demonstrate the benefits of squeezed states for achieving higher secrecy.

EB-5.5 TUE 17:00

Single-emitter quantum key distribution over 175 km fibre with optimised finite key rates

•J. Ho[1], C.L. Morrison[1], R.G. Pousa[2], F. Graffitti[1], Z.X. Koong[1], P. Barrow[1], N.G. Stoltz[3], D. Bouwmeester[4,5], J. Jeffers[2], D.K.L. Oi[2], B.D. Geradot[1], and A. Fedrizzi[1]; [1]Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]SUPA Departement of Physics, University of Strathclyde, Glasgow, United Kingdom; [3]Materials Department, University of California, Santa Barbara, USA; [4]Huygens-Kamerlingh Onnes Laboratory, Leiden

NOTES

CM-6.6 TUE 17:15

Femtosecond laser fabrication of gradient refractive index micro-lenses in chalcogenide glass for applications in visible and infrared region

•*T. Le Phu*[1], *D. Le Coq*[2], *and P. Masselin*[1]; [1] *Université du Littoral Côte d'Opale, Dunkerque, France*; [2] *Institut des Sciences Chimiques de Rennes, Rennes, France*

We report a direct laser writing process to fabricate gradient refractive index micro-lenses inside chalcogenide glass for both visible and infrared applications. The working distance can be controlled by selecting writing parameters and substrate thickness.

CK-3.6 TUE 17:15

Extremely narrow, sharp-peaked resonances at the edge of the continuum

•*I. Lukosiunas*[1], *L. Grineviciute*[2], *J. Nikitina*[1], *D. Gailevicius*[1], *and K. Staliunas*[1,3,4]; [1] *Vilnius University, Vilnius, Lithuania*; [2] *Center for Physical Sciences and Technology, Vilnius, Lithuania*; [3] *ICREA, Passeig Llu'ıs Companys 23, Barcelona, Spain*; [4] *UPC, Dep. de Fisica, Rambla Sant Nebridi, Barcelona, Spain*

We report a newly observed phenomenon, specifically of a critical narrowing of Fano resonance in a driven potential well. The resonances obtain unusual sharp-peak shapes at the continuum boundary inside dielectric thin films.

CA-5.5 TUE 17:15

Enhanced diamond Brillouin scattering based on cascaded Raman conversion

•*H. Chen*[1,2], *Y. Wang*[1,2], *Z. Lu*[1,2], *R.P. Mildren*[3], *and Z. Bai*[1,2,3]; [1] *Center for Advanced Laser Technology, Hebei University of Technology, Tianjin, China*; [2] *Hebei Key Laboratory of Advanced Laser Technology and Equipment, Tianjin, China*; [3] *MQ Photonics Research Centre, Department of Physics and Astronomy, Macquarie University, Sydney, Australia*

We report a diamond Raman Brillouin laser, and realize a 1.2/1.5 μm cascade Raman Brillouin laser output with controllable order by controlling its output transmittance and cavity length

CB-5.6 TUE 17:15

Design optimization of on-chip III-V/SiN quantum well/dot lasers

•*E. Alkhazraji*[1], *W.W. Chow*[2], *F. Grillot*[3], *J.E. Bowers*[4,5], *S. Madaras*[2], *M. Gehl*[2], *E. Skogen*[2], *and Y. Wan*[1]; [1] *King Abdullah University of Science and Technology, Thuwal, Saudi Arabia*; [2] *Sandia National Laboratories, Albuquerque, USA*; [3] *LTCI, Télécom Paris, Institut Polytechnique de Paris, Palaiseau, France*; [4] *Institute for Energy Efficiency, University of California - Santa Barbara, Santa Barbara, USA*; [5] *Materials Department, University of California - Santa Barbara, Santa Barbara, USA*

A parametric analysis and design-operation optimization are presented for integrated III-V quantum well and quantum dot lasers with SiN microring resonators to maximize the power and minimize the linewidth, which is crucial for several applications.

[8] *Universit'a dell'Insubria, Como, Italy*; [9] *DRS Daylight Solutions, San Diego, USA*

Passive Kerr resonators enable agile frequency comb generators in the visible and the near-infrared. We demonstrate coherently driven active ring resonators with an effective Kerr nonlinearity arising from gain saturation, paving the way to reconfigurable frequency combs in the mid-infrared.

CD-6.6 TUE 17:15

11-μJ picosecond-pulsed hollow-core-fibre-feedback optical parametric oscillator

•*Y. Wu, S. Liang, Q. Fu, F. Poletti, D.J. Richardson, and L. Xu*; *Optoelectronics Research Centre, Southampton, United Kingdom*

A fibre-laser-pumped hollow-core-fibre-feedback optical parametric oscillator operating at 1-MHz repetition-rate and generating 130-ps-pulsed signals and idlers at wavelengths of 1600 nm and 2950 nm, with a record overall pulse energy of 11.4 μJ is presented.

evidence the feasibility of simultaneous communication and ranging.

CH-4.5 TUE 17:15

Full-Field Hyperspectral Imaging of a Painting in the Mid-Infrared

•*J. Charsley*[1], *M. Botticelli*[2], *V. Risdonne*[3], *T. Visser*[2], *C. Young*[2], *M. Smith*[2], *M. Rutkauskas*[1], *Y. Altmann*[1], *and D. Reid*[1]; [1] *Heriot-Watt University, Edinburgh, United Kingdom*; [2] *University of Glasgow, Glasgow, United Kingdom*; [3] *Victoria & Albert Museum, London, United Kingdom*

A compact and cost-effective mid-infrared hyperspectral imager (700-1400cm-1 bandwidth) capable of fast acquisition and material identification through state-of-the-art signal processing strategies is demonstrated on a painted cultural heritage object for technical art history.

Room Osterseen ICM

JSVI-2.5 TUE 17:15

Temperature Tunable VO2 Perfect Absorber via W doping

•D. ceneda[1], M.C. Larciprete[1], M. Centini[1], R. Li Voti[1], D. Scirè[2], M. Mosca[2], D. Persano Adorno[3], R. Macaluso[2], T. Cesca[4], G. Mattei[4], K. Aydin[5], and C. Sibilia[1]; [1]Department of Basic and Applied Sciences for Engineering, Sapienza, Rome, Italy; [2]Department of Engineering, University of Palermo, Palermo, Italy; [3]Department of Physics and Chemistry, University of Palermo, Palermo, Italy; [4]Department of Physics and Astronomy, University of Padova, Padova, Italy; [5]Department of Electrical and Computer Engineering, Northwestern University, Evanston, USA

We performed infrared optical characterization of W-doped VO2 films at increasing W doping percentage, deposited by PLD on sapphire substrates, obtaining a temperature tunable VO2 perfect absorber reaching a reflectance of 0.02% at room temperature.

Room 1 Hall B1 (B11)

CF-5.5 TUE 17:15

Carrier-envelope phase-tuned nonlinear optical dynamics of single-cycle pulses generated in hollow-core photonic-crystal fiber

•I. Savitsky[1], E. Stepanov[1,2], A. Voronin[1,2], A. Lanin[1,2], and A. Fedotov[1,2]; [1]M. V. Lomonosov Moscow State University, Moscow, Russia; [2]Russian Quantum Center, Moscow, Russia

We demonstrate a source of high peak power single-cycle near-to-mid-IR phase stable pulses based on soliton self-compression in an antiresonant hollow-core fiber. These pulses are shown to be well suited for ultrafast light–matter interactions analysis.

Room 2 Hall B1 (B12)

Understanding the potential and limitations of the first Ce:LYSO luminescent concentrator pumped by UV LEDs thanks to simulations and experiments. New source with better performance than the best blue LEDs on the market.

CE-4.5 TUE 17:15

Persistent luminescence in Ce,Cr-doped garnet crystals

T. Delgado[1], D. Rytz[2], L. Giordano[1], G. Cai[1], M. Allix[3], E. Veron[3], and •B. Viana[1]; [1]PSL University, Chimie ParisTech, IRCP-CNRS,, Paris, France; [2]BREVALOR Sàrl, 1669, Les Sciernes, Switzerland; [3]CNRS, CEMHTI UPR 3079, Univ. Orléans, , Orleans, France

Ce,Cr-doped GYAGG single crystals with persistent luminescence have been elaborated. Single crystals can be useful to better understand the mechanism. Volume effects have been shown whereas surface polishing should be controlled to enhance light extraction

Room 6 Hall B3 (B32)

gies, IFN - CNR, Milano, Italy; [6]CNR - SPIN, UoS di Salerno, Fisciano (SA), Italy; [7]Unità CNISM di Salerno, Università degli Studi di Salerno, Fisciano (SA), Italy

We investigate a novel ultrafast charge photoinjection regime in undoped monocrystalline germanium with attosecond transient reflectivity spectroscopy. We decouple several physical phenomena with different timing within the pump envelope, while intra-band motion hinders charge injection.

CG-2.3 TUE 17:15

Ultrafast Transition from State-Blocking Dynamics to Electron Localization in Transition Metal β-Tungsten

E.W. de Vos, S. Neb, A. Niedermayr, F. Burri, M. Hollm, •L. Gallmann, and U. Keller; Department of Physics, ETH Zürich, Zürich, Switzerland

We describe an ultrafast transition of the electronic response of optically excited β-Tungsten. The response moves from a regime where state-filling of the excited carrier population dominates towards localization of carriers onto the outer d-orbitals

Room 7 Hall A1 (A11)

CJ-1.5 TUE 17:15

Mitigation of Transverse Mode Instability (TMI) with High Beam Quality using Multimode Fiber Amplifiers

C.-W. Chen[1], K. Wisal[2], Y. Eliezer[1], A.D. Stone[1], and •H. Cao[1]; [1]Department of Applied Physics, Yale University, New Haven, USA; [2]Department of Physics, Yale University, New Haven, USA

We demonstrate numerically and theoretically that the transverse-mode stability of a high-power fiber amplifier is greatly enhanced by simultaneously exciting many high-order modes, while the amplified light maintains high spatial coherence and beam quality.

Room 8 Hall A1 (A12)

University, Leiden, Netherlands; [5]Department of Physics, University of California, Santa Barbara, USA

We report on experimental results for fibre-based quantum key distribution using frequency-converted single photons from a quantum dot. We exploit improved theoretical techniques for finite-key analysis enabling practical QKD over metropolitan distances.

EB-5.6 TUE 17:15

Localizing eavesdroppers inside a quantum channel using stimulated Brillouin scattering

•A. Popp[1,2,3], B. Stiller[1,2], and C. Marquardt[1,2,3]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany; [3]SAOT, Graduate School in Advanced Optical Technologies, Erlangen, Germany

We present a novel approach to localize eavesdroppers inside a quantum channel using distributed Brillouin scattering. Applying BOCDA, we are able to localize evanescent outcoupling down to 1% in a standard fiber channel.

NOTES

13:00 – 14:00

CD-P: CD Poster session

CD-P.1 TUE

Power-efficient hyperparametric oscillation via bound states in the continuum

•F. Lei, Z. Ye, K. Twayana, Y. Gao, M. Girardi, Ó.B. Helgason, P. Zhao, and V. Torres-Company ; Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden

We present a hyperparametric oscillation with record high power efficiency in an integrated silicon nitride microring-waveguide system, which is realized by utilizing the concept of bound states in the continuum.

CD-P.2 TUE

Efficient Generation of Vacuum-Ultraviolet Light in an Ultracompact Setup for Applications in Molecular and Nuclear Spectroscopy

•M. Seitz[1], J. Al-Nuwaider[2], F. Belli[3], L. Silletti[1], V. Wanie[1], F. Calegari[1,4], and A. Trabattoni[1,2]; [1]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Institute of Quantum Optics, Hannover, Germany; [3]Heriot-Watt University, School of Engineering and Physical Sciences, Edinburgh, United Kingdom; [4]Physics Department, Universität Hamburg, Hamburg, Germany

This contribution presents an innovative and efficient vacuum ultraviolet light source, employing consecutive nonlinear frequency conversion in nonlinear crystals and up-conversion in a hollow core fiber via four-wave mixing.

CD-P.3 TUE

Increasing brightness in multiphoton microscopy with low-repetition-rate, wavelength-tunable femtosecond fiber laser

•J. Bogusławski, A. Kwaśny, D. Stachowiak, and G. Soboń; Laser & Fiber Electronics Group, Wrocław University of Science and Technology, Wrocław, Poland

We show an improved brightness in multiphoton microscopy using a custom-built fiber laser. The laser offers versatile output parameters, including wavelength (760-800nm) and pulse-repetition-rate (1-25MHz) tunability, at short sub-90 fs duration and high energy (>1nJ).

CD-P.4 TUE

High Energy Burst Pulsed KGW Raman Laser

•A. Tarasov and H. Chu; Laseroptek, Seongnam, South Korea

We realized for the first time burst pulse generation in KGW Raman laser with energy 13 J, 11.6 J and 8.5 J at the wavelengths 559, 589 and 621 nm correspondingly, operating at 1 Hz

CD-P.5 TUE

Time-frequency analysis of dark-waves

•L. Vamos[1], C. Hensel[1], I. Tyulnev[1], L. Maidment[1], U. Elu[1], M. Enders[1], and J. Biegert[1,2]; [1]ICFO - Institut de Ciencies Fotoniques, Castelldefels, Spain; [2]ICREA - Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain

We demonstrated the depolarization effect in athmospheric pulse propagation by high quality fits onto the induction decay part of field-resolved measurements. The time-frequency analysis reveals coupling effects among rotational modes in a 60ps range.

CD-P.6 TUE

Photonic Generation and Band-selection of Multi-Carrier Chirped Waveforms through Stimulated Brillouin Scattering

•R. Dhawan, D. Parida, and A. Choudhary; Ultrafast Optical Communications and High-performance Integrated Photonics (UFO-CHIP) group, Department of Electrical Engineering, Indian Institute of Technology (IIT), Delhi, New Delhi, India

Photonic frequency-multiplication of the RF frequency of linear frequency modulated waveforms by 4X and multi-band LFM generation is demonstrated though a simple modulation technique. Selection of individual bands is also achieved through flexible Brillouin filtering

CD-P.7 TUE

Laser guiding of consecutive meter-scale discharges in air

P. Walch, L. Arantchouk, B. Mahieu, M. Lozano, Y.-B. André, A. Mysyrowicz, and •A. Houard; Laboratoire d'Optique Appliquée – ENSTA Paris, Ecole Polytechnique, CNRS, Institut Polytechnique de Paris , Palaiseau, France

We study the evolution of meter-scale long-lived laser guided electric discharges and the interaction between consecutive discharges in the perspective of creating a quasi-permanent conductive channel induced by femtosecond laser filamentation.

CD-P.8 TUE

Energy Conversion Efficiency Improvement of a MgO:PPLN-based Subnanosecond Optical Parametric Generator Using a Supercontinuum Seed

•J. Banys, S. Armalytė, V. Tamulienė, V. Jarutis, and J. Vengelis; Laser Research Center, Faculty of Physics, Vilnius University, Vilnius, Lithuania

We propose seeding the MgO:PPLN crystal-based subnanosecond micro-laser pumped optical parametric generator with supercontinuum generated in a photonic crystal fiber - an idea that significantly increases the energy conversion efficiency while preserving good output beam quality.

CD-P.9 TUE

Comparison of Dark Temporal Cavity Solitons in Fabry-Pérot and Ring Resonators with Normal Dispersion

•G.N. Campbell[1], L. Hill[2], P. Del'Haye[2,3], and G.-L. Oppo[1]; [1]University of Strathclyde, Glasgow, United Kingdom; [2]Max Planck Institute for the Science of Light, Erlangen, Germany; [3]Friedrich Alexander University Erlangen-Nuremberg, Erlangen, Germany

We characterize dark vectoral temporal cavity solitons for a Fabry-Pérot resonator with normal dispersion and make comparison with an equivalent ring resonator system. The Fabry-Pérot offers advantages in the generation of frequency combs.

CD-P.10 TUE

Critical coupling in Cavity Resonator Integrated Grating Filters (CRIGFs) for SHG control

O. Gauthier-Lafaye[1], P. Dubreuil[1], •S. Calvez[1], A. Monmayrant[1], E. Hemsley[2], A.-L. Fehrembach[2], and E. Popov[2]; [1]LAAS-CNRS, Toulouse, France; [2]Institut Fresnel, Marseille, France

We demonstrate experimentally critical coupling for nonlinear conversion in grating-coupled Fabry-Pérot planar microcavities known as Cavity-Resonant Integrated Grating Filters. Novel asymmetric designs offer Q-factors from 1000 to 8000 and allow critical coupling with maximised SHG.

CD-P.11 TUE

Ultrafast third-order nonlinear optical response of 2D NbS_2, $NbSe_2$, $ZrTe_2$, and MoS_2 LTMDs in suspension

•A.J.A. Carvalho[1], D. Valente[1], C.L.A.V. Campos[1], A.M. Jawaid [2], R. Busch[2], R.A. Vaia[2], and A.S.L. Gomes[1]; [1]Physics Department, Universidade Federal de Pernambuco, 50670-901, Recife, Brazil; [2]Materials and Manufacturing Directorate, Air Force Research Laboratories, WPAFB, 45433, Recife, USA

We investigated the ultrafast third-order nonlinearity of 2D transition-metal dichalcogenides based on the optical Kerr gate technique and discuss the physical mechanism responsible for the effect. Measured nonlinear coefficients ranged from $8.6 \times 10^{-19}\mathrm{m}^2/\mathrm{W}$ to $5.3 \times 10^{-18}\mathrm{m}^2/\mathrm{W}$.

CD-P.12 TUE

Mid-infrared generation in GaSe and LGS with few-cycle pulses compressed by cascaded multipass cells

•J.G. Meyer, S. Goncharov, A. Zablah, and O. Pronin; Helmut-Schmidt-Universität, Hamburg, Germany

We generated 7 fs pulses at 1 μm wavelength from two cascaded multipass cells after a Pharos laser. By driving IDFG in GaSe and LGS, we covered a spectral range between 3 and 18 μm.

CD-P.13 TUE

Switchable Ultraviolet Harmonic Beam Manipulation via Spatial Phase Modulation of Near-infrared Driving Beam

•S. Won, S. Choi, T. Kim, B. Kim, S.-W. Kim, and Y.-J. Kim; Korea Advanced Institute of Science and Technology, Daejeon, South Korea

We present the polarization-resolved ultraviolet (UV) harmonic beam pattern manipulation via spatial phase modulation of the driving beam. Our work enables the arbitrary control of UV laser pulses in UV optical hologram and encryption.

CD-P.14 TUE

A New Approach to OPCPA Idler Pulse Energy Build-up at 2.3 μm by Transient Stimulated Raman Chirped-Pulse Amplification

•A. Petrulėnas, P. Mackonis, and A. Rodin; State research institute Center for Physical Sciences and Technology , Vilnius, Lithuania

The combination of OPCPA and transient stimulated Raman amplification of chirped pulses in KGW demonstrates a new approach for idler energy buildup in the SWIR range. After SRA idler energy increase 33% with nearly transform-limited 53 fs pulses after compression.

CD-P.15 TUE

Parametric Amplification in Dual-Core Fibers Via Intermodal Four-wave Mixing

•M. Shi[1], V. Ribeiro[1,2], and A.M. Perego[1]; [1]Aston Institute of Photonic Technologies, Aston University, B4 7ET, Birmingham, United Kingdom; [2]Kets Quantum Security Ltd. BS15 4PJ, Bristol, United Kingdom

We demonstrate analytically and numerically a novel dual-core fiber based optical parametric amplifier operating via intermodal four-wave mixing and featuring a frequency asymmetric spectrum with signal and idlers generated into two different supermodes.

CD-P.16 TUE

Thermal and non-thermal optical nonlinearities of 2D layered transition metal dichalcogenides in suspension

•C.L.A.V. Campos[1], J.E.Q. Bautista[1], C.B. de Araújo[1], A.M. Jawaid[2], R. Busch[2], R.A. Vaia[2], and A.S.L. Gomes[1]; [1]Departamento de Física, Universidade Federal de Pernambuco, , 50670-901 , Recife, Brazil; [2]Materials and Manufacturing Directorate, Air Force Research Laboratories, WPAFB, 45433, Ohio, USA

We investigate the nonlinear optical response of bidimensional transition-metal dichalcogenide in suspension due to intensity-dependent Kerr-type nonlinearity and explained the origin of the slow (thermal) and ultrafast (nonthermal) nonlinearities

CD-P.17 TUE

Assessment of the Feasibility of Employing Chaos Synchronization in Two Cascaded Microresonators for Secure Data Transmission

•*D. Lemcke[1,2], D. Moreno[1,3], S. Fujii[4], A. Nakashima[1], A. Uchida[5], and T. Tanabe[1]; [1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, Yokohama, Japan; [2]RWTH Aachen University, Aachen, Germany; [3]Polytechnic University of Valencia, Valencia, Spain; [4]Department of Physics, Faculty of Science and Technology, Keio University, Yokohama, Japan; [5]Department of Information and Computer Sciences, Saitama University, Saitama, Japan*

To employ chaos synchronization in actual transmission systems we use differential binary shift keying modulation to analyze the degree of synchronization of two cascaded microresonator frequency combs simulated utilizing the modified Lugiato-Levefer equations.

CD-P.18 TUE

Few-cycle ultra-broadband beam scanning microscope prototype

•*C. Maibohm[1], H. Sebastião[1], J. Martins[1], M.L. Ribeiro[1], M. Miranda[2], P.T. Guerreiro[2], R. Romero[2], H. Crespo[2,3], and J.B. Nieder[1]; [1]INL - International Iberian Nanotechnology Laboratory, Braga, Portugal; [2]Sphere Ultrafast Photonics, Porto, Portugal; [3]IFIMUP-IN and Dept. of Physics and Astronomy, University Porto,, Porto, Portugal*

SyncRGB-FLIM beam scanning microscope, where a sub-10 fs pulsed laser is maintained at the focus pulse allowing for efficient imaging of various labelled and label-free markers across the full visible wavelength spectrum.

CD-P.19 TUE

Nonlinear-crystals-based optical transient detection system with femtosecond pulses

•*. Sukeert[1], C.K. Suddapalli[2], P.G. Schunemann[3], G.J. de Valcárcel[4], M. Ebrahim-Zadeh[1,5], and A. Esteban-Martín[1,4]; [1]ICFO—Institut de Ciències Fotòniques, Castelldefels (Barcelona), Spain; [2]Tata Institute of Fundamental Research Hyderabad, Hyderabad (Telangana), India; [3]BAE Systems Inc, Nashua (New Hampshire), USA; [4]Departament d'Òptica i Optometria i Ciències de la Visió, Universitat de València, Burjassot (Valencia), Spain; [5]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain*

We report a nonlinear-crystals-based up-converted optical transient detection system with femtosecond pulses for phase measurement of a dynamic signal in the infrared while suppressing stationary background, and remarkable ability of detection in the visible range.

CD-P.20 TUE

Theory of Parametric Amplification in two Coupled Waveguides: Frequency-Dependent Coupling and Resilience to Pump Fluctuations

•*M. Shi[1], V. Ribeiro[1,2], and A.M. Perego[1]; [1]Aston Institute of Photonic Technologies, Aston University, B4 7ET, Birmingham, United Kingdom; [2]Kets Quantum Security Ltd. BS15 4PJ, Bristol, United Kingdom*

We present a comprehensive theoretical framework for dual waveguides based parametric amplifiers description, highlighting the role of frequency dependent coupling for dispersion engineering and the robustness of the amplification scheme with respect to pump fluctuations.

CD-P.21 TUE

Resonance-enhanced Third Harmonic Generation in Mn+-dominated Laser-induced Plasmas

•*M. Oujja[1], J.J. Camacho[2], M. Castillejo[1], and R. de Nalda[1]; [1]Instituto de Quimica Fisica Rocasolano - CSIC, Madrid, Spain; [2]Facultad de Ciencias, Universidad Autónoma, Madrid, Spain*

A laser-induced plasma of metallic manganese is diagnosed by optical emission spectroscopy and its properties are correlated with its high nonlinear optical response in a third order harmonic generation experiment.

CD-P.22 TUE

Measuring nonlinearities under high dispersion and loss

•*D. Castelló-Lurbe[1,2,3], C. Cuadrado-Laborde[4], E. Silvestre[1,5], A. Díez[1,2], and M.V. Andrés[1,2]; [1]Institut Universitari de Ciències dels Materials, Universitat de València, Catedrático Agustín Escardino 9, 46980 Paterna, Spain; [2]Departament de Física Aplicada i Electromagnetisme, Universitat de València, Dr. Moliner 50, 46100 Burjassot, Spain; [3]Brussels Photonics, Department of Applied Physics and Photonics, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussel, Belgium; [4]Instituto de Física Rosario (CONICET-UNR), Blvr. 27 de Febrero 210bis, S2000EZP Rosario, Argentina; [5]Departament d'Òptica i Optometria i Ciències de la Visió, Universitat de València, Dr. Moliner 50, 46100 Burjassot, Spain*

Accuracy limitations on the nonlinear coefficient measurement when dispersion and loss cannot be neglected are overcome. We demonstrate our approach experimentally propagating pulses along a kilometer-long standard fiber pumped close to $2~\mu$m.

CD-P.23 TUE

MIR Supercontinuum Using Gain-Switched and Modelocked Pumping

•*C.R. Smith[1], C.R. Petersen[1,2], and O. Bang[1,2,3]; [1]DTU Electro, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]NORBLIS ApS, Virum, Denmark; [3]NKT Photonics A/S, Birkerød, Denmark*

We obtain a supercontinuum spectrum extending beyond 4μm with RIN below 13% from ZBLAN pumped by a homebuilt flexible amplified gain-switched 1950nm diode. These promising results are compared with pumping by a commercial modelocked laser.

CD-P.24 TUE

Optical switches in thin film coatings based on highly nonlinear materials

•*M. Steinecke[1], K. Kiedrowski[1], M. Jupé[1,2], A. Wienke[1,2], and D. Ristau[1,2,3]; [1]Laser Zentrum Hannover e.V., Hanover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics and Engineering - Innovation Across Disciplines), Hanover, Germany; [3]Leibniz University Hannover, Institute of Quantum Optics, Hanover, Germany*

A concept for a fast, passive optical switch based on the optical Kerr-effect in thin film interference coatings is presented. The materials, manufacturing and successful validation of optical switching is presented and discussed.

CD-P.25 TUE

Conical Odd Harmonic Generation Induced by Femtosecond Filamentation in LiSAF

•*R. Grigutis, V. Jukna, G. Tamošauskas, and A. Dubietis; Laser Research Center, Vilnius University, Vilnius, Lithuania*

We report on conical odd-harmonics generation that accompany supercontinuum generation in LiSAF using femtosecond pulses due to filament inscribed nanograting, justified by the measurements of time evolution and angle-resolved spectra of supercontinuum and odd-harmonics emissions.

CD-P.26 TUE

Direct measurement of the two-photon excitation cross-section of xenon by laser absorption

•*C. Drag[1], F. Marmuse[2], and C. Blondel[1]; [1]Laboratoire de Physique des Plasmas, Palaiseau, France; [2]European Spatial Agency, Noordwijk, Netherlands*

The two-photon excitation cross-section is a key parameter for the TALIF method, which is commonly used to measure atomic densities for plasma diagnostics. We present a new method for cross-section measurements applied to Xe.

CD-P.27 TUE

Deterministic soliton crystal dual-microcomb generation in coupled nonlinear microcavities by tuning the coupling coefficient

•*Z. Cheng[1,2], D. Huang[2,3], F. Li[1,2], C. Lu[1,2], and P.K.A. Wai[1,2,4]; [1]Photonics Research Centre, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University, Hong Kong, China; [2]The Hong Kong Polytechnic University Shenzhen Research Institute, Shenzhen, China; [3]Photonics Research Centre, Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong, China; [4]Department of Physics, Hong Kong Baptist University, Kowloon Tong, Hong Kong, China*

We propose a novel dual-frequency comb generation scheme in two coupled nonlinear microcavities by tuning the coupling coefficient between the two microcavities. Synchronously tuning of the two pumps is not required for dual-microcomb generation.

CD-P.28 TUE

Heat-induced variation of second-harmonic generation in silicon oxynitride thin films

•*J. Lukeš[1,2] and K. Žídek[1]; [1]Research Center TOPTEC, Institute of Plasma Physics of the Czech Academy of Sciences, Prague, Czech Republic; [2]Technical University in Liberec, Faculty of Mechatronics, Informatics and Interdisc. Studies, Liberec, Czech Republic*

Efficient optical enhancement of second harmonic generation on thin silicon nitride and silicon oxynitride films is presented. Thermal-induced changes in mechanical stress are proposed as the main cause, but other effects are also discussed.

CD-P.29 TUE

The efficient intermodal four-wave mixing process in a few-mode fibers

•*K. Michal and U.A. Laudyn; Warsaw University of Technology, Faculty of Physics, Warsaw, Poland*

The work presents an intermodal four-wave mixing in a few-mode fiber within the visible wavelength band and a sub-nanosecond regime. A high conversion efficiency (over 40%) was obtained in a stimulated nonlinear process.

CD-P.30 TUE

Spectral broadening in concave-convex multipass cells in gas and solid medias

•*K. Schwarz[1], N. Kovalenko[1], V. Hariton[2], K. Fritsch[1,3], and O. Pronin[1]; [1]Helmut Schmidt University, Hamburg, Germany; [2]Instituto Superior Técnico, Lisbon, Portugal; [3]n2-Photonics GmbH, Hamburg, Germany*

Convex-concave multipass cell operating with 0.2 mJ, 260 fs input pulses is demonstrated with solid-state and gas media. The pulses are broadened and compressed to sub-60 fs paving the way to high energy foldable convex-concave cells.

CD-P.31 TUE

Linear and Nonlinear Optical Properties of Aluminum

•M. Scalora[1], M. Belchovski[2], S. Mukhopadhyay[3], K. Hallman[4], R. Vilaseca[3], C. Cojocaru[3], J. Trull[3], and M.A. Vincenti[2]; [1]Aviation and Missile Center, US Army CCDC - 35898-5000, Redstone Arsenal, AL , USA; [2]Department of Information Engineering – University of Brescia, Via Branze 38, 25123 , Brescia, Italy; [3]Department of Physics, Universitat Politècnica de Catalunya, Rambla Sant Nebridi 22, 08222 , Terrassa , Spain; [4]PeopleTec, Inc. 4901-I Corporate Dr, 35805, Huntsville, AL, USA

We report our theoretical results of second and third harmonic generation from a flat Al layer. Our results suggests that the intrinsic properties of Al may be more pronounced compared to other plasmonic materials.

CD-P.32 TUE

Chalcogenide-ring fiber design for Brillouin Scattering with OAM modes

D. Yadav, K. Aggarwal, •A. Choudhary, and V. Venkataraman; Indian Institute of Technology Delhi, New Delhi, India

We demonstrate the excitation of strong backward stimulated Brillouin scattering using orbital angular momentum modes in a chalcogenide-ring silica optical fiber design through simulations and discuss the momentum conservation between the optical and acoustic modes.

CD-P.33 TUE

Image Upconversion System by THG of a Self-illuminated and Self-synchronized Passively Q-Switched Laser

•A.J. Torregrosa[1], M.L. Rico[2], and J. Capmany[1]; [1]Dpto. de Ingeniería de Comunicaciones and I3E, Universidad Miguel Hernández, Elche, Spain; [2]Dpto. de Tecnología Informática y Computación, Universidad de Alicante, Alicante, Spain

We present a self-illuminated and self-synchronized infrared-to-visible image upconversion system based on intracavity third harmonic generation in a passively Q-Switched YVO4:Nd3+ laser oscillating at 1342 nm resulting in a 447 nm upconverted image.

CD-P.34 TUE

DC Kerr effect modulators in silicon for cryogenic mid-infrared applications

•M. Radulovic[1,2], B.D.J. Sayers[1,2], S.G. Currie[1,2], D.A. Quintero Dominguez[1], and J.W. Silverstone[1]; [1]Big Photon Lab, H. H. Wills Physics Laboratory and Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom; [2]Quantum Engineering Centre for Doctoral Training, H. H. Wills Physics Laboratory and Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom

We iteratively design and implement silicon photonic modulators based on DC Kerr effect in the 2μm band and we compare them and consider their performance in the quantum photonics applications.

CD-P.35 TUE

Novel scheme for a broadband SRS microscope with sparse-wavenumber acquisitions based on the Hadamard transform

•L. Genchi, S.P. Laptenok, and C. Liberale; King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

We present a novel scheme for multiplexed stimulated Raman scattering microscopy based on the Hadamard transform. It uses an acousto-optic tunable filter and is driven by a femtosecond oscillator and a picosecond optical parametric oscillator.

13:00 – 14:00

CF-P: CF Poster session

CF-P.1 TUE

Simultaneous measurement of sub-femtosecond timing jitter in two frequency channels by using time stretched self-coherent detection

•Y. Li[1,2], D. Huang[1,2], F. Li[2,3], and P.K.A. Wai[2,3,4]; [1]Photonics Research Institute, Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong, China; [2]The Hong Kong Polytechnic University Shenzhen Research Institute, Shenzhen, China; [3]Photonics Research Institute, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University, Hong Kong, China; [4]Department of Physics, Hong Kong Baptist University, Hong Kong, China

We demonstrate simultaneous measurement of sub-femtosecond timing jitter in two frequency channels by time stretched self-coherent detection. The phase information of the beating-frequency signal of the chirped pulses is utilized to determine the timing jitter.

CF-P.2 TUE

Linearity of High-Sensitivity Infrared Electro-Optic Sampling

•Z. Wei[1,2], C. Hofer[1,2,3], D. Gerz[1,2,4], N. Karpowicz[1,2], and I. Pupeza[1,2,4]; [1]Ludwig Maximilians University Munich, Garching, Germany; [2]Max Planck Institute of Quantum Optics, Garching, Germany; [3]Center for Molecular Fingerprinting, Molekuláris-Ujjlenyomat Kutató Közhasznú Nonprofit Kft., Budapest, Hungary; [4]Leibniz Institute of Photonic Technology - Member of the research alliance “Leibniz Health Technologies“, Jena, Germany

Electro-optic sampling (EOS) holds the records for sensitivity and dynamic range for infrared detection. Here, we investigate the linearity of EOS and discuss how high gate-pulse energies benefit both sensitivity and linearity of field-sensitive detection.

CF-P.3 TUE

Tunable ultrafast mid-IR source intensity noise properties

Q. Bournet[1,2], •M. Natile[2], F. Guichard[2], Y. Zaouter[2], M. Jonusas[3], A. Bonvalet [3], M. Joffre[3], F. Druon [1], M. Hanna[1], and P. Georges[1]; [1]Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, Palaiseau, France; [2]Amplitude, Pessac, France; [3]Laboratoire d'Optique et Biosciences, Ecole Polytechnique, CNRS, INSERM, Institut Polytechnique de Paris, Palaiseau, France

We report on extensive noise characterization of widely tunable (3.5-10 μm), high repetition rate (100 kHz), mid-IR few-cycle sources.

CF-P.4 TUE

High-power ultrashort pulse amplification with an Yb:YScO3 crystal

•N. Torcheboeuf[1], C. Hofer[1], L. Karlen[1], C. Kränkel[2], A. Uvarova[2], L. Huelshoff[2], M. Gaponenko[3], G. Spühler[3], B. Eiermann[4], D. Zadravec[4], F. Fink[5], H. Schlich[5], and S. Lecomte[1]; [1]Centre Suisse d'Electronique et de Microtechnique (CSEM), Neuchâtel, Switzerland; [2]Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany; [3]NKT Photonics Switzerland GmbH, Regensdorf, Switzerland; [4]WZW Optic AG, Balgach, Switzerland; [5]MaTeck Material Technologie & Kristalle GmbH, Jülich, Germany

A Yb:YScO3 crystal was fabricated and tested as a booster stage in an amplified femtosecond laser. Its unique properties allowed to reach power levels of 93.5 W for MHz repetition rates with sub-300fs pulse duration.

CF-P.5 TUE

Ultra-compact system to synthesize space-time light sheets

•M. Yessenov[1], O. Mhibik[1], L. Mach[1], T. Hayward[2], R. Menon[2], L. Glebov[1], I. Divliansky[1], and A. Abouraddy[1]; [1]CREOL, University of Central Florida, Orlando, USA; [2] Department of Electrical and Computer Engineering, University of Utah, Salt Lake City, USA

We introduce an ultra-compact and robust system to generate space-time wave packets based on chirped volume Bragg gratings to spatially resolve the spectrum, which reduced the volume of the synthesis setup down to 25x25x8 mm3.

CF-P.6 TUE

Analysis of wavelength dependent wavefront deformation in thin plate compressors for energetic single-cycle laser pulses

•L. Lehotai[1], S. Tóth[1], I. Seres[1], J. Csontos[1], V. Pajer[1], Á. Börzsönyi[1], K. Osvay[2], and R.S. Nagymihály[1]; [1]ELI ALPS, ELI-HU Non-Profit Ltd, Szeged, Hungary; [2]National Laser-initiated Transmutation Laboratory, University of Szeged, Szeged, Hungary

A novel 3+1D numerical simulation for spatio-temporal couplings in high energy post-compression systems was developed and validated with experimental results. Our method helps to identify and minimize spatio-temporal distortions to achieve energetic single-cycle laser pulses.

CF-P.7 TUE

Multi-heterodyne Differential Phase Measurement of Microcombs

•K. Twayana[1], I. Rebolledo-Salgado[1,2], M. Girardi[1], F. Lei[1], Ó.B. Helgason[1], M. Karlsson[1], and V. Torres-Company[1]; [1]Chalmers University of Technology, Gothenburg, Sweden; [2]RISE Research Institutes of Sweden, Borås, Sweden

We report differential phase measurement and reconstruction of 100 GHz soliton microcombs assisted by electro-optic down-conversion using another (uncalibrated) soliton microcomb as an optical reference.

CF-P.8 TUE

Tunable Dual-Wavelength Laser at 1.8 μm Based on SESAM and NOLM

•X. Wen[1], T. Qiao[1], M. Zhou[1], H. He[1], Y. Zhou[1], and K.K.-Y. Wong[1,2]; [1]The University of Hong Kong, Department of Electrical and Electronic Engineering, Hong Kong, China; [2]Advanced Biomedical Instrumentation Centre, Hong Kong Science Park, Hong Kong, China

A tunable dual-wavelength all-fiber laser at 1.8 μm utilizing SESAM and NOLM was demonstrated for the first time. Two typical mode-locked regimes of the dual-wavelength signal varying from single-pulse/single-pulse to single-pulse/multi-pulse were observed.

CF-P.9 TUE

Highly sensitive, highly versatile, 100-kHz vis-NIR ultrafast pump-probe setup based on an interferometric spectrometer

•*A. Villa[1], A. Ross[1], V. Policht[1], O. Dogadov[1], and F. Scotognella[1,2]; [1]Politecnico di Milano, Milan, Italy; [2]Center for Nano Science and Technology@PoliMi, Istituto Italiano di Tecnologia, Milan, Italy*

We present a high sensitivity ultrafast pump-probe setup running at 100 kHz and achieving shot-to-shot detection through an interferometric spectrometer. Wide pump tunability and high temporal resolution are reported, along with sensitivities up to 10-5.

CF-P.10 TUE

Stable harmonic modelocked laser operation by damping the temporal displacement of optical pulses in analogy to Brownian particles

•*M. Laçin[1], P. Repgen[1], A. Şura[2], Ç. Şenel[3], and F.Ö. İlday[1,2,4]; [1]Department of Physics, Bilkent University, Ankara, Turkey; [2]Department of Electrical and Electronics Engineering, Bilkent University, Ankara, Turkey; [3]TÜBİTAK National Metrology Institute (UME), Kocaeli, Turkey; [4]UNAM-National Nanotechnology Research Center and Institute of Materials Science and Nanotechnology, Bilkent University, Ankara, Turkey*

In analogy to the damping of the movement of a Brownian particle through a viscous liquid, we damp the temporal displacement of harmonic modelocked pulses in a laser cavity for superior short-term stability.

CF-P.11 TUE

Temporal Characterization of Ultra-Short Laser Pulses Using Third-Order Nonlinear Process with Perturbation

•*H. Cao[1,2], P. Huang[1], H. Yuan[1,2], H. Wang[1,2], X. Wang[1,2], Y. Wang[1,2], W. Zhao[1,2], and Y. Fu[1,2]; [1]Center for Attosecond Science and Technology, State Key Laboratory of Transient Optics and Photonics, Xi'an Institute of Optics and Precision Mechanics, Xi'an, China; [2]University of Chinese Academy of Sciences, Beijing, China*

We propose a simple method to temporal characterize the few-cycle laser pulses. The method is based on introducing perturbation to the third-order nonlinear processes, including transient grating in solid plates and THG in air.

CF-P.12 TUE

1-MHz mode-locked all-fiber linear-cavity laser based on two SESAMs at 1.7 μm for multiphoton microscopy

•*T. Qiao[1], M. Zhou[1], X. Wen[1], and K.K.-Y. Wong[1,2]; [1]The University of Hong Kong, Department of Electrical and Electronic Engineering, Hong Kong, China; [2]Advanced Biomedical Instrumentation Centre, Hong Kong Science Park, Hong Kong, China*

A 1.7-μm mode-locked all-fiber laser with a repetition rate of about 1 MHz was demonstrated. It is mode-locked by two semiconductor saturable absorber mirrors and employs a compact linear cavity for the first time.

CF-P.13 TUE

High-speed Time Stretch LIDAR at 780nm with a single-pixel silicon avalanche photodetector

•*C. Stock[1], T.F. Kutscher[1], A. Gruber[1], P. Lamminger[1], C. Leonhardt[1], F. Sommer[1,2], J. Jurkevicius[1], and S. Karpf[1]; [1]Universität zu Lübeck, Lübeck, Germany; [2]Leibniz-Institut für Virologie, Hambrug, Germany*

We present an inertia-free, high-speed time-stretch LIDAR system based on a new swept source pulsed laser at 780nm. This enables detection using a single-pixel avalanche photodiode. We present 3D scene acquisitions at 2 kHz rate.

CF-P.14 TUE

Coupled active cavities for all-fiber optical frequency comb generation

•*C. Simon, N. Englebert, F. Leo, and S.-P. Gorza; Université libre de Bruxelles (ULB), Bruxelles, Belgium*

We introduce a design of active resonators hosting cavity solitons, that overcomes the saturation power limitation of the intracavity amplifier. This paves the way to high-brightness fiber frequency comb sources based on active cavity solitons

CF-P.15 TUE

Nonlinear compression of mJ-level pulses via double-pass loose focusing in air

•*F. Zhang[1,2], A. Pelekanidis[1,2], M. Du[1,2], K. Eikema[1,2], and S. Witte[1,2]; [1]Advanced Research Center for Nanolithography (ARCNL), Amsterdam, Netherlands; [2]Department of Physics and Astronomy, Vrije Universiteit, Amsterdam, Netherlands*

We report on a novel double-pass-based scheme for nonlinear pulse compression, which overcomes the pulse energy limitation and beam quality degradation, and features extreme simplicity, high compression efficiency, and average power scaling capabilities.

CF-P.16 TUE

Broadband Auston-Type Photoconductive Field Sampling in Gallium Phosphide

•*N. Altwaijry[1,2], M. Qasim[1,2], M. Mamaikin[1,2], J. Schötz[1,2], K. Golyari[1,2], M. Heynck[1,2], E. Ridente[1,2], V.S. Yakovlev[1,2], N. Karpowicz[1,2], and M.F. Kling[1,2,3,4]; [1]Max Planck Institute of Quantum Optics, Garching, Germany; [2]Ludwig-Maximilians-Universität, Garching, Germany; [3]SLAC National Accelerator Laboratory, Menlo Park, USA; [4]Applied Physics Department, Stanford University, Stanford, USA*

We present an Auston-type technique for sampling near-infrared fields by applying a short visible-UV gate pulse to a common semiconductor. The gate pulse causes an appreciable change in carrier density (within femtoseconds) permitting field detection.

CF-P.17 TUE

Few Cycle Pulse Compression and White Light Generation in Cascaded Multipass Cells

•*S. Goncharov[1], K. Fritsch[2], and O. Pronin[1]; [1]Helmut Schmidt University, Holstenhofweg 85, 22043, Hamburg, Germany; [2]n2-Photonics GmbH, Hans-Henny-Jahnn-Weg 53, 22085, Hamburg, Germany*

We report supercontinuum generation and pulse compression in two cascaded multipass cells based on dielectric mirrors. The 230 fs long-, 12 μJ pulses were compressed to 7 fs, corresponding to 1.0 GW peak power and throughput of 84%.

CF-P.18 TUE

Characterizing ultrashort laser pulses with a time-dependent polarization state using the d-scan technique

•*D. Díaz Rivas, A.-K. Raab, C. Guo, A. L'Huillier, and C. Arnold; Department of Physics, Lund University, Lund, Sweden*

In this work, a polarization gate is generated using ultrashort pulses with a duration of 6 femtoseconds and characterized with the dispersion scan technique. The temporal reconstruction confirms the creation of the time-dependent polarization state.

CF-P.19 TUE

High Power Ultrafast Pulsed Laser at 2060 nm from a Stabilized Doubly Resonant Optical Parametric Oscillator

•*H. Rao[1,2], C.M. Dietrich[1,2], J.R.C. Andrade[3], R. Mevert[1,2], F.J. Geesmann[1], A. Demircan[1,2], I. Babushkin[1,2,3], and U. Morgner[1,2]; [1]Leibniz University Hannover, Institute of Quantum Optics, Hannover, Germany; [2]Cluster of Excellence PhoenixD, Hannover, Germany; [3]Max Born Institute, Berlin, Germany*

A high power 2-μm femtosecond laser source is demonstrated by a doubly resonant optical parametric oscillator. Under a pump power of 18.7 W, a stable output power of 4.9 W is observed.

CF-P.20 TUE

Passive mode-locking of a fiber laser using a V4C3 MXene based saturable absorber at 1910 nm

•*S.-y. Kwon, K. Lee, T. Woo, J. Ryu, J. Jung, and J.H. Lee; School of Electrical and Computer Engineering, University of Seoul, Seoul, South Korea*

The saturable absorption property of V4C3 MXene was investigated at 2-um wavelengths. A saturable absorber was fabricated with a ~13% modulation depth. A fiber laser mode-lcoked by the device produced ~1.1-ps pulses at ~1912 nm.

CF-P.21 TUE

Status of the ELI-ALPS High repetition rate (HR) laser systems

P. Jójárt[1], •I. Seres[1], Z. Bengery[1], B. Gilicze[1], Z. Várallyay[1], Á. Börzsönyi[1], E. Shestaev[2], N. Walther[2], M. Tschernajew[2], C. Grebing[2], S. Breitkopf[2], T. Eidam[2], and J. Limpert[2]; [1]ELI-ALPS, Szeged, Hungary; [2]Active Fiber Systems GmbH, Jena, Germany

The ELI-ALPS High Repetition rate laser systems provide millijoule level, few-cycle laser pulses at 100 kHz repetition rate. HR-1 is available for user experiments, and HR-2 is expected to reach specifications by summer 2023.

CF-P.22 TUE

Ultrafast Spectroscopy at Artemis

•*R.T. Chapman, A.S. Wyatt, Y. Zhang, J.O.F. Thompson, C.E. Sanders, G.M. Greetham, and E. Springate; Central Laser Facility, Harwell, United Kingdom*

The recent expansion of the Artemis facility to house both a high pulse energy laser and a high repetition rate laser for extreme ultraviolet generation has been realised and the first results are presented here.

CF-P.23 TUE

Dispersion Management in Vulcan OPCPA Petawatt Laser Using a Grating-prism Compressor

•*V. Aleksandrov, M. Galimberti, I. Musgrave, N. Stuart, and C. Hernandez-Gomez; Central Laser Facility, Science and Technology Facilities Council, Didcot, United Kingdom*

We design an additional grating-prism compressor to manage the dispersion in Vulcan OPCPA Petawatt Laser up to the fifth order. Transmission gratings are used to further improve the temporal contrast of the 16 fs pulses.

13:00 – 14:00

CK-P: CK Poster session

CK-P.1 TUE

Ultra-low-loss broadband multiport optical splitters

•*P. Vildoso[1,2], R.A. Vicencio[1,2], and J. Petrovic[3]*; *[1]Departamento de Física, Facultad de Ciencias Físicas y Matematicas, Universidad de Chile, Santiago, Chile*; *[2]Millenium Institute for Research in Optics-MIRO, Concepción, Chile*; *[3]Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia*

Novel near-zero-loss 1xN optical splitters are inverse designed and demonstrated by laser writing in glass. The 20-60 nm FWHM bandwidth at 640 nm, <0.5 dB imbalance and downscalable footprint demonstrate advantage over other design methods.

CK-P.2 TUE

Bi-Layer Grating Couplers for Hybrid SixNy - Si3N4 Photonics with Sub-Decibel Coupling Efficiency

•*V. Vitali[1,2], C. Lacava[2], T. Domínguez Bucio[1], F.Y. Gardes[1], and P. Petropoulos[1]*; *[1]Optoelectronics Research Centre, University of Southampton, Southampton , United Kingdom*; *[2]Electrical, Computer and Biomedical Engineering Department, University of Pavia, Pavia , Italy*

A general strategy for the design of bi-layer SixNy-Si3N4 grating couplers is presented. Coupling efficiencies exceeding -0.5 dB are numerically demonstrated for a 400nm-thick bottom Si3N4 waveguide using different top-layer SixNy materials.

CK-P.3 TUE

Ion-implanted diced ridge waveguides in Pr:YLF

•*K. Hasse[1], S. Suntsov[1], S. Püschel[2], H. Tanaka[2], C. Kränkel[2], I. Bányász[3], and D. Kip[1]*; *[1]Helmut Schmidt University, Hamburg, Germany*; *[2]Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany*; *[3]Wigner Research Centre for Physics, Budapest, Hungary*

We demonstrate the first ion-implanted waveguides in Pr:YLF. Ridge waveguides diced into the surface of ion-implanted Pr:YLF enable single and multimode guiding with transmission losses of 0.4 – 2.5 dB/cm depending on wavelength and waveguide dimensions.

CK-P.4 TUE

Laser based Methods for Photoluminescence Enhancement of Silicon Nanocrystals in a Silicon Suboxide Matrix

•*L.J. Richter and J. Ihlemann*; *Institut für Nanophotonik Göttingen e.V., Göttingen, Germany*

Silicon nanocrystals offer an opportunity for the implementation of silicon-based photonics and thus integration into microelectronics processes. Here, results are presented for laser-based methods for photoluminescence enhancement of silicon nanocrystals in a silicon suboxide matrix.

CK-P.5 TUE

All-Optically Adressable Sub-Micron Pixels

•*M. Crouzier[1,3], V. Yam[1], G. Magno[2], T. Lopez[3], and B. Dagens[1]*; *[1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France*; *[2]Department of Electrical and Information Engineering, Polytechnic University of Bari, Bari, Italy*; *[3]Stellantis, Centre technique de Vélizy, Vélizy-Villacoublay, France*

We numerically study the coupling between plasmonic chains deposited above a waveguide array. This structure allows the independent and local excitation of plasmonic nanostructures defining submicrometer pixels for addressable optical traps or spatial light modulators.

CK-P.6 TUE

Design and Fabrication of Angled MMI-Based Duplexer for Sensing Applications

•*A. Thottoli[1], A.S. Vorobev [1,2,3], G. Biagi[2,4], S. Iadanza[2,3,5,6], G. Magno[1], L. O'Faolain[2,3], and M. Grande[1]*; *[1]Department of Electrical and Information Engineering, Politechnico di Bari, Bari, Italy*; *[2]Centre for Advanced Photonics and Process Analysis, Munster Technological University, Cork, Ireland*; *[3]Tyndall National Institute, T12 PX46 Cork, Ireland., Cork, Ireland*; *[4]PolySenSe Lab, Physics Department, University of Bari, Bari, Switzerland*; *[5]Laboratory of Nano and Quantum Technologies, Paul Scherrer Institut, Villigen, Switzerland*; *[6]IBM Research Zurich, Zurich, Switzerland*

We propose a compact, low-loss, broadband angled multi-mode interference based duplexer coupler as an optical component for integrating multiple wavelengths with higher optical output power transmittance for multiple gas sensing applications.

CK-P.7 TUE

Modified Photonic Band Gap Via Thermal Shrinkage of Two-photon Polymerized Distributed Bragg Reflectors

•*Y.-S. Chen[1], M. Taverne[2], C.-C.K. Huang[3], Y.-L.D. Ho[2], and J.G. Rarity[1]*; *[1]University of Bristol, Bristol, United Kingdom*; *[2]Northumbria University, Newcastle upon Tyne, United Kingdom*; *[3]University of Southampton, Southampton, United Kingdom*

Thermal shrinkage is applied on the polymer-based distributed Bragg reflectors (DBR) template to reduce the period. A uniform shrinkage is observed on the template, which modified the photonic band gap to a shorter wavelength.

CK-P.8 TUE

Apodized Chirped Bragg Gratings in a Silicon Nitride-on-Insulator Platform at Short-Wave Infrared Wavelengths

•*M. Sinobad[1], J. Lorenzen[1], A. Berg[1], H. Francis[2], J. Carreira[2], M.A. Gaafar[1], T. Herr[1,3], N. Singh[1], and F.X. Kärtner[1,3]*; *[1]Deutsches Elektronen-Synchrotron, Hamburg, Germany*; *[2]Ligentec SA, Ecublens, Switzerland*; *[3]Universität Hamburg, Hamburg, Germany*

We report on apodized chirped Bragg gratings in a silicon nitride-on-insulator platform. Applications for this device include nonlinear photonics, specifically dispersion compensation in mode-locked lasers operating in the short-wave infrared wavelength band.

CK-P.9 TUE

MIRPIC – a rising photonic integration platform for mid-infrared

•*R. Piramidowicz[1,2,3], S. Stopiński[1,2,3], K. Anders[1,2,3], A. Jusza[1,3], M. Lelit[1,4], A. Połatyński[1,5], P. Wiśniewski[4], M. Słowikowski[1,4], M. Juchniewicz[4], K. Pavłov[4], M. Żbik[2], J. Jurenczyk[2], K. Pierściński[6], and D. Pierścińska[6]*; *[1]Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland*; *[2]VIGO Photonics S.A., Ożarów Mazowiecki, Poland*; *[3]LightHouse Sp. z o.o., Lublin, Poland*; *[4]Warsaw University of Technology, Centre for Advanced Materials and Technologies CEZAMAT, Warsaw, Poland*; *[5]VPIphotonics GmbH, Berlin, Germany*; *[6]Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland*

We present and discuss the results of the development of the first integrated photonic platform for mid-IR spectral range (MIRPIC), based on heterogeneously integrated of QCLs, Ge-on-Si waveguiding components, and antimonide super lattice mid-IR detectors.

CK-P.10 TUE

Generalized Vectorial Light Transmission Control Using Bilayer Metasurfaces with Fully Designable Anisotropy and Chirality

•*T. Chang[1,2], J. Jung[1], and J. Shin[1]*; *[1]Department of Materials Science and Engineering, KAIST, Daejeon, South Korea*; *[2]Centre for Disruptive Photonic Technologies, SPMS and TPI, Nanyang Technological University, Singapore, Singapore*

We realize bilayer dielectric metasurfaces that enable complete passive vectorial linear control on light transmission for a specific wavelength. We demonstrate polarization-multiplexed holographic techniques that were not possible previously, and propose a metasurface-based optical platform.

CK-P.11 TUE

Inverse Design of Low-Loss Subwavelength Grating Couplers

•*S. Hooten[1], T. Van Vaerenbergh[2], M. Fiorentino[1], and R. Beausoleil[1]*; *[1]Hewlett Packard Labs, Milpitas, CA, USA*; *[2]Hewlett Packard Labs, HPE Belgium, Diegem, Belgium*

The AI-enhanced inverse design of low-loss, high-bandwidth subwavelength grating couplers (SWGCs) is presented. We obtain 3D-simulated 0.7dB insertion loss and 40nm 1dB-bandwidth at λ=1550nm.

CK-P.12 TUE

Arbitrary 3D beam delivery from planar optical waveguides for quantum technology

•*D.-W. Ko, Q.S. Ahmed, J.W. Field, J.C. Gates, and P. Horak*; *University of Southampton, Southampton, United Kingdom*

We design 2D holographically written grating couplers for the generation of arbitrarily shaped free-space beams from integrated planar waveguides. Local grating periods and index modulations depend on target field, pump beam profile and pump depletion.

CK-P.13 TUE

Laser-engineered nanocomposites for SERS applications

•*M. Hoffmann, S. Wackerow, A. Abdolvand, and S.A. Zolotovskaya*; *Materials Science & Engineering Research Cluster, School of Science and Engineering, University of Dundee, Dundee , United Kingdom*

A rapid and scalable approach to sub-micron periodic array deposition of Ag and Au nanoparticles is presented. Multiscale plasmonic effects in the Ag/AuNP-TiO2 arrays enabled substantial SERS performance improvement with the enhancement factors reaching 10^7.

CK-P.14 TUE

Efficient Phase Tuning of Silicon Photonic Devices Using Alignment Assisted Liquid Crystal Tuners

•*S. Kumari, R. Kallega, S. Shelwade, A. Keloth, and S.K. Selvaraja*; *Indian Institute of Science Bangalore, Bangalore, India*

We demonstrate a groove-assisted liquid crystal phase tuner integrated over a silicon Mach-Zehnder interferometer. The fabricated device offers a phase tuning efficiency of 2.25π/mW, which is 30% more efficient than a groove-less device.

CK-P.15 TUE

Thermal Crosstalk Alleviated Silicon Microring Switches

•*R. Cubas Heim[1], S. De[1,2], R. Das[1], K. Singh[1], T. Kleine-Ostmann[2], and T. Schneider[1]*; *[1]TU Braunschweig, Braunschweig, Germany*; *[2]PTB Braunschweig, Braunschweig, Germany*

We demonstrate simulation results for densely packed photonic chips for a routed optical switching network. As we show, by a deep trench design, the thermal crosstalk between the switches can be drastically reduced.

CK-P.16 TUE

Impurity-generated wavepackets in one dimensional photonic lattices

•B. Real[1,2], D. Guzmán-Silva[1,2], and R.A. Vicencio[1,2]; [1]Departamento de Física, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile; [2]Millenium Institute for Research in Optics, Santiago, Chile

We propose a method to create on-chip wavepackets with well-defined quasimomentum by exploiting the leaky mode of an impurity in one-dimensional photonic lattices

CK-P.17 TUE

Isotropic double Dirac cones in the electromagnetic dispersion relation detected by high-resolution angle-resolved reflection spectroscopy

A. Begum[1,2], Y. Yao[1,2], T. Kuroda[1], E. Watanabe[1], N. Ikeda[1], Y. Sugimoto[1], H. Koyama[1], Y. Takeda[1,2], and •K. Sakoda[1]; [1]National Institute for Materials Science, Tsukuba, Japan; [2]University of Tsukuba, Tsukuba, Japan

We successfully fabricated SOI photonic crystal slabs by EB lithography that materialized electromagnetic isotropic double Dirac cones in the zone center, which were confirmed by high-resolution angle-resolved reflection spectroscopy in the mid IR range.

CK-P.18 TUE

Polarization coupling in thin film lithium niobate waveguide

•D. Fu, H.R. Fergestad, A. Prencipe, T. Li, and K. Gallo; KTH Royal Institute of Technology, Stockholm, Sweden

A thin film lithium niobate waveguide with two tapers is fabricated and measured with controlled polarization. 40 % longitudinal coupling between fundamental TE and TM modes is observed at telecom wavelengths.

CK-P.19 TUE

Broadband perfect absorbers based on copper nanoparticles thin films

•N. Perdana[1], K. Rogall[2], J. Drewes[2], A. Vahl[2], T. Strunskus[2], M. Abdelaziz[2], F. Faupel[2], and C. Rockstuhl[1,3]; [1]Institute of Theoretical Solid State Physics, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany; [2]Institute of Material Science, Chair for Multicomponent Materials, Kiel University, Kiel, Germany; [3]Institute of Nanotechnology, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

We study thin film broadband perfect absorbers with copper nanoparticles. We have simulated and fabricated samples of the perfect broadband absorbers. It turns out we can achieve almost 90% light absorption over a broad range.

CK-P.20 TUE

Deformed Polymer Microcavities to Enhance Dynamical Properties of Semiconductor Lasers

•R. de Mey[1], K. Vanmol[1], J. Van Erps[1], S.W. Jolly[1,2], and M. Virte[1]; [1]Brussels Photonics (B-PHOT), Dept. of Applied Physics and Photonics, Vrije Universiteit Brussel, Brussels, Belgium; [2]Service OPERA-Photonique, Université Libre de Bruxelles, Brussels, Belgium

We investigate the use of deformed polymer microcavities to achieve time-distributed optical feedback in semiconductor lasers. We analyze how the geometry of the cavity impacts the laser dynamics and the properties of the generated chaos.

CK-P.21 TUE

Diamond ”Sawfish” photonic crystal cavities

•M.E. Stucki[1,2], T. Pregnolato[1,2], J.M. Bopp[1,2], M. van der Hoeven[1], and T. Schröder[1,2]; [1]Ferdinand-Braun-Institute gGmbH, Berlin, Germany; [2]Department of Physics, Humboldt University of Berlin, Berlin, Germany

In order to enhance spectral properties and photon collection of color centers in diamond, we fabricate “Sawfish” photonic crystal cavities using quasi-isotropic under etching and demonstrate their performance spectroscopically.

CK-P.22 TUE

Photonics for Single Photon Sources Fabricated Using Nanoimprint Lithography

•Y. Li, J. Qian, and J.M. Smith; University of Oxford, OXFORD, United Kingdom

We fabricate the planar-hemispherical optical microcavities for single photon sources using nanoimprint lithography. Clear optical confinement modes are observed in transmission spectra through microcavities. We aim to embed emitters later to create cavity-coupled single photon sources.

CK-P.23 TUE

Advanced optical interfaces for silicon-nitride-based bio-photonic platform operating in visible spectral range

•M. Lelit[1,2], K. Anders[1,3], M. Słowikowski[1,2], M. Juchniewicz[2], B. Stonio[1,2], S. Stopiński[1,3], and R. Piramidowicz[1,3]; [1]Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland; [2]Warsaw University of Technology, Centre for Advanced Materials and Technologies CEZAMAT, Warsaw, Poland; [3]VIGO Photonics S.A., Ożarów Mazowiecki, Poland

Advanced optical interfaces developed for SiN-based visible passband photonic platform intended for biosensing applications is being reported in this work. Results for 3D-tapers assisted edge couplers and light-leakage-shielded grating couplers are presented.

CK-P.24 TUE

Surface second harmonic generation from AB-type stacks of dielectric nanolaminates

•F. Abtahi[1], P. Paul[1,2], A. Kuppadakkath[1], A. Pakhomov[1], A. Szeghalmi[1,2], F. Setzpfandt[1,2], and F. Eilenberger[1,2,3]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Abbe Center of Photonics, Jena, Germany; [2]Franhofer-Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [3]Max Plank School of Photonics, Jena, Germany

We investigate the second harmonic generation response of artificial optical surfaces functionalized with subwavelength stacks of dielectric, amorphous media which multiply the number of surfaces experienced by an electric field dramatically.

CK-P.25 TUE

Photon Confinement in 3D Photonic Band Gap Superlattices

•M. Kozon[1,2], M. Schlottbom[2], J.J.W. van der Vegt[2], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands

We present an extensive analysis of photon confinement properties of 3D inverse woodpile photonic band gap crystals with respect to their structural parameters. We also analyze their potential for cavity quantum electrodynamics.

CK-P.26 TUE

Mode-locking System of Coupled Microcavities with Gain and Nonlinear Loss

•R. Imamura[1], S. Fujii[2], A. Nakashima[1], and T. Tanabe[1]; [1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, Yokohama, Japan; [2]Department of Physics, Faculty of Science and Technology, Keio University, Yokohama, Japan

We numerically study the mode-locking regime in a system in which a gain-doped resonator is coupled to a nonlinear loss-functionalized resonator. In this system, mode-locking is possible even with low gain and relatively low Q.

CK-P.27 TUE

Experimental Observation of Radiance Phenomena in One-Dimensional Photonic Lattices

•D. Román-Cortés[1,2], J. Cubillos[1,2], C. Cid-Lara[1,2], I. Salinas[1,2], P. Solano[3], and R.A. Vicencio[1,2]; [1]Departamento de Física, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile; [2]Millennium Institute for Research in Optics - MIRO, Santiago, Chile; [3]Departamento de Física, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, Concepción, Chile

We experimentally observe both super-radiance and the generation of bound states in the continuum when two photonic “atoms” emit towards a continuum-like 1D photonic lattice, depending on the specific separation and phase between them.

CK-P.28 TUE

Robust reverse chiral light dynamics around conjugate exceptional points in1D photonic bandgap waveguides

•S. Dey and S. Ghosh; Indian Institute of Technology Jodhpur, Jodhpur, India

We report the hosting of conjugate exceptional points (EPs) in two complementary gain-loss assisted 1D photonic bandgap waveguides and explore the robust chiral and reverse chiral mode conversion phenomena following dynamical EP encirclement schemes.

CK-P.29 TUE

Study on bifurcating light trajectory in a distorted photonic crystal with multiple slip dislocations

•Y. Kawamoto[1], J. Hashizume[1], H. Kitagawa[1], and K. Kitamura[1,2]; [1]Kyoto Institute of Technology, Kyoto, Japan; [2]Japan Science and Technology, Saitama, Japan

We have numerically analyzed light propagation in the distorted photonic crystal which possesses multiple slip dislocations and shown the trajectory repeated curvature and bifurcation, in which can explain by potential two units lattice shapes change.

CK-P.30 TUE

Discontinuous Galerkin Method to Model Light Propagation in Photonic Crystals of Any Size

•M. Kozon[1,2], L.J. Corbijn van Willenswaard[1,2], M. Schlottbom[2], W.L. Vos[1], and J.J.W. van der Vegt[2]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, Enschede, Netherlands

We present a discontinuous Galerkin method for light propagation through large photonic crystals by utilizing their local periodicity, allowing us to treat the whole crystal as one finite element with Bloch basis functions.

CK-P.31 TUE

Radiation phenomena in kagome photonic lattices

I. Salinas[1,2], J. Cubillos[1,2], A. Szameit[3], P. Solano[4], and •R. Vicencio[1,2]; [1]D. Fisica, FCFM, Universidad de Chile, Santiago, Chile; [2]Millenium Institute for Research in Optics - MIRO, Santiago, Chile; [3]Institute of Physics, University of Rostock, Rostock, Germany; [4]D. Fisica, FCFM, Universidad de Concepcion, Concepcion, Chile

We study radiation, super and sub radiance phenomena in a 2D kagome photonic lattice. We show that an in (out of) phase atoms emission drastically improves (reduces) the energy radiated to the lattice.

CK-P.32 TUE

Q-factor optimization in photonic crystal nanobeam cavities based on elliptical nanopillars for refractive index sensing

•J.H. Mendoza-Castro[1,2], A.S. Vorobev[1,3,4], S. Iadanza[3,4], B. Lendl[2], M. Grande[1], and L. O'Faolain[3,4]; [1]Department of Electrical and Information Engineering, Politecnico di Bari, Via E. Orabona, 4, 70126 , Bari, Italy; [2]Institute of Chemical Technologies and Analytics, TU Wien, Getreidemarkt 9/164,1060 , Vienna, Austria; [3]Centre for Advanced Photonics and Process Analysis, Munster Technological University, T12 T66T Bishopstown , Cork, Ireland; [4]Tyndall National Institute, T12 PX46 , Cork, Ireland

We present a compact and flexible Photonic Crystal Nanobeam Cavity (PhCNC) design in which optimization of the calculated Q-factor (10^6) is achieved by elliptically shaped Si_3N_4 nanopillars

CK-P.33 TUE

Fabrication of 3D Photonic Band Gap Crystals from Silicon

M.J. Goodwin[1,2], C.A.M. Harteveld[1], L.J. Corbijn van Willenswaard[1], T.J. Vreman[1], A.S. Schulz[1], D.A. Grishina[1], and •W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]MESA+ Nanolab, University of Twente, Enschede, Netherlands

A method of creating 3D, inverse woodpile, photonic crystals in silicon by reactive ion etching. The crystals were characterized by various tomography and imaging techniques.

CK-P.34 TUE

Integrated Circuits with Optical Injection Locking of Ring Lasers for QKD and QPSK Applications

D. Massella[1], M. Wallace[2], R. Broeke[2], F. Diaz[1,3], and •N. Pinto[1]; [1]Universidade de Vigo, Vigo, Spain; [2]Bright Photonics, Eindhoven, Netherlands; [3]AtlanTTic research center, Vigo, Spain

The present work demonstrates the design and experimental implementation of two monolithically integrated ring laser circuits, based on the optical injection locking technique. Preliminary characterization results show that locking is achievable under current designs.

CK-P.35 TUE

Stable soliton comb from dual ring microresonators

•A.n. Karunakaran[1,2], A. Manetta[1], P. Varming[1], O.B. Helgason[3], P. Montague[1], M. Pu[2], V. Torres-Company[3], and K. Yvind[2]; [1]NKT Photonics A/S, Birkerod, Denmark; [2]DTU Electro, Technical University of Denmark, Kgs. Lyngby, Denmark; [3]Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden

We present a packaged SiN dual-ring resonator for frequency comb generation. Using an ultra-stable pump laser and active temperature stabilization we alleviate frequency drifts and detuning fluctuations. The resulting solitons are stable over several hours.

CK-P.36 TUE

Towards the Simultaneous Coupling and Enhancement of hBN Based Single Photon Emission with Si_3N_4 Photonic Structures

•B. Laudert[1], J.P. Berti Ligabo[1], and F. Eilenberger[1,2]; [1]Institute of Applied Physics, Friedrich Schiller University Jena, Jena, Germany; [2]Fraunhofer-Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

A proposed scheme for the simultaneous enhancement and coupling for hBN based single-photon emission with Si_3N_4 photonic structures. In FDTD simulations we have achieved a Purcell factor of 7.9 and a coupling efficiency of 35%.

CK-P.37 TUE

Photonic Energy Density and Scattering from Random and Periodic Arrays of Silicon Pillars

M.J. Goodwin[1,2], O. Akdemir[1], M.D. Truong[1], L. Bitenc[1], A. Lagendijk[1], and •W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]MESA+ Nanolab, University of Twente, Enschede, Portugal

A range of randomly and periodically arrange pillars have been fabricated to study photonic energy density and localization in scattering media.

CK-P.38 TUE

Computation of Optical Properties of Real Photonic Band Gap Crystals as Opposed to Utopian Ones

L.J. Corbijn van Willenswaard[1,2], S. Smeets[3], N. Renaud[3], M. Schlottbom[2], J.J.W. van der Vegt[2], and •W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Insitute for Nanotechnology, Universiteit Twente, Enschede, Netherlands; [2]Mathematics of Computational Science (MACS), MESA+ Insitute for Nanotechnology, Universiteit Twente, Enschede, Netherlands; [3]Netherlands eScience Center, Amsterdam, Netherlands

Manufacturing deviations of real photonic crystals are not included in predictive models. Here we present the numerical transmission spectrum computed from tomographically reconstructed crystal and compare this with a utopian model without these deviations.

CK-P.39 TUE

Topological Valley Photonic Crystals for on-chip transport of light

•E. Narváez Castañeda[1], A. Khanda[2], M. Brauckmann[1], B. Brecht[1], and T. Zentgraf[1]; [1]Paderborn University, Paderborn, Germany; [2]Karlsruhe Institute of Technology, Karlsruhe, Germany

We present a scheme for topologically noise-protected transport of light at 1550 nm in a Silicon on Insulator Platform. We report the design, fabrication and characterization of our structures.

CK-P.40 TUE

Butt-Coupling Optical Probe Card for Wafer-Scale Photonic-Integrated-Circuits Test with Polarization Control

C.-Y. Wu[1], •M.-C. Lee[1], M.-J. Lu[2], S.-Y. Mu[2], J. Chen[2], and C.-S. Cheng[2]; [1]National Tsing Hua University, Hsinchu, Taiwan; [2]Advanced Semiconductor Engineering Inc., Kaohsiung, Taiwan

A Si photonics optical probe card is presented for on-wafer testing photonic integrated circuits via a butt coupling scheme. This probe card can characterize the polarization-dependent loss of devices under test.

CK-P.41 TUE

An Integrated Passively Q-switched Nanophotonic Laser in the NIR Based on Two-Dimensional Materials

G. Nousios[1], T. Christopoulos[1], •O. Tsilipakos[2], and E. Kriezis[1]; [1]Aristotle University of Thessaloniki, Thessaloniki, Greece; [2]National Hellenic Research Foundation, Athens, Greece

We propose and analyze a nanophotonic Q-switched lasing element utilizing 2D materials for optically pumped gain and saturable absorption. Lasing is rigorously evaluated with a temporal coupled-mode theory framework and mW peak power is predicted.

13:00 – 14:00

EG-P: EG Poster session

EG-P.1 TUE

Electron decoherence and distant object detection

•C.I. Velasco[1], V. Di Giulio[1], and F.J. García de Abajo[1,2]; [1]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels (Barcelona), Spain; [2]ICREA - Institucio Catalana de Recerca i Estudis Avancats, Barcelona, Spain

We show that two-path decoherence of a single-electron beam caused by inelastic interaction with a material structure is driven by infrared divergences, which are encapsulate in quantum interactions that leave traces up to macroscopic distances.

EG-P.2 TUE

Particle-in-Cell simulations of ultrashort optical laser pulses for magnetic field enhancement and electric field suppression

•L. Grünewald[1,2], R. Martín-Hernández[3], E. Gangrskaia[4], V. Shumakova[4], C. Hernández-García[3], and S. Mai[1]; [1]Institute for Theoretical Chemistry, Faculty of Chemistry, University of Vienna, Vienna, Austria; [2]Vienna Doctoral School in Chemistry (DoSChem), University of Vienna, Vienna, Austria; [3]Grupo de Investigacíon en Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, University of Salamanca, Salamanca, Spain; [4]Photonics Institute, TU Wien, Vienna, Austria

We report simulations of electromagnetic fields of ultrashort, azimuthally polarized laser beams interacting with metal apertures of different shape, providing magnetic field enhancement and electric field suppression near the beam axis for magneto-only optical spectroscopy.

EG-P.3 TUE

Designing plasmonic sensors using Babinet's principle

•J.A. Riley[1,2], M. Horák[3,4], V. Křápek[3,4], and V. Pacheco-Peña[1]; [1]School of Mathematics, Statistics and Physics, Newcastle University, Newcastle Upon Tyne, United Kingdom; [2]School of Engineering, Newcastle University, Newcastle Upon Tyne, United Kingdom; [3]Central European Institute of Technology, Brno University of Technology, Brno, Czech Republic; [4]Institute of Physical Engineering, Brno University of Technology,, Brno, Czech Republic

Numerical and experimental, studies of complementary plasmonic sensors designed using Babinet's principle is presented. Spectral changes in the localised surface plasmons resonances are demonstrated when introducing variations in the parameters of a nearby dielectric analyte.

EG-P.4 TUE

Low-temperature plasmonically enhanced single-molecule spectroscopy of fluorescent proteins

•*O. Evans[1], V. Singh[1], O. Aksakal[2], D. Jones[2], P. Borri[2], and W. Langbein[1]; [1]Cardiff University, School of Physics and Astronomy, Cardiff, United Kingdom; [2]Cardiff University, School of Biosciences, Cardiff, United Kingdom*

We present plasmonically enhanced single-molecule cryo-spectroscopy of far-red fluorescent protein, mRhubarb. The temporal switching and jitter of the spectra provide information on the conformational dynamics of the chromophore and fluorescent protein.

EG-P.5 TUE

Development of the Far-Field Photoluminescence emission from a Quantum Well during its Field Evaporation in a Tomographic Atom Probe

•*E.M. Weikum [1], G. Beainy[1], J. Houard[1], S. Moldovan[1], J.-M. Chauveau[2], M. Hugues[2], D. Lefebvre[2], A. Vella [1], and L. Rigutti[1]; [1]Université de Rouen , Rouen, France; [2]Université Côte d'Azur, Valbonne, France*

The Photonic Atom Probe allows the correlative measurement of Atom Probe Tomography and Photoluminescence data. In this contribution, both the laser absorption and PL emission properties of the nanometric specimen are investigated.

EG-P.6 TUE

Towards Plexcitonic Systems of Gold Nano-Antennas and J-aggregates

•*A.M. Jumbo Nogales[1], M. Grzelczak[2], and Y. Rakovich[3]; [1]Materials Physics Center, Donostia, Spain; [2]Donostia International Physics Center, Donostia, Spain; [3]Ikerbasque, Basque Foundation for Science, Bilbao, Spain*

The coupling of gold nano-structures and J-aggregates provides interesting applications due to their unique properties. We used gold nano-bipyramids and JC-1 J-aggregates in strong coupling to characterize plexcitonic systems and evaluate their potential for applications.

EG-P.7 TUE

Probing the Position Resolved Energy Density Inside Photonic Scattering Slabs with Strong Absorption and Anisotropy

•*O. Akdemir[1], L. Bitenc[2], I.L. Maxwell[1], M. Goodwin[1], M.D. Truong[1], A. Lagendijk[1], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), University of Twente, Enschede, Netherlands; [2]University of Ljubljana, Ljubljana, Slovenia*

We present experiments to probe the position-dependent energy density inside strongly absorbing and anisotropic scattering samples. Common analytical approximations fail to describe such samples. We compare experiments to analytical approximations and Monte Carlo simulations.

EG-P.8 TUE

Uncovering the Physics of Ultraslow Hot-exciton Relaxation and Interparticle Auger Coupling in HgTe Quantum Dots

•*K. Fan[1], K.A. Sergeeva[2], A.A. Sergeev[1], L. Zhang[1], C.C.S. Chan[1], Z. Li[2], X. Zhong[2], S.V. Kershaw[2], J. Liu[1], A.L. Rogach[2], and K.S. Wong[1]; [1]Department of Physics, The Hong Kong University of Science and Technology, Hong Kong, China; [2]Department of Materials Science and Engineering, City University of Hong Kong, Hong Kong, China*

Transient absorption measurement reveals ultraslow hot-exciton cooling in HgTe quantum dots. Auger recombination is significantly enhanced by interparticle excitonic coupling at reduced ligand length. The discovery contributes to developing high-performance optoelectronic materials with confinement-bulk duality.

EG-P.9 TUE

All-Silicon Topology Optimized Two-Photon Absorption Detector for On-chip Interconnects

•*A.N. Kamel[1,2], M.R.A. Newman[1,2,3], A. Marchevsky[1,2,4], R.E. Christiansen[2,5], A.N. Babar[1,2], P.T. Kristensen[1,2], O. Sigmund[2,5], S. Stobbe[1,2], J. Mørk[1,2], and K. Yvind[1,2]; [1]DTU Electro, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]NanoPhoton - Center for Nanophotonics, Kgs. Lyngby, Denmark; [3]Interuniversity Microelectronics Centre (IMEC), Leuven, Belgium; [4]Microsoft Danmark ApS, Kg. Lyngby, Denmark; [5]Department of Civil and Mechanical Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark*

We present and all-silicon, topology-optimized, resonant two-photon PIN detector for on-chip interconnects. Using topology optimization, the field enhancement necessary for efficient two-photon detection is possible at moderate quality factor and thus does not limit speed.

NOTES

Room 1 ICM

8:30 – 10:00

CM-7: Laser written waveguides and gratings

Chair: Robert Thomson, Heriot-Watt University, Edinburgh, United Kingdom

CM-7.1 WED 8:30

'Designer Glasses' for Ultrafast Laser-Inscribed Low-Loss Optical Waveguides

T.T. Fernandez[1,2], A. Ross-Adams[1], M. Bakovic[3], M.J. Withford[1,3], and •S. Gross[3,4]; [1]MQ Photonics Research Centre, School of Mathematical and Physical Sciences, Macquarie University, NSW 2109, Sydney, Australia; [2]University of South Australia, Laser Physics and Photonics Devices Laboratories, SA 5095, Adelaide, Australia; [3]Modular Photonics Pty Ltd, Sydney, Australia; [4]MQ Photonics Research Centre, School of Engineering, Macquarie University, NSW 2109, Sydney, Australia

The composition of the glass substrate when creating optical waveguides using Ultrafast Laser Inscription is crucial for the formation of high-quality waveguides. We present tailored glass compositions enabling ~0.05 dB/cm propagation loss.

CM-7.2 WED 8:45

Femtosecond inscription of a spectral array of seven fiber Bragg gratings at the same spot using a single uniform phase-mask

•A. Halstuch and A.A. Ishaaya; School of Electrical and Computer Engineering, Ben-Gurion University of the Negev, Beer-Sheva, Israel

A spectral array of seven fiber-

Room 4a ICM

8:30 – 10:00

CK-4: Active components

Chair: Stefano Pelli, CNR-IFAC, Sesto Fiorentino, Italy

CK-4.1 WED (Invited) 8:30

Photophysics of single color centers in silicon

•A. Dréau; Laboratoire Charles Coulomb, Montpellier, France

With a view to developing quantum applications, we fabricate single color centers in silicon, associated with the so-called G-center, and investigate their single-photon emission to understand their photophysics and interactions with their local environment.

Room 4b ICM

8:30 – 10:00

EG-6: Nanomanipulation, nano-organization and correlation

Chair: Michele Celebrano, Politecnico di Milano, Italy

EG-6.1 WED 8:30

Hyper Rayleigh Scattering of Liquids : an Insight into Nanoscale organization of Liquids

•F. Rondepierre[1], J. Duboisset[2], and P.-F. Brevet[1]; [1]Institut Lumière Matière, UMR CNRS 5603,Université Claude Bernard Lyon 1, Villeurbanne, France; [2]Aix Marseille Université, C.N.R.S., Centrale Marseille, Institut Fresnel, F-13013 Marseille, France, Marseille, France

Second Harmonic Scattering is demonstrated to probe aqueous electrolyte nanoscale orientational correlations undergoing long to short-range transition with salt concentration. These experimental results are described within a theoretical framework involving the liquid correlation function.

EG-6.2 WED 8:45

Inducing electron-photon correlations at an integrated photonics microresonator

A. Feist[1,2], G. Huang[3,4], G. Arend[1,2], Y. Yang[3,4], •J.-W. Henke[1,2], A.S. Raja[3,4], F.J. Kappert[1,2], J. Pan[3,4], H. Lourenco-Martins[1,2], Z. Qiu[3,4], J. Liu[3,4], O. Kfir[1,2], T.J. Kippenberg[3,4], and C. Ropers[1,2]; [1]Max Planck

Room 13a ICM

8:30 – 10:00

CA-6: Visible and UV lasers

Chair: Takunori Taira, RIKEN SPring-8 Center (RSC), Japan

CA-6.1 WED 8:30

UV-diode-pumped green and yellow Tb^{3+} lasers

•M. Badtke, S. Kalusniak, H. Tanaka, and C. Kränkel; Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

We investigated the visible laser performance of Tb^{3+}:$LiLuF_4$ under different UV-pump wavelengths using a 2ω-Ti:sapphire. Furthermore, we demonstrated the first UV-laser-diode pumped Tb^{3+}-laser, which shows promise as a compact and efficient yellow laser source.

CA-6.2 WED 8:45

Diode-pumped Q-switched Alexandrite Laser as an emitter in a compact general purpose lidar system for atmospheric measurements

•S. Scheuer[1], A. Munk[1], M. Strotkamp[1], B. Jungbluth[1], J. Höffner[2], J. Froh[2], T. Mense[2], and A. Mauer[2]; [1]Fraunhofer

Room 13b ICM

8:30 – 10:00

JSI-1: Nonlinear X-ray wave-mixing

Chair: Giuseppe Sansone, University of Freiburg, freiburg, Germany

JSI-1.1 WED (Invited) 8:30

X-ray Transient Grating experiments at Free Electron Lasers

•C. Svetina; Instituto Madrileño de Estudios Avanzados en Nanociencia (IMDEA Nanociencia), Madrid, Spain

Optical transient grating is a four-wave-mixing method implemented to investigate transport phenomena and diffusion processes. I will show results in developing X-ray Transient Grating at X-ray Free Electron Lasers and discuss the challenges and perspectives.

Room 14a ICM

8:30 – 10:00

CD-7: Spectroscopy applications

Chair: Aurelien Houard, ENSTA Paris, France

CD-7.1 WED 8:30

High harmonic spectroscopy of quantum phases in a high-Tc superconductor

J. Alcalà[1], U. Bhattacharya[2], M. Ciappina[3,4], U. Elu[2], T. Graß[2], P. T. Grochowski[2,5,6,7], M. Lewenstein[2,8], A. Palau[1], T. P. H. Sidiropoulos[2], T. Steinle[2], •I. Tyulnev[2], and J. Biegert[2,8]; [1]ICMAB-CSIC - Institut de Ciència de Materials de Barcelona, Barcelona, Spain; [2]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Barcelona, Spain; [3]Guangdong Technion - Israel Institute of Technology, Shantou, China; [4]Technion - Israel Institute of Technology, Haifa, Israel; [5]Center for Theoretical Physics, Polish Academy of Sciences, Warsaw, Poland; [6]Institute for Quantum Optics and Quantum Information, Austrian Academy of Sciences, Innsbruck, Austria; [7]Institute for Theoretical Physics, University of Innsbruck, Innsbruck, Austria; [8]ICREA - Institución Catalana de Investigación y Estudios Avanzados, Barcelona, Spain

We report on the new non–linear optical signatures of quantum phase transitions in the high-temperature superconductor YBCO, observed through high harmonic generation spectroscopy.

CD-7.2 WED 8:45

Bright phase-stable waveforms covering the entire infrared molecular fingerprint region

•H. Kassab[1], S. Gröbmeyer[2], C. Hofer[1,3,4], W. Schweinberger[2,3], P. Steinleitner[1,2], M. Högner[1], T. Amotchkina[1], M. Knorr[5], R. Huber[5], F. Krausz[1,2,3], N. Karpowicz[1,2], and I. Pupeza[1,2,6]; [1]Max Planck Institute

Room 14b ICM

8:30 – 10:00

CH-5: Optical frequency combs

Chair: Arnaud Mussot, University of Lille, France

CH-5.1 WED (Tutorial) 8:30

Optical frequency comb applications beyond frequency metrology using versatile control of optical waves

•*K. Minoshima*; *The University of Electro-Communications, Chofu, Japan*

Optical frequency comb provides powerful tools in broad area using its versatile phase controllability. In this tutorial, our recent works on various metrology applications such as highly functional spectroscopy, quantum optics, and imaging are presented.

Room Osterseen ICM

8:30 – 10:00

EE-1: Ultrafast spectroscopy of solids

Chair: Lenard Vamos, ICFO, Castelldefels, Spain

EE-1.1 WED 8:30

Following phase transition in niobium dioxide by time-resolved high-harmonic spectroscopy

•*Z. Nie[1], L. Guery[1], P. Juergens[1,2], and P. Kraus[1,3]; [1]Advanced Research Center for Nanolithography, Amsterdam, Netherlands; [2]Max-Born-Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [3]Department of Physics and Astronomy, and LaserLaB, Vrije Universiteit, Amsterdam, Netherlands*

Robust experimental evidence of ultrafast insulator-to-metal transition in niobium dioxide has been found in time-resolved high harmonic spectroscopy and such sensitive methodology based on extreme nonlinearity could be generalized to any phase transitions.

EE-1.2 WED 8:45

Signature of diabatic transition of dressed excitons in monolayer WSe_2

•*K. Uchida[1], S. Kusaba[1], K. Nagai[1], T.N. Ikeda[2], and K. Tanaka[1]; [1]Department of Physics, Kyoto University, Kyoto, Japan; [2]Institute of Solid State Physics, University of Tokyo, Kashiwa, Japan*

Room 1 Hall B1 (B11)

8:30 – 10:00

CF-6: New trends in post-compression I

Chair: Oleg Pronin, Helmut-Schmidt-Universität / Universität der Bundeswehr Hamburg, Germany

CF-6.1 WED 8:30

Low-Noise Tunable Source for Stimulated Raman Scattering Imaging

•*I. Martin[1,3], S. Bux[1], T. Sylvestre[2], S. Metais[3], H. Rigneault[3], and N. Forget[1]; [1]Fastlite, Antibes, France; [2]Institut FEMTO-ST, Besançon, France; [3]Institut Fresnel, Marseille, France*

We present a low-noise tunable (0.78-1μm) OPA at 40 MHz, pumped by a Kerrlens mode-locked Ytterbium laser. The RIN is shot noise-limited (-160 dB/Hz) at ~3MHz and we were able to acquire SRS images.

CF-6.2 WED 8:45

Taming light bullets in the hollow-fiber compressor

•*G. Steinmeyer[1], T. Nagy[1], I. Babushkin[2], and C. Mei[3]; [1]Max-Born-Institut, Berlin, Germany; [2]Institute of Quantum Optics, Leibniz University , Hannover, Germany; [3]University of Science and Technology, Beijing, China*

Room 6 Hall B3 (B32)

8:30 – 10:00

CI-1: Fibers for telecommunications

Chair: Katarzyna Krupa, Institute of Physical Chemistry PAS, Warsaw, Poland

CI-1.1 WED 8:30

The Impact Of Zero-Dispersion Wavelength Fluctuations In A Parametric Amplifier Based On Dual Core Fibers

V. Ribeiro[1], M. Shi[2], and •A.M. Perego[2]; [1]Kets Quantum Security Ltd, Bristol, United Kingdom; [2]Aston University, Birmingham, United Kingdom

We present a theory of the zero-dispersion wavelength fluctuations impact on a dual core fiber parametric amplifier gain, demonstrating agreement with Montecarlo simulations and superior resilience compared to standard single core fiber optical parametric amplifiers.

CI-1.2 WED 8:45

Generalized angle-OAM Talbot effect in ring-core fibers

•*M. Eriksson[1], J. Hu[2], S. Gigan[2], and R. Fickler[1]; [1]Physics Unit, Photonics Laboratory, Tampere University, Tampere, Finland; [2]Laboratoire Kastler Brossel, ENS-Université PSL, CNRS, Sorbonne Université, Collège de France, Paris, France*

Room 7 Hall A1 (A11)

8:30 – 10:00

CJ-2: Beam combination of fiber lasers and amplifiers

Chair: Liang Dong, Clemson University, Clemson, USA

CJ-2.1 WED (Invited) 8:30

Coherently combined high power multicore fibers

•*J. Limpert*; *Institute of Applied Physics, University Jena, Jena, Germany; Helmholtz-Institute Jena, Jena, Germany; 3Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

The basics, the progress and the perspectives of the coherent combination of amplifying multicore fibers with high core count will be reviewed.

Room 8 Hall A1 (A12)

8:30 – 10:00

EB-6: Integrated quantum optics

Chair: Nicolas Fabre, Telecom Paris, France

EB-6.1 WED 8:30

High-fidelity on chip four-photon GHZ states

•*M. Pont[1], G. Corrielli[2], A. Fyrillas[3], I. Agresti[4,5], G. Carvacho[4], N. Maring[3], P.-E. Emeriau[3], F. Ceccarelli[2], R. Albiero[2], P.H.D. Ferreira[2,6], N. Somaschi[3], J. Senellart[3], M. Morassi[1], A. Lemaitre[1], I. Sagnes[1], P. Senellart[1], F. Sciarrino[4], M. Liscidini[7], N. Belabas[1], and R. Osellame[2]; [1]C2N, CNRS, Universite Paris-Saclay, UMR 9001, Palaiseau, France; [2]IFN-CNR, Milano, Italy; [3]Quandela, Massy, France; [4]Dipartimento di Fisica, Sapienza Universita di Roma, Rome, Italy; [5]University of Vienna, Faculty of Physics, Vienna, Austria; [6]Physics Department, Federal University of Sao Carlos, Sao Carlos, Brazil; [7]Dipartimento di Fisica, Universita di Pavia, Pavia, Italy*

We use a quantum-dot based single-photon source to demonstrate a high-fidelity high-rate generation of 4-photon quadri-partite GHZ states with an integrated photonic circuit. Our experimental platform paves the way towards photonic intermediate scale quantum computation.

EB-6.2 WED 8:45

High bandwidth homodyne detection in a monolithic ePIC process

J. Frazer, J.F. Tasker, •G. Ferranti, and J.C.F. Matthews; *Quantum Engineering Technology Labs, H. H. Wills Physics Laboratory and Department of Electrical & Electronic Engineering, University of Bristol, Bristol,*

Room 1 ICM

Bragg-gratings is inscribed with a single-uniform phase-mask at the same spot. These gratings are inscribed with a femtosecond laser, while the wavelength tunability is achieved by defocusing and phase-mask movement.

CM-7.3 WED 9:00

High-efficiency fibre coupling from laser-written waveguides using partially overlapping multi-pass inscription

•*M. Ehrhardt, M. Heinrich, and A. Szameit*; *Institute for Physics, University of Rostock, Rostock, Germany*

We shape the mode field of femtosecond laser-written waveguides in fused silica via the partial overlap of multiple inscription passes. Judicious tuning of exposure parameters facilitates near-unity mode overlap and coupling to standard single-mode fibers.

Room 4a ICM

CK-4.2 WED 9:00

A Photonic Integrated Circuit-Based Erbium-doped Waveguide Amplifier

•*Y. Liu[1,2], Z. Qiu[1,2], X. Ji[1,2], A. Lukashchuk[1,2], J. He[1,2], J. Riemensberger[1,2], M. Hafermann[3], R.N. Wang[1,2], J. Liu[1,2], C. Ronning[3], and T.J. Kippenberg[1,2]*; *[1]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]Center for Quantum Science and Engineering,Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [3]Institute of Solid State Physics, Friedrich Schiller University Jena, Jena, Germany*

We demonstrate an Erbium-doped waveguide amplifier by erbium ion implantation in Si_3N_4 photonic integrated circuits, achieving 145 mW on-chip output power and more than 30 dB small-signal gain, on par with Erbium-doped fiber amplifiers.

Room 4b ICM

Institute for Multidisciplinary Sciences, Göttingen, Germany; [2]4th Physical Institute, University of Göttingen, Göttingen, Germany; [3]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [4]Center for Quantum Science and Engineering, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

We couple free electrons to the optical modes of a high-Q photonic chip-based microresonator. Inelastic scattering leads to the generation of single photons in the cavity modes, correlated to an energy-loss of the electrons.

EG-6.3 WED 9:00

Midinfrared optical force for sorting materials depending on their chemical structures

Y.A. Darmawan[1], T. Goto[1], T. Yanagishima[2], T. Fuji[1], and •T. Kudo[1]; *[1]Laser Science Laboratory, Toyota Technological Institute, Nagoya, Japan; [2]Department of Physics, Graduate School of Science, Kyoto University, Kyoto, Japan*

Optical force is resonantly enhanced when a midinfrared quantum cascade laser excites molecular vibrational modes of target materials. We experimentally discovered that particles are sorted accordingly to their chemical structures using a midinfrared optical force.

Room 13a ICM

Institute for Laser Technology ILT, Aachen, Germany; [2]Leibniz Institute of Atmospheric Physics IAP, Kühlungsborn, Germany

We present the design and performance of four prototypes of narrow-bandwidth emitters based on diode-pumped Alexandrite lasers for atmospheric Doppler-Mie, -Rayleigh and -resonance lidars. Furthermore, first results for efficient frequency-doubling into UV are presented.

CA-6.3 WED 9:00

375-400nm UV Generation via an Alexandrite laser and Zn-indiffused MgO-doped PPLN Waveguides

•*G. Tawy[1], N. Palomar Davidson[1], P.L. Mennea[1], G. Churchill[1], L.D. Wright[2], R.H.S. Bannerman[1], P.G.R. Smith[1], J.C. Gates[1], M.J. Damzen[3], and C.B.E. Gawith[1]*; *[1]Optoelectronics Research Centre, Southampton, United Kingdom; [2]Covesion Ltd., Southampton, United Kingdom; [3]Imperial College London, London, United Kingdom*

We present the very first demonstration of a widely tunable UV laser source from an Alexandrite laser using second-harmonic-generation in PPLN waveguides. Waveguide efficiency, spectra and mode profiles are presented.

Room 13b ICM

JSI-1.2 WED 9:00

All X-ray four-wave mixing on a gas phase sample

•*A.S. Morillo-Candas[1], A. Al-Haddad[1], S. Augustin[1], A. Cannizzo[2], Y. Deng[1], T. Feurer[2], J. Knurr[1,3], C. Ott[4], E. Prat[1], M. Rebholz[4], A. Sarracini[1], K. Schnorr[1], Z. Sun[1], X. Xie[1], N. Yang[1,3], S. Zedane[1], H. Zhang[1,3], T. Pfeifer[4], C. Bostedt[1,3], and G. Knopp[1]*; *[1]Paul Scherrer Institute, Villigen, Switzerland; [2]Institute of Applied Physics, Bern, Switzerland; [3]Ecole Polytechnique Federal de Lausanne , Lausanne, Switzerland; [4]Max Planck Institut für Kernphysik, Heidelberg, Germany*

An all X-ray - four wave mixing (FWM) experiment has been successfully demonstrated at the SwissFEL free electron laser in an atomic gas (Ne) by using a “folded BOX” configuration, which ensures temporal and spatial overlap of the X-ray beams.

Room 14a ICM

of Quantum Optics, Garching, Germany; [2]Ludwig Maximilian University Munich, Garching, Germany; [3]Center for Molecular Fingerprinting, Budapest, Hungary; [4]Quantum Matter Institute, University of British Columbia, Vancouver, Canada; [5]. Department of Physics, University of Regensburg, Regensburg, Germany; [6]Leibniz Institute of Photonic Technology - Member of the research alliance “Leibniz Health Technologies“, Jena, Germany

Modern Yb-based MHz-repetition-rate lasers readily provide 10-fs-scale pulses with 100-W-level average powers. Using such a laser, we simultaneously cover the entire infrared molecular fingerprint region with passively-phase-stable 130-mW-average-power waveforms, via multi-crystal intrapulse difference-frequency mixing.

CD-7.3 WED 9:00

Broadband Dual-Comb Spectroscopy in the Near-Ultraviolet Spectral Region

•*L. Fürst, A. Kirchner, A. Eber, F. Siegrist, R. di Vora, and B. Bernhardt*; *Institute of Experimental Physics, Graz, Austria*

We demonstrate direct ultraviolet dual-comb spectroscopy using two broadened frequency-tripled frequency comb outputs. Absorption spectroscopy of formaldehyde was accomplished with complete state resolution at 100 μs acquisition time and 133 GHz resolution.

Room 14b ICM

Room Osterseen ICM

We observed the signature of diabatic transition between different Floquet eigenstates in monolayer WSe_2 by irradiating with intense mid-infrared light.

EE-1.3 WED 9:00

Direct signatures of light-driven bands in ultrafast nonlinear optical excitations

•*A. Galler, A. Rubio, and O. Neufeld*; *Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany*

We theoretically show that strong-field nonlinear-optical transitions in solids, which are the basis for a plethora of physical phenomena, map the structure of the Floquet light-dressed electronic bands, opening new possibilities for ultrafast spectroscopy.

Room 1 Hall B1 (B11)

Spatio-temporal soliton formation is discussed in a fully analytical approach, solving the eigenvalue problem of the nonlinear Schrödinger equation in the Fourier domain. Resulting scaling rules and design considerations are presented.

CF-6.3 WED 9:00

Generation of Tuneable Vacuum Ultraviolet Pulses Through Resonant Dispersive Wave Emission With an Ytterbium-based Laser

•*C. Brahms and J.C. Travers*; *Heriot-Watt University, Edinburgh, United Kingdom*

We generate tuneable ultrafast pulses in the vacuum ultraviolet down to 145 nm through resonant dispersive wave emission in a gas-filled hollow-core fibre pumped by compressed pulses from a commercial high-power ytterbium-based drive laser.

Room 6 Hall B3 (B32)

We show the first experimental demonstration of the generalized angle-OAM Talbot effect in ring-core fibers, combining the self-imaging effects in both angular and OAM domains, which may enable novel quantum and classical information manipulation in the future.

CI-1.3 WED (Invited) 9:00

Optical Communications: a Hollow Future ahead?

•*F. Poletti*[1,2], *G. Jasion*[1], *E. Numkam Fokoua*[1,2], *H. Sakr*[1,2], *and I. Davidson*[1]; [1]*Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*; [2]*Lumenisity, Southampton, United Kingdom*

Hollow core fibre technology has progressed very rapidly in recent years, to the point that its optical performance has reached levels compatible with those required for optical communications. We will review state-of-the-art and future prospects.

Room 7 Hall A1 (A11)

CJ-2.2 WED 9:00

32 mJ, 158 fs pulses from a coherently combined ytterbium-doped fiber laser system

•*H. Stark*[1,2], *M. Benner*[1], *J. Buldt*[1], *A. Klenke*[1,3,4], *and J. Limpert*[1,2,3,4]; [1]*Friedrich Schiller University Jena, Abbe Center of Photonics, Institute of Applied Physics, Jena, Germany*; [2]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*; [3]*Helmholtz-Institute Jena, Jena, Germany*; [4]*GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany*

We present a high-energy fiber chirped-pulse amplification laser system based on spatial and temporal coherent combination of 128 pulse replicas. A pulse energy of 32 mJ at 158 fs pulse duration and 20 kHz repetition rate is achieved.

Room 8 Hall A1 (A12)

United Kingdom

We demonstrate a monolithic homodyne detector with a 3 dB bandwidth of 19.8 GHz and shot noise clearance of 16 dB. This result highlights the potential of monolithic integration to improve performance of devices for quantum technologies.

EB-6.3 WED 9:00

Quantum enhanced integrated single photon nonlinear interferometer

•*K.-H. Luo, M. Santandrea, M. Stefszky, H. Herrmann, and C. Silberhorn*; *Integrated Quantum Optics Group, Institute for Photonic Quantum Systems (PhoQS), Paderborn University, Paderborn, Germany*

We have experimentally studied an integrated nonlinear SU(1,1) interferometer at the single photon level. The Fisher information deduced from interference fringes of singles reveals quantum advantage even in a lossy device.

Room 1 ICM

CM-7.4 WED 9:15

DUV laser written gratings on zinc doped lithium niobate waveguides

•R.H.S. Bannerman[1], J.W. Field[1], Q.S. Ahmed[1], P.C. Gow[1], J.C. Gates[1], P.G.R. Smith[1], and C.B.E. Gawith[1,2]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]Covesion Ltd., Southampton, United Kingdom

Gratings are fabricated on 40mm long single-mode zinc-indiffused ridge PPLN waveguides using a focused holographic process and a nanosecond pulsed 213nm laser. Damage-free gratings are made with fluences from 30 mJ/cm^2 to 6 kJ/cm^2.

CM-7.5 WED 9:30

Ultrafast Laser Written Waveguide Chips for Quantum Applications

•B. Sun[1], A. Sotirova[2], V.D. Cruz[2], C. Ballance[2], E. Mer[3], R.B. Patel[3], I.A. Walmsley[3], and M.J. Booth[1,4]; [1]Department of Engineering Science, University of Oxford, Oxford , United Kingdom; [2]Department of Physics, University of Oxford, Oxford , United Kingdom; [3]Ultrafast Quantum Optics group, Department of Physics, Imperial College London, London, United Kingdom; [4]Erlangen Graduate School in Advanced Optical Technologies (SAOT), Friedrich-Alexander-University Erlangen-Nürnberg, Erlangen, Germany

Waveguide-based chips created by SPIM-WG technique enabled several new functionalities in quantum applications. Scalable devices with high index contrast, closely stacked waveguide array and low crosstalk demonstrated application in trapped ion quantum computation.

Room 4a ICM

CK-4.3 WED 9:15

Integrated Germanium-on-Silicon Ring Resonator with High Q-factor in the Mid-Infrared

•R. Armand[1], M. Perestjuk[1,2], A. Della Torre[1], M. Sinobad[1], A. Mitchell[2], A. Boes[2,3], J.-M. Hartmann[4], J.-M. Fedeli[4], V. Reboud[4], C. Monat[1], and C. Grillet[1]; [1]Institut des Nanotechnologies de Lyon, Ecully, France; [2]RMIT, Melbourne, Australia; [3]The University of Adelaide, Adelaide, Australia; [4]CEA-Leti, Grenoble, France

We report a high-Q ring resonator in the mid-infrared in a germanium-on-silicon chip-based platform. The side-coupled ring exhibits a loaded Q-factor of 154,000 at the operating wavelength around 4.18 μm.

CK-4.4 WED 9:30

Towards on-chip ultrafast pulse amplification

•M.A. Gaafar[1], K. Wang[2], M. Ludwig[1], T. Wildi[1], M. Sinobad[1], J. Lorenzen[1], H. Francis[3], M. Geiselmann[3], F.X. Kärtner[1,4], S.M. Garicia-Blanco[2], N. Singh[1], and T. Herr[1,4]; [1]Deutsches Elektron-Synchrotron DESY, Notkestraße 85, Hamburg, Germany; [2]Integrated Optical Systems, MESA+ Institute for Nanotechnology, University of Twente, 7500AE, Enschede, Netherlands; [3]LIGENTEC SA, EPFL Innovation Par L, Chemin de la Dent-d'Oche 1BB, Switzerland CH-1024 Ecublen, Ecublen, Switzerland; [4]Physics Department, Universität Hamburg, Luruper Chaussee 149, 22761, Hamburg, Germany

Here we demonstrate a broadband, large mode area thulium-based integrated amplifier with tailored group-velocity dispersion. We measure up to 10 dB signal pulse net gain at 1820 nm inside a 5 cm-long waveguide.

Room 4b ICM

EG-6.4 WED 9:15

Accurate transfer of individual nanoparticles onto single photonic nanostructures

•J. Redolat[1], M. Camarena[1], A. Griol[1], M. Kovylina[1], A. Xomalis[2,3], J. Baumberg[2], A. Martinez[1], and E. Pinilla[1]; [1]Universitat Politècnica de València, Nanophotonics Technology center., Valencia, Spain; [2]NanoPhotonics Centre, Cavendish Laboratory. University of Cambridge, Cambridge, United Kingdom; [3]Empa, Swiss Federal Laboratories for Materials Science and Technology, , Thun, Switzerland

We present a reproducible, single-step, and cost-effective method for the controlled nanopositioning of single metallic nanoparticles (NPs) onto lithographically fabricated photonic nanostructures with sub-micron accuracy.

EG-6.5 WED 9:30

Recoil and Quantum Effects in the Interaction of Low-Energy Free Electrons with Illuminated Planar Surfaces

•A.P. Synanidis[1], P.A.D. Gonçalves[1], C. Ropers[2], and F.J. García de Abajo[1,3]; [1]ICFO – Institut de Ciències Fotòniques, The Barcelona Institute of Science and Technology, 08860 Castelldefels (Barcelona), Spain; [2]Max Planck Institute for Multidisciplinary Sciences, Germany, 37077 Göttingen, Germany; [3]ICREA – Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys 23, 08010 Barcelona, Spain

We present a theoretical framework to describe electron-light-matter interactions for low-energy electrons, encompassing quantum and recoil effects, and allowing us to predict exciting phenomena during electron scattering from illuminated planar surfaces and surface optical modes.

Room 13a ICM

CA-6.4 WED 9:15

Deep-red laser operation of cleaved single-crystal plates of Eu:CsGd(MoO4)2 molybdate

•A. Baillard[1], P. Loiko[1], A. Pavlyuk[2], A. Braud[1], and P. Camy[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]A.V. Nikolaev Institute of Inorganic Chemistry, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia

A deep-red 17at.% Eu:CsGd(MoO4)2 laser based on cleaved single-crystal plates generates 212 mW at 703.1 nm (the 5D0→7F4 transition) with a slope efficiency of 30.1%, a laser threshold of 51 mW and a linear polarization.

CA-6.5 WED 9:30

Acousto-optic Q-switched Alexandrite Laser with Wavelength Tuning and Second Harmonic Generation

•M. Liang[1], A. Minassian[2], and M. Damzen[1]; [1]Imperial College London, London, United Kingdom; [2]Unilase, London, United Kingdom

We present the first ever Acousto-Optic Q-switched Alexandrite laser. We demonstrate 290 microJoules pulse energy at 5 kHz, wavelength-tuning from 734 – 783 nm, and second harmonic generation in LBO (and BBO) crystal to generate tunable ultraviolet.

Room 13b ICM

JSI-1.3 WED 9:15

Nanoscale Transient Magnetization Dynamics With Extreme Ultraviolet Transient Gratings

•L. Foglia; Elettra Sincrotrone Trieste S.C.p. A. , Trieste, Italy

We review the recent advances on investigating and controlling nanoscale ultrafast magnetization dynamics using EUV transient gratings, which is paramount for understanding light-controlled ultrafast magnetic data processing and storage applications.

JSI-1.4 WED 9:30

Time Resolved Hard X-ray/ Optical Transient Grating Spectroscopy on a Liquid Jet

A.S. Morillo-Candas[1], A. Al-Haddad[1], S. Augustin[1], C. Bacellar[1], A. Cannizzo[2], C. Cirelli[1], D. Fainozzi[3], T. Feurer[2], P. Johnson[1], T. Mamyrbayev[1], A. Maznev[4], K. Nelson[4], K. Schnorr[1], C. Svetina[5], J. Vila-Comamala[1], M. Chergui[6], C. Bostedt[1], and •G. Knopp[1,6]; [1]Paul Scherrer Institute, Villigen , Switzerland; [2]Institute of Applied Physics, University of Bern, Bern, Switzerland; [3]Elettra-Sincrotrone Trieste, Trieste, Italy; [4]Massachusetts Institute of Technology, Cambridge, USA; [5]IMDEA nanociencia, Madrid, Spain; [6]École polytechnique fédéral de Lausanne, Lausanne, Switzerland

We demonstrate for the first time the feasibility of hard X-ray/optical transient grating spectroscopy (XO-TG) on a liquid jet system at SwissFEL and use it for the investigation of the chemical dynamics of an aqueous ferrioxalate solution.

Room 14a ICM

CD-7.4 WED 9:15

Spectroscopy of Heteronuclear Xenon-noble Gas Dimers - Towards Bose-Einstein Condensation of Vacuum-UV Photons

•E. Boltersdorf, T. vom Hövel, F. Vewinger, and M. Weitz; Institut für Angewandte Physik, Bonn, Germany

We report experimental work aimed at extending the applicability of Bose-Einstein-condensation of photons from current visible spectral range experiments to the vacuum-ultraviolet (100nm-200nm) regime. For this, spectroscopic experiments investigating dense xenon-noble gas mixtures are presented.

CD-7.5 WED 9:30

Harmonic generation from silicon membranes at visible and ultraviolet wavelengths

•L. Rodríguez[1], K. Hallman[2], J. Trull[1], C. Cojocaru[1], M.A. Vincenti[3], N. Akozbek[4], R. Vilaseca[1], and M. Scalora[5]; [1]Department of Physics, Universitat Politècnica de Catalunya, Terrassa, Spain; [2]PeopleTech, Inc., Huntsville, USA; [3]Department of Information Engineering - University of Brescia, Brescia, Italy; [4]US Army Space & Missile Defense Command, Tech Center, Redstone Arsenal, Huntsville, USA; [5]DEVCOM Aviation and Missile Center, Redstone Arsenal, Huntsville, USA

We report an experimental-theoretical study of harmonic generation in silicon nanomembranes that allows us to determine physical properties of the material. With this, we are able to predict harmonic efficiencies in more complex structures.

Room 14b ICM

CH-5.2 WED 9:30

High speed mid-infrared dual comb spectroscopy with a single optical parametric oscillator

•D. Long[1], M. Cich[2], C. Mathurin[3], A. Heiniger[2], G. Mathews[3], A. Frymire[3], and G. Rieker[3]; [1]National Institute of Standards and Technology , Gaithersburg, MD, USA; [2]Toptica Photonics, Pittsford, NY, USA; [3]Precision Laser Diagnostics Laboratory, University of Colorado, Boulder, CO , USA

A pair of mid-infrared frequency combs were simultaneously generated in a single optical parametric oscillator. The resulting combs exhibited high power, high mutual coherence, and allowed for quantitative spectroscopy on nanosecond timescales.

Room Osterseen ICM

EE-1.4 WED 9:15

Landau Transitions and Berry Curvature Effects in Optically Induced Anomalous Hall Current

C. Dresler[1], •S. Priyadarshi[1], J. Hübner[2], and M. Bieler[1]; [1]Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; [2]Institut für Festkörperphysik, Leibniz Universität Hannover, Hannover, Germany

We induce anomalous Hall currents in bulk GaAs by ultrafast optical excitation of Landau levels. An analysis of the resulting THz radiation suggests that both, Berry curvature and scattering contribute to the AHC.

EE-1.5 WED 9:30

Probing ultrafast carrier dynamics in perovskite wide bandgap oxides

•H.-Y. Chen[1,2,3], R. Versteeg[1], P. Marsik[4], and M. Chergui[1,3]; [1]Laboratory of Ultrafast Spectroscopy(LSU), École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland; [2]Laboratory for Ultrafast Microscopy and Electron Scattering(LUMES), École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland; [3]Lausanne Centre for Ultrafast Science (LACUS), École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland; [4]Department of Physics, Faculty of Science and Medicine, University of Fribourg, Fribourg, Switzerland

We studied wide bandgap perovskite oxides by ultrafast transient reflectivity. Clear excitonic bleaching and enhancement as well as giant acoustic phonon was observed. A hot carrier cooling lifetime below 1 ps was revealed.

Room 1 Hall B1 (B11)

CF-6.4 WED 9:15

GW-scale pulse compression at multi-MHz-rate via all-bulk quasi-waveguide spectral broadening

•S. Gröbmeyer[1], K. Fritsch[1,2], V. Pervak[1], F. Krausz[1,3], and K.F. Mak[3]; [1]Ludwig-Maximilians-Universität München, München, Germany; [2]Helmut-Schmidt-Universität/Universität der Bundeswehr Hamburg, Hamburg, Germany; [3]Max-Planck-Institut für Quantenoptik, Garching, Germany

We present spectral broadening via a distributed quasi-waveguide, with which we generated 10.8 fs pulses at 100 W of average power and 0.64 GW of peak power with excellent temporal and spatial fidelity.

CF-6.5 WED 9:30

Generation of picosecond pulses from tapered laser diodes with over 40 W peak power at wavelengths of 780 nm and 830 nm

•S. Wohlfeil, H. Christopher, J. Fricke, P. Della Casa, A. Maaßdorf, H. Wenzel, A. Knigge, and G. Tränkle; Ferdinand-Braun-Institut (FBH), Berlin, Germany

We present two monolithic diode lasers with tapered gain sections emitting at 780 nm and 830 nm. Picosecond pulses with over 40 W peak power are measured in passive mode-locking operation.

Room 6 Hall B3 (B32)

CI-1.4 WED 9:30

High efficiency interface between multi-mode and single-mode fibers

•O. korichi, M. Hiekkamäki, and R. fickler; Tampere University,Photonics Laboratory, Physics Unit, Tampere, Finland

We present a method capable of achieving MMF–SMF coupling efficiencies from 30% to 70% using a multi-plane light conversion scheme (MPLC).

Room 7 Hall A1 (A11)

CJ-2.3 WED 9:15

Coherent beam combining and telecom modulation: reciprocal impact

•P. Pichon[1], B. Rouzé[1], M. Gay[2], L. Bramerie[2], L. Lombard[1], and A. Durécu[1]; [1]DOTA, ONERA, Université Paris Saclay, Palaiseau, France; [2]Institut Foton, CNRS UMR 6082, Université de Rennes, Lannion, France

This work explores the compatibility between 1) coherent beam combining in MOPA configuration using frequency-tagging locking and 2) a telecom signal relying on either amplitude modulation (NRZ) or phase modulation (DPSK).

CJ-2.4 WED 9:30

Optimized multicore fiber designs for coherent combination

•C. Jauregui [1], A. Klenke[1,2,3], A. Steinkopff[1], C. Aleshire[1], M. Bahri[1], J. Nold[4], S. Kuhn[4], N. Haarlammert[4], T. Schreiber[4], and J. Limpert[1,2,3,4]; [1]Institute of Applied Phyiscs, Friedrich-Schiller University Jena, Jena, Germany; [2]Helmholtz-Institute Jena, Jena, Germany; [3]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany; [4]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

The interconnection between the different design parameters for multicore fibersis presented andguidelines to obtain optimized multicore fiber designs for high-power, coherently-combined systems are discussed.

Room 8 Hall A1 (A12)

EB-6.4 WED 9:15

Integrated photonics for quantum communication on a CubeSat

•J. Pudelko[1,2], Ö. Bayraktar[1,2], I. Khan[1,2], W. Boxleitner[3], S. Petscharnig[3], C. Pacher[3], G. Leuchs[1,2], and C. Marquardt[1,2]; [1]Max-Planck-Institute for the Science of Light, Erlangen, Germany; [2]Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany; [3]AIT Austrian Institute of Technology GmbH, Center for Digital & Safety, Vienna, Austria

We present a photonic integrated CubeSat payload consisting of a sender for weak coherent states and a quantum random number generator, intended to demonstrate two important building blocks for satellite based quantum communication from space.

EB-6.5 WED 9:30

Nitrogen-vacancy centres integrated with foundry silicon nitride photonics

•H.-C. Weng, J. Monroy-Ruz, J.C.F. Matthews, J.G. Rarity, K.C. Balram, and J.A. Smith; Quantum Engineering Technology Labs, H. H. Wills Physics Laboratory and Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom

We demonstrate the coupling of NV centres in nanodiamond to foundry optimised silicon nitride photonics in an all-integrated device. The NV centres show a fluorescence lifetime of order 10 ns through the waveguide channel.

Room 1 ICM

CM-7.6 WED 9:45

244nm Direct UV Written Gratings in SiNx layers

•*A.I. Flint, G. De Paoli, S.T. Ilie, R.H.S. Bannerman, P.C. Gow, J.C. Gates, F.Y. Gardes, and P.G.R. Smith; University of Southampton, Optoelectronics Research Centre Southampton, Southampton, United Kingdom*

Interferometric 244nm laser inscription with is used to write 550nm period holographic gratings into SiNx layers. We present the characterisation of the fabrication process and optimisation grating response in etched and diced waveguides.

Room 4a ICM

CK-4.5 WED 9:45

A lithographically defined quantum dot with simultaneous subwavelength confinement of light

•*G. Kountouris, L. Vestergaard, A.S. Darket, J. Mørk, and P.T. Kristensen; Technical University of Denmark, Kongens Lyngby, Denmark*

We present a design for deterministic fabrication of a lithographically defined quantum dot in a dielectric cavity with deep sub-wavelength confinement of light and characterize the performance by quantifying the achievable radiative rate and efficiency.

Room 4b ICM

EG-6.6 WED 9:45

Moulding optical tweezers for 3D enhanced trapping

•*C. Sharp[1], U.G. Butaite[1], M. Horodynski[2], G.M. Gibson[3], S. Rotter[2], J.M. Taylor[3], and D.B. Phillips[1]; [1]Department of Physics and Astronomy, University of Exeter, Exeter, United Kingdom; [2]Institute for Theoretical Physics, Vienna University of Technology, Vienna, Austria; [3]School of Physics and Astronomy, University of Glasgow, Glasgow, United Kingdom*

We experimentally demonstrate 3D enhanced optical trapping. For constant laser power, our enhanced optical traps reduce the motion a trapped particle by an order of magnitude, when compared with a Gaussian beam.

Room 13a ICM

CA-6.6 WED 9:45

Detailed optomechanical design of a 150 mJ single frequency UV laser for the Aeolus-2 mission

•*D. Esser[1], M. Giesberts[1], B. Erben[1], S. Nyga[1], R. Kasemann[1], C. Wührer[2], S. Hahn[2], M. Leyendecker[1], J. Eßer[1], W. Wirz[1], S. Klein[1], M. Traub[1], J. Klein[1], W. Brandenburg[1], M. Höfer[1], D. Mohr[1], L. Pérez Prieto[2], and H.-D. Hoffmann[1]; [1]Fraunhofer Institut f. Lasertechnik, Aachen, Germany; [2]Airbus Defense & Space GmbH, München, Germany*

The detailed design of a demonstrator for a laser transmitter for ESA's Aeolus-2 mission is presented. The laser is capable to generate 150 mJ pulses at 355 nm wavelength and beam propagation factor < 2.

Room 13b ICM

JSI-1.5 WED 9:45

Polarization gratings at the nanoscale: a new tool to study dichroic samples

•*R. Mincigrucci, F. Bencivenga, L. Foglia, G. Perosa, and C. Masciovecchio; Elettra Sincrotrone Trieste SCpA, Trieste, Italy*

We hereby present a new class of transient gratings that can be generated by two crossed polarized extre ultraviolet beams. Possible applications to dichroic samples will be discussed.

Room 14a ICM

CD-7.6 WED 9:45

Mid-infrared Spontaneous and Stimulated Raman Scattering in a Silicon Core Fiber

•*M. Huang[1], S. Sun[1], T.S. Saini[1], Q. Fu[1], L. Xu[1], D. Wu[1], H. Ren[2], L. Shen[3], T.W. Hawkins[4], J. Ballato[4], and A.C. Peacock[1]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]School of Optoelectronic Engineering and Instrumentation Science, Dalian University of Technology, Dalian, China; [3]Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, China; [4]Centre for Optical Materials Science and Engineering Technologies and Department of Materials Science and Engineering, Clemson University, Clemson, USA*

Raman scattering beyond 2.2 μm is measured for the first time in a silicon core fiber. Both spontaneous and stimulated effects are observed, with a gain of 30 dB achieved via a pulsed pump laser.

Room 4a ICM

10:30 – 12:00

CK-5: Silicon nitride systems and devices

Chair: Béatrice Dagens, Université Paris-Saclay, France

CK-5.1 WED 10:30

Room-temperature Sputtered Ultralow-loss Silicon Nitride

•*S. Zhang[1], T. Bi[1,2], I. Harder[1], O. Lohse[1], F. Gannott[1], A. Gumann[1], Y. Zhang[1], and P. Del'Haye[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany*

We demonstrate a new process for integrated silicon nitride photonic devices based on reactive sputtering. We achieve propagation losses

Room 4b ICM

10:30 – 12:00

JSIV-1: Photo(electro)chemistry and desalination

Chair: Giulia Tagliabue, EPFL, Lausanne, Switzerland

JSIV-1.1 WED (Invited) 10:30

Plasmonic bimetallic metasurfaces for large-scale solar Hydrogen production

•*E. Cortes; University of Munich (LMU), Munich, Germany*

Optimization strategies for the synthesis and design of plasmonic catalysts: from understanding mechanistic details at the single particle level to the fabrication of cm2 supercrystals towards large-scale Hydrogen production.

Room 13a ICM

10:30 – 12:00

CA-8: High-power lasers and facilities

Chair: Marc Brunel, Institut FOTON, Université de Rennes, France

CA-8.1 WED (Invited) 10:30

High-Power Q-switched Near Infrared Cryogenic Lasers

•*M. Ganija[1,2], K. Boyd[1,2], and J. Munch[1]; [1]CADR-USPL, Faculty of SET, The University of Adelaide, Adelaide, Australia; [2]Directed Energy Technologies and Effects, Defence Science and Technology Group, Adelaide, Australia*

We report diffraction limited beam quality, continuous and pulsed Ho:YAG at 80 % efficiency with respect to pump power. We demonstrated average powers above

Room 13b ICM

10:30 – 12:00

JSI-2: X-ray source developments

Chair: Christoph Bostedt, EPFL, Lausanne, Switzerland

JSI-2.1 WED 10:30

Self-Seeding Systems at the European XFEL

•*G. Geloni; European XFEL, Schenefeld, Germany*

On behalf of the FEL R&D group, in this contribution I will discuss present capabilities and future possibilities of Self-Seeding systems at the European X-ray Free-Electron Laser.

Room 14a ICM

10:30 – 12:00

CD-8: Nonlinear dynamics I

Chair: François Leo, Université libre de Bruxelles, Belgium

CD-8.1 WED (Invited) 10:30

Laser-guided lightning using kHz filamentation at 1030 nm

•*A. Houard[1], P. Walch[1], T. Produit[2], V. Moreno[2], B. Mahieu[1], A. Sunjerga[3], C. Herkommer[4], A. Mostajabi[3], U. Andral[2], Y.-B. André[1], M. Lozano[1], L. Bizet[1], M.C. Schroeder[2], G. Schimmel[2], M. Moret[2], O. Maurice[5], B. Esmiller[5], K. Michel[4], W. Haas[6], T. Metzger[4], M. Rubinstein[7], F. Rachidi[3], V. Cooray[8], A. Mysyrowicz[1], J. Kasparian[2,9], and J.-P. Wolf[2]; [1]Laboratoire d'Optique Appliquée –*

Room 14b ICM

10:30 – 12:00

CH-6: Imaging at the nanoscale

Chair: Thomas Chaigne, Fresnel Institute, Marseille, France

CH-6.1 WED 10:30

Multi-Wavelength Ptychography for Wavefront Sensing

•*A. Pelekanidis[1,2], M. Du[1], X. Liu[1,2], F. Zhang[1], K.S.E. Eikema[1,2], and S. Witte[1,2]; [1]Advanced Research Center for Nanolithography, Amsterdam, Netherlands; [2]Department of Physics and Astronomy, Vrije Universiteit, Amsterdam, Netherlands*

We use multi-wavelength ptychography to reconstruct and characterize extreme ultraviolet wavefronts generated via high harmonic generation (HHG). We demonstrate the aberration transfer between the fun-

Room 14b ICM

CH-5.3 WED 9:45

Detection Sensitivity of Dual-Comb Spectroscopy

•*M. Roiz[1], S. Larnimaa[1], J. Karhu[1,2], and M. Vainio[1,3]; [1]Department of Chemistry, University of Helsinki, Helsinki, Finland; [2]Metrology Research Institute, Aalto University, Espoo, Finland; [3]Photonics Laboratory, Physics Unit, Tampere University, Tampere, Finland*

We have built a passively coherent dual-comb spectrometer to study different aspects that affect detection sensitivity in dual-comb spectroscopy as well as demonstrate possible ways to improve it.

Room Osterseen ICM

EE-1.6 WED 9:45

Ultrafast Interband Transition in Gold Probed by a Femtosecond Plasmonic Wavepacket

•*B. Lovász[1], P. Sándor[1], Z. Pápa[1,2], J. Budai[2], and P. Dombi[1,2]; [1]Wigner Research Centre for Physics, Budapest, Hungary; [2]ELI-ALPS Research Institute, ELI-HU Nonprofit Kft, Szeged, Hungary*

We measured hot electron population decay induced by ultrafast interband transition in gold with a novel free-space-pump plasmon-probe setup. Hot electrons thermalized with 117-fs and the lattice with 5-ps time constant.

Room 1 Hall B1 (B11)

CF-6.6 WED 9:45

Complete analysis of picosecond optical pulses by using the offset frequency intensity modulation

•*K. Oguchi[1], S. Nitanai[2], and Y. Ozeki[1]; [1]Department of Electrical Engineering and Information Systems, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan; [2]Department of Electrical and Electronic Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, Japan*

We propose a method of characterizing picosecond optical pulses using offset-frequency intensity modulation and spectral measurement. We experimentally measure the chirp of picosecond Ti:sapphire laser pulses, which was difficult to be characterized by previous methods.

Room 6 Hall B3 (B32)

CI-1.5 WED 9:45

Proposal for Multiport Photon Routing using Photonic Crystal Cavity Phase Shifters

•*M. Heuck; Technical University of Denmark, Kgs. Lyngby, Denmark*

We propose compact multiport photon routers based on static mixing circuits and dynamic photonic crystal cavity phase shifters. We discuss optimized mixing circuits and sensitivity to imperfections for implementations in lithium niobate on insulator.

Room 7 Hall A1 (A11)

CJ-2.5 WED 9:45

Phase Combination of 12 Fibers Using Multi-Plane Light Conversion Device

•*R. Demur[1], E. Turpin[1,2], L. Leviandier[1], J. Bourderionnet[1], and E. Lallier[1]; [1]Thales Research & Technology, Palaiseau, France; [2]C2N Centre de Nanosciences et de Nanotetchnologies, Palaiseau, France*

We present the coherent beam combination of 12 fibers using a multi-plane light conversion device. We evaluate the combination efficiency of the device and comment the steering performances compared to the theory.

Room 8 Hall A1 (A12)

EB-6.6 WED 9:45

Generation of spatially entangled states of light in nonlinear waveguide arrays

A. Raymond[1], S. Francesconi[1], J. Palomo[2], P. Filloux[1], M. Morassi[3], A. Lemaître[3], F. Raineri[3,4], M. Amanti[1], S. Ducci[1], and •F. Baboux[1]; [1]Université Paris Cité, Paris, France; [2]Université PSL, Paris, France; [3]CNRS/Université Paris-Saclay, Palaiseau, France; [4]Université Côté d'Azur, Nice, France

We demonstrate a nonlinear waveguide array, where photon pairs generated by SPDC are simultaneously spread over the whole array through cascaded quantum walks. This concept implements a compact and versatile source of spatially entangled states.

Room Osterseen ICM

10:30 – 12:00

CM-LIM: Lightmatter interaction

Chair: Emmanuel Stratakis, FORTH, Institute of Electronic Structure and Laser, Heraklion, Crete

CM-LIM.1 WED 10:30

Defect-rich Nanocatalysts from Pulsed Laser Diffusion Enhancement in Liquids

•*S. Barcikowski, K. Lau, S. Zerebecki, C. Rehbock, A. Ziefuß, and S. Reichenberger; Chemical Technology and Center for NanoIntegration Duisburg-Essen CENIDE, University of Duisburg-Essen, Essen, Germany*

Laser Particle Processing in Liquid allows to enhance diffusion processes on a nanosecond time scale by precise and efficient laser excitation allowing to write catalytically active defects with single-

Room 1 Hall B1 (B11)

10:30 – 12:00

CF-7: Ultrafast laser technology I

Chair: Hanieh Fattahi, MPI for the Science of Light, Erlangen, Germany

CF-7.1 WED 10:30

Single-cavity dual-comb Yb:YAG laser operating at 250 MHz with ultra-low noise

•*J. Pupeikis, B. Willenberg, C. Bauer, S. Camenzind, A. Nussbaum-Lapping, C. Phillips, and U. Keller; ETH Zurich, Zurich, Switzerland*

We demonstrate a 250 MHz single-cavity dual-comb laser delivering 2 W average power per comb with 100 Hz radio-frequency comb linewidth and 22 fs relative timing jitter over [10 Hz – 8.25 kHz].

Room 6 Hall B3 (B32)

10:30 – 12:00

CI-2: Frequency combs

Chair: Alessandro Tonello, University of Limoges, France

CI-2.1 WED (Tutorial) 10:30

Microcombs for Optical Communications

•*V. Torres Company; Chalmers University of Technology, Gothenburg, Sweden*

This tutorial will give an overview of the enabling characteristics of microcombs in wavelength division multiplexing and coherent communication systems.

Room 7 Hall A1 (A11)

10:30 – 12:00

CJ-3: Mode-locked fiber lasers

Chair: Alex Fuerbach, Macquarie University, Sidney, Australia

CJ-3.1 WED 10:30

Towards a self-starting all-fibre all-normal dispersion Mamyshev Oscillator in the 2 μm band

•*D.C. Kirsch[1], M.E. Likhachev[2], S.S. Aleshkina[2], M.V. Yashkov[3], and M. Chernysheva[1]; [1]Leibniz Institute of Photonic Technology, Jena, Germany; [2]Prokhorov General Physics Institute of the Russian Academy of Sciences, Dianov Fiber Optics Research Center, Moscow, Russia; [3]Institute of Chemistry of High Purity Substances of the Russian Academy of Sciences, Nizhny Novgorod, Russia*

Room 8 Hall A1 (A12)

10:30 – 12:00

EB-7: Quantum sensing

Chair: Gerd Leuchs, Institute for the Science of Light, Erlangen, Germany

EB-7.1 WED 10:30

Ultrasensitive Photonic Quantum Noise Sensing by Frequent-measurement Nonlinear Filtering

•*G. Kurizki[1], O. Firstenberg[1], T. Opatrný[2], D.B.R. Dasari[3], F. Caruso[4], F. Piacentini[5], and M. Genovese[5,6]; [1]Weizmann Institute of Science, Rehovot, Israel; [2]Palacky University , Olomouc, Czech Republic; [3]University of Stuttgart, Stuttgart , Germany; [4]University of Florence, Sesto Fiorentino, Italy; [5]Istituto Nazionale di Ricerca Metrologica, Torino, Italy; [6]INFN (sez. Torino), Torino, Italy*

NOTES

Room 4a ICM

of less than 3.5 dB/m after 800 °C annealing, enabling resonators with Q>10million for soliton generation.

CK-5.2 WED 10:45

Semiconductor Laser Frequency Stabilization based on a Silicon Nitride Photonic Integrated Circuit

A. Brugnoni[1], A.E. Kaplan[1,2], V. Vitali[1,2], M. Re[3], •C. Lacava[1,2], and I. Cristiani[1]; [1]Photonics Group, Department of Electrical, Computer and Biomedical Engineering, Pavia, Italy; [2]Optoelectronics Research Centre, Southampton, United Kingdom; [3]Huawei Technologies Italia S.r.l., Milano, Italy

The design and experimental characterization of a fully-integrated silicon nitride frequency stabilizer is presented. A C-band semiconductor laser stabilization with a maximum frequency deviation of 60 MHz from the nominal value was demonstrated.

CK-5.3 WED 11:00

Ultra-high-quality factor microring resonator based on silicon nitride

•S. Cui[1,2], K. Cao[1,2], Y. Yu[1,2], and X. Zhang[1,2]; [1]Wuhan National Laboratory for Optoelectronics and School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan, China; [2]Optics Valley Laboratory, Wuhan, China

We demonstrated a highly multimode MRR to achieve ultra-low propagation loss. Our method eliminates the requirement for chemical mechanical planarization and can be applied to different material platforms, thus greatly relaxing the fabrication processing requirements.

Room 4b ICM

JSIV-1.2 WED 11:00

Monocrystalline Plasmonic Nanostructures for Hot Carrier Photochemistry

•F. Kiani and G. Tagliabue; École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

We study quantum efficiency spectra of a redox reaction for monocrystalline gold nano-antennas having different thicknesses on TiO2-coated glass substrates. The results unravel the role of metal properties and plasmon excitation effects in plasmonic photocatalysis.

Room 13a ICM

100 W and pulse energies 470 mJ at high repetition rate.

CA-8.2 WED 11:00

Progress on Laser Development at the Extreme Photonics Applications Centre

•P. Mason, N. Stuart, J. Phillips, R. Heathcote, S. Buck, A. Wojtusiak, M. Galimberti, T. de Faria Pinto, S. Hawkes, S. Tomlinson, R. Pattathil, T. Butcher, C. Hernandez-Gomez, and J. Collier; Central Laser Facility, STFC, Didcot, United Kingdom

Progress on the development of a state-of-the-art petawatt laser driver operating at 30 J, 30 fs and 10 Hz pulse rate at the Extreme Photonics Applications Centre

Room 13b ICM

JSI-2.2 WED 10:45

Status and near future plans for generating pulses with shorter wavelengths and duration by the FERMI FEL

•M.B. Danailov; Elettra-Sincrotrone Trieste SCpA, Trieste, Italy

An overview of the status and ongoing upgrades of FERMI is presented, with emphasis on the roots to expand the current FEL parameters to shorter wavelengths and pulses. Ongoing seed laser upgrade will be discussed.

JSI-2.3 WED 11:00

Development of Two-Colour Sub-Femtosecond Pump/Probe Techniques with X-ray Free-Electron Lasers

•Z. Guo; SLAC National Accelerator Laboratory, Menlo Park, USA; Department of Applied Physics, Stanford University, Stanford, USA

We report the attosecond control and diagnosis of gigawatt-level two-colour $(\omega/2\omega)$ attosecond pump/probe pulse pairs with tunable sub-femtosecond delays at the Linac Coherent Light Source (LCLS).

Room 14a ICM

ENSTA Paris, Ecole Polytechnique, CNRS, IP Paris , Palaiseau, France; [2]Groupe de Physique Appliquée, Université de Genève, Geneva, Switzerland; [3]EMC Laboratory, Electrical Engineering Institute, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland; [4]TRUMPF Scientific Lasers GmbH + Co. KG, Unterföhring, Germany; [5]ArianeGroup, Les Mureaux, France; [6]Swisscom Broadcast AG, Bern, Switzerland; [7]School of Management and Engineering Vaud, University of Applied Sciences and Arts Western Switzerland, Yverdon-les-Bains, Switzerland; [8]Department of Electrical Engineering, Uppsala University, Uppsala, Sweden; [9]Institute for Environmental Sciences, Université de Genève, Geneva, Switzerland

We demonstrate the guiding of lightning over a distance of 50 m by laser filamentation of a high-repetition-rate terawatt laser.

CD-8.2 WED 11:00

UV Pulse Compression in Hollow Core Fibers using XPM

•J.P. Messerschmidt[1,2], Y. Jiang[1], G.M. Rossi[1,2], and F.X. Kärtner[1,2]; [1]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Physics Department and The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Hamburg, Germany

UV pulse self-compession to below 7 fs and μJ-level pulse energy is achieved via cross-phase modulation in a hollow-core fiber compressor. Further energy scaling and pulse compression down to few-fs is currently being investigated.

Room 14b ICM

damental laser and the harmonics, and chromatic aberration inherent during HHG.

CH-6.2 WED 10:45

Nanoscale Material-specific Imaging Using an Extreme Ultraviolet Table-top Light Source

•C. Liu[1,2,3], W. Eschen[1,2,3], L. Loetgering[1,2,3], D.S. Penagos Molina[1,2,3], R. Klas[1,2,3], V. Schuster[1,2,3], A. Kirsche[1,2,3], L. Berthold[4], A. Iliou[5], M. Steinert[2], F. Hilmann[5], M. Krause[4], J. Limpert[2,6], and J. Rothhardt[1,2,3,6]; [1]Helmholtz Institute Jena, Jena, Germany; [2] Institute of Applied Physics, Friedrich-Schiller-University Jena, Jena, Germany; [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany; [4]Fraunhofer Institute for Microstructure of Materials and Systems IMWS, Halle, Germany; [5]Leibniz Institute for Natural Product Research and Infection Biology, Jena, Germany; [6]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

We present our latest results on table-top ptychographic imaging at 13.5 nm. Quantitative amplitude- and phase images were obtained with sub-20 nm spatial resolution. Investigations of silicon-based semiconductor samples and microorganisms are enabled with excellent material-specificity.

CH-6.3 WED 11:00

Shape Measurement of Gold Nanorods in Water Using Microcavities

•Y. Yin, A. Trichet, and J. Smith; University of Oxford, Oxford, United Kingdom

We characterize aspect ratios of single gold nanorods in water using open-access microcavities. By measuring Stokes parameters of a transmitted beam, we obtain the anisotropic particles' perturbation

Room Osterseen ICM

laser-pulse-precision into nanoparticles.

CM-LIM.2 WED 10:45

High-temperature laser absorption of steel

•*J. Volpp*; *Luleå University of Technology, Luleå, Sweden*

It was possible to measure laser absorption values at high temperatures using a radiometric setup. Measurement data show a general trend of increasing absorption at increasing temperature with an absorption drop just above boiling temperature.

CM-LIM.3 WED 11:00

Exploration of the ultimate limitation of Moore's law using Lloyd's Mirror interference lithography

•*S. Santra*[1], *K. M. Dorney*[2], *F. Holzmeier*[2], *J. Petersen*[2], *S. De Gendt*[1,2], *and E. W. Larsen*[2]; [1]*KU Leuven, Leuven, Belgium*; [2]*imec, Leuven, Belgium*

We demonstrate the utilization of a tabletop high harmonic generation EUV source to perform interference lithography of ~20 nm pitch line/space patterns in a spin-on metal-oxide photoresist by deploying a Lloyd's mirror interference lithography setup.

Room 1 Hall B1 (B11)

CF-7.2 WED 10:45

High-speed optical sampling by dynamic repetition rate tuning of an optically injected mode-locked laser diode

•*A.F. Ribeiro*[1], *T. Gomes*[1,2], *and M.A. Cataluna*[1]; [1]*Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom*; [2]*IFIMUP and Departamento de Física e Astronomia, Faculdade de Ciências, Universidade do Porto, Porto, Portugal*

We demonstrate high-speed optical sampling by cavity tuning (OSCAT), with record scan rates of up to 20 MHz, enabled by the wide and dynamic repetition rate tuning of a dual-tone optically-injected mode-locked quantum-dot laser diode.

CF-7.3 WED 11:00

Monolithic Kerr-Lens-Modelocked 2.2-GHz Yb:Y2O3 Oscillator, Amplified by a Semiconductor Optical Amplifier

•*H. Ostapenko*[1], *Y. Feng*[1], *T. Lamour*[2], *R. McCracken*[1], *O. Mandel*[2], *D. Weise*[2], *and D.T. Reid*[1]; [1]*Heriot-Watt University, Edinburgh, United Kingdom*; [2]*Airbus Defence and Space GmbH, Immenstaad, Germany*

We present a fully bonded 2.2-GHz low-noise Yb:ceramic laser oscillator with 189 fs pulses which are then amplified through the chirped-pulse amplification in a semiconductor optical amplifier to 69 mW of average power.

Room 6 Hall B3 (B32)

Room 7 Hall A1 (A11)

The self-starting of a Thulium-based Mamyshev oscillator in all-fibre and all-normal dispersion configuration is explored. The first studies of the unoptimised, free-running laser demonstrate the generation of 200-ps pulses with up to 6 nJ energy.

CJ-3.2 WED 10:45

E-band Fourier domain mode locked laser and its application in optical coherence tomography

•*Y. Shi*[1,2], *D. Huang*[1,2], *Y. Li*[1,2], *F. Li*[2,3], *and P.K.A. Wai*[2,3,4]; [1]*Photonics Research Institute, Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong, China*; [2]*The Hong Kong Polytechnic University Shenzhen Research Institute, Shenzhen, China*; [3]*Photonics Research Institute, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University, Hong Kong, China*; [4]*Department of Physics, Hong Kong Baptist University, Hong Kong, China*

We demonstrate for the first time an E-band Fourier domain mode locked laser with a 50 kHz sweep rate and a 90 nm sweep range, and its application in swept-source optical coherence tomography.

CJ-3.3 WED 11:00

Coherence Breakdown Within the Ultra-Stable Regime of Fourier Domain Mode-Locked Lasers Under Increasing Intracavity Power

•*Ö.E. Aşırım*[1], *R. Huber*[2], *and C. Jirauschek*[1]; [1]*Technical University of Munich, Munich, Germany*; [2]*University of Lübeck, Lübeck, Germany*

The high coherence of FDML lasers is demonstrated to gradually deteriorate in the ultra-stable regime above a threshold power whose value depends on the fiber parameters. The numerical results are in excellent agreement with experiment.

Room 8 Hall A1 (A12)

We report novel methods for detecting quantum noise signatures via nonlinear filtering of quantum noise by frequent measurements of single quanta probes. Unparalleled sensitivity is reported for spin and photon probes.

EB-7.2 WED 10:45

Nonlinear filtering of thermal excitations from Quantum spin ensembles by Quantum spin probe measurements

•*D.B.R. Dasari*[1], *S. Yang*[2], *A. Chakrabarti*[3], *A. Finkler*[3], *G. Kurizki*[3], *and J. Wrachtrup*[1]; [1]*3. Physics Institute, University of Stuttgart, Stuttgart, Germany*; [2]*Department of Physics, The Hong Kong University of Science and Technology, Clear Water bay, Hong Kong, China*; [3]*Department of Chemical Physics, Weizmann Institute of Science, Rehovot, Israel*

We report nonlinear purification of Quantum spin ensembles by frequent measurements of a coupled Quantum Probe. Quantum State Engineering and Quantum Random walks follow as a natural consequence in both the ensemble and probe dynamics.

EB-7.3 WED 11:00

Rotation sensing with structured photons and multi-plane light-conversion

•*R. Fickler*[1], *M. Hiekkamäki*[1], *M. Eriksson*[1], *A.Z. Goldberg*[2,3], *F. Bouchard*[2], *and L.L. Sánchez-Soto*[4,5]; [1]*Tampere University, Tampere, Finland*; [2]*National Research Council of Canada, Ottawa, Canada*; [3]*University of Ottawa, Ottawa, Canada*; [4]*Max-Planck-Institut für die Physik des Lichts, Erlangen, Germany*; [5]*Departamento de Óptica,, Madrid, Spain*

Using the structured photons, we generate twisted N00N-states to perform super sensitive angular measurements. We further use them to encode high-dimensional King states for simultaneous mul-

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Room 4a ICM

CK-5.4 WED 11:15

Ultrasmall Submicrometer Sized Periodic Deposition on the Silicon Nitride Microring with Nanodispensing Technique

•H. Takeda[1], A. Abazi[2,3], A. Eich[2,3], Y. Tomishige[1], K. Hiramoto[1], J. Chen[1], Y. Mikami[1], N. Tate[1], Y. Oki[1], C. Schuck[2,3], and H. Yoshioka[1]; [1]Kyushu University, Fukuoka, Japan; [2]University of Muenster, Muenster, Germany; [3]Center for Soft Nano Science, Muenster, Germany

For use in the telecommunication band (around 1.55 micrometer), a second-order Bragg grating (grating period is shorter than 1 micrometer) was printed on an optical microring using nanodispensing technique and spectroscopic measurement showed spectral shift.

CK-5.5 WED 11:30

Perfect soliton crystal linear-wave scattering in a Si3N4 microring resonator

•H. Zhang[1], L. Lu[1,2], J. Chen[1,2], and L. Zhou[1,2]; [1]State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai, China; [2]SJTU-Pinghu Institute of Intelligent Optoelectronics, Shanghai, China

We investigate the perfect soliton crystal linear-wave scattering by injecting an extra probe laser in a Si3N4 microring resonator. With a properly set probe laser, the comb spectrum is adjusted in the experiments.

Room 4b ICM

JSIV-1.3 WED 11:15

Plasmonic Cu2SSe Nanocrystals: Chemical Synthesis and Applications

•N. Manwar and J.C. Colmenares Q.; Institute of Physical Chemistry, Polish Academy of Sciences (IPC-PAS), Warsaw, Poland

We are exploring the cuprous sulfide selenide (Cu2SSe) alloy NCs for plasmon induced catalytic (PIC) applications. Nevertheless, the chemical synthesis route is used to prepare the Cu2S, Cu2Se, and Cu2SSe nanocrystals and characterized those in detailed.

JSIV-1.4 WED 11:30

Record efficient and stable Si-based photoanodes enabled by ultrathin transition-metal alloy film for solar-assisted water splitting

•F. Xiang, N. Li, A. Burguete-Lopez, Z. He, M. Elizarov, and A. Fratalocchi; King Abdullah University of Science and Technology (KAUST), Jeddah province, Thuwal city, Saudi Arabia

We report an ultrathin transition-metal alloy coating strategy on Si photoanodes for efficient and stable solar-assisted water splitting. This technique extended the device lifetime to above 200 hours with a world-record efficiency of 4.25%.

Room 13a ICM

CA-8.3 WED 11:15

Femtosecond Precision Synchronization of Independent Laser Systems for Pump-Probe Experiments

•E.C. Erdman[1,2], J. Novák[1], R. Antipenkov[1], L. Indra[1,3], B. Tykalewicz[1], M. Horáček[1], J. Fara[1], J.A. Naylon[1], P. Bakule[1], and B. Rus[1]; [1]The Extreme Light Infrastructure ERIC, ELI Beamlines Facility, Dolní Břežany, Czech Republic; [2]Charles University in Prague, Prague, Czech Republic; [3]Czech Technical University in Prague, Prague, Czech Republic

A new laser (F-SYNC) operating at 13mJ, 1kHz, and compressible to <20fs has been developed. Here, we describe our work on its synchronization to a second 1kHz laser (L1-Allegra) with fs-level precision and arbitrary delay.

CA-8.4 WED 11:30

High Contrast Front-End for High Repetition Rate 100 TW-Class Laser System

•L. Indra[1,2], A. Špaček[1,2], J.T. Green[1], J. Bartoníček[1,3], J. Eisenschreiber[1,4], M. Fibrich[1,2], B. Tykalewiz[1], M. Horáček[1], J.A. Naylon[1], and B. Rus[1]; [1]The Extreme Light Infrastructure ERIC, ELI Beamlines Facility, Dolní Břežany, Czech Republic; [2]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Czech Republic; [3]Faculty of Mechanical Engineering, Czech Technical University in Prague, Czech Republic; [4]Charles University, Faculty of Mathematics and Physics, Prague, Czech Republic

We present an overview of a front-end, which seeds a 100TW-class laser and provides a synchronized multi-mJ, 2.2μm, 2kHz auxiliary output. Both branches are seeded via supercontinuum generated and amplified by a single regenerative amplifier.

Room 13b ICM

JSI-2.4 WED 11:15

Spectral phase interferometry for direct electric-field reconstruction of XUV synchrotron light

•T. Fuji[1], T. Kaneyasu[2], M. Fujimoto[3], Y. Okano[3], E. Salehi[3], M. Hosaka[4,5], Y. Takashima[4], A. Mano[4], Y. Hikosaka[6], S.-i. Wada[7], and M. Katoh[7,3]; [1]Toyota Technological Institute, Nagoya, Japan; [2]SAGA Light Source, Tosu, Japan; [3]Institute for Molecular Science, Okazaki, Japan; [4]Nagoya University, Nagoya, Japan; [5]University of Science and Technology of China, Hefei, China; [6]University of Toyama, Toyama, Japan; [7]Hiroshima University, Higashi-Hiroshima, Japan

We have demonstrated the characterization of XUV synchrotron light using spectral phase interferometry for direct electric-field reconstruction. A tandem undulator was used to generate a spectrally sheared replica of the original wave packet.

JSI-2.5 WED 11:30

An attosecond timing tool for phase-resolved experiments at free-electron lasers

•P.K. Maroju[1], M. Di Fraia[2], O. Plekan[2], M. Bonanomi[3,4], B. Merzuk[1], D. Busto[1,5], I. Makos[1], M. Schmoll[1], R. Shah[1], P.R. Ribic[2], L. Giannessi[2,6], G. De Ninno[2,7], C. Spezzani[2], G. Penco[2], A. Demidovich[2], M. Danailov[2], M. Coreno[2,6,8], M. Zangrando[2], A. Simoncig[2], M. Manfredda[2], R.J. Squibb[9], R. Feifel[9], S. Bengtsson[5], E.R. Simpson[5], T. Csizmadia[10], M. Dumergue[10], S. Kuehn[10], K. Ueda[11], J. Li[12], K.J. Schafer[12], F. Frassetto[13], L. Poletto[13], K.C. Prince[2], J. Mauritsson[5], C. Callegari[2], and G. Sansone[1]; [1]Physikalisches Institut, Albert-Ludwigs-Universität, Freiburg, Germany; [2]Elettra-Sincrotrone, Trieste, Italy; [3]Dipartimento di Fisica Politecnico, Milano, Italy; [4]Istituto di Fotonica e Nanotecnologie CNR-IFN, Milano, Italy; [5]Department of Physics, Lund Uni-

Room 14a ICM

CD-8.3 WED 11:15

Experimental realization of a coherent Raman comb

•J. Ignacchiti[1], A. Reigue[1], F. Amrani[1,2], B. Debord[1,2], F. Gérôme[1,2], and F. Benabid[1,2]; [1]GPPMM Group, Xlim Institue, CNRS UMR 7251, Université de Limoges, Limoges, France; [2]GLOphotonics, Limoges, France

Working in the transient regime of stimulated Raman scattering in H2-filled hollow core fiber, we demonstrate the phase locking of the generated Raman comb, in quantitative agreement with the numerical resolution of the Maxwell-Bloch equations.

CD-8.4 WED 11:30

Spatial Multiplexing of Temporal Localized Structures in Degenerate Optical Cavities

A. Bartolo[1], N. Vigne[2], M. Marconi[1], G. Beaudoin[3], K. Pantzas[3], I. Sagnes[3], A. Garnache[2], and •M. Giudici[1]; [1]Université Côte d'Azur, Centre National de La Recherche Scientifique, UMR7010 Institut de Physique de Nice, Valbonne, France; [2]Institut d'Electronique et des Systèmes, UMR5214, Centre National de la Recherche Scientifique, University of Montpellier, Montpellier, France; [3]Centre for Nanosciences and Nanotechnology, Centre National de la Recherche Scientifique UMR9001, Université Paris-Saclay, Palaiseau, France

We have implemented spatially independent sources of temporal localized structures in the transverse plane of a degenerate cavity VECSEL. A large variety of spatio-temporal light states can be obtained and controlled all-optically.

Room 14b ICM

to the cylindrically symmetric resonance modes.

CH-6.4 WED 11:15

Single-Molecule Image Scanning Microscopy

•E. Slenders, S. Patil, A. Bucci, L. Bega, M. Donato, M. Held, and G. Vicidomini; Istituto Italiano di Tecnologia, Genoa, Italy

We present single-molecule image scanning microscopy, a technique for single-molecule localization microscopy that combines structured illumination with structured detection. We show that this technique has several advantages over PALM, MINFLUX, and RASTMIN.

CH-6.5 WED 11:30

Subatomic Optical Localization and Metrology with Topologically Structured Light

T. Liu[1], •C.-H. Chi[1], J.-Y. Ou[1], K. MacDonald[1], and N. Zheludev[1,2]; [1]University of Southampton, Southampton, United Kingdom; [2]Nanyang Technological University, Singapore, Singapore

The first realization of optical picomotion metrology is reported. The position of a nanowire is localized with 'sub-Brownian' precision better than 100 picometers via deep learning analysis of topologically structured light scattering from the nanowire.

Room Osterseen ICM

CM-LIM.4 WED 11:15

Investigation on the influence of beam steering frequency on keyhole behaviour using a dynamic beam laser

F. Hugger[1], •R. Sättele[1], E. Punzel[1], A. Bürger[1], and J. Wagner[2]; [1]BBW Lasertechnik GmbH, Prutting, Germany; [2]Institut für Strahlwerkzeuge (IFSW), Stuttgart, Germany

Dynamic beam lasers enable rapid changes in intensity distributions at MHz frequencies. The influence of various thermal cycles on the dynamic response of the capillary surface is analytically investigated and compared to high-speed images.

CM-LIM.5 WED 11:30

Direct writing of silver-seed paths for electroless copper deposition using laser-induced forward transfer

•M. Domke[1], S. Stroj[1], J. Landsiedel[2], and N. Aguiló-Aguayo[2]; [1]Research Center for Microtechnology, Vorarlberg University of Applied Sciences, Dornbirn, Austria; [2]Research Institute of Textile Chemistry and Textile Physics, University of Innsbruck, Dornbirn, Austria

A laser-induced forward transfer of Ag nano and micro particle is utilized to generate seed paths for the growth of conductive lines on textiles via electroless copper deposition.

Room 1 Hall B1 (B11)

CF-7.4 WED 11:15

Towards deep UV spectroscopy with a high-power single-cavity dual-comb thin-disk oscillator

•T. Hofer, K. Fritsch, and O. Pronin; Helmut Schmidt University, Hamburg, Germany

Frequency-doubling our high-power dual-comb spectrometer based on a single-cavity thin-disk oscillator enables simultaneous spectroscopic measurements in two spectral domains in order to evaluate and discuss the further frequency conversion towards deep UV dual-comb spectroscopy.

CF-7.5 WED 11:30

Mode-locked Pulses with Narrowband Comb-like Peaks Formed by Intracavity Amplitude Modulation from Gaseous Molecules

•D. Okazaki[1,2], W. Song[1], I. Morichika[1], and S. Ashihara[1]; [1]Institute of Industrial Science, The University of Tokyo, Tokyo, Japan; [2]Institute for Chemical Research, Kyoto University, Kyoto, Japan

The mode-locked oscillation with intense narrowband spectral peaks is observed in Cr:ZnS laser with intracavity gaseous molecules. The shape of peaks varies inside the cavity because of intracavity narrowband amplitude modulation under strong nonlinearity.

Room 6 Hall B3 (B32)

CI-2.2 WED 11:30

Active Feedback Stabilization of Super-efficient Microcombs

•I. Rebolledo-Salgado[1,2], O. Bjarki Helgason[1], M. Girardi[1], M. Zelan[2], and V. Torres-Company[1]; [1]Dept. Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden; [2]Measurement Science and Technology, RISE Research Institutes of Sweden, Borås, Sweden

We report the long-term operation of a super-efficient microcomb. We use the soliton power to maintain a fixed pump detuning. The microcomb operates over 25 hours using a thermal control in a packaged module.

Room 7 Hall A1 (A11)

CJ-3.4 WED 11:15

1550 nm FDML-MOPA laser with kilowatt wavelength-swept pulses

•T. Kutscher, A. Gruber, P. Lamminger, C. Leonhardt, M. Wiggert, C. Stock, and S. Karpf; Institute of Biomedical Optics, Lübeck, Germany

We present a swept-source FDML-MOPA laser at 1550nm with 60ps pulses at 1kW peak power. The 326kHz sweep rate is modulated to 80 MHz pulse rate to enable high-speed imaging using inertia-free spectro-temporal line scanning.

CJ-3.5 WED 11:30

Four-wave mixing fast wavelength sweeping FDML laser with kW peak power at 900 nm and 1300 nm

•P. Lamminger[1], H. Hakert[1], S. Lotz[1], J.P. Kolb[2], T. Kutscher[1], S. Karpf[1], and R. Huber[1,2]; [1]Institute of Biomedical Optics, Universität zu Lübeck, Luebeck, Germany; [2]Medizinisches Laserzentrum Lübeck GmbH, Luebeck, Germany

Here presented is a fast wavelength sweeping fiber laser with kilowatt peak power at 900nm built of a 1064nm MOPA laser and a 1300nm FDML laser using four-wave mixing in a photonic crystal fiber.

Room 8 Hall A1 (A12)

tiparameter sensing of a rotation around a randomly chosen axis.

EB-7.4 WED 11:15

Coherent two-photon LIDAR with incoherent thermal light

•C.-H. Lee[1], Y. Kim[1], D.-G. Im[1], U.-S. Kim[1], V. Tamma[2], and Y.-H. Kim[1]; [1]Department of Physics, Pohang University of Science and Technology, Pohang, South Korea; [2]School of Mathematics and Physics, University of Portsmouth, Portsmouth, United Kingdom

We demonstrate a coherent two-photon LIDAR with thermal light that exploits the counterintuitive emergence of second-order interference beyond the coherence length. We expect our LIDAR scheme can play a crucial role in remote sensing.

EB-7.5 WED 11:30

Vector Magnetometry Based on Polarimetric Optically Detected Magnetic Resonance

P. Reuschel[1], M. Agio[1,2], and •A.M. Flatae[1]; [1]Laboratory of Nano-Optics, University of Siegen, Siegen, Germany; [2]National Institute of Optics (INO), National Research Council (CNR), Sesto Fiorentino, Italy

We introduce vector magnetometry based on polarimetric optically detected magnetic resonance of ensembles of nitrogen-vacancy centers in diamond without a magnetic bias field. The approach is general for other spin-1 color centers with C3v symmetry.

NOTES

Room 4a ICM

CK-5.6 WED 11:45

Spectrally asymetric frequency conversion with pulsed four-wave mixing in graphene covered Si_3N_4 waveguides

•P. Demongodin[1], H. El Dirani[2], S. Kerdilès[2], J. Lhuillier[1], T. Wood[1], C. Sciancalepore[2], and C. Monat[1]; [1]Université de Lyon, Ecole Centrale de Lyon, INSA Lyon, Universit'e Claude Bernard Lyon 1, CPE Lyon, CNRS, INL, UMR5270, Ecully, France; [2]Universitté Grenoble-Alpes, CEA-LETI, Grenoble, France

We investigate the nonlinear response of Si_3N_4 waveguides locally covered by graphene with pulsed degenerate FWM at telecom wavelength. Our measurements highlight a strong asymmetry in the power of the generated idler with graphene.

Room 4b ICM

JSIV-1.5 WED 11:45

Large-Scale Decentralized Photothermal Desalination: A Blueprint to Make Efficient Off-Grid Technologies a Reality

W. Schmid, A. Machorro-Ortiz, P. Dongare, N. Halas, and •A. Alabastri; Rice University, Houston, TX, USA

Our general approach for large-scale solar-driven photothermal desalination (SDPD), emphasizing the positive feedback relationship between evaporative power transfer and heat recovery, guides the discussion of recent advancements toward efficient and modular day-long water purification.

Room 13a ICM

CA-8.5 WED 11:45

A variable output 100 Hz laser system with few-cycle and TW level pulses

•P. Gaal[1], B. Nagyilles[1], M. Karnok[1], A.P. Kovacs[1,2], T. Gilinger[1], M. Fule[1,3], C. Kiraly[1], R. Nagymihaly[1,4], I. Seres[1,4], S. Toth[1,4], and K. Osvay[1,2]; [1]National Laser-Initiated Laboratory, University of Szeged, Szeged, Hungary; [2]Dept Optics and Quantum Electronics, University of Szeged, Szeged, Hungary; [3]Dept. Experimental Physics, University of Sz, Szeged, Hungary; [4]ELI-ALPS, Szeged, Hungary

A versatile 100Hz laser system based on negatively and positively chirped CPA has been developed. The few cycle output provides pulses with 9.2fs and 0.3mJ, while the power output supports 26fs pulses with 36mJ.

Room 13b ICM

versity, Sweden; [6]INFN Laboratori Nazionali di Frascati, Rome, Italy; [7]Laboratory of Quantum Optics, University of Nova Gorica, Slovenia; [8]ISM-CNR, Istituto Struttura della Materia, Trieste, Italy; [9]Department of Physics, University of Gothenburg, Sweden; [10]ELI ALPS, ELI-HU, Szeged, Hungary; [11]Institute of Multidisciplinary Research for Advanced Materials, Tohoku, Japan; [12]Department of Physics and Astronomy Louisiana State University, Baton Rouge, USA; [13]Istituto di Fotonica e Nanotecnologie, Padua, Italy

We will present a novel attosecond timing tool for the single-shot characterization of the relative phase of an attosecond pulse train and an infrared laser field. A resolution of one atomic unit (24 as) is demonstrated.

JSI-2.6 WED 11:45

FLASH2020+: Providing new opportunities for excellent FEL experiments

•L. Schaper, M. Beye, M. Gühr, I. Hartl, and S. Schreiber; Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

By 2025 the FLASH facility will be transformed to simultaneously deliver high intensity SASE and spectrally clean Fourier limited externally seeded FEL pulses driving next generation FEL experiments in the XUV to soft X-ray regime.

Room 14a ICM

CD-8.5 WED 11:45

Enhancing Ising Machine Robustness Through Period-2 Dynamics in Optical Resonators

•L. Quinn[1,2], G. Xu[3], Y. Xu[1,2], J. Fatome[4], S. Murdoch[1,2], M. Erkintalo[1,2], and S. Coen[1,2]; [1]Physics Department, University of Auckland, Auckland, New Zealand; [2]he Dodd-Walls Centre for Photonic and Quantum Technologies, Otago, New Zealand; [3]School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan, China; [4]ICB, UMR 6303 CNRS, Université Bourgogne-Franche-Comté, Dijon, France

Here we propose a novel coherent Ising machine (CIM) based upon spontaneous symmetry-breaking (SSB) in a driven Kerr resonator. We demonstrate enhanced robustness due to the utilization of period-2 symmetry-breaking dynamics.

Room 14b ICM

CH-6.6 WED 11:45

A Photonic Atom Probe allowing for super-resolution photoluminescence spectroscopy and contactless optical piezo-spectroscopy

L. Rigutti[1], E. Di Russo[1], P. Dalapati[1], L. Venturi[1], J. Houard[1], I. Blum[1], S. Moldovan[1], J.-M. Chauveau[2], M. Huges[2], D. Blavette[1], F. Vurpillot[1], and •A. Vella[1]; [1]Univ Rouen Normandie, INSA Rouen Normandie, CNRS, Groupe de Physique des Matériaux UMR 6634, Rouen, France; [2]Centre de Recherche sur l'Hétéro-Epitaxie et ses Applications, UPR10 CNRS , Valbonne, France

We present the Laser-assisted Atom Probe Tomography coupled with in-situ micro-photoluminescence bench as a new instrument for in-situ correlative microscopy with improuved optical resolution and contactless optical piezospectroscopy.

Room 4a ICM

12:00 – 12:52

PP-2: Early-stage Researcher (ESR) session - Poster pitches II

Chair: Emiliano Descrovi, European Optical Society, Palaiseau, France

PP-2.1 WED (Poster pitch of CC-P.1) 12:00

400 kHz repetition rate THz-TDS with 24 mW of average power driven by a compact industrial Yb-laser

•C. Millon[1], S. Houver[2], and C.J. Saraceno[2]; [1]Ruhr University Bochum, Bochum, Germany; [2]Paris Cite University, Paris, France

We demonstrate a 24 mW average power THz-TDS at 400 kHz repetition rate, driven directly by a commercial fs-laser. We show no thermal effects on the generated THz while varying the repetition rate.

PP-2.2 WED (Poster pitch of CE-P.2) 12:04

Low-temperature and hydrogen-free silicon dioxide cladding for next-generation integrated photonics

Z. Li[1,2], •Z. Qiu[1,2], R.N. Wang[1,2], M. Divall[1,2], and T. Kippenberg[1,2]; [1]Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]Center for Quantum Science and Engineering, EPFL, Lausanne, Switzerland

We demonstrate a hydrogen-free low-loss silicon dioxide film deposited with $SiCl_4$ for cladding of photonic integrated circuits. A very wide low-loss window of 1260 nm to 1625 nm is achieved at deposition temperature as low as 300 °C.

PP-2.3 WED (Poster pitch of CE-P.3) 12:08

Laser-Assisted Bonding Prototype Equipment for Hybrid Integration of Silicon Photonic Circuits

•A. Vlasov, T. Uusitalo, E. Lepukhov, H. Virtanen, S.-P. Ojanen, J. Viheriälä, and M. Guina; Tampere University, Physics Unit, Optoelectronic Research Centre, Korkeakoulunkatu 3, Tampere, Finland

Hybrid integration on silicon substrate is promising way towards increased density and enhanced functionality. We introduce the self-developed laser-assisted bonding setup with bottom coaxial irradiation architecture, which combines the bonding beam delivery and microscopy channels.

PP-2.4 WED (Poster pitch of CG-P.2) 12:12

Attosecond Optical Spectroscopy of Monocrystalline Diamond

•G.L. Dolso[1], S.A. Sato[2], N. Di Palo[1], G. Inzani[1], R. Borrego-Varillas[3], M. Nisoli[1,3], and M. Lucchini[1,3]; [1]Department of Physics, Politecnico di Milano, Italy; [2]Center for Computational Sciences, University of Tsukuba, Japan; [3]Institute for Photonics and Nanotechnologies, IFN-CNR, Milano, Italy, Italy

We measured attosecond electron dynamics in single-crystalline diamond induced by few-femtosecond opti-

Room Osterseen ICM

CM-LIM.6 WED 11:45

Inscription of Waveguides and Beam Splitters in Borosilicate Glass using a Femtosecond Laser with a Long Focal Length

•*T. Willburger, S. Funken, M.-J. Kleefoot, and H. Riegel; Aalen University, Aalen, Germany*

In this work, we present the potential for the microfabrication of direct written optical components such as waveguides and beam splitters into the volume of borosilicate glass using femtosecond laser with a long focal length.

Room 1 Hall B1 (B11)

CF-7.6 WED 11:45

Self-Starting Kerr-Lens-Mode-locked 1-GHz Ti:sapphire Oscillator Pumped by a Single Laser Diode

•*H. Ostapenko, T. Mitchell, P. Castro-Marin, and D.T. Reid; Heriot-Watt University, Edinburgh, United Kingdom*

We present a 1-GHz self-starting Ti:Sapphire laser oscillator pumped by a single green diode, achieving 106 mW of average output power at 1W of pump with 111 fs pulses and low-noise performance.

Room 6 Hall B3 (B32)

CI-2.3 WED 11:45

Direct-modulation optoelectronic oscillator for optical frequency comb and pulse generation

•*B. Sinquin, M. Vallet, M. Alouini, and M. Romanelli; Univ. Rennes, CNRS, Institut FOTON UMR 6082, Rennes, France*

We propose a direct-modulation optoelectronic oscillator to generate simultaneously ultra-pure RF signals and low jitter picosecond optical pulses. We demonstrate a phase noise of -123 dBc/Hz at 10 kHz and a broad optical spectrum.

Room 7 Hall A1 (A11)

CJ-3.6 WED 11:45

Frequency-Shifted-Feedback Mode-Locked Fibre Laser with Tuneable Repetition Rate

•*J.-B. Lecourt[1], A. Baylon[2], S. Boivinet[1], T. Cassim[2], F. Défossez[1], A. Gognau[1], J.-P. Yehouessi[1], and Y. Hernandez[1]; [1]Multitel Innovation Center, Mons, Belgium; [2]Euro-Multitel SA, Mons, Belgium*

A Frequency Shifted Feedback mode-locked fiber laser is developed. The laser can operate at different repetition rates, fundamental frequency imposed by cavity length and harmonics, thanks to dynamic control of the transmission of the Acousto-Optic-Modulator

Room 8 Hall A1 (A12)

EB-7.6 WED 11:45

Time-frequency quantum metrology

•*N. Fabre; Telecom Paris, Institut Polytechnique de Paris, 19 Place Marguerite Perey, 91120, Palaiseau, France*

The engineering of the spectral distribution of photon pairs, and the influence of the scaling with the number of photons, are investigated for the measurement of time and frequency delay.

NOTES

Room 4a ICM

cal light pulses. Our results, supported by TDDFT simulations, validate macroscopic models and identify the contribution of individual sub-bands to the total optical response.

PP-2.5 WED (Poster pitch of CG-P.3) 12:16

Optical levitation of reflective shells using an LG01 vortex beam

•*A.-H. Munj, R. Smith, and W. Kerridge-Johns; Imperial College, London, United Kingdom*

We present optical levitation of reflective silver-coated glass shells ranging from 53-93μm in diameter, at large working distances (40-100mm) using a LG01 vortex laser. Minimum levitation powers ranged from 50mW to 100mW.

PP-2.6 WED (Poster pitch of CI-P.13) 12:20

Multiple Scattering Layers As Physical Unclonable Functions For Optical Wireless Communication

•*A. Rates[1], J. Vrehen[2], B.L. Mulder[1], W.L. IJzerman[2,3], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Signify, Eindhoven, Netherlands; [3]Department of Mathematics and Computer Science, Eindhoven University of Technology, Netherlands*

We study the correlation of light speckle between multiple scattering layers. Based on this, we propose an optical wireless communication scheme using scattering media as physical unclonable functions.

PP-2.7 WED (Poster pitch of CL-P.1) 12:24

Towards the development of a SWIR-LEDs based optoelectronic system for urea monitoring during haemodialytic therapy

•*E. Bodo, V. Bello, and S. Merlo; Dep. of Electrical, Computer & Biomedical Engineering, University of Pavia, Italy*

We provide the proof of concept of urea concentration detection by means of amplitude measurement, specifically exploiting the urea absorption band around λ = 2.15 μm, that can provide valuable information about dialysis efficiency.

PP-2.8 WED (Poster pitch of CL-P.2) 12:28

Classification of clinically significant prostate cancer using Raman spectroscopy and Support Vector Machine classification

•*S.J. van Breugel[1,2,3], I. Low[4], M.L. Christie[4], M.R. Pokorny[4], H.U. Holtkamp[1,3], M.K. Nieuwoudt[1,2,3], M.C. Simpson[1,2,3,5], K. Zargar-Shoshtari[4,6], and C. Aguergaray[2,3,5]; [1]School of Chemical Sciences, University of Auckland, Auckland, New Zealand; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [3]The Photon Factory, University of Auckland, New Zealand; [4]Counties Manukau District Health Board, Auckland, New Zealand; [5]Department of Physics, University of Auckland, New Zealand; [6]Faculty of Medical and Health Sciences, University of Auckland, New Zealand*

Raman spectroscopy and support vector machine classification are combined to detect clinically significant prostate cancer on a data set of 152 patients. The reported cohort and classification performance are the highest reported to date.

PP-2.9 WED (Poster pitch of EB-P.1) 12:32

Deep Learning Based TEMPEST Attacks on a Quantum Key Distribution Sender

•*A. Baliuka[1,2], M. Stöcker[1], M. Auer[1,2,3], P. Freiwang[1,2], H. Weinfurter[1,2,4], and L. Knips[1,2,4]; [1]LMU, Munich, Germany; [2]MCQST, Munich, Germany; [3]Univ. der Bundeswehr München, Neubiberg, Germany; [4]MPQ, Garching, Germany*

A side-channel attack on the electronics of a quantum key distribution sender is demonstrated analyzing radio-frequency emissions using neural networks. It can extract almost all secret key at a few centimeters from the device.

PP-2.10 WED (Poster pitch of EC-P.1) 12:36

Observation of interaction-induced topological doublon states

•*J. Beck[1], H. Drüeke[1], M.J. Meschede[1], M. Heinrich[1], F.S. Piccioli[1,2], S. Weidemann[1], D. Bauer[1], and A. Szameit[1]; [1]Institute for physics, University Rostock, Germany; [2]INO-CNR BEC Center and Dipartimento di Fisica, Universita' di Trento, Italy*

We present the first observation of propagating topologically protected doublon states in an anomalous Floquet driven 1D array. Using dimensional mapping, the two repulsive interacting particles in 1D were observed in 2D laser-written waveguide lattices.

PP-2.11 WED (Poster pitch of EH-P.1) 12:40

Holographic Optical Metasurfaces with High Trap Stiffness

•*T. Plaskocinski, J. Xiao, M. Biabanifard, S. Persheyev, and A. Di Falco; University of St Andrews, UK*

Photonic metasurfaces have been proposed to create on-chip solutions for optical trapping applications. We present a metasurface-enabled on-chip system, capable of trapping extended objects, with performance comparable to a system using high numerical aperture objectives.

PP-2.12 WED (Poster pitch of EH-P.16) 12:44

Self-Assembled Deep Ultraviolet Rhodium nanogap antenna to enhance single protein autofluorescence

•*P. Roy[1], S. Zhu[2], J.B. Claude[1], J. Liu[2], and J. Wenger[1]; [1] Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, AMUTech, Marseille, France; [2]Department of Chemistry, Duke University, Durham, USA*

Self-assembled label-free detection platform for single proteins in DUV range using natural autofluorescence and Rh Dimer gap antenna design, showing 2 orders higher enhancement than confocal methods and 1 order higher than current state-of-the-art techniques.

PP-2.13 WED (Poster pitch of EI-P.6) 12:48

Second-order nonlinearity of excitons in hBN-encapsulated monolayer transition metal dichalcogenides

•*S. Takahashi[1], S. Kusaba[1], K. Watanabe[2], T. Taniguchi[3], K. Yanagi[4], and K. Tanaka[1,5]; [1]Department of Physics, Kyoto University, Kyoto, Japan; [2]Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan; [3]International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Tsukuba, Japan; [4]Department of Physics, Tokyo Metropolitan University, Tokyo, Japan; [5]Institute for Integrated Cell-Material Sciences, Kyoto, Japan*

P-series excitons besides s-series were observed by sum frequency generation spectroscopy in monolayer transition metal dichalcogenides. New insights into nonlinear optical responses were obtained from energy level structures and polarization dependences.

Room 1 ICM

14:00 – 15:30

JSI-3: Imaging geometric and electronic structures

Chair: Cristian Svetina, IMDEA, Madrid, Spain

JSI-3.1 WED (Invited) 14:00

Imaging ultrafast electron dynamics in isolated nanoparticles

B. Senfftleben[1], J. Zimmermann[1,2], A. Colombo[2], E. Hassanpour Yesaghi[2], L. Hecht[2], A. Hoffmann[1], M. Kretschmar[1], K. Kolatzki[2], B. Kruse[3], B. Langbehn[4], N. Monserud[1], T. Nagy[1], M. Sauppe[2], R.M. Tanyag[1,4], J. Tümmler[1], A. Ulmer[4], T. Möller[4], I. Will[1], T. Fennel[3], M.J.J. Vrakking[1], A. Rouzée[1], B. Schütte[1], and •D. Rupp[1,2]; [1]Max Born Institute, Berlin, Germany; [2]NUX, DPHYS, ETH Zürich, Zürich, Switzerland; [3]Institut für Physik, Uni Rostock, Rostock, Germany; [4]IOAP, TU Berlin, Berlin, Germany

We image isolated nanoparticles in free flight with intense pulses from X-ray free electron lasers and high-harmonic sources. The recent advent of intense attopulses even allows to resolve ultrafast changes of the nanoparticles' electronic structure.

Room 4a ICM

14:00 – 15:30

CK-6: Integrated optical devices I

Chair: Joyce Poon, Max-Planck-Institute for Microstructure Physics, Halle, Germany

CK-6.1 WED (Invited) 14:00

Lighting up the brain: Implantable neural probes using wafer-scale integrated photonics

•J. Poon; Max Planck Institute of Microstructure Physics, Halle (Saale), Germany; University of Toronto, Toronto, Canada

I will present silicon photonic integrated circuits operating in the visible spectrum that miniaturize today's microscopy and fiber optic tools to enable unique multiphysical and multifunctional interfaces to the brain for optogenetics and fluorescence imaging.

Room 4b ICM

14:00 – 15:30

JSIV-2: Thermal radiation and photovoltaics

Chair: Esther Alarcon Llado, AMOLF, Amsterdam, The Netherlands

JSIV-2.1 WED (Invited) 14:00

Incandescent Metasurfaces

•J.-J. Greffet; Université Paris-Saclay, Institut d'Optique Graduate School, Palaiseau, France

We introduce the basic concepts of an incandescent metasurface emphasizing the differences with usual metasurfaces. We then discuss recent results demonstrating control of directivity, emission spectrum, polarization and fast modulation.

Room 13a ICM

14:00 – 15:30

CA-7: Power scaling

Chair: Clara Saraceno, University of Bochum, Bochum, Germany

CA-7.1 WED (Tutorial) 14:00

Prospects in power scaling of fiber lasers and amplifiers

•A. Tuennermann; Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; Friedrich Schiller University Jena, Institute of Applied Physics, Jena, Germany

The state of the art of science and technology in fiber lasers and amplifiers is reviewed. The prospects for future developments using advanced fiber designs in combination with modern laser and amplifier architectures are discussed.

Room 13b ICM

14:00 – 15:30

CB-6: Integrated photonics and frequency combs

Chair: Benedikt Schwarz, Technical University, Wien, Austria

CB-6.1 WED (Keynote) 14:00

Ultra-low loss hybrid silicon nitride integrated photonics: from chipscale frequency combs, frequency agile lasers to Erbium amplifiers on chip

•T.J. Kippenberg; EPFL, Lausanne, Switzerland

Recent advances allowed to create ultra-low-loss, meter-long waveguides in silicon nitride. I will review advances of this technology, from chipscale frequency combs, parametric amplifiers, ultra-narrow linewidth lasers with fiber laser-coherence, and erbium amplifiers on chip.

Room 14a ICM

14:00 – 15:30

CD-9: Nonlinear dynamics II

Chair: Ayhan Demircan, Leibnitz University Hannover, Germany

CD-9.1 WED 14:00

Ultrasensitive Dispersive Fourier Transform Characterization of Nonlinear Instabilities

•L. Sader[1], S. Bose[2,3], A. Khodadad Kashi[2,3], Y. Boussafa[1], R. Dauliat[1], P. Roy[1], M. Fabert[1], A. Tonello[1], V. Couderc[1], M. Kues[2,3], and B. Wetzel[1]; [1]XLIM Research Institute, CNRS UMR 7252, University of Limoges, Limoges, France; [2]Institute of Photonics, Leibniz University Hannover, Hannover, Germany; [3]Cluster of Excellence PhoenixD, Leibniz University Hannover, Hannover, Germany

We report on a dispersive Fourier transform characterization technique using single photon detectors. We show that this ultrasensitive approach allows the characterization of nonlinear noise-driven dynamics with ultra-high resolution and theoretically unlimited dynamic range.

CD-9.2 WED 14:15

Genetic algorithm optimization of broadband operation in a noise-like pulse fiber laser

•M. Hary[1,2], C. Lapre[2], F. Meng[3], C. Finot[4], G. Genty[1], and J.M. Dudley[2]; [1]Photonics Laboratory, Tampere University, Tampere, Finland; [2]Université de Franche-Comté, Institut FEMTO-ST, CNRS UMR 6174, Besançon, France; [3]State Key Laboratory of Integrated Optoelectronics, College of Electronic Science & Engineering, Jilin University, Jilin, China; [4]Université de Bourgogne, Laboratoire Interdisciplinaire Carnot de Bourgogne, CNRS UMR 6303, Dijon, France

We use a genetic algorithm to locate the optimal broadband states of

Room 14b ICM

14:00 – 15:30

CH-7: Instrumentation for optical sensing and microscopy

Chair: Marco Grande,Politecnico di Bari, Italy

CH-7.1 WED 14:00

Fabrication of Chequerboard Diffraction Grating for Robust and Single-Shot Phase-Shifting Digital Holography

•T. Maeda[1,2], S. Yanase[1,2], H. Sotobayashi[1], and K. Akahane[2]; [1]Aoyama Gakuin University, Sagamihara, Japan; [2]National Institute of Information and Communications Technology, Koganei, Japan

A chequerboard diffraction grating was fabricated to demonstrate robust and single-shot phase-shifting digital holography. In the experiment, the phase distribution of light was successfully measured with the same accuracy as the conventional four-shot method.

CH-7.2 WED 14:15

Metasurface Confocal – Enabling a Shift in Optical Instrumentation

•D.J. Townend, J. Williamson, D. Tang, N. Sharma, A.J. Henning, H. Martin, and X. Jiang; University of Huddersfield, Huddersfield, United Kingdom

We present our results showing the creation of an ultra-compact and lightweight confocal sensor based on a single metasurface. When deployed as an integrated sensor this will help realise smarter and more automated manufacturing processes.

Room Osterseen ICM

14:00 – 15:30

EF-1: Complex fiber dynamics I

Chair: Gian-Luca Oppo, University of Strathclyde, United Kingdom

EF-1.1 WED (Tutorial) 14:00

Nonlinear Multimode Fiber Optics

•S. Wabnitz; Sapienza University of Rome, Rome, Italy

This tutorial will present an overview of recent research progress in the field of nonlinear multimode fiber optics. Phenomena such as multimode solitons, geometric parametric instability and beam self-cleaning lead to new technological applications.

Room 1 Hall B1 (B11)

14:00 – 15:30

CF-8: Ultrafast laser technology II

Chair: Takao Fuji, Toyota Technological Institute, Nagoya, Japan

CF-8.1 WED (Invited) 14:00

Novel ultrafast laser technology for generating gigawatt-class isolated attosecond pulses

•E. Takahashi; RIKEN, Wako, Japan

We introduce two novel light sources; one is a 6-TW single-cycle laser system via dual-chirped optical parametric amplification, and the other is GW-scale isolated attosecond pulse driven by a high-energy 3-channel waveform synthesis.

Room 6 Hall B3 (B32)

14:00 – 15:30

CI-3: Ultrafast telecommunications

Chair: Alessandro Tonello, University of Limoges, France

CI-3.1 WED (Invited) 14:00

Graphene Plasmonics – A Beyond 100 GHz Technology

•J. Leuthold, S.M. Koepfli, P. Ma, X. Zhang, M. Baumann, S. Nashashibi, J. Smajic, U. Koch, and Y. Fedoryshyn; ETH Zurich, Zurich, Switzerland

Novel approaches towards new generations of graphene plasmonic modulators and detectors with responses of 500 GHz and beyond are introduced. Important performance parameters such as losses, efficiency or responsivity are addressed by combining the technologies.

Room 7 Hall A1 (A11)

14:00 – 15:30

CJ-4: Specialty fiber characterisation techniques and components

Chair: Laurent Bigot, CNRS-University of Lille, France

CJ-4.1 WED 14:00

Fiber-modes characterization using singular value decomposition

•Y. Tu[1,2,3], C. Pfleghar[1], C. Jauregui[1], and J. Limpert[1,2,3,4]; [1]Friedrich-Schiller-Universität Jena, Institute of Applied Physics, Abbe Center of Photonics, Albert-Einstein-Str. 15,07745, Jena, Germany; [2]Helmholtz Institute Jena, Fröbelstieg 3, 07743 , Jena, Germany; [3]GSI Helmholtzzentrum für Schwerionenforschung, Planckstraße 1, 64291 , Darmstadt, Germany; [4]Fraunhofer Institue for Applied Optics and Precision Engineering, Albert-Einstein-Str. 7, 07745 , Jena, Germany

A novel experimental fiber-modes characterization method is proposed. This method, unlike the experimental methods before, can operate with any light source and any fiber length, which can be used to characterize more fibers.

CJ-4.2 WED 14:15

Picometer-resolution and high dynamic-range profilometer for hollow-core fiber surface roughness characterization

•A. Dhaybi[1], J. Osório[1], K. Vasko[1], F. Amrani[1,2], G. Tessier[3], B. Debord[1,2], F. Gérôme[1,2], and F. Benabid[1,2]; [1]GPPMM Group, XLIM Institute, CNRS UMR 7252, Limoges, France; [2]GLOphotonics, Limoges, France; [3]Institut de la Vision, CNRS UMR 7210, INSERM, Sorbonne University, Paris, France

Large dynamic and picometer-resolution surface-roughness-profilometer for varied types of HCPCF is reported. Measurement of the two surfaces HCPCF cladding-silica-membrane is ob-

Room 8 Hall A1 (A12)

14:00 – 15:30

EB-8: Quantum imaging

Chair: Miles Padgett, University of Glasgow, UK

EB-8.1 WED 14:00

Quantum image distillation with undetected photon beam

J. Fuenzalida[1,2], M. Gilaberte Basset[2,3], S. Töpfer[1,2], J.P. Torres[4], and •M. Gräfe[1,2,3]; [1]Institute of Applied Physics, Technical University of Darmstadt, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [3]Friedrich Schiller University Jena, Abbe Center of Photonics, Jena, Germany; [4]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology and Dept. Signal Theory and Communications, Universitat Politecnica de Catalunya, Castelldefels/Barcelona, Spain

We present quantum image distillation of objects in presence of strong noise. Our approach is based on quantum holography with undetected light and exploits quantum correlated photon pairs and induced coherence in a nonlinear interferometer.

EB-8.2 WED 14:15

Mid-infrared quantum scanning microscopy with visible light

•J.R. León-Torres[1,2], J. Fuenzalida[1], M. Gilaberte Basset[1], S. Töpfer[1], and M. Gräfe[3]; [1]Fraunhofer Institute of Applied Optics and Precision Engineering IOF, Jena, Germany; [2]Institute of Applied Physics, Friedrich-Schiller-Universität Jena, Jena, Germany; [3]Institute of Applied Physics, Technische Universität Darmstadt, Jena, Germany

A label-free quantum scanning imaging system is presented, capable of detecting in the visible regime, while illuminating with undetected light in the Mid-IR region by exploiting the quantum correlations of photon-pairs.

Room 1 ICM

JSI-3.2 WED 14:30

Visualization of Light-induced Transitions in Dielectric-metallic Nanoparticles with Intense X-ray Pulses

•Z. Sun[1], K. Schnorr[1], A. Al Haddad[1], S. Augustin[1], A.S. Morillo Candas[1], G. Knopp[1], J. Knurr[1,2], A. Sarracini[1], X. Xie[1], N. Yang[1,2], H. Zhang[1,2], and C. Bostedt[1,2]; [1]Paul Scherrer Institut, Villigen PSI, Switzerland; [2]Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

We demonstrated time-resolved single-shot single-particle imaging of ultrafast laser induced phase transitions of free-flying dielectric-metallic core-shell nanoparticles from femto- to nanosecond with intense X-ray free-electron lasers at SwissFEL.

JSI-3.3 WED 14:45

Imaging laser-driven dynamics in materials with atomic resolution and in real time with ultrashort x-ray pulses

•D. Gorelova; I. Institute for Theoretical Physics, University of Hamburg, Hamburg, Germany

Based on a rigorous theoretical analysis, we propose a novel method of imaging real-time optically-driven electron dynamics in materials by means of attosecond x-ray pulses.

Room 4a ICM

CK-6.2 WED 14:30

Mid-infrared photonic integrated platform based on Fe-doped InGaAs buried in InP

•M. Montesinos Ballester, E. Jöchl, R. Wang, P. Täschler, Z. Wang, E. Gini, M. Beck, and J. Faist; Institute for Quantum Electronics, ETH-Zurich, Zürich, Switzerland

In this work we present a mid-infrared photonic integrated platform based on Fe-doped InGaAs waveguides buried in InP, demonstrating propagation losses as low as 0.57 dB/cm at 4.6 μm wavelength in TM polarization.

CK-6.3 WED 14:45

Optical Power Splitters for Integrated Multimode Photonics

•J. Haines[1], V. Vitali[1], P. Petropoulos[1], C. Lacava[1,2], K. Bottrill[1], M. Gandolfi[3], C. De Angelis[3], Y. Franz[1], and M. Guasoni[1]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia, Italy; [3]CNR-INO and Department of Information Engineering, University of Brescia, Brescia, Italy

Compact 1xN integrated power splitters for both the fundamental and higher order modes are fabricated and tested. Our devices are based on arrays of coupled waveguides with non uniform spacing allowing for arbitrary power splitting.

Room 4b ICM

JSIV-2.2 WED 14:30

The contribution has been withdrawn.

JSIV-2.3 WED (Invited) 14:45

Diffused light concentration for enhanced solar energy yield

•R. Saive; University of Twente, Enschede, Netherlands

We report on a photonic system capable of collimating diffuse light in free space and investigate how such a system can open up new possibilities for harvesting solar energy through light emission onto solar panels.

Room 13a ICM

Room 13b ICM

CB-6.2 WED 14:45

Self-generation of optical frequency combs in III-V/SiN external cavity laser with frequency-selective mirror

•C. Rimoldi, L.L. Columbo, and M. Gioannini; Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Torino, Italy

We theoretically and numerically investigate the mechanism behind the spontaneous generation of frequency comb regimes in III-V SiN hybrid lasers with a narrowband mirror, displaying both amplitude and frequency modulation.

Room 14a ICM

a noise-like pulse fiber laser around 1550 nm. The broadest bandwidths spanning 100's of nm are automatically found within only a few generations.

CD-9.3 WED 14:30

Dynamics of Raman Cavity Solitons in Passive Kerr Resonators

•Z. Li[1], Y. Xu[1], S. Shamailov[1], X. Wen[2], W. Wang[2], X. Wei[2], Z. Yang[2], S. Coen[1], S.G. Murdoch[1], and M. Erkintalo[1]; [1]Department of Physics and The Dodd-Walls Centre, University of Auckland, Auckland, New Zealand; [2]School of Physics and Optoelectronics, South China University of Technology, Guangzhou, China

In this contribution, we explore the multi-pulsing dynamics of the dissipative Raman solitons, demonstrating that a variety of multi-soliton states can be deterministically generated and that the resultant solitons display complex behaviours.

CD-9.4 WED 14:45

Two-frequency pulse compounds in presence of a zero-nonlinearity point

•O. Melchert[1,2], S. Bose[2,3], S. Willms[1,2], I. Babushkin[1,2], U. Morgner[1,2], and A. Demircan[1,2]; [1]Leibniz Universität Hannover, Institute of Quantum Optics, Hannover, Germany; [2]Cluster of Excellence PhoenixD, Hannover, Germany; [3]Leibniz Universität Hannover, Institute of Photonics, Hannover, Germany

We discuss the complex propagation dynamics of two-frequency pulse-compounds in waveguides with single zero-dispersion and zero-nonlinearity points. We demonstrate that under the impact of the Raman effect, a higher-order trapped state transitions into the groundstate.

Room 14b ICM

CH-7.3 WED 14:30

Frequency-Controlled Dot Pattern Projection of Ultrashort Pulse using Optical Phased Array Based on Optical Frequency Comb

•*T. Kato*[1,2] *and K. Minoshima*[1]; [1]*The University of Electro-Communications (UEC), Tokyo, Japan*; [2]*PRESTO, JST, Tokyo, Japan*

We demonstrated a dot pattern projection of ultrashort pulse by pulse-to-pulse interference using an optical-phased array based on an optical frequency comb by changing the ratio of two frequency parameters of the comb.

CH-7.4 WED 14:45

Birefringent elements for optical microscopy by ultrafast laser writing

•*Y. Lei*[1], *P. Kazasky*[1], *and M. Shribak*[2]; [1]*Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*; [2]*Marine Biological Laboratory, University of Chicago, Woods Hole, MA, USA*

Geometric phase prisms (GP prisms) and retardance gradient prisms (X prisms) are demonstrated by ultrafast laser writing in silica glass and are used for differential interference contrast imaging, with the potential to replace Wollaston prisms.

Room Osterseen ICM

Room 1 Hall B1 (B11)

CF-8.2 WED 14:30

Intra-Cavity Femtosecond Standing Waves for Multi-Photon Pump-Probe Experiments at 100 MHz

•*T. Heldt*[1,2], *J.-H. Oelmann*[1,2], *L. Guth*[1,2], *N. Lackmann*[1], *J. Nauta*[1,2], *T. Pfeifer*[1], *and J.R. Crespo López-Urrutia*[1]; [1]*Max-Planck-Institut für Kernphysik, Heidelberg, Germany*; [2]*Heidelberg Graduate School for Physics, Heidelberg, Germany*

Enhancing frequency combs in cavities adds to their high coherence and megahertz repetition rate the high intensities needed for strong-field physics. Our approach also generates femtosecond standing waves at the cavity focus.

CF-8.3 WED 14:45

Nanojoule-level spectrally tunable all-PM mode-locked Yb:fiber laser

•*S. Ebrahimzadeh*[1], *S. Adnan*[1], *V. Shumakova*[2,3], *V.F. Pecile*[2,4], *J. Fellinger*[2], *M. Leskowschek*[2], *P.E.C. Aldia*[2,4], *A.S. Mayer*[2], *L.W. Perner*[2,4], *S. Salman*[5,7,8], *S. Schilt*[6], *C.M. Heyl*[5,7,8], *I. Hartl*[5], *O.H. Heckl*[2], *and G. Porat*[1,9]; [1]*Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Alberta T6G 1H9,, Edmonton, Canada*; [2]*Christian Doppler Laboratory for Mid-IR Spectroscopy and Semiconductor Optics, Faculty Center for Nano Structure Research, Faculty of Physics, University of Vienna,1090, Vienna, Austria*; [3]*Photonics Institute, TU Wien,1040, Vienna, Austria*; [4]*Vienna Doctoral School in Physics, University of Vienna, 1090, Vienna, Austria*; [5]*Deutsches Elektronen-Synchrotron DESY, 22607, Hamburg, Germany*; [6]*Laboratoire Temps-Fréquence, Université de Neuchâtel, CH-2000, Neuchâtel, Switzerland*; [7]*GSI*

Room 6 Hall B3 (B32)

CI-3.2 WED 14:30

Ultra-broadband UTC-PD using well-optimized InGaAs/InP active layer toward 200-GHz bandwidth and beyond

•*T. Umezawa, S. Nakajima, A. Matsumoto, K. Akahane, and N. Yamamoto*; *National Institute of Information and Communications Technology, Tokyo, Japan*

We present an ultra-broadband high-speed UTC-PD using well-optimized and extremely thin active layers to achieve 200-GHz bandwidth and beyond. The characteristics of the fabricated device are discussed, along with the simulation results.

CI-3.3 WED 14:45

SOA-Based Power Equalisation for 100 Gb/s Passive Optical Network

•*F. Jamali, S.L. Murphy, C. Antony, and P.D. Townsend*; *Tyndall National Institute, University College Cork, Cork, Ireland*

SOA-based optical power equalisation using variable bias and control light injection are investigated for 100 Gb/s PAM4 PON. A high dynamic range of 23 dB is achieved, and gain saturation induced patterning effects are studied.

Room 7 Hall A1 (A11)

tained for the first-time. The results confirm the newly-developed technique to reduce surface-roughness with shear-stress.

CJ-4.3 WED 14:30

Fibre Bragg Gratings Inscribed in Dy-doped InF3 Fibre Using Talbot Interferometer and Vis-fs-Laser

•*K. Grebnev and M. Chernysheva*; *Leibniz Institute of Photonic Technology, Jena, Germany*

n this work we present inscription Bragg grating in Dy-doped InF3 fiber using Talbot interferometer and visible femtosecond laser. Optical properties, process of thermal annealing and ways of inscription optimization are described.

CJ-4.4 WED 14:45

Spatial coherence characterization in multimode fibers

•*J. Li, P. Ryczkowski, and G. Genty*; *tampere university, Tampere, Finland*

We characterize experimentally the spatial coherence of a step-index multimode fiber coupled broadband light across the full beam profile. Our experimental observations agree with numerical simulations using a random mode coupling theoretical model.

Room 8 Hall A1 (A12)

EB-8.3 WED 14:30

Experimental separation estimation of incoherent optical sources reaching the Cramér-Rao bound

•*C. Rouvière*[1], *D. Barral*[1], *A. Grateau*[1], *G. Sorelli*[1,2], *I. Karuseichyk*[1], *M. Walschaers*[1], *and N. Treps*[1]; [1]*Laboratoire Kastler Brossel, ENS-Université PSL, CNRS, Sorbonne Université, Collège de France, Paris, France*; [2]*Fraunhofer IOSB, Ettlingen, Fraunhofer Institute of Optronics, System Technologies and Image Exploitation, Ettlingen, Germany*

We experimentally implement the separation estimation between to incoherent optical sources. Our method, relying on spatial-mode demultiplexing and intensity measurements, saturates the Cramér-Rao bound, with five orders of magnitude gain compared to the Rayleigh limit.

EB-8.4 WED 14:45

Resolution of quantum imaging with undetected photons via position correlations

•*M. Gilaberte Basset*[1,2], *R. Sonderheimer*[1,3], *J. Fuenzalida*[4], *A. Vega*[2], *S. Töpfer*[4], *E. Santos*[2], *F. Setzpfandt*[2], *F. Steinlechner*[1,2], *and M. Gräfe*[1,2,4]; [1]*Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*; [2]*Friedrich-Schiller-University, Institute of Applied Physics, Jena, Germany*; [3]*Friedrich-Schiller-University, Institute of Condensed Matter Theory and Optics, Jena, Germany*; [4]*Institute of Applied Physics, Technical University of Darmstadt, Darmstadt, Germany*

We present experimental resolution results for imaging with undetected photons via position correlations. These support the theory published to date, nevertheless showing the

Room 1 ICM

JSI-3.4 WED 15:00

Ultrafast orbital tomography of a molecular film at a FEL

•*M. Scholz[1], K. Baumgärtner[2], N. Wind[3], M. Reuner[4], M. Heber[1], D. Kutnyakhov[1], L. Wenthaus[1], M. Beye[1], F. Reinert[2], F. Roth[5], K. Niki[6], D. Popova-Gorelova[4], and K. Rossnagel[1,7]; [1] Deutsches Elektronen-Synchrotron DESY, Notkestraße 85, Hamburg, Germany; [2] Experimentelle Physik 7, Julius-Maximilians-Universität, Am Hubland, Würzburg, Germany; [3] Institut für Experimentalphysik, Universität Hamburg, Luruper Chaussee 149, Hamburg, Germany; [4] I. Institute for Theoretical Physics, Universität Hamburg, Luruper Chaussee 149, Hamburg, Germany; [5] Institute of Experimental Physics, TU Bergakademie Freiberg, Leipziger Straße 23, Freiberg, Germany; [6] Graduate School of Science and Engineering, Chiba University, 1-33 Yayoi-cho, Inage-ku, Chiba, Japan; [7] Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, Kiel, Germany*

Flow of charge and energy across the molecule-substrate interface are of essential importance for surface chemistry and novel devices. By shooting a 'molecular movie' at a FEL, we disentangle electronic and structural dynamics.

JSI-3.5 WED 15:15

Sub-wavelength Charge Dynamics in Textured Infrared and Free Electron Lasers

J. Wätzel[1], P.R. Ribič[2], M. Coreno[2,3], M.B. Danailov[2], C. David[4], A. Demidovich[2], M. Di Fraia[2], L. Giannessi[2,5], K. Hansen[6], Š. Krušič[7], M. Manfredda[2], M. Meyer[8], A. Mihelič[7], N. Mirian[2,9], O. Plekan[2], B. Ressel[10], B. Rösner[4], A. Simoncig[2], S. Spampinati[2], M. Stupar[10], M. Žitnik[7], M. Zangrando[2,11], C. Callegari[2], G.D. Ninno[2,10], and •J. Berakdar[1]; [1] Martin-Luther University Halle-

Room 4a ICM

CK-6.4 WED 15:00

Ultra-low loss mid-infrared frequency conversion in silicon-on-insulator waveguides

•*D.A. Sulway[1], Y. Yonezu[2,3], L.M. Rosenfeld[1], P. Jiang[1], T. Aoki[3], and J.W. Silverstone[1]; [1] Quantum Engineering Technology Labs, Bristol, United Kingdom; [2] NTT Basic Research Laboratories, Kanagawa, Japan; [3] Waseda University, Tokyo, Japan*

We demonstrate stimulated four-wave mixing with the use of ultra-low loss adiabatic fibre-chip couplers at 2.1 microns in silicon. We measure -0.48 dB of coupler transmission, and subsequently a broad 40 nm four-wave mixing bandwidth.

CK-6.5 WED 15:15

Resonant Micro-Opto-Mechanical Phase Modulator Fabricated in Glass by a Femtosecond Laser

R. Memeo[1,2], •A. Crespi[1,2], and R. Osellame[2,1]; [1] Dipartimento di Fisica - Politecnico di Milano, Milano, Italy; [2] Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN-CNR), Milano, Italy

We demonstrate an integrated optics modulator based on the elasto-optic effect, exploiting the resonant oscillations of a mechanical microstructure and operating at megahertz frequency. The device is en-

Room 4b ICM

JSIV-2.4 WED 15:15

Light management for photovoltaics and a European PV industry

•*A. Polman; NWO Institute AMOLF, Amsterdam, Netherlands*

We present novel light management strategies to develop flexible, integrated and ultra-high efficiency photovoltaics using spectrum splitting, contact cloaking, radiative cooling and triple-junction tandems and promote a new European PV industry.

Room 13a ICM

CA-7.2 WED 15:00

Q-switched Ho:YAG Master Oscillator Power Amplifier with 85 W Average Output Power at 2.1 μm

M.J. Barber, P.C. Shardlow, and •W.A. Clarkson; Optoelectronics Research Centre, Southampton, United Kingdom

We report on a two-stage Ho:YAG MOPA where the pump power is provided by ten spatially-combined 1907 nm thulium fibre lasers, producing 85 W of average output power for 320 W of combined pump power.

CA-7.3 WED 15:15

All optical-parametric-amplification technic based high-energy laser front-end

•*L. Lafargue[1,2], G. Dalla-Barba[1], F. Scol[1], F. Audo[1], O. Vanvincq[2], G. Bouwmans[2], and E. Hugonnot[1]; [1] Commissariat à l'Énergie Atomique et aux Énergies Alternatives, Centre d'Études Scientifiques et Techniques d'Aquitaine, Le Barp, France; [2] Univ. Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France*

We set up a high-energy laser front-end which consists of μJ-range

Room 13b ICM

CB-6.3 WED 15:00

Dynamics of Integrated Multi-Wavelength Lasers with Optical Frequency Comb Injection

•*S. Abdollahi, P. Marin-Palomo, and M. Virte; Brussels Photonics Team (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium*

We demonstrate experimentally that subjecting multi-wavelength lasers to frequency comb injection leads to broadening and multiplication of the original comb. We achieve comb multiplication up to a 1 THz and highlight the mode coupling impact.

CB-6.4 WED 15:15

Study of noise transfer in semiconductor frequency combs

•*T. Steshchenko, V. Roncin, and F. Du-Burck; Laboratoire de Physique des Lasers, C.N.R.S./Université Sorbonne Paris Nord, Villetaneuse, France*

The noise transfer from the supply current to the optical modes and the RF beat of a mode-locked Fabry-Perot Qdash laser is studied experimentally and the results are interpreted from the theory.

Room 14a ICM

CD-9.5 WED 15:00

Unveiling the Volumetric Orbital Angular Momentum Density Flow of Light by Symmetry Breaking of its Second Harmonic

•*O. Yesharim[1], I. Hurvitz[1], S. Pearl[1,2], A. Karnieli[1], and A. Arie[1]; [1] Tel Aviv University, Tel Aviv, Israel; [2] Soreq NRC, Yavne, Israel*

Optical orbital angular momentum beams exhibit hidden rotational energy flow that varies in three dimensional space. We present a nearly non-destructive measurement that allows for volumetric orbital density flow determination using nonlinear optical symmetry breaking.

CD-9.6 WED 15:15

4-Field Symmetry Breakings in Microresonator-Based Photonic Molecules

•*A. Ghosh[1,2], L. Hill[1,3], G.-L. Oppo[3], and P. Del'Haye[1,2]; [1] Max Planck Institute for the Science of Light, 91058 Erlangen, Germany; [2] Friedrich Alexander University Erlangen-Nuremberg, 91058 Erlangen, Germany; [3] University of Strathclyde, G4 0NG Glasgow, United Kingdom*

We study two different arrangements of photonic molecules and show nested and sequential symme-

Room 14b ICM

CH-7.5 WED 15:00

Single pumped superluminal laser

•*Y. Sternfeld*[1], *Z. Zhou*[2], *S. Shahriar*[2,3], *and J. Scheuer*[4]; [1]*Tel Aviv University, Department of Physics and Astronomy, Tel Aviv, Israel*; [2]*Northwestern University, Department of Electrical and Computer Engineering, Evanston, USA*; [3]*Northwestern University, Department of Physics and Astronomy, Evanston, USA*; [4]*Tel Aviv University, School of Electrical Engineering, Tel Aviv, Israel*

We present a new approach for realizing superluminal ring laser using a single isotope of atomic Rb vapor by producing electromagnetically induced transparency (EIT) in self-pumped Raman gain.

CH-7.6 WED 15:15

Miniature spectrometer based on a rotated chirped volume Bragg grating

•*M. Yessenov, O. Mhibik, L. Mach, L. Glebov, A. Abouraddy, and I. Divliansky*; *CREOL, University of Central Florida, Orlando, USA*

We introduce a compact spectrum analyzer based on a new optical component – rotated chirped volume Bragg grating – with a compact footprint capable of pulse stretching and compression without the need for free space propagation.

Room Osterseen ICM

EF-1.2 WED (Invited) 15:00

Guided Brillouin interactions - from optical vortex isolators to extreme thermodynamics

•*B. Stiller*; *Max Planck Institute for the Science of Light, Erlangen, Germany*; *University Erlangen-Nuremberg, Erlangen, Germany*

We investigate Brillouin-Mandelstam interactions of vortex modes with application to nonreciprocal devices and lasers in twisted photonic crystal fibers. In liquid-core fibers, we use optoacoustics to experimentally explore different thermodynamic regimes such as negative pressure.

Room 1 Hall B1 (B11)

Helmholtzzentrum für Schwerionenforschung GmbH, 64291, Darmstadt, Germany; [8]*Helmholtz-Institute Jena, 07743, Jena, Germany*; [9]*Department of Physics, University of Alberta, Edmonton, Alberta T6G 2E1, Edmonton, Canada*

We report on a self-starting all-PM Yb:fiber laser, based on a phase-biased nonlinear amplifying loop mirror. The laser wavelength is tunable from 1017nm to 1071nm, with up to 110mW average power and 1.42nJ pulse energy.

CF-8.4 WED 15:00

Conversion of Mode-Locked States within an Empty Optical Resonator

•*M. Zwilich, F. Schepers, and C. Fallnich*; *University of Münster, Institute of Applied Physics, Münster, Germany*

A longitudinal mode-locked beam is converted to a transverse mode-locked beam by an empty optical resonator. Equivalently, an amplitude-modulated beam is converted to a beam periodically moving across the transverse plane.

CF-8.5 WED 15:15

Intra-pulse Intensity Noise Shaping in a Mode-locked Fiber Oscillator

•*M. Edelmann*[1,2], *M. Pergament*[1], *and F.X. Kärtner*[1,2]; [1]*Deutsches Elektronen-Synchrotron DESY, Center for Free-Electron Laser Science CFEL, Hamburg, Germany*; [2]*Department of Physics, Universität Hamburg, Hamburg, Germany*

We demonstrate intra-pulse intensity noise shaping in a mode-locked fiber oscillator. The intrinsic re-shaping of intra-pulse intensity noise distributions enables efficient

Room 6 Hall B3 (B32)

CI-3.4 WED 15:00

Graphene photonics nested Mach-Zehnder modulator for advanced modulation formats

•*V. Sorianello*[1], *A. Montanaro*[1], *M.A. Giambra*[2], *N. Ligato*[2], *W. Templ*[3], *P. Galli*[4], *and M. Romagnoli*[1]; [1]*Photonic Networks and Technologies Lab – CNIT, Pisa, Italy*; [2]*CamGraPhIC srl, INPHOTEC, Pisa, Italy*; [3]*Nokia Bell Labs, Stuttgart, Germany*; [4]*Nokia Solutions and Networks Italia, Vimercate, Italy*

We show the first graphene photonics I/Q modulator based on electro-absorption modulators on silicon photonic waveguides. We show 40Gb/s QPSK modulation with very compact design able to operate from the O-band to L-band and beyond.

CI-3.5 WED 15:15

All-Optical Hard Limiter Using Quantum-Dot SOA-based MZIs

•*H. Yashima and Y. Uji*; *Tokyo University of Science, Tokyo, Japan*

An all-optical hard limiter using quantum-dot semiconductor optical amplifier-based Mach-Zehnder interferometers is proposed. We show that the proposed device has characteristics close to those of an ideal hard limiter and eliminates noise.

Room 7 Hall A1 (A11)

CJ-4.5 WED 15:00

Hybrid Silica-Fluoride Side-polished Fiber Pump Combiner

•*B. Perminov and M. Chernysheva*; *Leibniz Institute of Photonic Technology, Thüringen - Jena, Germany*

In this work we present the hybrid silica-fluoride side-polished fiber pump combiner. By adjusting their relevant position via X-Y and rotation stage maximum coupling coefficient of 60% has been achieved.

CJ-4.6 WED 15:15

Femtosecond laser-written waveguides and couplers for integrated mid- infrared photonic devices

T. Fernandez[1,2], *S. Gross*[3], *M. Withford*[1], *B. Johnston*[1], *T. Gretzinger*[1], *S. Rehman*[1], *and* •*A. Fuerbach*[1]; [1]*School of Mathematical and Physical Sciences, Macquarie University, Sydney, Australia*; [2]*University of South Australia, Laser Physics and Photonics Devices Laboratories, Adelaide, Australia*; [3]*School of Engineering, Macquarie University, Sydney, Australia*

We report the fabrication of fiber-

Room 8 Hall A1 (A12)

use for a more general analytical expression that we also provide.

EB-8.5 WED 15:00

Compact Infrared Imaging Using Undetected Visible Photons With Rapid Analysis

•*E. Pearce*[1], *N.R. Gemmell*[1], *J. Flórez*[1], *J. Ding*[1], *C.C. Phillips*[1], *R.F. Oulton*[1], *and A.S. Clark*[1,2]; [1]*Department of Physics, Blackett Laboratory, Imperial College London, London, United Kingdom*; [2]*Quantum Engineering Technology Labs, University of Bristol, Bristol, United Kingdom*

We present a compact, portable nonlinear interferometer for infrared imaging with visible detection, including rapid data analysis of transmission and phase. The device is robust to operation outside the laboratory.

EB-8.6 WED 15:15

Fourier-transform mid-infrared spectroscopy using nonlinear interferometers

•*J. Kunz, C. Lindner, S. Herr, S. Wolf, J. Kiessling, and F. Kühnemann*; *Fraunhofer IPM, Freiburg, Germany*

Nonlinear interferometers based on correlated photon pairs allow mid-infrared spectroscopy with only near-infrared detection. We use this measurement concept in combination with Fourier-transform processing to perform spectroscopic analysis of multi-gas samples.

Room 1 ICM

Wittenberg, Halle, Germany; [2]Elettra-Sincrotrone, Trieste, Italy; [3]ISM-CNR, in Basovizza Area Science Park, Trieste, Italy; [4]Paul Scherrer Institut, Villigen-PSI, Villigen, Switzerland; [5]INFN-LNF, Via E. Fermi 40, Frascati , Italy; [6]Center for Joint Quantum Studies and Department of Physics, School of Science, Tianjin University, China; [7]J. Stefan Institute, Jamova cesta, Ljubljana, Slovenia; [8]European XFEL, Hamburg, Germany; [9]Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany; [10]University of Nova Gorica, Slovenia; [11]Istituto Officina dei Materiali, Consiglio Nazionale delle Ricerche, Trieste, Italy

Combining structured XUV and infrared laser pulses allow the control of localized and delocalized charge-current distributions on femtoseconds/nanometer time-length scales within the laser spots. Applications to ultrafast spintronic and quantum information are presented.

16:00 – 17:30

JSI-4: Nonlinear and ultrafast X-ray spectroscopy

Chair: Rebecca Boll, EuXFEL, Schenefeld, Germany

JSI-4.1 WED 16:00

Following site-selective chemical bond changes via ultrafast X-ray photoelectron spectroscopy

A. Al Haddad[1], S. Oberli[2], A. Picon[3], J. Knurr[1,2], S. Augustin[1], G. Knopp[1], A.S. Morillo-Candas[1], E. Prat[1], Z. Sun[1], K. Schnorr[1], and •C. Bostedt[1,2]; [1]Paul Scherrer Institute, Villigen PSI, Switzerland; [2]Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland; [3]Universidad Autonoma de Madrid, Madrid, Spain

We demonstrate howto track electronic and nuclear dynamics on the femtosecond time scale with site selectivity using ultrafast time-resolved photoelectron spec-

Room 4a ICM

tirely realized in glass by femtosecond laser micromachining.

16:00 – 17:30

CK-7: Integrated optical devices II

Chair: Stefano Pelli, CNR-IFAC, Sesto Fiorentino, Italy

CK-7.1 WED (Invited) 16:00

Femtosecond-Laser Written Universal Photonic Processors

•F. Ceccarelli[1], C. Pentangelo[2,1], N. Di Giano[2,1], R. Arpe[2], S. Piacentini[1,2], A. Crespi[2,1], and R. Osellame[1]; [1]Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN-CNR), Milano, Italy; [2]Dipartimento di Fisica - Politecnico di Milano, Milano, Italy

Universal photonic processors (UPPs) are an enabling technology for many applications. Two 6-mode UPPs (785 and 1550 nm) fabricated by femtosecond laser micromachining show an unprecedented reconfiguration fidelity. Their

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16:00 – 17:30

EH-1: Temporal and topological metamaterials

Chair: Nicolò Maccaferri, Umeå University, Sweden

EH-1.1 WED (Invited) 16:00

Topological Phases of Spacetime Crystals

J. Serra and •M. Silveirinha; University of Lisbon, Lisboa, Portugal

Heuristically, nontrivial topologies are associated with some form of angular momentum. Surprisingly, here, we find that nontrivial topological phases and synthetic spacetime-rotations can be engineered in temporal-crystals that imitate a translational motion with uniform velocity.

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FOPCPA source coupled to a power-amplifier free-space OPCPA, to get more than 200 mJ at 1053-nm-central-wavelength with a repetition rate of 2 Hz.

16:00 – 17:30

CA-9: Waveguide lasers

Chair: Michael Damzen, Imperial College London, United Kingdom

CA-9.1 WED 16:00

Multi-GHz Femtosecond Mode-locking and Noise Characterization of fs-laser-inscribed Waveguide Lasers

•J.E. Bae[1], M. Hyun[2], X. Mateos[3], M. Aguiló[3], F. Díaz[3], C. Romero[4], J.R.V. de Aldana[4], J. Kim[2], and F. Rotermund[1]; [1]Department of Physics, KAIST, Daejeon, South Korea; [2]Department of Mechanical Engineering, KAIST, Daejeon, South Korea; [3]Universitat Rovira i Virgili (URV), Tarragona, Spain; [4]University of Salamanca, Spain

Multi-GHz femtosecond mode-locked Yb:KLuW waveguide lasers and their characteristics of noise spectra are investigated. The

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16:00 – 17:30

CB-7: Diode laser frequency combs

Chair: Michael Haider, Technical University of Munich, Germany

CB-7.1 WED 16:00

Subharmonic Optical Injection Locking of a Mode-locked Laser Diode

•A.F. Ribeiro[1], T. Gomes[1,2], and M.A. Cataluna[1]; [1]Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]IFIMUP and Departamento de Física e Astronomia, Faculdade de Ciências, Universidade do Porto, Porto, Portugal

We demonstrate subharmonic dual-tone optical injection locking of a 20GHz quantum-dot mode-locked laser diode, at driving frequencies of 10, 5, and 2.5GHz. Broad repetition rate tunabilities (hundreds of MHz) are achieved for all orders.

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try breakings along with switching regimes. The results show the possibility of developing all optical four-way optical switches.

16:00 – 17:30

CD-10: Resonant structures

Chair: Ingo Breunig, University of Freiburg, Germany

CD-10.1 WED 16:00

Investigation on Optical Parametric Oscillators Based on Different Silicon Nitride Waveguide Geometries

•M. Gao[1], N.M. Lüpken[1], K.-J. Boller[2,1], and C. Fallnich[1]; [1]Institute of Applied Physics, University of Münster, Germany; [2]University of Twente, MESA+ Institute for Nanotechnology, Enschede, Netherlands

We identify synchronously pumped silicon nitride waveguide-based optical parametric oscillators, showing a significantly improved output energy of 255 pJ and conversion efficiency of 17 % while achieving 176 nm wavelength tunability at around 1.15 μm.

Room 14b ICM

16:00 – 17:30

CH-8: Methods in optical sensing and microscopy

Chair: Meritxell Vilaseca,Universitat Politecnica de Catalunya, Terrassa, Barcelona,Spain

CH-8.1 WED 16:00

Telecentric Correlation Holography: A Novel Method to Record Fresnel Incoherent Correlation Holograms

•*T. Spellauge and T. Hellerer*; *Multiphoton Imaging Laboratory, University of Applied Sciences Munich, Lothstr. 34, 80335 Munich, Germany*

We present a novel holographic system capable of generating laterally shift-invariant holograms using incoherent sources like LEDs. Our self-referencing interferometer contains windows with carefully chosen properties, which enable near-perfect spatio-temporal superposition of both light fields.

Room Osterseen ICM

16:00 – 17:30

EF-2: Kerr solitons and frequency combs I

Chair: Svetlana Gurevich, University of Münster, Germany, Münster, Germany

EF-2.1 WED (Invited) 16:00

Thermal Effects in Kerr-Microresonator Optical Frequency Combs

•*T. Drake, G. Colacion, L. Rukh, E. Perez de Juan, and B. Stone*; *University of New Mexico, Albuquerque, USA*

We present an experimental investigation of thermodynamic instabilities in Kerr-microresonator optical frequency combs. By understanding and harnessing the coupling of thermal effects to properties of the comb light, we can improve comb precision and performance.

Room 1 Hall B1 (B11)

periodic noise suppression of the circulating intra-cavity pulse.

16:00 – 17:30

CF-9: Ultrafast spectroscopy

Chair: Birgitta Bernhardt, University of Technology, Graz, Austria

CF-9.1 WED 16:00

High-sensitivity coherent dual-comb spectroscopy with single-cavity dual-comb OPO operating at 250 MHz

•*C. Phillips, C. Bauer, J. Pupeikis, B. Willenberg, and U. Keller*; *ETH Zurich, Zurich, Switzerland*

We demonstrate high-sensitivity dual-comb spectroscopy from a free-running optical parametric oscillator pumped by a picosecond solid-state laser. Both cavities leverage spatial multiplexing to obtain two combs in one cavity with ultralow noise and high power.

Room 6 Hall B3 (B32)

16:00 – 17:30

CI-4: Fibers for telecommunications and THz

Chair: Peter Horak, University of Southampton, United Kingdom

CI-4.1 WED 16:00

Optimizing the Capacity of Standard Cladding Diameter Multicore Fiber Systems using S, C, and L Bands

•*R. Luis, G. Rademacher, B. Puttnam, J. Sakaguchi, and H. Furukawa*; *NICT, Koganei, Japan*

We optimize the core count in standard cladding diameter multicore fibers to maximize capacity by exploiting the crosstalk wavelength dependency. Introducing the S band in C+L band systems increases the optimum core count to 5.

Room 7 Hall A1 (A11)

coupled integrated photonic devices in three different mid-infrared compatible glasses using the femtosecond laser direct-write technique and discuss the physical origin of the induced refractive index change.

16:00 – 17:30

CJ-5: Novel fiber lasers

Chair: Jayanta Sahu, Univ of Southampton, Southampton, United Kingdom

CJ-5.1 WED 16:00

Radially polarized picosecond MOPA system based on double-clad ytterbium-doped spun tapered fiber with ring-shaped active core

•*I. Zalesskaia*[1], *E. Motorin*[2], *V. Ustimchik*[2], *F. Lindner*[3], *V. Reichel*[3], *K. Wondraczek*[3], *Y. Lei*[4], *P. G. Kazansky*[4], *R. Gumenyuk*[1,2], *and V. Filippov*[2]; [1]*Tampere University, Tampere, Finland*; [2]*Ampliconyx Ltd, Tampere, Finland*; [3]*Dept. Leibniz Institute of Photonic Technology e.V., Jena, Germany*; [4]*Optoelectronics Research Centre, Southampton, United Kingdom*

We have demonstrated the successful direct amplification of a

Room 8 Hall A1 (A12)

16:00 – 17:30

EB-9: Quantum communication

Chair: Birgit Stiller, Max Planck Institute for the Science of Light, Erlangen, Germany

EB-9.1 WED 16:00

Multiplexed quantum teleportation from a telecom qubit to a matter qubit through 1 km of optical fibre

D. Lago-Rivera[1], *J.V. Rakonjac*[1], •*S. Grandi*[1], *and H. de Riedmatten*[1,2]; [1]*Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain*; [2]*Institucio Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We report temporally multiplexed quantum teleportation from a telecom qubit onto a solid-state quantum memory separated by 1 km of optical fibre. An active feed-forward scheme is implemented on the teleported qubit.

Room 1 ICM

troscopy with an x-ray pump / x-ray probe approach at a free-electron laser source.

JSI-4.2 WED 16:15

Ultrafast Electron Dynamics Measured with an Attosecond X-Ray Free-Electron Laser

•T. Driver; *Stanford PULSE Institute, Menlo Park, USA; Linac Coherent Light Source, SLAC National Accelerator Laboratory, Menlo Park, USA*

We present the generation of attosecond x-ray free-electron laser pulses and pulse pairs and their application to measurements of ultrafast coherent electron dynamics in both core-excited neutral molecules and valence ionized molecular ions.

JSI-4.3 WED 16:30

Unraveling Rabi dynamics with a seeded FEL at XUV wavelength

•S. Nandi[1], E. Olofsson[2], M. Bertolino[2], S. Carlström[2], F. Zapata[2], D. Busto[2], C. Callegari[3], M. Di Fraia[3], P. Eng-Johnsson[2], R. Feifel[4], G. Gallician[5], M. Gisselbrecht[2], S. Maclot[2], L. Neoričić[2], J. Peschel[2], O. Plekan[3], K.C. Prince[3], R.J. Squibb[4], S. Zhong[2], P.V. Demekhin[6], M. Meyer[7], C. Miron[5], L. Badano[3], M.B. Danailov[3], L. Giannessi[3], M. Manfredda[3], F. Sottocorona[3], M. Zangrando [3], and J.M. Dahlström[2]; *[1] Université de Lyon, Université Claude Bernard Lyon 1, CNRS, Institut Lumière Matière, Villeurbanne, France; [2] Department of Physics, Lund University, Lund, Sweden; [3] Elettra-Sincrotrone Trieste, Trieste, Italy; [4] Department of Physics, University of Gothenburg, Gothenburg, Sweden; [5] Université Paris-Saclay, CEA, CNRS, LIDYL, Gif-sur-Yvette, France; [6] Institute of Physics and CINSaT, University of Kassel, Kassel, Germany; [7] European XFEL, Schenefeld, Germany*

Room 4a ICM

performance dramatically improves in vacuum.

CK-7.2 WED 16:30

Fabrication of AlGaN Integrated Photonic Devices

•S. Gundogdu[1,2], T. Pregnolato[1,2], T. Kolbe[2], S. Hagedorn[2], S. Pazzagli[1], M. Weyers[2], and T. Schröder[1,2]; *[1] Humboldt Universitat zu Berlin, Berlin, Germany; [2] Ferdinand-Braun-Institut, Berlin, Germany*

AlGaN is a promising material for photonics due to its wide bandgap, high electro-optic coefficient, and nonlinearity. We demonstrate waveguides, tapers, directional couplers, ring resonators, and Mach-Zender interferometers for operating at 632 nm.

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EH-1.2 WED 16:30

Metamaterial Continuous Time Crystal - A New State of Photonic Matter

T. Liu[1], V. Raskatla[1], J.-Y. Ou[1], •K. MacDonald[1], and N. Zheludev[1,2]; *[1] University of Southampton, Southampton, United Kingdom; [2] Nanyang Technological University, Singapore, Singapore*

A continuous time crystal state can be realised in a nano-opto-mechanical metamaterial - light resonant with the metamolecules' plasmonic mode triggers a spontaneous transition to a state characterised by transmissivity oscillations resulting from many-body interactions.

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measured timing jitter is compared with the numerical estimation depending on cavity parameters including repetition rates and saturable absorber types.

CA-9.2 WED 16:15

Improved thermal performances of resonant reflection waveguide grating structure

•A. Boubekraoui[1], D. Bashir[1], G. Mourkioti[2], J.I. Mackenzie[2], T. Graf[1], and M. Abdou Ahmed[1]; *[1] Institut für Strahlwerkzeuge,Universität Stuttgart, Pfaffenwaldring 43, 70569 , Stuttgart, Germany; [2] Optoelectronics Research Centre, University of Southampton,, Southampton, S017 1BJ, United Kingdom*

We present laser and thermal performances of resonant grating used in a thin-disk laser resonator emitting 191W of output power. Grating surface temperature of 32°C was recorded for a power density of 52 $\frac{kW}{cm^2}$.

CA-9.3 WED 16:30

Room-temperature Distributed Feedback FAPbBr3 Perovskite Nanocrystal Laser Integrated on Silicon Nitride Waveguide Platform

•F. Fabrizi[1,2], P. Cegielski[1], M. Runkel[3], V. Morad[4], D. Dirin[4], S. Suckow[1], T. Riedl[3], M. Kovalenko[4], S.B. Anantharaman[1], and M.C. Lemme[1,2]; *[1] AMO GmbH, Aachen, Germany; [2] RWTH Aachen University, Aachen, Germany; [3] Bergische Universität Wuppertal, Wuppertal, Germany; [4] ETH Zürich, Zürich, Switzerland*

Colloidal halide perovskite nanocrystals, due to their exceptional optical properties, are prime candidate materials for on-chip visible light sources. Here, we

Room 13b ICM

CB-7.2 WED 16:15

Improvement of laser diode chaos properties by optical comb injection

•Y. Doumbia, T. Malica, D. Wolfersberger, and M. Sciamanna; *CentraleSupélec, Metz, France*

We experimentally study the optical injection dynamics of frequency combs in lasers diode. We observe chaotic dynamics with a bandwidth of 33 GHz and a spectral flatness up to 0.83.

CB-7.3 WED 16:30

Frequency Comb Broadening by Optical Noise Injection in a Semiconductor Laser

•A. Borodkin[1], A. Kovalev[2], M. Giudici[1], G. Huyet[1], A. Ramdane[3], M. Marconi[1], and E. Viktorov[2]; *[1] Université Côte d'Azur, Centre National de La Recherche Scientifique, Institut de Physique de Nice, F-06560 Valbonne, France; [2] ITMO University, 197101 St. Petersburg, Russia; [3] Centre de Nanosciences et de Nanotechnologies, CNRS UMR 9001, Université Paris-Saclay, 91120 Palaiseau, France*

We demonstrate experimentally a spectral broadening induced by optical noise injection in a InAs/InP quantum dash frequency comb laser and relate it to the nearly instanta-

Room 14a ICM

CD-10.2 WED 16:15

Multiply-resonant Waveguide Gratings for Enhanced Second-harmonic Generation

•M. Mekhael, S. Bej, A. Panah-Pour, R. Fickler, and M.J. Huttunen; *Photonics Laboratory, Physics Unit, Tampere University, Finland*

We design a resonant waveguide grating structure for enhanced nonlinear optical processes. We find that rectangular lattice structures with L-shaped protrusions can support two simultaneous high-Q resonances at pump and second-harmonic wavelengths, providing multiresonant enhancement.

CD-10.3 WED 16:30

Tunable dual comb source in a Kerr microresonator

•P.C. Qureshi[1,2], V. Ng[1,2], F. Azeem[1,3], L.S. Trainor[1,3], H.G.L. Schwefel[1,3], S. Coen[1,2], M. Erkintalo[1,2], and S.G. Murdoch[1,2]; *[1] The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [2] Department of Physics, University of Auckland, Auckland, New Zealand; [3] Department of Physics, University of Otago, Dunedin, New Zealand*

We show two new tuning techniques for microresonator dual-comb setups. By selecting the number of azimuthal modes between the two pumps, and by varying their relative detunings, discrete (coarse)

Room 14b ICM

CH-8.2 WED 16:15

Application of superconducting nanowire detector arrays in molecular beam research and mass spectroscopy

•R. Gourgues; Single Quantum, Delft, Netherlands

We report on the fabrication and characterization of arrays of Superconducting Nanowire Detectors made of NbTiN. We employ these devices for the detection of large single charged molecules with low kinetic energy.

CH-8.3 WED 16:30

Plasmonic-Based Non-Invasive In-Operando Technique for the Characterization of MoS2 Nanoswitches

•J. Symonowicz[1], D. Polyushkin [2], T. Mueller [2], and G. Di Martino[1]; [1]Department of Materials Science and Metallurgy, University of Cambridge, Cambridge, United Kingdom; [2]Vienna University of Technology, Institute of Photonics, Vienna, Austria

We develop the first non-destructive plasmonic-based technique to characterize nanoswitches in-operando and under ambient conditions. With our method we describe nano-kinetics of electrical switches based on MoS2 nanosheets.

Room Osterseen ICM

EF-2.2 WED 16:30

Parametrically-driven cavity solitons in a pure Kerr microresonator

G. Moille[1,2], M. Leonhardt[3], D. Paligora[3], N. Englebert[4], F. Leo[4], J. Fatome[3,5], K. Srinivasan[1,2], and •M. Erkintalo[3]; [1]Joint Quantum Institute, NIST/University of Maryland, College Park, USA; [2]Microsystems and Nanotechnology Division, National Institute of Standards and Technology, Gaithersburg, USA; [3]Department of Physics and The Dodd-Walls Centre, University of Auckland, New Zealand; [4]Service OPERA-Photonique, Universite libre de Bruxelles, Belgium; [5]Laboratoire Interdisciplinaire Carnot de Bourgogne CNRS-Universite de Bourgogne, Dijon, France

We report on the first experimen-

Room 1 Hall B1 (B11)

CF-9.2 WED 16:15

Generation of Tunable Narrowband Azimuthally Polarized Pulses for Magnetic Excitation of Eu3+ Ions

•E. Gangrskaia[1], V. Shumakova[1], A. Bellissimo[1], E. Kaksis[1], L. Grünewald[2,3], S. Mai[2], A. Baltuška[1,4], and A. Pugžlys[1,4]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]Institute of Theoretical Chemistry, University of Vienna, Vienna, Austria; [3]Vienna Doctoral School in Chemistry (DoSChem), University of Vienna, Vienna, Austria; [4]Center for Physical Sciences & Technology, Vilnius, Lithuania

In order to induce the selective excitation of magnetic-dipole transitions in Eu3+ ions, we generate narrowband wavelength-tunable azimuthally polarised pulses by combining spectral shifting via stimulated Raman scattering and spectral focusing.

CF-9.3 WED 16:30

Speeding up field-resolved spectroscopy by Compressed Sensing

•K. Scheffter[1,2], J. Will[1,2], C. Riek[3], H. Jousselin[4], S. Coudreau[4], N. Forget[4], and H. Fattahi[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Friedrich-Alexander University Erlangen-Nürnberg, Erlangen, Germany; [3]Zurich Instruments Germany, Munich, Germany; [4]Fastlite, Antibes, France

We experimentally demonstrate compressed sensing in field-resolved spectroscopy for the first time. Our method based on rapid, random sampling allows for signal reconstruction beyond the Nyquist limit, accelerating measurement speed by three orders of magnitude.

Room 6 Hall B3 (B32)

CI-4.2 WED 16:15

Rate Optimized Probabilistic Shaping-based Transmission over Field Deployed Coupled-Core 4-Core-Fiber

A. Nespola[1], M.A. Amirabadi[2,3], R. Ryf[4], M. Mazur[4], N.K. Fontaine[4], L. Dallachiesa[4], T. Hayashi[5], M.H. Kahaei[3], S.A. Nezamalhosseini[3], A. Marotta[6], A. Mecozzi[6], C. Antonelli[6], and •A. Carena[2]; [1]Links Foundation, Turin, Italy; [2]Politecnico di Torino, Turin, Italy; [3]Iran University of science and technolog, Tehran, Iran (the Islamic Republic of).; [4]Nokia Bell Labs, Murray Hill, NJ, USA; [5]Sumitomo Electric Industries, Ltd, Yokohama, Japan; [6]Universita Degli Studi Dell'Aquila, L'Aquila, Italy

We demonstrate probabilistic shaping-based long-haul transmission over field-deployed coupled-core multi-core-fibers. Results show that probabilistic shaping maintains its gain over uniform QAM over long distances.

CI-4.3 WED 16:30

Effects of Fluctuations in Dispersion of Transmission Lines on Optical Eigenvalue Communication

•T. Motomura, A. Maruta, and K. Mishina; Osaka University, Suita, Japan

We evaluate effects of longitudinal fluctuations of dispersion parameter on eigenvalue transmission by numerical simulations. A long-distance transmission suppressing an eigenvalue shift using an NZ-DSF is achieved by selecting effective eigenvalues.

Room 7 Hall A1 (A11)

cylindrical-vector beam in a picosecond MOPA system, which carries 10 ps pulses at 1030 nm with a 91 kW peak power and 0.97 μJ pulse energy.

CJ-5.2 WED 16:15

Pr3+ vortex fibre laser with interferometric output coupler in red and orange

•W.R. Kerridge-Johns[1,2], A.S. Rao[2,3], Y. Fujimoto[4], and T. Omatsu[2]; [1]Department of Physics, Imperial College, London, United Kingdom; [2]Graduate School of Engineering, Chiba University, Chiba, Japan; [3]Institute for Advanced Academic Research, Chiba University, Chiba, Japan; [4]Chiba Institute of Technology, Chiba, Japan

We construct a Pr3+:waterproof fluoro-aluminate glass fibre laser with first order vortex output using an interferometric Gaussian to vortex mode converting output coupler. We find multiple laser wavelengths in orange (606nm-615nm), red (635nm-640nm), and infrared (695nm-700nm).

CJ-5.3 WED 16:30

Tapered Fiber Amplifier Operated Near 1030 nm with 430 kW Peak and 50 W Average Power

K. Bobkov[1], E. Mikhailov[1], A. Levchenko [1], V. Velmiskin [1], D. Khudyakov[1], S. Aleshkina[1], T. Zaushitsyna[1], M. Bubnov[1], D. Lipatov[2], and •M. Likhachev[1]; [1]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; [2]G.G. Devyatykh Institute of chemistry of high purity substances of the Russian Academy of Sciences, Nizhny Novgorod , Russia

Tapered Yb-doped fiber amplifier was optimized for operation near 1030 nm. Output peak power of 430 kW in 5.2-ps-pulses with average power of 32 W was obtained.

Room 8 Hall A1 (A12)

EB-9.2 WED 16:15

Tomography of distant single Atoms

•F. Fertig[1,2], Y. Zhou[1,2], P. Malik[1,2], T. van Leent[1,2], and H. Weinfurter[1,2,3]; [1]Fakultät für Physik, Ludwig-Maximilians-Universität, Munich, Germany; [2]Munich Center for Quantum Science and Technology (MCQST), Munich, Germany; [3]Max-Planck-Institut für Quantenoptik, Garching, Germany

We report on the generation and tomographic reconstruction of an entangled state of two single-atoms separated by 400 meters, and detail on the evaluation of the entangled state fidelity.

EB-9.3 WED 16:30

Experimental anonymous conference key agreement

•J. Webb[1], J. Ho[1], F. Grasselli[2], G. Murta[2], A. Pickston[1], A. Ulibarenna[1], and A. Fedrizzi[1]; [1]Heriot-Watt University, Edinburgh, United Kingdom; [2]Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany

Experimental fully-anonymous conference key agreement in a six-user network, where all users' identities are hidden. The conference key rates for all group configurations show the key rate advantage when multipartite entanglement is used.

Room 1 ICM

Despite being a cornerstone of quantum physics, Rabi dynamics in light-matter interaction has only been studied at long wavelengths. Here, we present the first demonstration of Rabi dynamics at XUV wavelengths using a seeded FEL.

JSI-4.4 WED 16:45

Photoelectron Signatures of Nonperturbative Dynamics in Resonant Two-photon Ionization of Helium

•*E. Olofsson and J.M. Dahlström*; *Division of Mathematical Physics, Lund University, Lund, Sweden*

Motivated by recent experimental results from the FERMI free-electron laser, we study photoionization from a Rabi-oscillating He atom using an effective Hamiltonian approach. We investigate the interference between resonant and non-resonant ionization processes.

JSI-4.5 WED 17:00

Atomic two-color XUV interferometer

•*M. Žitnik[1,2], A. Mihelič[1,2], K. Bučar[1,2], Š. Krušič[1,2], J. Turnšek[1,2], R. Squibb[3], R. Feifel[3], I. Ismail[4], P. Lablanquie[4], J. Palaudoux[4], O. Plekan[5], M. Di Fraia[5], N. Pal[5], M. Coreno[5,6], M. Manfredda[5], A. Simoncig[5], P.R. Ribič[5,7], F. Sottocorona[5], E. Allaria[5], K.C. Prince[5], C. Callegari[5], and F. Penent[4]*; *[1]Jožef Stefan Institute, Ljubljana, Slovenia; [2]Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana, Slovenia; [3]University of Gothenburg, De-*

Room 4a ICM

CK-7.3 WED 16:45

Precision-machined hollow-core waveguides for extreme-ultraviolet wavelengths

•*T. Strobl[1,2], L. Hein[1,2], T.W. Hänsch[1,2], T. Udem[1,2], T. Sukegawa[3], M. Koyama[3], and A. Ozawa[1]*; *[1]Max-Planck-Institut für Quantenoptik, 85748 Garching, Germany; [2]Fakultät für Physik, Ludwig-Maximilians-Universität München, 80799 München, Germany; [3]Canon Inc., 30-2, Shimomaruko 3-choume, Ohta-ku, Tokyo, Japan*

Waveguides for extreme-ultraviolet wavelengths are demonstrated. Hollow-core waveguides were fabricated on a metal substrate using a precision machining centre and tested with 123.6 nm radiation. This technology enables miniaturisation of XUV frequency comb metrology experiments.

CK-7.4 WED 17:00

High-Extinction Reconfigurable Mach-Zehnder Interferometer Based on Silicon Photonic MEMS

•*D.U. Kim[1], M.G. Lim[1], Y.J. Park[1], D.J. Choi[1], M.J. Her[1], M.S. Hong[1], Y. Jeong[2], K. Yu[2], and S. Han[1]*; *[1]Department of Robotics Engineering, Daegu Gyeongbuk Institute of Science and Technology, Daegu, South Korea; [2]School of Electrical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea*

We propose and demonstrate a high-extinction reconfigurable Mach-Zehnder interferometer with

Room 4b ICM

EH-1.3 WED 16:45

Optical time diffraction as a window into Epsilon Near Zero dynamics

•*R. Tirole[1], S. Vezzoli[1], E. Galiffi[2], B. Tillman[3], P.A. Huidobro[4], A. Alu[2,5], S.A. Maier[1,3,6], J.B. Pendry[1], and R. Sapienza[1]*; *[1]The Blackett Laboratory, Department of Physics, Imperial College London, United Kingdom; [2]Photonics Initiative, Advanced Science Research Center, City University of New York, USA; [3]Chair in Hybrid Nanosystems, Nanoinstitut Munchen, Ludwig-Maximilians-Universitat Munchen, Germany; [4]Instituto de Telecomunicacoes, Instituto Superior Tecnico-University of Lisbon, Portugal; [5]Physics Program, Graduate Center, City University of New York, USA; [6]School of Physics and Astronomy, Monash University, Clayton, Australia*

In a pump-probe experiment with an Indium Tin Oxide thin film, a temporal analogue of Young's double slit experiment is demonstrated. The generated spectral oscillations give insight on the nonlinear dynamics within the epsilon-near-zero platform.

EH-1.4 WED 17:00

How to exploit light-matter interactions in space (x,y,z) and time (t) to enable spatiotemporal effective materials?

•*V. Pacheco-Peña[1] and N. Engheta[2]*; *[1]School of Mathematics, Statistics and Physics, Newcastle University, Newcastle Upon Tyne, NE1 7RU, United Kingdom; [2]Department of Electrical and Systems Engineering, University of Pennsylvania, Philadelphia, PA 19104, USA*

We discuss how temporally modulated media ϵr (t) within spatially inhomogeneous multilayers can be exploited to achieve space-time effec-

Room 13a ICM

demonstrate a room-temperature integrated distributed feedback nanocrystal laser with ultranarrow FWHM upon optical pumping.

CA-9.4 WED 16:45

Femtosecond-laser-written depressed-cladding waveguide laser in Tm3+:CaF2

•*P. Loiko[1], K. Eremeev[1], C. Romero[2], J.R.V. de Aldana[2], X. Mateos[3], A. Benayad[1], P. Camy[1], and A. Braud[1]*; *[1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]University of Salamanca, Salamanca, Spain; [3]Universitat Rovira i Virgili (URV), Tarragona, Spain*

Depressed-cladding low-loss (0.3 dB/cm) buried waveguides were fabricated in a bulk Tm3+:CaF2 crystal by femtosecond Direct Laser Writing. The 50 μm-diameter waveguide laser delivered 385 mW at 1.87 μm with 41.1% slope efficiency.

CA-9.5 WED 17:00

High-energy pulse laser system at 1540 nm using an Er,Yb:glass planar waveguide amplifier for coherent doppler wind lidar

•*J. Nomura[1], W. Yoshiki[1], K. Hirosawa[1], T. Yanagisawa[2], N. Ohata[1], S. Imamura[3], D. Sakaizawa[3], and N. Tomii[3]*; *[1]Mitsubishi Electric Corporation, Information Technology R & D Center, 5-1-1 Ofuna Kamakura Kanagawa 247-8501, Japan; [2]Mitsubishi Electric Corporation, Communication System Center, 8-1-1 Tsukaguchi-Honmach Amagasaki Hyogo 661-8661, Japan;*

Room 13b ICM

neous carrier relaxation process in the Q-dash inhomogeneous material.

CB-7.4 WED 16:45

Dual-comb interferometer based on densified gain-switched laser diodes for high-resolution sensing applications

•*C. Quevedo-Galán[1], A. Rosado[1,2], P. López-Querol[1], A. Pérez-Serrano[1], J.M. García Tijero[1], and I. Esquivias[1]*; *[1]CEMDATIC - E.T.S.I. Telecomunicación, Universidad Politécnica de Madrid (UPM), Madrid, Spain; [2]Instituto de Óptica 'Daza de Valdes', IO-CSIC, Madrid, Spain*

A dual-comb interferometer based on externally-densified gain-switched optical frequency combs has been employed to measure the transmission profile of an etalon, paving the way for applications requiring ultra-high resolution.

CB-7.5 WED 17:00

Accurate measurement of the linewidth enhancement factor of semiconductor lasers by a simple technique

•*B. Sinquin and M. Romanelli*; *Institut FOTON, UMR 6082, Rennes, France*

We propose a simple, precise and reliable method for the measurement of the linewidth enhancement factor in semiconductor lasers. We show experimentally 3% uncertainty. This technique is of interest in the context of microwave photonics.

Room 14a ICM

and continuous (fine) tunings are demonstrated.

CD-10.4 WED 16:45

Magnesium Fluoride Photonic-Belt Resonators For Generating Broadband Frequency Combs

•*V. Ng[1,2], P.C. Qureshi[1,2], F. Azeem[1,3], L.S. Trainor[1,3], H.G.L. Schwefel[1,3], S. Coen[1,2], M. Erkintalo[1,2], and S.G. Murdoch[1,2]*; *[1]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [2]University of Auckland, Auckland, New Zealand; [3]University of Otago, Dunedin, New Zealand*

We consider photonic belt resonators which support only a few optical modes. These resonators are dispersion engineered to generate broadband optical frequency combs, free from spectral defects, and extended by dispersive waves.

CD-10.5 WED 17:00

Symmetry breaking in high-Q silicon nitride resonators

•*Y. Zhang[1], S. Zhang [1], T. Bi[1,2], G.N. Ghalanos[1,3], H. Yan[1,2], and P. Del'Haye[1,2]*; *[1]Max Planck Institute for the Science of Light, 91058 Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, 91058 Erlangen, Germany; [3]Blackett Laboratory, Imperial College London, SW7 2AZ London, United Kingdom*

Symmetry breaking of counterpropagating light in microresonators has many applications, ranging from

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CH-8.4 WED 16:45

High-sensitivity Hyperspectral Fourier-plane Microscopy by an Ultrastable Common-path Interferometer

A. Genco[1], C. Cruciano[1], M. Corti[1], B. Ardini[1], K. McGhee[3], L. Sortino[4], L. Hüttenhofer[4], T. Virgili[2], D.G. Lidzey[3], S.A. Maier[4,5,6], A. Bassi[1], G. Valentini[1], G. Cerullo[1,2], and •C. Manzoni[2]; [1]Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; [2]IFN CNR, Milano, Italy; [3]Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom; [4]Faculty of Physics, Ludwig-Maximilians-Universität München, Munich, Germany; [5]School of Physics and Astronomy, Monash University, Clayton, Victoria, Australia; [6]Department of Physics, Imperial College London, London, United Kingdom

A common-path birefringent interferometer produces hyperspectral images of the k-space of optical microcavities and metasurfaces, obtaining a simultaneous angular and spectral view of the samples, retrieving 3D maps of their angular dispersions with optimal resolution.

CH-8.5 WED 17:00

Nanosecond compressive FLIM via Random Temporal Signals with direct lifetime retrieval

•J. Junek and K. Žídek; Regional Center for Special Optics and Optoelectronic Systems TOPTEC, Institute of Plasma Physics of the CAS, Prague 8, Czech Republic

We present the novel RATS method for time-resolved spectroscopy. We tuned overall method performance while maintaining low cost. We outline an alternative FLIM reconstruction algorithm that shortens the post-processing time, making the method more attractive.

Room Osterseen ICM

tal observation of parametrically-driven cavity solitons (PDCSs) in a pure Kerr resonator. Bichromatic pumping of a silicon nitride microresonator results in PDCS frequency combs in between the two pump frequencies.

EF-2.3 WED 16:45

Soliton Generation in a Gallium Phosphide Photonic Crystal Cavity

•A. Davydova[1], A. Nardi[2], N. Kuznetsov[1], C. Möhl[2], M.H. Anderson[1], J. Riemensberger[1], T.J. Kippenberg[1], and P. Seidler[2]; [1]Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]IBM Research Europe, Zurich, Switzerland

We demonstrate a broadband dispersion-engineered photonic crystal Fabry-Perot resonator based on Gallium phosphide with record-high quality factor. With subharmonic pulsed pumping, we achieve generation of stable dissipative Kerr frequency combs.

EF-2.4 WED 17:00

Electrically-driven platform for soliton generation

•N. Opačak[1,2], D. Kazakov[2], L. Columbo[3], M. Beiser[1], F. Pilat[1], M. Brambilla[4], F. Prati[5], M. Piccardo[2,6], F. Capasso[2], and B. Schwarz[1,2]; [1]Institute of Solid State Electronics, TU Wien, Vienna, Austria; [2]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, USA; [3]Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Torino, Italy; [4]Dipartimento di Fisica Interateneo and CNR-IFN, Universitá e Politecnico di Bari,

Room 1 Hall B1 (B11)

CF-9.4 WED 16:45

Sub-20-fs UV Pump - XUV Probe Beamline for Ultrafast Molecular Spectroscopy

•A. Crego[1,2], S. Severino[3], F. Medeghini[3], L. Mai[3], F. Frassetto[4], L. Poletto[4], M. Lucchini[1,3], M. Reduzzi[3], M. Nisoli[1,3], and R. Borrego-Varillas[1]; [1]Institute for Photonics and Nanotechnologies, IFN-CNR, Piazza Leonardo da Vinci 32, 20133, Milano, Italy; [2]Grupo de Investigación en Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, Universidad de Salamanca, E-37008, Salamanca, Spain; [3]Dipartimento di Fisica, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133, Milano, Italy; [4]Institute for Photonics and Nanotechnologies, IFN-CNR, via Trasea 7, 35131, Padova, Italy

We developed a unique UV–XUV spectroscopy beamline with sub-20-fs temporal resolution, unambiguously characterized by in-situ photoelectron cross-correlation. We present its application to resolve for the first time the ultrafast S2/S1 passage in acetylacetone.

CF-9.5 WED 17:00

Laser-induced Nonthermal Spin Dynamics in Ferromagnetic Materials Probed by Ultrafast Magneto-optic Spectroscopy

•I.C. Yu[1], J.-H. Shim[2], B.-G. Park[3], K.-J. Kim[1], D.-H. Kim[4], J.H. Oh[1], K.-J. Lee[1], and F. Rotermund[1]; [1]Department of Physics, Korea Advanced Institute of Science and Technology (KAIST), 34141 Daejeon, South Korea; [2]Department of Physics and Center for Attosecond Science and Technology, POSTECH, 37673 Pohang, South Korea; [3]Department of Materials Science and Engineering, Korea Advanced

Room 6 Hall B3 (B32)

CI-4.4 WED 16:45

On the Influence of Gating on Computational Complexity and Performance of Recurrent Neural Networks-based Equalizers

•D. Argüello Ron; Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom

Low computational complexity variants of bi-LSTM and bi-GRU models are proposed and successfully used to compensate the nonlinearities from the transmission of DP 34.4 Gbaud 16QAM over 450km of TWC fiber without sacrificing performance.

CI-4.5 WED 17:00

THz-range all-optical wavelength conversion using a feedback-controlled multi-wavelength laser

•P. Marin-Palomo, S. Abdollahi, and M. Virte; Brussels Photonics Team (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium

We demonstrate wavelength conversion of up to 10.5 nm (1.36 THz) through single optical injection in a multi-wavelength laser. The proposed scheme enables amplification and control of the frequency shift without additional optical input.

Room 7 Hall A1 (A11)

Average power scalability to 50 W was demonstrated.

CJ-5.4 WED 16:45

Tunable Brillouin/Neodymium fiber laser with non-resonant pumping

•R. Prakash[1], D. Darwich[1], C. Dixneuf[2], G. Guiraud[2], K. Le Corre[3], T. Robin[3], R. Florentin[4], M. Laroche[4], G. Santarelli[1], and A. Hilico[1]; [1]LP2N, IOGS, CNRS and Université de Bordeaux, Talence, France; [2]Azur Light Systems, Pessac, France; [3]Exail (formerly iXblue), Lannion, France; [4]CIMAP, ENSICAEN-CNRS-CEA, Normandie Université, Caen, France

We demonstrate a high power, polarization maintaining, low-noise, single frequency, tunable Neodymium-doped fiber laser and its subsequent use as a non-resonant Brillouin fiber laser pump.

CJ-5.5 WED 17:00

Fabrication and characterisation of few mode DBR Brillouin-Raman lasers

•R.H.S. Bannerman[1], A.I. Flint[1], J.C. Gates[1], N.G.R. Broderick[2], C.B.E. Gawith[1,3], and P.G.R. Smith[1]; [1]Optoelectronics Research Centre, University of Southampton, United Kingdom; [2]Dodd Walls Centre for Photonics and Quantum Technologies, Department of Physics, The University of Auckland, New Zealand; [3]Covesion Ltd., Southampton, United Kingdom

We present our work on the fabrication and characterization of

Room 8 Hall A1 (A12)

EB-9.4 WED 16:45

Transmission of light-matter entanglement over a metropolitan network

J.V. Rakonjac[1], •S. Grandi[1], S. Wengerowsky[1], D. Lago-Rivera[1], F. Appas[1], and H. de Riedmatten[1,2]; [1]ICFO-Institut de Ciencies Fotoniques, Castelldefels, Spain; [2]ICREA-Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain

We report entanglement between a multimode quantum memory and a photon, after propagation in a metropolitan fibre link. The detection setup is then placed in a remote location while detection events are sent back through optical fibres.

EB-9.5 WED 17:00

Efficient interface between ultrafast and nanosecond optical quantum systems

•F. Sośnicki, M. Mikołajczyk, A. Golestani, and M. Karpiński; University of Warsaw, Warszawa, Poland

We experimentally demonstrate large-scale spectral bandwidth compression by over two orders of magnitude of broadband heralded single photons, from 0.56 nm to 4 pm, increasing a photon flux through a 3.6 pm filter by a factor of 16.

Room 1 ICM

partment of Physics, Gothenburg, Sweden; [4]LCP-MR (UMR 7614), Sorbonne Universit'e and CNRS, Paris, France; [5]Elettra-Sincrotrone Trieste, Trieste, Italy; [6]Consiglio Nazionale delle Ricerche –Istituto di Struttura della Materia, Trieste, Italy; [7]Laboratory of Quantum Optics, University of Nova Gorica, Nova Gorica, Slovenia

We report on using helium $(\omega_1 + \omega_1)/(\omega_3 - \omega_1)$ XUV interferometer to detect phase shift of the fundamental radiation tuned to the $4s^{-1}5p$ window resonance after passing 5 m long gas attenuator filled with krypton.

JSI-4.6 WED 17:15

Impulsive X-ray Raman in liquid water

•*O. Alexander[1], F. Egun[1], D. Garratt[2], L. Rego[1,3], J. Cryan[2,4], T. Driver[2,4], J.P. Marangos[2,4], A. Marinelli[4], R. Coffee[4], D. Deponte[4], D. Haxton[5], E. Thierstein[2,4], J. Lee[1], J. Turner[1], K. Kowalczyk[1], K. Zhao[1], M.-F. Lin[4], N. Berrah[6], P. Bucksbaum[2], R.-P. Wang[7], S. Beauvarlet[6], S. Moeller[2,4], J. Oneal[2,4], G. Dakovski[4], and K. Larsen[2,4]; [1]Imperial College London, London, United Kingdom; [2]Stanford Pulse Institute, California, USA; [3]University of Salamanca, Salamanca, Spain; [4]Linac Coherent Light Source, California, USA; [5]KLA Corporation, California, USA; [6]University of Connecticut, Connecticut, USA; [7]Universität Hamburg, Hamburg, Germany*

We observe impulsive X-ray Raman emission from micrometer-thick liquid water jets using intense 350 as X-ray XFEL pulses, at the oxygen K-edge. Our calculation predict valence states excitations, with populations dependent on the propagation length.

Room 4a ICM

MEMS-based tunable couplers and phase shifter. The measured extinction ratio at 1550 nm and 1560 nm is 41.76 dB and 41.25 dB, respectively.

CK-7.5 WED 17:15

Amorphous Silicon based Cross-talk Resilient Photonic Phase Shifters

•*S. De[1,2], R. Das[1], K. Singh[1], Y. Mandalawi[1], T. Kleine-Ostmann[2], and T. Schneider[1]; [1]TU Braunschweig, Braunschweig, Germany; [2]PTB Braunschweig, Braunschweig, Germany*

We show that the phase crosstalk in amorphous silicon based integrated photonic devices is much smaller than in crystalline ones and can be further mitigated by deep trenches.

Room 4b ICM

tive materials, opening a new direction for a full manipulation of light-matter interactions in both space and time.

EH-1.5 WED 17:15

Edge Modes, Symmetries, and Zak Phases: Analysis via Bloch Impedance

•*I. Tsukerman[1] and V. Markel[2]; [1]Department of Electrical and Computer Engineering, The University of Akron, Akron, Ohio, USA; [2]Departments of Radiology and Bioengineering, University of Pennsylvania, Philadelphia, PA, USA*

Unidirectional modes exist at interfaces of topologically different periodic structures. In photonics, a general proof of this bulk-boundary correspondence principle is still lacking. This paper provides such a proof, along with illustrative numerical examples.

Room 13a ICM

[3]Japan Aerospace Exploration Agency, 6-13-1 Osawa Mitaka Tokyo 181-0015, Japan

We have developed a high-energy pulse laser system at 1540 nm using an Er,Yb:glass planar waveguide amplifier that outputs pulses with energy exceeding 40 mJ for coherent doppler wind lidar.

CA-9.6 WED 17:15

High energy passively Q-switched laser on a CMOS platform

•*N. Singh[1], J. Lorenzen[1], M. Sinobad[1], K. Wang[2], A. Liapis[3], H. Frankis[4], M. Gaafar[1], S. Haugg[5], H. Francis[6], J. Carreira[6], M. Geiselmann[6], T. Herr[1], J. Bradley[4], Z. Sun[3], S. Garcia-Blanco[2], and F. Kärtner[1,7]; [1]Center for Free-Electron Laser Science CFEL, Hamburg, Germany; [2]University of Twente, Enschede, Netherlands; [3]Aalto University, Espoo, Finland; [4]McMaster University, Hamilton, Canada; [5]CHyn, University of Hamburg, Hamburg, Germany; [6]LIGENTEC, Ecublens, Switzerland; [7]Department of Physics, Universität Hamburg, Hamburg, Germany*

We demonstrate CMOS-compatible high energy Q-switched laser in the eye-safe window, with an on-chip output pulse energy over 150 nanojoules at a repetition rate of ~1 MHz in the fundamental optical mode in a compact footprint.

Room 13b ICM

CB-7.6 WED 17:15

Detection and investigation of pulse asymmetries in passively mode-locked quantum-dot laser diodes using dispersion-scan

•*T.d.S. Gomes[1,2], H. Crespo[2,3], and M.A. Cataluna[1]; [1]Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]IFIMUP and Departamento de Física e Astronomia, Faculdade de Ciências da Universidade do Porto, Porto, Portugal; [3]Blackett Laboratory, Imperial College, London, United Kingdom*

We demonstrate a dispersion-scan setup to characterize and compress pulses from a quantum-dot mode-locked laser diode, studying the influence of drive current and reverse bias on pulse asymmetry and compressing the pulses to sub-ps durations.

Room 14a ICM

isolators to memories and gyroscopes. We report symmetry breaking in a high-Q silicon nitride resonator at a threshold power below 4 mW.

CD-10.6 WED 17:15

Polarization-Based Idler Elimination: Enhancing the Efficiency of Optical Parametric Amplification

•*G. Jansonas[1,2], R. Budriūnas[1,2], G. Valiulis[1], and A. Varanavičius[1]; [1]Vilnius University, Laser Research Center, Vilnius, Lithuania; [2]Light Conversion Ltd., Vilnius, Lithuania*

This study presents a novel way to increase the energy conversion efficiency of optical parametric amplification by eliminating the idler wave from the interaction using consecutive type-I and type-II amplification processes.

Room 14b ICM

CH-8.6 WED 17:15

Sensing of Dynamic Light-Liquid Interaction with Dual Beam Thermal Lens Spectroscopy

•*J.L. Domínguez-Juárez*[1,2], *R. Quintero-Torres*[1], *J.L. Aragón*[1], *M.A. Quiroz-Juárez* [1], *and J. Villatoro*[3,4]; [1]*Centro de Física Aplicada y Tecnología Avanzada, Universidad Nacional Autónoma de México, , 76230, Juriquilla, Querétaro, México*; [2]*Cátedras CONACyT, Centro de Física Aplicada y Tecnología Avanzada, UNAM, 76230 , Juriquilla, Querétaro, México*; [3]*Department of Communications Engineering, University of the Basque Country UPV/EHU, 48013, Bilbao, Spain*; [4]*Ikerbasque-Basque Foundation for Science, E-48011,, Bilbao, Spain*

We show dynamic wave-front sensing as a temperature-induced index of refraction changes for thermalization processes in liquids. Light-liquid interaction is analyzed with the help of visible image changes of a diffraction patterns response.

Room Osterseen ICM

Bari, Italy; [5]*Dipartimento di Scienza e Alta Tecnologia, Universitá dell'Insubria, Como, Italy*; [6]*Center for Nano Science and Technology, Fondazione Istituto Italiano di Tecnologia, Milano, Italy*

We demonstrate a new type of optical solitons in a free-running ring semiconductor laser. The soliton is predicted within the framework of complex Ginzburg-Landau equation and confirmed by both the experimental measurements and numerical simulations.

EF-2.5 WED 17:15

Cavity soliton Raman self-frequency shift cancellation

•*N. Englebert, C. Simon, C. Mas Arabí, F. Leo, and S.-P. Gorza*; *OPERA-Photonique, Université libre de Bruxelles, Brussels, Belgium*

We report theoretically and experimentally on the formation of temporal cavity solitons shorter than the fundamental limit imposed by the stimulated Raman scattering in a fiber Kerr resonator that includes a phase modulator.

Room 1 Hall B1 (B11)

Institute of Science and Technology (KAIST), 34141 Daejeon, South Korea; [4]*Department of Physics, Chungbuk National University, 28644 Cheongju, South Korea*

Time-resolved magneto-optic measurements are performed to study coherent light-spin interaction in ferromagnetic Co/Pt and Co films. We found out that laser-induced nonequilibrium spin states play an important role in ultrafast demagnetization of ferromagnetic materials.

CF-9.6 WED 17:15

Field-Resolved Infrared Spectroscopy using a Broadband Achromatic Interferometer

•*S. Maithani*[1,2], *A. Maity*[1,2,3], *W. Schweinberger*[1,2,3], *A. Weigel*[1,2,3], *F. Krausz*[1,2,3], *and I. Pupeza*[1,2,4]; [1]*Max Planck Institute of Quantum Optics, Garching, Germany*; [2]*Ludwig Maximilians-University Munich, Garching, Germany*; [3]*Center for Molecular Fingerprinting, Molekuláris- Ujjlenyomat Kutató Közhasznú Nonprofit Kft., Budapest, Hungary*; [4]*Leibniz Institute of Photonic Technology – Member of research alliance "Leibniz Health Technologies", Jena, Germany*

We demonstrate a broadband mid-infrared interferometric setup, cancelling source excitation noise and extending the dynamic range in molecular field-resolved spectroscopy. First electro-optic-sampling measurements at the destructive port showed a tenfold suppression of the excitation field.

Room 6 Hall B3 (B32)

CI-4.6 WED 17:15

THz-bandwidth passive logic gates through noninstantaneous nonlinearity

•*N. Perron*[1], *M. Chemnitz*[2], *B. Fischer*[1], *S. Junaid*[2], *M. Schmidt*[2], *and R. Morandotti*[1]; [1]*Institut National de la Recherche Scientifique (INRS-EMT), Varennes, Canada*; [2]*Leibniz Institute of Photonic Technology, Jena, Germany*

We implement ultrafast, power-efficient, all-optical logic gates based on a liquid-core optical fiber platform. We present, theoretically and experimentally, the unique nonlinear interactions driving each logic operation, implemented using only standard telecom components.

Room 7 Hall A1 (A11)

short (<300mm) Fabry-Perot DBR Raman-Brillouin lasers in highly nonlinear fiber. Our aim is to better understand their application to compact cascading of Raman laser DFBs.

CJ-5.6 WED 17:15

Influence of clad-to-core ratio on the performance of Nd-doped LMA fiber amplifiers at 915 nm

•*R. Florentin*[1], *K. Le Corre*[1,2], *T. Robin*[2], *B. Cadier*[2], *A. Barnini*[2], *R. Prakash*[3], *G. Santarelli*[3], *H. Gilles*[1], *S. Girard*[1], *and M. Laroche*[1]; [1]*CIMAP, ENSICAEN-CNRS-CEA, Normandie Université, Caen, France*; [2]*Exail (formerly iXblue), Lannion, France*; [3]*LP2N, IOGS, CNRS and Université de Bordeaux, Bordeaux, France*

We report an analytical, numerical and experimental work about high power emission at 915nm. It investigates the impact of clad-to-core ratio and bending radius of Neodymium doped large mode area fibers on the output power.

Room 8 Hall A1 (A12)

EB-9.6 WED 17:15

Entanglement source for space-ground quantum communication

•*T. TROISI, Y. PELET, G. SAUDER, S. TANZILLI, and A. MARTIN*; *Institut de Physique de Nice, UMR 7010, NICE, France*

We present a high rate entangled-based photon source working at telecom wavelength, com- patible with existing fibre communication networks, with hybrid encoding (energy-time and polarisation), with the aim of fulfilling spatial constraints.

13:00 – 14:00

CH-P: CH Poster session

CH-P.1 WED

Two-photon lensless endoscopes with multicore fibers

F. El Moussawi[1], M. Hofer[2], •S. Sivankutty[1], A. Bertoncini[3], D. Labat[1], A. Cassez[1], G. Bouwmans[1], R. Cossart[4], O. Vanvincq[1], C. Liberale[3], H. Rigneault[2], and E. Andresen[1]; [1]Univ. Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France; [2]Aix-Marseille University, CNRS, Institut Fresnel, Marseille, France; [3]King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; [4]Aix-Marseille University, INSERM, INMED, Marseille, France

We present here two approaches to functionalizing a bending-resilient multicore fiber for lensless endoscopes by tapering and 3D printing micro-optics at its tip. A major improvement in the sensitivity (>10x) is experimentally demonstrated.

CH-P.2 WED

Single-Molecule Microscopy in Ultrahigh Vacuum

•T. Fang, N. Vogeley, and D. Wang; Institute of Physics, University of Kassel, 34132 Kassel, Germany

By adapting oil-immersion microscopy to a novel vacuum window, we resolve the dynamics of single molecules on a fused-silica surface under ultrahigh vacuum conditions with high spatial and temporal resolution.

CH-P.3 WED

Wavelength Scanning Multimode Fiber Imaging

B. Lochocki[1], •A. Ivanina[1], A. Bandhoe[1], J.F. de Boer[2], and L.V. Amitonova[1,2]; [1]Advanced Research Center for Nanolithography (ARCNL), Amsterdam, Netherlands; [2]LaserLaB, VU Amsterdam, Amsterdam, Netherlands

Compressive imaging via a multimode fiber is demonstrated using a visible spectrum swept source and wavelength dependent speckle illumination. The high-resolution image reconstruction is shown for narrow sweeping bandwidth of < 27.5 nm.

CH-P.4 WED

Deeply Sub-wavelength 2D Optical Metrology with Superoscillatory Light

•Y. Wang[1], J.-K. So[2], E.A. Chen[2], C. Rendón-Barraza[2], B. Wang[2], G. Adamo[2], E. Plum[1], K. MacDonald[1], J.-Y. Ou[1], and N. Zheludev[1,2]; [1]Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore, Singapore

We demonstrate optical metrology for two-dimensional sub-wavelength objects with resolution beyond $\lambda/50$ via deep learning-enabled analysis of light scattering from target objects illuminated by the phase singularity of superoscillatory structured light.

CH-P.5 WED

Next Generation of Nonlinear Laser Microscopy Based on High Energy Fs-Pulses: Widefield Mode up to 2.2 microns

•L. Vittadello[1,2], F. Kodde[1,2], J. Klenen[1,2], and M. Imlau[1,2]; [1]University of Osnabrueck, Department of Physics, Osnabrueck, Germany; [2]Center of Cellular Nanoanalytics Osnabreuck, Osnabrueck, Germany

The use of lasers having energy per pulse in the μJ allows (i) to develop an easily reproducible nonlinear widefield microscope and (ii) to image deeper with less photodamage up to 2.2 microns.

CH-P.6 WED

Cantilever-Enhanced Photoacoustic Detector for Black and Brown Carbon

•J. Karhu[1,2], J. Kuula[2,3], T. Mikkonen[2,4], M. Ward[2], A. Virkkula[3], E. Ikonen[1,5], T. Hieta[6], H. Timonen[3], and M. Vainio[2,4]; [1]Aalto University, Espoo, Finland; [2]University of Helsinki, Helsinki, Finland; [3]Finnish Meteorological Institute, Helsinki, Finland; [4]Tampere University, Tampere, Finland; [5]VTT Technical Research Centre of Finland, Espoo, Finland; [6]Gasera Ltd., Turku, Finland

We present a photoacoustic instrument for multiwavelength measurement of aerosol light absorption. The method uses cantilever-enhanced photoacoustics, which improves sensitivity and is particularly suitable for measuring multiple modulation frequencies simultaneously.

CH-P.7 WED

Influence of the non-thermally coupled three-photon band on the performance of Y_2O_3: Yb^{3+}/Er^{3+} single-particle nanothermometers

A.R. Pessoa[1,2], J.A.O. Galindo[2], L.F. dos Santos[3], R.R. Gonçalves[3], S.A. Maier[4,5,1], •L.d.S. Menezes[2,1], and A.M. Amaral[2]; [1]Chair in Hybrid Nanosystems, Faculty of Physics, Ludwig-Maximilians-University, Munich, Germany; [2]Physics Department, Universidade Federal de Pernambuco, Recife, Brazil; [3]Chemistry Department, Universidade de São Paulo, Ribeirão Preto, Brazil; [4]School of Physics and Astronomy, Monash University, Melbourne,, Australia; [5]Department of Physics, Imperial College London, London, United Kingdom

Intruding overlapped non-thermally coupled emission bands can lead to temperature readout errors in luminescence nanothermometry. We apply a new simple method to correct it based on the different power dependencies of the relevant emission bands.

CH-P.8 WED

Optical Localization of Nanoparticles in Sub-Rayleigh Clusters

•B. Wang[1], Y. Li[2], E.A. Chan[1], G. Adamo[1], B. An[2], Z. Shen[1], and N.I. Zheludev[1,3]; [1]Centre for Disruptive Photonic Technologies, The Photonics Institute, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, Singapore; [2]Artificial Intelligence Research Institute, School of Computer Science and Engineering, Nanyang Technological University, Singapore, Singapore; [3]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom

By deep learning analysis of diffraction patterns of light scattered on sub-wavelength nano-holes clustered within Rayleigh distance, we retrieve their positions with high accuracy breaking the diffraction limit of optical resolution.

CH-P.9 WED

Nanometer-precision multimode fiber ruler

•K. Abrashitova[1] and L.V. Amitonova[1,2]; [1]Advanced Research Center for Nanolithography (ARCNL), Amsterdam, Netherlands; [2]Vrije Universiteit Amsterdam, Amsterdam, Netherlands

We demonstrate single-nanometer-precision metrology with a hair-thin multimode optical fiber. Our results show the nanoscale optical ruler at the output fiber facet and establish a new benchmark for compact optical alignment sensors.

CH-P.10 WED

Numerical Study on Multiplexing Scalability in Ptychography

•D.S. Penagos Molina[1,2,3], W. Eschen[1,2,3], C. Liu[1,2,3], J. Limpert[1,2,3,4], and J. Rothhardt[1,2,3,4]; [1]Institute of Applied Physics and Abbe Center of Photonics, Friedrich-Schiller-University Jena, Jena, Germany; [2]Helmholtz-Institute Jena, Jena, Germany; [3]GSI Helmholtzzentrzum für Schwerionenforschung, Darmstadt, Germany; [4]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We present a detailed numerical analysis on the multiplexing capabilities in ptychography for boosting scanning performance. By using 16 incoherent beams, a performance increase up to 15x was found.

CH-P.11 WED

In-Titanium Embedded multiplexed femtosecond Fiber Bragg Gratings under intense heat flow – Comparison between experimental and numerical heat and strain cartography

•E. Deliancourt[1], A. Lerner[1], K. Achour[2], A. Jolly[3], J.-C. Le Pallec[2], A. Quet[4], C. Guérin[3], S. Hulin[1], and G. Laffont[1]; [1]Paris-Saclay University, CEA, List,, Palaiseau, France; [2]Paris-Saclay University, CEA, Service d'Etudes Mécaniques et Thermiques, Gif-Sur-Yvette, France; [3]CEA-CESTA, Le Barp, France; [4]CEA-DAM, Le Ripault, Monts, France

High temperature and strain measurements were performed within a titanium plate, with pairs of femtosecond-Point-by-Point Fiber Bragg Gratings array anchored with plasma projection of ceramic powder. Numerical and experimental cartography of the plate were investigated.

CH-P.12 WED

Spatially Encoded Compressive Microscope for Ultrabroadband VIS/NIR/SWIR Hyperspectral Imaging

•L. Klein[1,2], K. Žídek[1], and J. Touš[3]; [1]Regional Centre for Special Optics and Optoelectronic Systems (TOPTEC) Institute of Plasma Physics of the Czech Academy of Sciences, Za Slovankou 1782/3, 182 00, Prague, Czech Republic; [2]Technical University of Liberec, Faculty of Mechatronics, Informatics and Interdisciplinary Studies, Studentská 1402/2, 461 17, Liberec, Czech Republic; [3]Crytur, spol. s.r.o., Na Lukách 2283, 51101, Turnov, Czech Republic

A broadband hyperspectral microscope is presented. Thanks to the compressive imaging principle, the system can create hyperspectral data in a wavelength range from 400-2200 nm. Performance tests and potential applications of the setup are demonstrated.

CH-P.13 WED

High Temperature Performance of Femtosecond Laser Written FBGs

•R. Elliott, T. Lee, M. Beresna, M. Ibsen, and G. Brambilla; Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

We investigate thermal stability of Bragg gratings fabricated with different femtosecond laser writing parameters, reporting high stability up to 1200°C, and study structural and spectral changes at the high temperature failure regime including by tapering.

CH-P.14 WED

Fano resonances in a Photonic Crystal side-coupled Micro Ring Resonator for refractive index sensing

J.H. Mendoza Castro[1,2], •A.S. Vorobev[1,3,4], S. Iadanza[3,4], B. Lendl[2], M. Grande[1], and L. O'Faolain[3,4]; [1]Department of Electrical and Information Engineering, Politecnico di Bari, Via E. Orabona, 4, 70126 , Bari, Italy; [2]Institute of Chemical Technologies and Analytics, TU Wien, Getreidemarkt 9/164,1060 , Vienna, Austria; [3]Centre for Advanced Photonics and Process Analysis, Munster Technological University, T12 T66T Bishopstown, Cork, Ireland;

[4]Tyndall National Institute, T12 PX46 , Cork, Ireland

We present a compact Si_3N_4 Photonic Crystal (PhC) - Micro Ring Resonator (MRR) structure able to support Fano lineshapes with high-Q factor (10^4), and asymmetry, in the presence of air and water.

CH-P.15 WED

Integrated ArUco Fiducial Markers in Resonant Waveguide Gratings for Pose Estimation

•*F.A. Kraft, M. Ahmadi, and M. Gerken*; *Chair for Integrated Systems and Photonics, Kiel University, Kiel, Germany*

We show the integration of ArUco fiducial markers with resonant waveguide gratings via a lithographic process. This enhances their capabilities in regards of pose estimation and angle-dependency compensation.

CH-P.16 WED

Improved optical inspection of lateral III-V-semiconductor oxidation afforded by a spectrally-shaped illumination

•*N. Monvoisin, E. Hemsley, L. Laplanche, G. Almuneau, S. Calvez, and A. Monmayrant*; *LAAS-CNRS, Toulouse, France*

We report the implementation of a spectrally-shaped source for an improved optical in-situ inspection of lateral III-V-semiconductor wet oxidation process that is critical in Vertical-Cavity Surface-Emitting Laser (VCSEL) fabrication.

CH-P.17 WED

Neuromorphic Camera Assisted High-Flow Imaging Cytometry for Particle Classification

I. Tsilikas[1], S. Deligiannidis[2], A. Tsirigotis[3], G. Tsigaridas[1], A. Bogris[2], and •*C. Mesaritakis[3]*; *[1]National Technical University of Athens, Dept. Physics, Athens, Greece*; *[2]University of West Attica, Dept. Informatics and Computer Engineering, Egaleo, Greece*; *[3]University of the Aegean, Dept. Information and Communication Systems Engineering, Samos, Greece*

Here we experimentally combine high-flow imaging-cytometer, an event-based 10 kframe/sec capable neuromorphic camera and lightweight machine learning, so as to simultaneously image and classify different type of particles with an accuracy of 97.6%.

CH-P.18 WED

Fourier Ptychography Microscopy for rapid characterization of ultrafast irradiated surfaces

N. Del Carmen Lozano, N. Faure, X. Sedao, R. Stoian, C. Fournier, T. Olivier, and •*C. Mauclair*; *Laboratoire Hubert Curien, Saint-Etienne, France*

Fourier Ptychography Microscopy (FPM) is used to characterize surfaces processed by ultrafast laser. We analyse its reconstruction performance (amplitude and phase). The FPM constitutes a promising in-situ characterization mean for ultrafast laser machining systems.

CH-P.19 WED

Dual-Comb Spectroscopy for Environmental Sensing

•*A. Eber, L. Fürst, F. Siegrist, A. Kirchner, R. di Vora, and B. Bernhardt*; *Institute of Experimental Physics, Graz, Austria*

A mobile frequency-doubled dual-comb set-up was developed for the measurement of atmospheric trace gasses. First results from field experiments are compared to laboratory measurements of nitrogen dioxide and dependencies to traffic volume are discussed.

CH-P.20 WED

Classification Of Environmental Micro-Fibres Using Stimulated Raman Microspectroscopy

•*S. Laptenok[1], L. Genchi[1], C. Martin[2,3], F. Baalkhuyur[2], C. Duarte[2], and C. Liberale[1,4]*; *[1]Biological and Environmental Science and Engineering Division, King Abdullah University of Science and Technology , Thuwal, Saudi Arabia*; *[2]Red Sea Research Center and Computational Bioscience Research Center, King Abdullah University of Science and Technology, Thuwal, Sadi Arabia*; *[3]Red Sea Global, SEZ Department of Environmental Sustainability, AlRaidah Digital City, Riyadh , Sadi Arabia*; *[4]Computer, Electrical and Mathematical Sciences and Engineering, King Abdullah University of Science and Technology , Thuwal, Sadi Arabia*

The analysis of the chemical composition of the microfibers collected from different environments using a broadband stimulated Raman scattering microscope suggests that most of the collected microfibers are of natural origin.

CH-P.21 WED

Study of Beam Steering using LCoS for LiDAR Applications

•*S.-J. Son, T.S. Meetei, B. Park, D.-K. Ko, and N.E. Yu*; *Gwangju Institute of Science and Technology, Gwangju, South Korea*

Optical beam steering at wavelength of 1550nm using a LCoS device was investigated for LiDAR application. The maximum steering angle of 15.6° was well matched with the short pixel period of 3.6 microns.

CH-P.22 WED

Miniaturization of a multi-gas sensor for environmental gases based on mid-infrared Quantum Cascade Lasers (QCL) and Silicon integration of Photoacoustic Cells

C. Constancias[1], B. Ben Bakir[1], •*M. Doron[1], M. Dubois[1], O. Lartigue[1], G. Lasfargues[1], J. Skubich[1], M. Volpert[1], G. Magat[1], J. Marianne[1], P. Labazuy[2,3], S. Moune[2,3], and E. Régis[2,3]*; *[1]Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble, France*; *[2]Université Clermont Auvergne, CNRS, IRD, OPGC, Laboratoire Magmas et Volcans, F-63000 Clermont-Ferrand, France*; *[3]Observatoire de Physique du Globe Clermont Ferrand (OPGC), Campus Universitaire des Cézeaux, 4 Avenue Blaise Pascal, F-63178 Aubière, France*

For environmental purposes, we design the miniaturization of a multi-gas sensor based on mid-infrared Quantum Cascade Lasers and Silicon integration of Photoacoustic Cells. For out-of-the-lab use, electronics downsizing is required without compromise on performance.

CH-P.23 WED

Multi-species Temperature Analysis in Methane Plasmas using Supercontinuum-based Fourier Transform Spectroscopy

•*R. Krebbers[1], N. Liu[1,2], F.J.M. Harren[1], A. Khodabakhsh[1], and S.M. Cristescu[1]*; *[1]Life Science Trace Detection Laboratory, Institute for Molecules and Materials, Radboud University, Nijmegen, Netherlands*; *[2]Laser Spectroscopy and Sensing Laboratory, Anhui University, Hefei, China*

In this presentation, results will be shown using supercontinuum-based Fourier transform spectroscopy for methane plasmas. Supercontinuum sources allow to probe plasmas and observe full ro-vibrational bands of multiple molecular species to obtain the plasma temperature.

CH-P.24 WED

Surface Modification to Optimize Generation and Detection of Light-Induced Acoustics

•*M. Illienko[1], P. Sudera[1], M. Velsink[1], and S. Witte[1,2]*; *[1]Advanced Research Center for Nanolithography, Amsterdam, Netherlands*; *[2]Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

Weak strain-optic coupling in most materials limits the application of ultrafast photoacoustics. We show enhancement of light-induced ultrasound detection by applying transparent nanolayers. Further improvement can be achieved by nanometre-scaled structuring of the sample surface.

CH-P.25 WED

Ultra-sensitive micro-toroid resonator sensor capable of resolving the angular orientation of nanoscale objects

•*M. Jalali and D. Erni*; *Universität Duisburg-Essen, Duisburg, Germany*

A nanoring is added to a micro-toroid, to achieve a plasmonic-photonic coupling between the ring and the micro-toroid. The ring will result in an electric field enhancement around the micro-toroid and accordingly improves the sensitivity.

CH-P.26 WED

High availability motion sensor with nonlinear interferometry and AI

•*R. Matha[1,2], S. Barland[1], and F. Gustave[2]*; *[1]Université Côte d'azur – CNRS, Institut de Physique de Nice, Valbonne , France*; *[2]DOTA, ONERA, Université Paris-Saclay, Plaiseau, France*

We show that a hybrid sensor based on multiple channels of self-mixing interferometry and a neural network provides a high-availability displacement measurement, robust to signal noise and to channel loss for non-cooperative targets.

CH-P.27 WED

Large-scale optical compression of free-space using an experimental three-lens spaceplate

•*N.J. Sorensen, M.T. Weil, and J.S. Lundeen*; *Physics Dept. and Nexus for Quantum Technologies, University of Ottawa, Ottawa, Canada*

We present a broadband three-lens spaceplate consisting of conventional optics in a 4-f arrangement. We experimentally measure compression ratios of 15.6, replacing 4.4 meters of free-space, three orders of magnitude greater than current optical spaceplates.

CH-P.28 WED

High-speed TIRF and 3D super-resolution structured illumination microscope with large field of view based on fiber optic components

•*H. Ortkrass[1], J. Schürstedt[1], G. Wiebusch[1], K. Szafranska[2], P. McCourt[2], and T. Huser[1]*; *[1]Biomolecular Photonics Research Group, Faculty of Physics, Bielefeld University, Bielefeld, Germany*; *[2]Department of Medical Biology, UiT - The Arctic University of Norway, Tromsø, Norway*

The presented TIRF and 3D structured illumination microscope (SIM) overcomes present limitations of commercially available and custom-built setups and features a small size, different imaging modalities and a cost-efficient implementaion.

CH-P.29 WED

Sensing the position of a single scatterer in an opaque medium by mutual scattering

M.D. Truong, A. Lagendijk, and •*W.L. Vos*; *Complex Photonic Systems (COPS), MESA + Institute for Nanotechnology, University of Twente, P.O. Box 217, 7500 AE , Enschede, Netherlands*

We investigate the potential of mutual scattering, light scattering with multiple properly phased incident beams, to study the metrology and extract structural information, especially the original depth of a moving scatterer, inside an opaque sample.

CH-P.30 WED

Polarization Grating-Based Spectropolarimeter for Circular Polarizer Inspections

•*Y.-C. Liang*[1], *Y. Chen*[2], *C.-T. Wang*[1], *S.-C. Jeng*[3], *and C.-K. Lee*[1]; [1]*Department of Photonics, National Sun Yat-sen University, Kaohsiung, Taiwan;* [2]*College of Photonics, National Yang Ming Chiao Tung University, Tainan, Taiwan;* [3]*Institute of Imaging and Biomedical Photonics, College of Photonics, National Yang Ming Chiao Tung University, Tainan, Taiwan*

Traditional inspections of polarizer films are time-consuming or invasive, such as ellipsometry or cross-section imaging. We estimate the resolution validity by matrix and construct a polarization grating-based spectropolarimeter to demonstrate efficient inspection of circular polarizers.

CH-P.31 WED

Ppb-level detection of methane using quartz enhanced photoacoustic spectroscopy (QEPAS) combined with bismuth-doped fiber amplifier

•*M. Zatorska and M. Nikodem; Wroclaw University of Science and Technology, Wroclaw, Poland*

Quartz-enhanced photoacoustic spectroscopy of methane near 1651 nm is presented. With the use of a novel bismuth-doped fiber amplifier, the detection limit down to 11 ppb is obtained for dry sample at ambient pressure.

CH-P.32 WED

Laser Induced Defects for 3D Fluorescence Imaging of Optical Structures

G. Ong, M. Beresna, G. Brambilla, and •*T. Lee; University of Southampton, Southampton, United Kingdom*

We demonstrate a method to 3D image optical structures by exploiting femtosecond laser induced structural defects acting as fluorophores for fluorescence imaging. Silica waveguides, multi-core fibre geometries and multiple cladding layers can be spatially resolved.

CH-P.33 WED

A novel Terahertz Microstructure Optical Fibre Biosensor based on Surface Plasmon Resonance

•*Y. Zhang*[1,2], *T. Miao*[2], *K. Li*[1], *N. Conper*[1], *and J. Xue*[2]; [1]*Faculty of Computing, Engineering and Science, University of South Wales, Pontypridd, United Kingdom;* [2]*Department of Physics, School of Arts & Sciences, University of Science & Technology , Xi'an, China*

Based on the SPR unique advantages, a D-type MOF biosensor using graphene as the SPR excitation material is designed, which presents the highest sensing sensitivity with 1300 GHz/RIU within the THz frequency range.

CH-P.34 WED

Optimizing Spacer Layer in Surface Plasmon-Coupled Emission Substrates for Single-Molecule Localization Microscopy

•*J.-Z. Lai and F.-C. Chien; Department of Optics and Photonics, National Central University, Taoyuan, Taiwan*

The fluorescence signals of blinking fluorophores in the single-molecule localization microscopy were enhanced by the optimal spacer layer of the surface plasmon-coupled emission substrate for reducing the required excitation power density in live cell imaging.

CH-P.35 WED

Electro-Optic Frequency Comb with Fourier-Limited Pulses achieved with a Hyper-Dispersion Compressor

•*E.M. Bayer*[1,2], *F. Bregolin*[2], *T. Puppe*[2], *R. Herda*[2], *T. Hellerer*[1], *and R. Wilk*[2]; [1]*Hochschule München University of Applied Sciences, Munich, Germany;* [2]*TOPTICA Photonics AG, Graefelfing, Germany*

We present an EOM-frequency comb, with a repetition rate of 7.8 GHz and a total spectral width of 132.6 GHz. We achieve Fourier-limited pulses with a duration of 12 ps via a hyper-dispersion compressor.

CH-P.36 WED

Ground-based remote sensing of CO2 in the atmospheric column using a portable laser heterodyne radiometer with a balanced photodetector

T. Wei, J. Wang, F. Shen, and •*W. Chen; Université du Littoral Côte d'Opale, Dunkerque, France*

All-fiber coupled portable laser heterodyne radiometer (LHR), using a wideband (1500–1640 nm) tunable external cavity diode laser as local oscillator, was developed for ground-based remote sensing of CO2 in the atmospheric column.

13:00 – 14:00

EE-P: EE Poster session

EE-P.1 WED

Ultrafast, All-Optical, and Highly Efficient Imaging of Molecular Chirality via Low-Order Nonlinear Spectroscopy

J. Vogwell[1], *L. Rego*[1], *O. Smirnova*[2,3], *and* •*D. Ayuso*[1,2]; [1]*Imperial College London, London, United Kingdom;* [2]*Max Born Institute, Berlin, Germany;* [3]*Technische Universität, Berlin, Germany*

We introduce an ultrafast chiro-optical method based on sum-frequency generation. In contrast to traditional implementations, the medium's chirality is encoded in the intensity of the nonlinear response, rather than in its phase, with extreme efficiency.

EE-P.2 WED

Vibrational Ladder Climbing of Liquid-Phase Carbon Dioxide

•*I. Morichika, H. Tsusaka, Q. Wan, and S. Ashihara; Institute of Industrial Science, The University of Tokyo, 4-6-1 Komaba, Meguro-ku, Tokyo 153-8505, Japan*

We report on successful demonstration of multi-quantum vibrational excitation in the anti-symmetric stretch of liquid-phase carbon dioxide up to the v = 9 state with mid-infrared femtosecond laser pulses.

EE-P.3 WED

Low-energy population inversion in graphene evidenced in a three-pulse pump-probe experiment

K. Mavridou[1,2], *A. Seidl*[1,2], *A. Pashkin*[1], *M. Helm*[1,2], *and* •*S. Winnerl*[1]; [1]*Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany;* [2]*Technische Universität Dresden, Dresden, Germany*

We study the dynamics of mid-infrared population inversion in intrinsic graphene. The population inversion is unambiguously evidenced by a sign change in the differential transient transmission in a three-pulse pump-probe experiment.

EE-P.4 WED

Nonlinear light stopping via self-action

•*R. Arkhipov*[1,2], *M. Arkhipov*[1], *I. Babushkin*[3], *and N. Rosanov*[1,2]; [1]*St. Petersburg State University, St. Petersburg, Russia;* [2]*Ioffe Institute, St. Petersburg, Russia;* [3]*Institute of Quantum Optics, Leibniz Universit¨at Hannover, Hannover, Germany*

In this talk, we demonstrate theoretically recently predicted new phenomenon - the self-stopping of intense single-cycle optical pulse in a homogeneous resonant medium.

EE-P.5 WED

Bright and ultrafast electron point source made of LaB6 nanotip

O. Bhorade, I. Blum, J. Houard, B. Deconihout, S. Moldovan, and •*A. Vella; UNIROUEN, CNRS, Groupe de Physique des Matériaux, Normandie Université, Rouen, France*

We study the electron emission properties of LaB6 nanotip under static electric field and under femtosecond laser illumination using a 2.25m laser at 13 MHz. Multiphoton and strong-field emission regimes are reported.

EE-P.6 WED

Ab initio calculations for valley-selective dynamical Franz-Keldysh effect in monolayer WSe$_2$

•*S. Yamada*[1], *K. Yabana*[2], *and T. Otobe*[1,3]; [1]*Kansai Photon Science Institute, National Institutes for Quantum Science and Technology, Kizugawa, Kyoto, Japan;* [2]*Center for Computational Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan;* [3]*Photon Science Center, The University of Tokyo, Hongo, Bunkyoku, Tokyo, Japan*

Valley selection control of the dynamical Franz-Keldysh effect in TMD monolayer is achieved by *ab initio* calculations mimicking measurements of attosecond transient absorption spectroscopy. A simplified two-band model reveals the mechanism behind the phenomena.

EE-P.7 WED

Ultrafast nanoplasmonic photoelectron dynamics between the multiphoton and strong-field regimes with tunable IR excitation

•*B. Bánhegyi*[1,2], *G. Ligeti*[1], *Z.G. Kiss*[1], *Z. Pápa*[1,3], *P. Rácz*[1], *and P. Dombi*[1,3]; [1]*Wigner Research Centre for Physics, Budapest, Hungary;* [2]*Budapest University of Technology and Economics, Budapest, Hungary;* [3]*ELI-ALPS Research Institute, Szeged, Hungary*

We observed transition between multiphoton and strong-field nanoplasmonic photoemission regimes. Based on the photoelectron spectra, we identified cut-off electrons even for trinagular spectra (lacking typical rescattering plateus) and we observed hybrid photoemission channels.

EE-P.8 WED

Robust generation of isolated attosecond pulses with self-compressed sub-cycle drivers from negatively pumped hollow capillary fibers

•*M.F. Galán, J. Serrano, E. Conejero Jarque, C. Hernández-García, and J. San Roman; Universidad de Salamanca, Salamanca, Spain*

We theoretically demonstrate the robust and tunable generation of isolated attosecond pulses from high-order harmonics driven by sub-cycle waveforms generated by soliton self-compression in a gas-filled hollow capillary fiber with a decreasing pressure gradient

EE-P.9 WED

Mid-infrared nonlinear response in the excitonic insulator Ta_2NiSe_5

•*K. Morimoto, K. Uchida, and K. Tanaka; Department of physics, Kyoto university, Kyoto, Japan*

We investigated the sideband generation in the excitonic insulator Ta_2NiSe_5 with gap-resonant mid-infrared pulses and observed enhancements of sideband emissions with decreasing temperature.

EE-P.10 WED

The contribution has been withdrawn.

EE-P.11 WED

Ultrafast Uniformed Quantum Manipulation with Chirped Pulses in InAs Quantum Dot Ensemble with Resonator

•*Y. Takahashi[1,2], K. Miyauchi[1,2], Y. Kinoshita[1,2], K. Akahane[3], and J. Ishi-Hayase[1,2]; [1]School of Fundamental Science and Technology, Keio University, Yokohama, Japan; [2]Center for Spintronics Research Network, Keio University, Yokohama, Japan; [3]National Institute of Information and Communications Technology, Tokyo, Japan*

We demonstrate ultrafast, uniform coherent population transfer of excitons via adiabatic rapid passage using chirped pulses in InAs QDs with and without a Fabry-Perot resonator.

EE-P.12 WED

Non-local transfer of ultrafast currents generated by few-cycle laser pulses

•*B. Fehér[1], V. Hanus[1], V. Csajbók[1], Z. Pápa[1,2], J. Budai[2], P. Paul[3,4], A. Szeghalmi[3,4], and P. Dombi[1,2]; [1]Wigner Research Centre for Physics, Budapest , Hungary; [2]ELI-ALPS Research Institute, Szeged, Hungary; [3]Institute of Applied Physics, Friedrich Schiller University Jena, Jena, Germany; [4]Fraunhofer Inst. for App. Opt. and Prec. Eng., Centre of Excellence in Photonics, Jena, Germany*

We investigated the nature of optical-to-electrical conversion of CEP-dependent ultrafast currents in dielectrics by studying the relationship between the current, laser beam and electrode geometry. We observed signatures of non-local, quasi-instantaneous current transfer.

EE-P.13 WED

Impact of MAPbBr3 Additives on Crystallinity and Charge Carrier Dynamics of Mixed Perovskite Films

•*J. Park[1], B.J. Kang[2], T.G. Park[1], J.J. Yoo[2], Y.U. Jeong[3], M. Park[4], S.S. Shin[2], and F. Rotermund[1]; [1]Department of Physics, Korea Advanced Institute of Science and Technology, Daejeon, South Korea; [2]Division of Advanced Materials, Korea Research Institute of Chemical Technology, Daejeon, South Korea; [3]Radiation Center for Ultrafast Science, Korea Atomic Energy Research Institute, Daejeon, South Korea; [4]Department of Chemistry, College of Natural Science, Pukyong National University, Busan, South Korea*

We investigate influence of MAPbBr3 additives on crystallinity and carrier dynamics in (FAPbI3)1-x(MAPbBr3)x solar cell films and verify that 0.8 mol% MAPbBr3 stabilizes crystal phase and enhances carrier life time leading to highest photo-conversion efficiency.

EE-P.14 WED

Attosecond Transient Interferometry

•*O. Kneller[1], C. Mor[1], N. Yaffe[1], D. Azoury[3], M. Krüger[4], S. Patchkovskii[2], and N. Dudovich[1]; [1]Weizmann Institute of Science, Rehovot, Israel; [2]Max-Born-Institute, Berlin, Germany; [3]Massachusetts Institute of Technology, Cambridge, MA, USA; [4]Technion - Israel Institute of Technology, HAIFA, Israel*

SPRINT resolves the transient phase of attosecond pulses via XUV-XUV interferometry, revealing the quantum evolution of strongly driven systems. This scheme probes the complex , sub cycle dynamics, hidden in most transient absorption measurements.

13:00 – 14:00

EF-P: EF Poster session

EF-P.1 WED

Zeno-Like Effect for Supercontinuum Generation by Soliton Fission

•*N. Bahr[1,2], S. Willms[1,2], I. Babushkin[1,2], U. Morgner[1,2], O. Melchert[1,2], and A. Demircan[1,2]; [1]Institute of Quantum Optics, Leibniz University Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering – Innovation Across Disciplines), Hannover, Germany*

Soliton fission of perturbed higher order solitons is inhibited when introducing absorption in the range of frequencies of the resonantly generated dispersive wave. This demonstrates a classical analog of the quantum mechanical Zeno-Effect.

EF-P.2 WED

Observing in single-shot the space-time dynamics of soliton collision with a recirculating fiber loop

•*F. Copie, P. Suret, and S. Randoux; Laboratoire PhLAM, Université de Lille, Villeneuve d'Ascq, France*

Several scenarios of soliton collision are experimentally observed in great details via single-shot recordings of spatiotemporal diagrams. The remarkable impact of the relative phase between solitons and the collision-induced temporal shifts are quantitatively verified.

EF-P.3 WED

Dark Temporal Cavity Soliton Pairs in Fabry-Pérot Resonators with Normal Dispersion and Orthogonal Polarizations

•*G.N. Campbell[1], L. Hill[1,2], P. Del'Haye[2,3], and G.-L. Oppo[1]; [1]University of Strathclyde, Glasgow, United Kingdom; [2]Max Planck Institute for the Science of Light, Erlangen, Germany; [3]Friedrich Alexander University Erlangen-Nuremberg, Erlangen, Germany*

We present dark and dark-bright temporal cavity soliton pairs for a Fabry-Pérot resonator with a Kerr medium, normal dispersion, and two polarizations. Spontaneous symmetry breaking of dark soliton pairs results in modified frequency combs.

EF-P.4 WED

Programmable THz-range comb multiplication using a feedback-controlled multi-wavelength laser

•*S. Abdollahi, P. Marin-Palomo, M. Ladouce, and M. Virte; Brussels Photonics Team (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium*

We demonstrate all-optical THz-range comb multiplication based on a feedback-controlled on-chip multi-wavelength laser. Varying the phase of the signal fed back to the laser we clone the injected comb to offset frequencies up to 1.3THz.

EF-P.5 WED

Bright and dark solitons in pure quartic Kerr resonators

•*P. Parra-Rivas[1,4], S. Hetzel[2], Y. Kartashov[3], P. Fernandez de Cordoba[4], J.A. Conejero[4], A. Aceves[2], and C. Milian[4]; [1]Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni, Sapienza Universita di Roma, Roma, Italy; [2]Department of Mathematics, Southern Methodist University, Dallas, USA; [3]Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Moscow, Russia; [4] Institut Universitari de Matematica Pura i Aplicada, Universitat Politecnica de Valencia, Valencia, Spain*

We study the bifurcation structure and stability of temporal bright and dark dissipative solitons emerging in pure quartic Kerr resonators. We show that pure quartic dispersion enhances the features of such states.

EF-P.6 WED

Generalized thermodynamics of optical multimode systems and the breach of the second law of thermodynamics

•*G. Steinmeyer; Max-Born-Institut, Berlin, Germany*

Thermodynamic descriptions of optical multimode systems have recently obtained significant attention, despite a frequently observed decrease in entropy, which violates the second law. Here, a generalized theory is presented that overcomes shortcomings of previous approaches.

EF-P.7 WED

Femtosecond filaments and air waveguides generated by TW vortex beams

•*S. Fu, B. Mahieu, A. Mysyrowicz, and A. Houard ; Laboratoire d'Optique Appliquée, Palaiseau, France*

We study the filamentation of femtosecond vortex beams produced with different laser sources at 800 nm and 1030 nm and demonstrate the possibility to use these vortex filaments as meter-scale air waveguide.

EF-P.8 WED

Optical solitons in Hatano-Nelson systems

•*I. Komis[1,3], Z.H. Musslimani[2], and K.G. Makris[1,3]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), 70013, Heraklion, Greece; [2]Department of Mathematics, Florida State University, Florida, 32306-4510, Tallahassee, USA; [3]ITCP, Department of Physics, University of Crete, 70013, Heraklion, Greece*

We investigate the interplay between Kerr nonlinearity and non-Hermiticity in a Hatano-Nelson lattice. We obtain lattice soliton solutions and study their stability, along with their localization degree as a function of the asymmetric coupling strength.

EF-P.9 WED

Exploring nonlinear propagation with higher order dispersion: Exact soliton solutions and the structure of their poles

•*Y.L. Qiang[1], T.J. Alexander[1], and C.M. de Sterke[1,2]; [1]Institute of Photonics and Optical Science (IPOS), School of Physics, The University of Sydney, Australia; [2]The Uni-*

versity of Sydney Nano Institute (Sydney Nano), The University of Sydney, Australia

We explore soliton solutions at high dispersion orders. We present families of analytic bright soliton solutions and a novel frequency-domain approach that may uncover the analytic form of solutions which are currently only known numerically.

EF-P.10 WED

Numerical Prediction of Incoherent Modulation Instability Dynamics through Deep Learning Approaches

•*Y. Boussafa, L. Sader, V.T. Hoang, B. Pessoa Chaves, A. Tonello, and B. Wetzel*; *XLIM Research Institute, CNRS UMR 7252, University of Limoges, Limoges, France*

We present a numerical study of modulation instability dynamics where optical coherent seeds compete with noise amplification. We demonstrate that neural networks can efficiently predict these incoherent dynamics and retrieve the optical seeds parameters.

EF-P.11 WED

Predatory Prey modes for a few moded laser system

•*N.G.R. Broderick*[1], *P.G.R. Smith*[2], *R. Bannerman*[2], *A.I. Flint*[2], *J.C. Gates*[2], *and C.B.E. Gawith*[2]; [1]*Dodd-Walls Centre and Department of Physics, University of Auckland, Auckland, New Zealand*; [2]*Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*

We discuss different models for a Raman-Brillouin Fabry Perot laser system and compare them to experimental results. We show that this behaviour can be explained using a simple Lotta-Volterra model with multiple prey species.

EF-P.12 WED

Noise correlations in phase-locked VECSEL arrays

•*S. Karuseichyk*[1], *V. Pal*[2], *I. Sagnes*[3], *and F. Bretenaker*[1]; [1] *LuMIn, Université Paris-Saclay, ENS, CNRS, Centrale-Supélec, Gif-sur-Yvette, France*; [2] *Department of Physics, Indian Institute of Technology Ropar, Rupnagar, India*; [3]*C2N, CNRS, Université Paris Saclay, Université Paris Sud, Palaiseau, France*

Phase-locking of the VECSEL laser array in a degenerate cavity was investigated. The influence of phase-locking on the intensity noise correlation between neighboring lasers and spectral synchronization up to single frequency operation was clearly identified.

EF-P.13 WED

Enabling coherent supercontinuum from picosecond pulses

•*D. Castelló-Lurbe*; *Institut Universitari de Ciències dels Materials, Universitat de València, Catedrático Agustín Escardino 9, 46980 Paterna, Spain*; *Departament de Física Aplicada i Electromagnetisme, Universitat de València, Dr. Moliner 50, 46100 Burjassot, Spain*; *Brussels Photonics, Department of Applied Physics and Photonics, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussel, Belgium*

Modulation instability of picosecond pulses under anomalous dispersion is canceled by exploiting a Kerr-index resonance in a silicon waveguide. This result opens a new avenue for generating coherent supercontinuum from on-chip pulsed lasers.

EF-P.14 WED

How time-distributed feedback impacts the laser dynamics?

•*M. Skënderas*[1], *S.W. Jolly*[1,2], *and M. Virte*[1]; [1]*Brussels Photonics (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium*; [2]*OPERA-Photonique, Universite Libre de Bruxelles, Bruxelles, Belgium*

We numerically investigate the impact of the time-distributed feedback on the laser dynamics by employing fiber Bragg Gratings with different lengths but with similar reflectivity. We report stability alterations for gratings longer than 7 cm.

EF-P.15 WED

Observation of Brillouin backscattering in a 50cm-long high-index doped silica chip waveguide

M. Zerbib[1], *V.T. Hoang*[2], *J.C. Beugnot*[1], *K.P. Huy*[1], *B. Little*[3], *S.T. Chu*[4], *D.J. Moss*[5], *R. Morandotti*[6], *B. Wetzel*[2], *and* •*T. Sylvestre*[1]; [1]*Institut FEMTO-ST, CNRS-Université de Franche-Comté, 25030 Besancon, France, Besancon, France*; [2]*Université de Limoges, XLIM, UMR CNRS 7252, 123 Avenue A. Thomas, 87060 Limoges, France, Limoges, France*; [3]*QXP Technologies Inc., Xian, China, Xian, China*; [4]*Department of Physics, City University of Hong Kong, Tat Chee Avenue, Hong Kong, SAR, China, Hong Kong, China*; [5]*Optical Sciences Centre, Swinburne University of Technology, Hawthorn, VIC 3122, Victoria, Australia, Victoria, Australia*; [6]*INRS-EMT, 1650 Boulevard Lionel-Boulet, Varennes, J3X 1S2, Québec, Canada, Varennes, Canada*

We report the observation of Brillouin backscattering in a 50-cm long spiral high-index doped silica chip waveguide and show that the measured Brillouin frequency shift at 16 GHz is in very good agreement with theory.

EF-P.16 WED

Bipartite-intensity-correlated comb emissions in quantum cascade lasers

•*T. Gabbrielli*[1,2], *N. Bruno*[1,2], *N. Corrias*[3], *S. Borri*[1,2], *L. Consolino*[1,2], *A. Zavatta*[1,2,3], *P. De Natale*[1,2], *and F. Cappelli*[1,2]; [1]*Istituto Nazionale di Ottica (CNR-INO), Florence, Italy*; [2]*European Laboratory for Non-linear Spectroscopy (LENS), Sesto Fiorentino - Florence, Italy*; [3]*QTI srl, Florence, Italy*

We demonstrate the presence of intensity correlations in different comb-emission regimes in quantum cascade lasers, setting the basis for a deeper understanding of the non-linear processes happening in their waveguide.

EF-P.17 WED

Temporal Fourier-Transform Phase Retrieval in Photorefractive Optical Transient Detection

•*J. García-Monreal, F. Silva, E. Roldán, G.J. de Valcárcel, and A. Esteban-Martín*; *Departament d'Òptica i Optometria i Ciències de la Visió, Burjassot (Valencia), Spain*

We report an experimental method that combines photorefractive optical transient detection with single-spot time-domain interferometric complex-field retrieval. The system suppresses stationary background, providing high-contrast detection and measurement of phase shifts of a light beam.

EF-P.18 WED

Slow vector breathers

D. Stoliarov[1], •*Q. Wang*[1], *S. Sergeyev*[1], *H. Kbashi*[1], *Z. Huang*[2], *and C. Mou*[2]; [1]*Aston Institute of Photonic Technologies (AIPT), Aston University, Birmingham, United Kingdom*; [2]*Key Laboratory of Specialty Fiber Optics and Optical Access Networks, Shanghai University, Shanghai, China*

The slow-scale polarization dynamics of breathers were examined experimentally. The study showed that the breather's power spike emerges according to the periodic phase difference slip, thereby indicating orthogonal states of polarization desynchronization.

EF-P.19 WED

Asymmetric Nonlinear Couplers: Benefits of Skewness in Dual-Core Optical Fibers

M. Longobucco[1,2], *N.V. Hung*[3], *L.X.T. Tai*[4], *R. Buczynski*[1,2], *I. Astrauskas*[5], *A. Pugzlys*[5], *A. Baltuska*[5], *B. Malomed*[6], *M. Trippenbach*[7], *and* •*I. Bugar*[5,8]; [1]*Department of Glass, Lukasiewicz Research Network - Institute of Microelectronics & Photonics, Aleja, Lotników 32/46, Warsaw, Poland*; [2]*Department of Photonics, Faculty of Physics, University of Warsaw, Pasteura 5, Warsaw, Poland*; [3]*International Training Institute for Materials Science, Hanoi University of Science and Technology, No 1 - Dai Co Viet Str., Hanoi, Vietnam*; [4]*Faculty of Physics, Warsaw University of Technology, Koszykowa 75, Warsaw, Poland*; [5]*Photonics Institute, TU Wien, Gußhausstraße 25-29, Vienna, Austria*; [6]*Department of Physical Electronics, School of Electrical Engineering, Faculty of Engineering, Center for Light-Matter Interaction, Tel Aviv University, Tel Aviv, Israel*; [7]*Institute of Theoretical Physics, Faculty of Physics, University of Warsaw, Pasteura 5, Warsaw, Poland*; [8]*Department of Chemistry, University of Ss. Cyril and Methodius in Trnava, Nám. J. Herdu 2, Trnava, Slovakia*

High contrast nonlinear switching of sub-nanojoule femtosecond pulses was achieved using high index difference soft glass dual-core fibers. The advantage of the dual-core asymmetry is studied experimentally and numerically in self-switching and cross switching configurations.

EF-P.20 WED

Fundamental laser-cavity detuning underlying dissipative soliton mode-locked lasers

•*L. Dai, S. Sun, Z. Zha, C. Mou, and H. Guo*; *Key Laboratory of Specialty Fiber Optics and Optical Access Networks, Joint International Research Laboratory of Specialty Fiber Optics and Advanced Communication, Shanghai Institute for Advanced Communication and Data Science, Shanghai University, Shanghai, China*

We demonstrate off-resonance behavior of optical dissipative solitons in decoherently driven laser cavities. An external probing laser is introduced to the cavity, which enables both the laser-cavity detuning measurement, and a soliton on-off switching dynamic.

EF-P.21 WED

Experimental study of the effects of optical feedback on the spatial and temporal coherence of the radiation emitted by a semiconductor laser

•*M. Duque Gijón*[1], *C. Masoller*[1], *and J. Tiana-Alsina*[2]; [1]*Departament de Fisica, Universitat Politecnica de Catalunya, Terrassa, Spain*; [2]*Department de Fisica Aplicada, Facultat de Fisica, Universitat de Barcelona, Barcelona, Spain*

We propose a simple experimental technique based on speckle analysis to discriminate the effects of optical feedback on spatial and temporal coherence of the light emitted by an edge-emitting laser in the coherence collapse regime.

EF-P.22 WED

Engineering nonlinear optical processes by arbitrarily manipulating phase relationships of the relevant electromagnetic fields

C. Ohae[1,2], *W. Liu*[2], *J. Zheng*[2], *and* •*M. Katsuragawa*[1,2]; [1]*Institute for Advanced Science, University of Electro-Communications, Tokyo, Japan*; [2]*Graduate School of Informatics and Engineering, University of Electro-Communications, Tokyo, Japan*

We discuss on engineering nonlinear optical processes by arbitrarily manipulating phase relationships of the relevant electromagnetic fields and show some experimental results in which high-order Raman-resonant four-wave-mixing process is used as a typical example.

EF-P.23 WED

Conical Diffraction Holography and Two-wave Mixing

•M.W. Iqbal[1,2], Y. Shiposh[3], A. Kohutych[3], N. Marsal[1,2], A. Grabar[3], and G. Montemezzani[1,2]; [1]Université de Lorraine, CentraleSupélec, LMOPS, Metz, France; [2]Chair in Photonics, CentraleSupélec, LMOPS, Metz, France; [3]Inst. for Solid State Physics and Chemistry, Uzhhorod National Univ., Uzhhorod, Ukraine

Polarization-sensitive holography and two-wave mixing amplification of vector beams is achieved in optically biaxial photorefractive $Sn_2P_2S_6$. Under conical diffraction conditions the effect is possible with any polarization combinations, including orthogonally polarized object and reference waves.

EF-P.24 WED

Subharmonic locking and optical frequency combs in short-cavity swept semiconductor lasers

•A. Stroganov, A. Kovalev, and E. Viktorov; ITMO University, St Petersburg, Russia

We numerically analyze a short-cavity frequency-swept semiconductor laser model and report on existence of subharmonic locking phenomenon that generates sustainable periodic pulse trains with a radian frequency being a unit fraction of the sweep rate.

13:00 – 14:00

JSI-P: JSI Poster session

JSI-P.1 WED

Nanoscale structural dynamics by EUV transient gratings

•F. Bencivenga, L. Foglia, C. Masciovecchio, and R. Mincigrucci; Elettra-Sincrotrone Trieste, Trieste, Italy

The use of EUV transient gratings to probe collective dynamics at sub-100 nm length-scales is presented, as well as the exploitation of this approach in other contexts, including nonlinear spectroscopy in gas phase samples

JSI-P.2 WED

Time-Resolved Experiments at the Small Quantum Systems Beamline at European XFEL

•T. Mullins, A. Alangattuthodi, T. Baumann, R. Boll, A. De Fanis, S. Dold, T. Mazza, J. Montano, Y. Ovcharenko, N. Rennhack, A. Roerig, S. Sasikumar, B. Senfftleben, M. Togawa, S. Usenko, and M. Meyer; European XFEL, Schenefeld, Germany

We present the many pump-probe capabilities at the SQS beamline. Experiments on ion spectroscopy, electron spectroscopy or x-ray scattering, using either two x-ray pulses or combining x-rays with optical laser pulses can be carried out.

JSI-P.3 WED

Generation of ultrafast laser pulses at the SXP instrument of the European XFEL

•P. Grychtol[1], E. Tikhodeeva[1], M. Seidel[2], C.M. Heyl[2], V. Vardanyan[1], D. Doblas-Jimenez[1], S. Molodtsov[1], and M. Izquierdo[1]; [1]European XFEL, 22869 Schenefeld, Germany; [2]DESY, 22607 Hamburg, Germany

This contribution presents the pump-probe laser infrastructure in general and more specifically the laser pulse compression scheme of the SXP instrument at the European XFEL.

JSI-P.4 WED

Ultrafast Laser Systems for High Repetition Rate FELs

A. Ahmed, O. Akcaalan, S. Alisauskas, H. Cankaya, G. Cirmi, J. Darvill, U. Große-Wortmann, V. Hariton, •I. Hartl, S. Hartwell, C.M. Heyl, Y. Hua, Y. Jiang, T. Lang, F. Pressacco, M. Seidel, A. Swiderski, H. Tavakol, A. Tajalli, H. Tünnermann, M. Kazemi, C. Li, C. Mahnke, C. Mohr, and J. Zheng; Deutsches Elektronen Synchroton DESY, Hamburg, Germany

We describe the ultrafast laser systems which are currently planned, under construction or installed to operate the high repetition rate free electron laser facilities FLASH and European XFEL.

JSI-P.5 WED

High Repetition-Rate Photoinjector Laser System for S3FEL

B. Zhang[1], X. Li[2], Q. Liu[2], Z. Zhu[2], J. Luo[2], Z. He[1,2], W. Liu[2,3], •G. Wu[1,2], W. Zhang[1,2], and X. Yang[1,2,4]; [1]State Key Laboratory of Molecular Reaction Dynamics, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, China; [2]Institute of Advanced Science Facilities, Shenzhen, China; [3]School of Physics and Astronomy, Sun Yat-Sen University, Zhuhai, China; [4]Department of Chemistry and Shenzhen Key Laboratory of Energy Chemistry, Southern University of Science and Technology, Shenzhen, China

We present the 1 MHz photoinjector laser system for the newly proposed Shenzhen superconducting soft X-ray FEL facility. The current status, challenges, and plans for further improving the performance of this laser system are discussed.

JSI-P.6 WED

Enabling Storage Ring FEL for lasing below 170 nm and production of 120 MeV circularly polarized γ-ray by VUV mirrors

•L. Kochanneck[1], H. Ehlers[1,2], S. Mikhailov[3,4], J. Yan[3,4], V. Popov[3,4], P. Wallace[3,4], G. Swift[3,4], M. Ahmed[3,4,5], Y.K. Wu[3,4], L.O. Jensen[1,6], and D. Ristau[1,7,8]; [1]Laser Zentrum Hannover e.V, Hollerithallee 8, Hannover 30419, Germany; [2]Laseroptik GmbH, Horster Str. 20, Garbsen 30826, Germany; [3]Department of Physics, Duke University, Horster Str. 20, Garbsen 30826, USA; [4]Triangle Universities Nuclear Laboratory, Horster Str. 20, Garbsen 30826, USA; [5]Department of Mathematics and Physics, North Carolina Central University , Horster Str. 20, Garbsen 30826, USA; [6]Trumpf Lasersystems for Semiconductor Manufacturing GmbH, Johann-Maus-Str. 2, Ditzingen 71254, Germany; [7]Leibniz University Hannover, Institute of Quantum Optics, Welfengarten 1, 30167 Hannover, Germany; [8]Cluster of Excellence PhoenixD (Photonics, Optics and Engineering - Innovation Across Disciplines), Welfengarten 1a, 30167 Hannover, Germany

Storage-ring FEL was enabled for lasing below 170 nm and 120 MeV gamma ray production by high-reflective and stable hybride mirrors for the first time.

JSI-P.7 WED

Seed laser upgrade for EEHG operation of FERMI FEL-1

•P. Cinquegrana, A. Demidovich, G. Kurdi, I. Nikolov, P. Sigalotti, P. Susnjar, and M. Danailov; Elettra-Sincrotrone Trieste S.C.p.A., Basovizza, Trieste, Italy

The FERMI FEL upgrade, which is designed to utilize Echo Enabled Harmonic Generation is under commissioning. We present the details of the updates to the seed laser system required by this upgrade.

13:00 – 14:00

JSIV-P: JSIV Poster session

JSIV-P.1 WED

The contribution has been withdrawn.

JSIV-P.2 WED

Photo-Electrochemical Imaging of Ultrathin Single-Crystalline Gold Micro-Flakes

•M. Sabzehparvar, P. Feurstein, F. Kiani, and G. Tagliabue; École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

We study photo-induced activity of gold micro-flakes of different thicknesses using light-assisted scanning electrochemical microscopy. Our work aims to reveal dependencies on thickness and wavelength for photocatalytic activity and stability, and the possible edge effects.

JSIV-P.3 WED

Optimizing the Nanostructures in Ultrathin Cu(In,Ga)Se2 Solar Cells

•S. Sedaghat and M. Schmid; Faculty of Physics & CENIDE, University of Duisburg-Essen, Duisburg, Germany

Dielectric nanostructures assist in trapping the light more efficiently inside the ultrathin Cu(In, Ga)Se2 absorber. In this work, we opto-electronically investigate the impact of two different dielectric nanostructures (nanoparticles and point contacts) on the photovoltaic parameters.

Room 1 ICM

8:30 – 10:00

EA-2: Nonlinear quantum optics

Chair: Juergen Volz, Humboldt Universität, Berlin, Germany

EA-2.1 THU 8:30

Interaction between heralded non-classical light and a highly non-linear cold Ryberg-blockaded ensemble

•F. Hoffet, J. Lowinski, L. Heller, A. Padron-Brito, K. Theophilo, and H. de Riedmatten; ICFO - The Insitute of Photonics Science, Casteldefells, Spain

Systems displaying strong non-linear response at low light level have recently drawn attention. Here, we experimentally demonstrate the interaction between an input heralded quantum state of light and a highly non-linear blockaded Rydberg ensemble.

EA-2.2 THU 8:45

Optical waveform engineering of non-Gaussian states

•A. Kawasaki[1], K. Takase[1,2], B.K. Jeong[1], T. Kashiwazaki[3], T. Kazama[3], K. Enbutsu[3], K. Watanabe[3], T. Umeki[3], S. Miki[4,5], H. Terai[4], M. Yabuno[4], F. China[4], W. Asavanant[1,2], M. Endo[1,2], J.-i. Yoshikawa[2], and A. Furusawa[1,2]; [1]The University of Tokyo, Tokyo, Japan; [2]RIKEN Center for Quantum Computing, Saitama, Japan; [3]NTT Device Technology Labs, Kanagawa, Japan; [4]Kobe University, Hyogo, Japan; [5]National Institute of Information and Communications, Hyogo, Japan

We propose a method of arbitrary-

Room 4a ICM

8:30 – 10:00

CK-8: Advanced design methods

Chair: Francesco Ceccarelli, Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN-CNR), Milano, Italy

CK-8.1 THU 8:30

Inverse Design of Microresonators Using Machine Learning

•A. Pal[1,2], A. Ghosh[1,2], S. Zhang[1], T. Bi[1,2], and P. Del'Haye[1,2]; [1]Max Planck Institute for the Science of Light, 91058 Erlangen, Germany; [2]Friedrich-Alexander-Universität Erlangen-Nürnberg, 91058 Erlangen, Germany

We apply a machine learning algorithm to inverse design integrated microresonators with desired dispersion properties along with experimental verification. This method can be used for tailoring broadband Kerr soliton frequency combs.

CK-8.2 THU 8:45

Demonstration of a low-depth universal linear optical circuit

•T. Odagawa[1], K. Sakaino[1], S. Kimura[1], T. Inagaki[1], H. Tang[2], K. Tanizawa[3], K. Ikeda[4], M. Okano[4], M. Takenaka[2], H. Yamada[1], and N. Matsuda[1]; [1]Tohoku University, Sendai, Japan; [2]The University of Tokyo, Tokyo, Japan; [3]Tamagawa University, Tokyo, Japan; [4]National Institute of Advanced Industrial Science and Technology, Ibaraki, Japan

Downsizing a universal linear optical circuit is crucial for scalable implementation in the limited chip area. We experimentally demonstrate the feasibility of a novel cir-

Room 4b ICM

8:30 – 10:00

EH-2: Quantum plasmonics

Chair: Cristian Ciracì, Istituto italiano di tecnologia, Lecce, Italy

EH-2.1 THU (Invited) 8:30

Ultrafast nanophotonics and opto-electronics: from all-optical switching based on metamaterial-cavity electrodynamics to plasmon-driven polaritonic chemistry

•N. Maccaferri; Department of Physics, Umeå University, Umeå, Sweden

Here, we will discuss different ways to harness ultrafast phenomena within the field of nanophotonics. Our results can be applied in a broad range of applications, from all-optical switching-based information processing to opto-electronics and photochemistry.

Room 13a ICM

8:30 – 10:00

CA-10: Ytterbium lasers

Chair: Ivan Bucharov, Sofia University, Bulgaria

CA-10.1 THU 8:30

21.5 W 153 fs Kerr-lens Mode-locked Yb:CALYO Bulk Oscillator

•X. Tian[1], W. Tian[1], Q. Li[1], G. Wang[1], C. Bai[1], L. Zheng[1], Y. Yu[1], X. Xu[2], Z. Wei[3], and J. Zhu[1]; [1]Xidian University, Xi'an, China; [2]Jiangsu Normal University, Xuzhou, China; [3]Chinese Academy of Science, Beijing, China

We reported on the demonstration of Kerr-lens mode-locked Yb:CALYO laser, delivering 153-fs pulses with an average power of 21.5 W.

CA-10.2 THU 8:45

Compact Single and Double Pass Yb Amplifier Using a High-Brightness Multi-Watt Tapered Laser Diode

•S. Dabbene[1], R. Gotti[1], D. Jedrzejczyk[2], A. Heinrich[2], M. Messner[2], A. Agnesi[1], and F. Pirzio[1]; [1]Dipartimento di Ingegneria Industriale e dell'Informazione, Università di Pavia, Pavia, Italy; [2]Pantec Biosolutions AG, Ruggell, Liechtenstein

We present a Yb:KYW amplifier pumped by a M^2<1.5, 5-W tapered diode. Seeding with a continuous-wave or mode-locked (<270 fs) tunable (1023-1035 nm) laser, we obtained double-pass small-signal-

Room 13b ICM

8:30 – 10:00

CB-8: Quantum cascade laser frequency combs

Chair: Giacomo Scalari, ETH, Zürich, Switzerland

CB-8.1 THU 8:30

Frequency modulated combs in semiconductor lasers

•B. Schwarz[1,2], N. Opačak[1,2], F. Pilat[1], S. Dal Cin[1], J. Hillbrand[1], M. Beiser[1], R. Weih[3], J. Koeth[3], S. Höfling[4], M. Piccardo[2,5], and F. Capasso[2]; [1]Institute of Solid State Electronics, TU Wien, Vienna, Austria; [2]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, USA; [3]Nanoplus GmbH, Gerbrunn, Germany; [4]Institute Technische Physik, University Würzburg, Würzburg, Germany; [5]Center for Nano Science and Technology, Fondazione Istituto Italiano di Tecnologia, Milan, Italy

Most comb research is focused on the generation of pulses. However, frequency combs can also exhibit a very different behavior with nearly constant output intensity. An overview on both theory and experiments will be presented.

CB-8.2 THU 8:45

Hot-Cavity Linewith Enhancement Factor of Mid-Infrared Semiconductor Lasers

•F. Pilat[1], N. Opačak[1], D. Kazakov[1,2], S. Dal Cin[1], F. Capasso[2], G. Strasser[1], and B. Schwarz[1,2]; [1]Institute of Solid State Electronics, TU Wien, Wien, Austria; [2]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts, USA

The linewidth enhancement factor describes the coupling of the intensity and phase of the laser light and is therefore an important property for frequency comb genera-

Room 14a ICM

8:30 – 10:00

EF-3: Kerr solitons and frequency combs II

Chair: Pedro Para-Rivas, Università la Sapienza, Roma, Italy

EF-3.1 THU 8:30

Quiet point engineering for low-noise microwave generation with soliton microcombs

A. Triscari, A. Tusnin, •A. Tikan, and T. Kippenberg; Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

In this work, we employ the avoided mode crossing engineering in microresonators for the ultra-low noise microwave generation with dissipative Kerr solitons.

EF-3.2 THU 8:45

Dissipative coherent structures and satellite comb generation in dispersion-periodic Kerr microresonators

•M. Anderson, A. Tikan, A. Tusnin, A. Davydova, J. Riemensberger, and T. Kippenberg; Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

We generate broadband satellite switching wave microcombs in a silicon nitride microresonator with longitudinally varying dispersion. We show in theory and experiment how this variation enables quasi-phase matching and the emergence of Faraday Instability.

Room 14b ICM

8:30 – 10:00

CH-9: Quantum and single-photon sensing

Chair: Crina Cojocaru, Universitat Politecnica de Catalunya, Barcelona, Spain

CH-9.1 THU (Invited) 8:30

Ultrasensitive Concentration and Chirality Measurements Realized by Sub-Shot-Noise Absorption Spectroscopy Using Entangled Photon Pairs

•*K. Matsuzaki*[1,2] *and T. Tahara*[2,1]; [1]*RIKEN Center for Advanced Photonics, RIKEN, Wako, Japan*; [2]*Molecular Spectroscopy Laboratory, RIKEN, Wako, Japan*

Based on sub-shot-noise absorption spectroscopy that we realized using entangled photon pairs as the light source, we performed concentration and chirality measurements with a sensitivity beyond the limit of the conventional method.

Room Osterseen ICM

8:30 – 10:00

JSI-5: Ultrafast molecular dynamics

Chair: Daniela Rupp, ETH Zürich, Switzerland

JSI-5.1 THU (Invited) 8:30

X-ray Induced Coulomb Explosion Imaging of Complex Molecules

•*R. Boll*; *European XFEL, Schenefeld, Germany*

Snapshot images of the complete structure of a gas-phase molecule with eleven atoms, including all hydrogens, can be recorded by Coulomb explosion imaging using intense, femtosecond soft X-ray pulses from the European XFEL.

Room 1 Hall B1 (B11)

8:30 – 10:00

CF-10: New trends in post-compression II

Chair: Ondřej Hort, ELI Beamlines Facility, Dolní Břežany, Czech Republic

CF-10.1 THU 8:30

Factor hundred compression of multi-mJ 1.2 ps pulses at 1030 nm to few cycles using multi-pass cells

•*E. Escoto*[1], *S. Rajhans*[1,2], *N. Khodakovskiy*[1], *P.K. Velpula*[3], *B. Farace*[1], *R. Shalloo*[1], *K. Põder*[1], *J. Osterhoff*[1], *W.P. Leemans*[1], *I. Hartl*[1], *and C.M. Heyl*[1,4,5]; [1]*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*Friedrich-Schiller-Universität Jena, Jena, Germany*; [3]*UGC-DAE Consortium for Scientific Research, Indore, India*; [4]*Helmholtz-Institute Jena, Jena, Germany*; [5]*GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany*

We demonstrate a two orders of magnitude compression of 10-mJ, 1.2-ps pulses from a Yb:YAG Innoslab laser system using two gas-filled multi-pass cells, providing 7-mJ, few-cycle pulses approaching the terawatt regime at kHz repetition rate.

CF-10.2 THU 8:45

Factor 9 Compression Down to 31 fs in a High-Pressure Krypton-Filled Multi-Pass Cell

•*M. Kadiwala*[1], *S. Goncharov*[1], *K. Fritsch*[2], *and O. Pronin*[1]; [1]*Helmut Schmidt University, Hamburg, Germany*; [2]*n2-Photonics GmbH, Hamburg, Germany*

We demonstrate factor-9 compression down to 31 fs in a single Krypton-filled multi-pass cell with an overall transmission of 95 % and with 90 % of the energy in the central peak.

Room 6 Hall B3 (B32)

8:30 – 10:00

CG-3: Taylored targets and fields

Chair: Lukas Gallmann,ETH, Zürich, Switzerland

CG-3.1 THU 8:30

Complex Structures of Spatially and Spectrally Resolved Solid High Harmonics

K.M. Kowalczyk[1], *H. Allegre*[1], *A.S. Wyatt*[2], *E. Springate*[2], *J.W.G. Tisch*[1], *J.P. Marangos*[1], *and* •*M. Matthews*[1]; [1]*Imperial College, London, United Kingdom*; [2]*Central Laser Facility, Harwell, United Kingdom*

We present the complex structures of spatially-resolved high harmonics from MgO and Sapphire. The spectral interference patterns changing with laser and sample parameters present insight into the channels of strong-field recombination in the crystal structures.

CG-3.2 THU 8:45

High-order harmonic generation in a sub-mm glass chip

•*A. Azzolin*[1,2], *G. Giovannetti*[2], *G. Fan*[2,3,4], *M.S. Ahsan*[2,5], *S. Rockenstein*[1], *L. Colaizzi*[1,2,6], *E. Maansson*[2], *D. Faccialà*[5], *F. Frassetto*[7], *D.W. Lodi*[6], *C. Manzoni*[5], *R. Martínez Vàzquez*[5], *M. Devetta*[5], *R. Osellame*[5], *L. Poletto*[7], *S. Stagira*[5,6], *C. Vozzi*[5], *V. Wanie*[2], *A. Trabattoni*[2,8], *and F. Calegari*[1,2,3]; [1]*Physics Department, University of Hamburg, Germany*; [2]*Centre for Free-Electron Laser Science, DESY, Hamburg, Germany*; [3]*The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Germany*; [4]*Shangai Key Lab of Modern Optical System, University of Shangai for Science and Technology, China*; [5]*Institute for Photonics and Nanotechnologies, CNR, Milano, Italy*; [6]*Physics Department, Politecnico di Milano, Italy*; [7]*Institute for Photonics and*

Room 7 Hall A1 (A11)

8:30 – 10:00

CJ-6: Specialty fiber and devices

Chair: Federica PolI, University of Parma, Parma, Italy

CJ-6.1 THU 8:30

Towards the development of mid-infrared all-integrated fiber laser systems for drone-based remote sensing

•*T. Gretzinger, T.T. Fernandez, and A. Fuerbach*; *Macquarie University, Sydney, Australia*

The development of a hybrid chip-fiber mid-infrared laser system is presented. It represents the basic building blocks for all-integrated compact laser sources for drone-based molecular sensing in the spectral fingerprint region.

CJ-6.2 THU 8:45

Dy3+- and Pr3+-doped phosphate glass optical fibres for laser emission at visible wavelengths

•*N.G. Boetti*[1], *D. Pugliese*[2], *M. Segura*[3], *S. Slimi*[3], *P. Loiko*[4], *G. Perrone*[2], *D. Janner*[2], *M. Ceballos*[3], *F. Diaz*[3], *M. Aguilo*[3], *X. Mateos*[3], *and J. Lousteau*[5]; [1]*Links foundation, Torino, Italy*; [2]*Politecnico di Torino, Torino, Italy*; [3]*Universitat Rovira i Virgili , Tarragona, Spain*; [4]*Université de Caen, Caen, France*; [5]*Politecnico di Milano, Milano, Italy*

Dy3+- and Pr3+-doped phosphate glasses were investigated as gain material for visible laser emission. Optical fibres were manufactured from the developed glasses and a prelim-

Room 8 Hall A1 (A12)

8:30 – 10:00

EB-10: Quantum memories

Chair: Fabrizio Piacentini, INRIM, Torino Italia

EB-10.1 THU 8:30

Simultaneous Trapping of Two Optical Pulses in an Atomic Ensemble as Stationary Light Pulses

•*U.-S. Kim and Y.-H. Kim*; *Department of Physics, Pohang University of Science and Technology, Pohang, South Korea*

We show theoretically that stationary light pulse (SLP) supports multiple phase-matching conditions and then experimentally demonstrate simultaneous SLP trapping of two optical pulses, resulting in an effective Q-factor of 2.9×10^9 and N-atom cooperativity of 8×10^6.

EB-10.2 THU 8:45

Spectral superresolution using a quantum memory

•*M. Mazelanik*[1], *A. Leszczyński*[1], *and M. Parniak*[1,2]; [1]*University of Warsaw, Warsaw, Poland*; [2]*University of Copenhagen, Copenhagen, Denmark*

We demonstrate a quantum-optimal measurement of frequency separation between two narrow spectral lines by utilizing optical quantum memory with built-in processing capabilities.

Room 1 ICM

waveform engineering of optical non-Gaussian states and demonstrate the generation of Schrödinger cat states with waveforms useful for large-scale optical quantum computing.

EA-2.3 THU 9:00

Single photon routing using a waveguide coupled atomic array

•T. Ray, J. Berroir, Z. Li, A. Urvoy, and J. Laurat; Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-Université PSL, Collegè de France, Paris, France

We demonstrate the routing of a single photon by controlling the reflection and simultaneously creating an electromagnetically induced transparency window in a waveguide coupled atomic array.

EA-2.4 THU 9:15

Multimode squeezing in dissipative Kerr solitons

•M.A. Guidry[1], D.M. Lukin[1], K.Y. Yang[1,2], and J. Vuckovic[1]; [1]E. L. Ginzton Laboratory, Stanford University, Stanford, CA, USA; [2]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA

We study broadband quadrature squeezing in Kerr soliton crystal microcombs. We propose an integrated photonic architecture to efficiently squeeze light over many modes, enabled by the phase-locked soliton dynamics.

Room 4a ICM

cuit structure with about half a circuit depth of conventional ones.

CK-8.3 THU 9:00

Machine Learning Techniques for the Free-Form Inverse Design of Nanophotonic Devices

•T. Gahlmann and P. Tassin; Chalmers University of Technology, Gothenburg, Sweden

Free-form inverse design of nanophotonic matasurfaces can be solved with a modified CGAN machine learning method that balances the accuracy of desired optical properties with experimental feasibility.

CK-8.4 THU 9:15

Spectral Control of Microlaser Array Using Artificial Neural Networks

•W.K. Ng[1], Z. Xuan[1], D. Saxena[1], I. Tanghe[2,3], K. Molkens[2,3], T.V. Raziman[1], P. Geiregat[3,4], D.V. Thourhout[2,3], and R. Sapienza[1]; [1]The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom; [2]Photonics Research Group, Ghent University - imec, Ghent, Belgium; [3]Center for Nano- and Biophotonics, Ghent University, Ghent, Belgium; [4]Physics and Chemistry of Nanostructures (PCN), Ghent University, Ghent, Belgium

We achieved control of the lasing spectrum in a complex system using a tandem neural network. The

Room 4b ICM

EH-2.2 THU 9:00

Ultrasensitive Optical Probing of Plasmonic Hot Electron Occupancies

J. Budai[1,2], Z. Pápa[1,3], P. Petrik[4], and •P. Dombi[1,3]; [1]ELI-ALPS, ELI-HU Non-Profit Ltd., Szeged, Hungary; [2]Department of Optics and Quantum Electronics, University of Szeged, Szeged, Hungary; [3]Wigner Research Centre for Physics, Budapest, Hungary; [4]Institute of Technical Physics and Materials Science, Centre for Energy Research, Budapest, Hungary

We demonstrate with ellipsometry that upon the optical excitation of surface plasmon polaritons, a non-thermal electron population appears in the topmost domain of the plasmonic film directly coupled to the local fields

EH-2.3 THU 9:15

Electron-near-field coupling strength in gold nanoparticles

•E. Akerboom[1], V. di Giulio[2], N.J. Schilder[1], F.J. Garcia de Abajo[2], and A. Polman[1]; [1]NWO-Institute AMOLF, Amsterdam, Netherlands; [2]ICFO-Institut de Ciencies Fotoniques, Barcelona, Spain

We study the coupling strength between electrons and the optical near fields of dipole modes in gold nanoparticles using Cathodoluminescence spectroscopy. Our model goes beyond the non-recoil approximation and matches the found trends in measurements.

Room 13a ICM

gain G_0~40, P_{out}~2.5 W, optical-to-optical efficiency ~50%, M^2<1.1.

CA-10.3 THU 9:00

Diode-pumped Kerr-lens mode-locked Yb:YAl3(BO3)4 laser

H.-J. Zeng[1], Z.-L. Lin[1], W.-Z. Xue[1], G. Zhang[1], Y. Huang[1], Y. Chen[1], V. Petrov[2], P. Loiko[3], X. Mateos[4], L. Wang[2], and •W. Chen[1,2]; [1]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, China; [2]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [3]Université de Caen, Caen Cedex, France; [4]Universitat Rovira i Virgili, Tarragona, Spain

We demonstrate a diode-pumped Kerr-lens mode-locked Yb:YAl3(BO3)4 laser delivering soliton pulses as short as 36 fs at 1059.7 nm with an average output power of 156 mW at 66.7 MHz.

CA-10.4 THU 9:15

Single crystalline and ceramic Yb:Lu2O3 gain media in thin-disk laser operation

•S. Esser[1], X. Xu[2], T. Graf[1], and M. Abdou Ahmed[1]; [1]University of Stuttgart, Institut für Strahlwerkzeuge (IFSW), Stuttgart, Germany; [2]Jiangsu Key Laboratory of Advanced Laser Materials and Devices, School of Physics and Electronic Engineering, Jiangsu normal University, Xuzhou, China

The sesquioxide crystal Yb:Lu2O3 has excellent properties for thin-disk lasers of high average power. A conventionally grown single-crystal and a polycrystalline ceramic Yb:Lu2O3 disk are compared with regard to their laser performance.

Room 13b ICM

tion. Here we study different mid-infrared lasers and operating conditions.

CB-8.3 THU 9:00

Sub-Bandwidth Limited Time-Domain Signal in Mid-Infrared Quantum Cascade Lasers

•B. Schneider, A. Dikopoldsev, F. Kapsalidis, P. Täschler, M. Beck, and J. Faist; ETH, Zürich, Switzerland

We demonstrate the observation of ultrashort features below the Fourier-limit in the time domain signal of mid-infrared quantum cascade laser frequency combs under RF-injection. Mean-field theory based simulations confirm the potential occurrence of such features.

CB-8.4 THU 9:15

Near-Infrared Optical Illumination for Injection Locking in Quantum Cascade Lasers

•M. Bertrand[1], A. Parriaux[2], K. Komagata[2], T. Südmeyer[2], and J. Faist[1]; [1]Institute for Quantum Electronics, ETH Zürich, Zürich, Switzerland; [2]Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, Neuchâtel, Switzerland

We study the influence of a 1.55 μm pulse laser illuminating a quantum cascade laser frequency comb. We demonstrate optical injection locking of the repetition rate and spectral modification of the mid-infrared spectrum.

Room 14a ICM

EF-3.3 THU 9:00

Optical frequency combs induced by modulation instability in fiber Fabry-Pérot resonators: impact of the pump pulse duration

•T. Bunel[1], M. Conforti[1], Z. Ziani[1], J. Lumeau[2], A. Moreau[2], A. Fernandez[3], O. Llopis[3], J. Roul[3], A. Perego[4], K. Wong[5], and A. Mussot[1]; [1]University of Lille, CNRS, UMR 8523-PhLAM Physique des Lasers, Atomes et Molécules, Lille, France; [2]Aix Marseille University, CNRS, Centrale Marseille, Institut Fresnel, Marseille, France; [3]LAAS-CNRS, Université de Toulouse, CNRS, 7 avenue de Colonel Roche, Toulouse, France; [4]Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom; [5]Department of Electrical and Electronic Engineering, The University of Hong Kong, Pokfulam Road, Hong-Kong, China

We investigate the modulation instability (MI) process in a fiber Fabry-Pérot resonator generating MI Kerr frequency combs in an all-fiber setup. Also, we show that the driving pulse duration impacts the Fabry-Pérot nonlinear dynamics.

EF-3.4 THU 9:15

Dual frequency Raman cavity soliton comb in a mini fiber ring cavity

•Y. Xu[1,2], Z. Li[1,2], S. Coen[1,2], M. Erkintalo[1,2], and S. Murdoch[1,2]; [1]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [2]Department of Physics, University of Auckland, Auckland, New Zealand

Recent development of Raman gain Kerr cavity solitons has opened a new approach for generating ultrabroad frequency combs. We demonstrate experimentally a dual-Raman cavity soliton comb generation in a mini fibre ring cavity.

Room 14b ICM

CH-9.2 THU 9:00

Sub-μm Axial Precision Depth Imaging With Entangled Two-Colour Hong-Ou-Mandel Microscopy

•*C. Torre, A. McMillan, J. Monroy-Ruz, and J.C.F. Matthews*; *Quantum Engineering Technology Labs, University of Bristol, Bristol, United Kingdom*

Sub-μm axial precision for 3D imaging Hong-Ou-Mandel microscopy is experimentally demonstrated using confocal imaging and a wavelength-entangled photon pair source with $\sim 10^3$ photon pairs per pixel for semi-transparent sample with $\sim 5\ \mu m$ depth features.

CH-9.3 THU 9:15

Time-Correlated Single-Photon Counting Measurements: A New Approach For High-Speed

•*A. Bovolenta, S. Farina, G. Acconcia, and I. Rech*; *Politecnico di Milano, Milan, Italy*

Historically, Time-Correlated Single Photon Counting (TCSPC) technique was characterized by long acquisition time. A completely new approach will be presented, which removes all limitations, opening the way to a high-speed and zero distortion TCSPC.

Room Osterseen ICM

JSI-5.2 THU 9:00

All-XUV Transient-Absorption Spectroscopy On the Ultrafast Dissociation of Oxygen Molecules

•*M. Rebholz, A. Magunia, G.D. Borisova, H. Lindenblatt, F. Trost, R. Moshammer, C. Ott, and T. Pfeifer*; *Max-Planck Institute for Nuclear Physics, Heidelberg, Germany*

We employ all-XUV pump—probe transient-absorption spectroscopy to investigate the femtosecond dissociation dynamics of oxygen. The time-dependent absorption signal allows us to extract time constants of the dissociation process for neutral and charged oxygen fragments.

JSI-5.3 THU 9:15

Creating Electronic Molecular Movies Using Time-Resolved X-Ray Photoelectron Spectroscopy

•*D. Mayer[1], F. Lever[1], D. Picconi[2], S. Alisauskas[1], A. Azzolin[3,4], F. Calegari[3,4,5], G. Cirmi[1,4], S. Düsterer[1], U. Frühling[1], A. Green[6,7], I. Hartl[1], M. Kuhlmann[1], T. Mazza[6], S. Palutke[1], S. Schulz[1], A. Trabattoni[4,8], A. Tul Noor[1], and M. Gühr[1]*; *[1]Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany; [2]Zernicke Institute for Advanced Materials, Groningen, Netherlands; [3]University of Hamburg, Hamburg, Germany; [4]Center for Free-Electron Laser Science (CFEL), Hamburg, Germany; [5]The Hamburg Centre for Ultrafast Imag-*

Room 1 Hall B1 (B11)

CF-10.3 THU 9:00

High-energy pulse compression in a multi-pass cell at 2μm

•*T. Nagy, F. Furch, M. Bock, and U. Griebner*; *Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany*

We present high-energy pulse compression at 2μm in a multi-pass cell. 40mJ, 2.8ps pulses at 1kHz are spectrally broadened in a 3-m long multi-pass cell filled with 850mbar air. Experiments are compared with 3D simulations.

CF-10.4 THU 9:15

High average power nonlinear post-compression at 1.9 μm wavelength employing a gas-filled multi-pass cell

•*L. Eisenbach[1,2], T. Heuermann[3,4,5], Z. Wang[3], J. Schulte[1,2], R. Meyer[1], M. Lenski[3], P. Gierschke[3,6], M. Sugiura[7], K. Tamura[7], P. Rußbüldt[1], J. Limpert[3,4,5,6], and C. Häfner[1,2]*; *[1]Fraunhofer Institute for Laser Technology (ILT), Aachen, Germany; [2]Chair for Laser Technology LLT, RWTH Aachen University, Aachen, Germany; [3]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University Jena, Jena, Germany; [4]Helmholtz-Institute Jena, Jena, Germany; [5]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany;*

Room 6 Hall B3 (B32)

Nanotechnologies, CNR, Padova, Italy; [8]Institute of Quantum Optics, Leibniz Universitaet Hannover, Germany

In this work we present experimental results on High-order Harmonic Generation in a sub-mm glass cell, showing a remarkable extension of the cut-off. The results are fully supported by 3D propagation simulations.

CG-3.3 THU 9:00

The dynamical Franz-Keldysh effect in the deep ultraviolet probed by transient absorption and dispersion of diamond

J. Reislöhner[1], X. Chen[2], D. Kim[1], S. Botti[2], and •A.N. Pfeiffer[1]; *[1]Institute of Optics and Quantum Electronics, Friedrich Schiller University, Jena, Germany; [2]Institute of Condensed Matter Theory and Optics, Friedrich Schiller University, Jena, Germany*

A tailored deep ultraviolet field is used for transient absorption and dispersion spectroscopy of diamond. The dynamical Franz-Keldysh effect and the optical Kerr effect coexist in the near-bandgap region.

CG-3.4 THU 9:15

The secret recipe for passive CEP stabilization

•*G. Steinmeyer[1], L. Ehrentraut[1], M. Schnürer[1], R. Maksimenka[2], and N. Forget[2]*; *[1]Max-Born-Institut, Berlin, Germany; [2]Fastlite, Antibes, France*

While conceptually appealing, passive CEP stabilization schemes often exhibit disappointing noise performance. Excessive phase jitters arise due to Gordon-Haus jitter multiplication during nonlinear spectral broadening, but can be mitigated with suitable seed lasers.

Room 7 Hall A1 (A11)

inary assessment of their emission under blue light pumping was conducted.

CJ-6.3 THU 9:00

Revisiting Pump Light Absorption in Structured Double Clad Fibers

•*B. Yildiz[1,2], D. Häßner[1], A. Grobecker[1], S. Kuhn[1], N. Haarlammert[1], and T. Schreiber[1]*; *[1]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [2]Institute of Applied Physics, Jena, Germany*

We present the influence of the numerical aperture on multimode lights behavior in specialty, double clad amplifier fibers. It is observed that depending on the incoming fields numerical aperture a fibers absorption characteristic can vary drastically

CJ-6.4 THU 9:15

Bi-Pulse Fiber Laser Source Concept for Integrated-Path Differential Absorption Lidar from Space

•*L. Lombard, N. Cézard, A. Durécu, and F. Gustave*; *Onera - The French Aerospace Lab, Palaiseau, France*

We propose and demonstrate a new all-fiber 1.5μm Master-Oscillator-Power-Amplifier architecture based on bi-pulse strategy to mitigate Stimulated-Brillouin-Scattering.

The pulses are alternatively long, narrow-linewidth and short, large-linewidth to alternate gas sensing and altimetry functions from space.

Room 8 Hall A1 (A12)

EB-10.3 THU 9:00

Machine learning optimal control pulses in an optical quantum memory

•*E. Robertson[1,2], L. Esguerra[1], L. Messner[3], G. Gallego[2], and J. Wolters[1,2]*; *[1]Institute für Optische Sensorsysteme, Deutsches Zentrum für Luft- und Raumfahrt, Berlin, Germany; [2]Technische Universität Berlin, Berlin, Germany; [3]Institut für Physik, AG Theoretische Optik Photonik, Humboldt-Universität zu Berlin, Berlin, Germany*

We present a genetic algorithm applied to the control pulses of an optical memory, achieving a memory efficiency of 0.35, and demonstrating a reduction of the pulse power by 50%, with a minimal efficiency tradeoff.

EB-10.4 THU 9:15

A Single-Photon-Compatible Telecom-C-Band Quantum Memory in a Hot Atomic Gas

S. Thomas[1], S. Sagona-Stophel[1], Z. Schofield[2], I. Walmsley[1], and •P. Ledingham[2]; *[1]IQOLS, Department of Physics, Imperial College London, London, United Kingdom; [2]Department of Physics and Astronomy, The University of Southampton, Southampton, United Kingdom*

This work demonstrates a hot-atom-based quantum memory for telecommunication photons with a signal-to-noise ratio of $1.9(1) \times 10^4$ for input coherent states of $\mu_{\text{in}} = 0.084(10)$ photons per pulse.

Room 1 ICM

EA-2.5 THU 9:30

Generating Ultracold Atomic Persistent Currents with Structured Light

G.W. Henderson, G.R.M. Robb, •G.-L. Oppo, and A.M. Yao; SUPA & Department of Physics, University of Strathclyde, Glasgow, United Kingdom

We model the evolution of coupled ultracold atomic and optical fields within a driven optical cavity, realising dynamic atomic persistent currents. The current's speed and direction is determined by the light's orbital angular momentum.

Room 4a ICM

modes that share the same spatial gain profile were also identified through the weights of the trained neural network.

CK-8.5 THU 9:30

Predicting the interplay between second- and third-order nonlinear interaction in periodically-poled nanophotonic waveguides using machine learning

•S. Lauria and M.F. Saleh; Heriot-Watt University, Edinburgh, United Kingdom

We have developed a recurrent neural network that efficiently simulates the unidirectional pulse propagation equation. The model is validated via predicting complex nonlinear interactions in a periodically poled nanophotonic $LiNbO_3$ waveguide.

Room 4b ICM

EH-2.4 THU 9:30

Ultrafast Charge and Spin Dynamics in Au-Ni Nanostructures

T. Tapani[1], N. Henriksson[1], A. Ciuciulkaite[2], T. Deckert[3], J. Allerbeck[4], H. Lee[5], D. Garoli[6], P. Vavassori[7], D. Brida[3], V. Kapaklis[2], and •N. Maccaferri[1]; [1]Umeå University, Umeå, Sweden; [2]Uppsala University, Uppsala, Sweden; [3]University of Luxembourg, Luxembourg, Luxembourg; [4]Empa, Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland; [5]Korea University, Seoul, South Korea; [6]Istituto Italiano di Tecnologia, Genova, Italy; [7]CIC nanoGUNE & IKERBASQUE, San Sebastian, Spain

We study charge and spin dynamics in hybrid Au-Ni nanostructures. Experimental results, verified by numerical modelling, reveal a modification of the ultrafast demagnetization and dynamics induced by the strong plasmonic response in the Au structure.

Room 13a ICM

CA-10.5 THU 9:30

High Performance Ytterbium Regenerative Amplifier Based on Yb:CALYO with High Energy 100 fs Pulses

•L. Petrov[1], D. Velkov[1], K. Georgiev [1], A. Trifonov[2], X. Xu[3], T. Popminchev[4,5], and I. Buchvarov[1,6]; [1]Physics Department, Sofia University, Sofia, Bulgaria; [2]IBPhotonics Ltd., Sofiia, Bulgaria; [3]Jiangsu Key Laboratory of Advanced Laser Materials and Devices, School of Physics and Electronic Engineering, Jiangsu Normal University, Xuzhou, China; [4]Department of Physics, University of California San Diego, La Jolla, USA; [5]Photonics Institute, TU Wien, Vienna, Austria; [6]John Atanasoff Center for Bio and Nano Photonics (JAC BNP), Sofia, Bulgaria

We present a high-performance chirped-pulse regenerative amplifier based on a single disordered Yb:CaYAlO4 crystal, generating record-short ultrafast pulses of 102 fs and 2.2 mJ energy at 1 kHz

Room 13b ICM

CB-8.5 THU 9:30

Comb formation in ring Quantum Cascade Lasers under radio-frequency injection

•I. Heckelmann, M. Bertrand, A. Dikopoltsev, M. Montesinos Ballester, M. Beck, G. Scalari, and J. Faist; Swiss Federal Institute of Technology (ETH), Zürich, Switzerland

Broadband optical frequency combs have become fundamental for spectroscopic applications. Here, we demonstrate an egg-shaped ring Quantum Cascade Laser under radio-frequency injection as a continuously tunable source for both single-mode and coherent multimode operation.

Room 14a ICM

EF-3.5 THU 9:30

Thermally stable initiation of dissipative Kerr solitons in photonic molecules

•Ó.B. Helgason, M. Girardi, Z. Ye, F. Lei, J. Schröder, and V. Torres-Company; Chalmers University of Technology, Gothenburg, Sweden

We demonstrate coupled anomalous dispersion microcavities enabling blue-detuned operation and thermally stable initiation of a dissipative Kerr soliton.

Room 14b ICM

CH-9.4 THU 9:30

Single-photon detector based long-distance Brillouin optical time domain reflectometry

•M. Romanet[1], E. Rochat[2], K. Phan Huy[3], and J.-C. Beugnot[1]; [1]Femto-ST institute, CNRS UMR 6174, University of Franche-Comté, 15B avenue des Montboucons, 25000, Besançon, France; [2]Omnisens SA, Riond-Bosson 3, 1110 Morges, Switzerland; [3]Femto-ST institute, CNRS UMR 6174, Supmicrotech ENSMM, 15B avenue des Montboucons, 25000, besançon, France

We present a novel distributed Brillouin optical time domain reflectometer based on quantum technologies, using a single-photon avalanche diodes in gated mode, with a range of 120 km and 10 m spatial resolution.

Room Osterseen ICM

ing, Hamburg, Germany; [6]European XFEL, Hamburg, Germany; [7]Stanford PULSE Institute, Menlo Park, USA; [8]Leibnitz Universität Hannover, Hannover, Germany

We show that time-resolved XPS is a useful tool to track transient charge flows in molecules after UV excitation. This provides direct sensitivity to electronic states invovled in the molecular relaxation.

JSI-5.4 THU 9:30

Probing the Population of Dark States in Ultrafast Reactions of Nucleobases with Time-Resolved NEXAFS at Free-Electron Lasers

F. Lever[1], •D. Mayer[1], D. Picconi[2], S. Alisauskas[1], F. Calegari[3,4,5], S. Düsterer[1], C. Ehlert[6], R. Feifel[7], M. Kuhlmann[1], T. Mazza[8], M. Robinson[4], R. Squibb[7], A. Trabbatoni[4,11], M. Ware[9], P. Saalfrank[10], T. Wolf[9], and M. Gühr[1]; [1]Deutsches Elektronen-Synchtrotron (DESY), Hamburg, Germany; [2]Zernicke Institute for Advanced Materials, Universtity of Groningen, Groningen, Netherlands; [3]Institut für Experimentalphysik, University of Hamburg, Hamburg, Germany; [4]Center for Free-Electron Laser Science (CFEL), Hamburg, Germany; [5]The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Hamburg, Germany; [6]Heidelberg Institute for Theoretical Studies (HITS), Heidelberg, Germany; [7]Department of Physics, Gothenburg University, Gothenburg, Sweden; [8]European XFEL, Schenefeld, Germany; [9]Stanford PULSE Institute, SLAC National Accelerator Laboratory, Menlo Park, USA; [10]Institut für Chemie, Universität Potsdam, Potsdam, Germany; [11]Leibnitz Universität Hannover, Hannover, Germany

UV absorption in nucleobases is a major cause of genetic lesions. We use time-resolved NEXAFS spectroscopy to probe ultrafast internal conversion in the dynamics of UV-photoexcited thionucleobases. We

Room 1 Hall B1 (B11)

[6]Fraunhofer Institute for Applied Optics and Precision Engineering (IOF), Jena, Germany; [7]Tokai Optical Co., Ltd., Okazaki, Japan

We demonstrate the highly efficient nonlinear temporal compression of 178 W average power at 1.9 μm wavelength down to 30 fs employing a gas-filled Herriott-type multi-pass cell.

CF-10.5 THU 9:30

Thermodynamic and nonlinear optical analysis of multipass-cell based pulse compression in the 2 μm range

•C. Mei[1], U. Griebner[2], and G. steinmeyer[2,3]; [1]Research Center for Convergence Networks and Ubiquitous Services, University of Science and Technology Beijing, 100083 Beijing, China, Beijing, China; [2]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Max-Born-Stra\ss e 2a, 12489 Berlin, Germany, Berlin, Germany; [3]Institut für Physik, Humboldt Universität zu Berlin, Berlin, Germany

We numerically investigate pulse compressions in four different solid materials inside multipass cells. It shows that thermodynamic property of materials is at least equally important as optical properties. Our findings provide effective guidelines for high-energy 2-μm pulse compressorion.

Room 6 Hall B3 (B32)

CG-3.5 THU 9:30

Attosecond soft X-ray spectroscopy reveals energy flow in a semimetal

T. Sidiropoulos[1], N. Di Palo[1], D. Rivas[1,2], S. Severino[1], M. Reduzzi[1], •H.-W. Sun[1], Y.-H. Chien[1], B. Nandy[1], B. Bauerhenne[3], S. Krylow[3], T. Vasileiadis[4], T. Danz[5], P. Elliott[6,7], S. Sharma[6], J.K. Dewhurst[7], C. Ropers[5], Y. Joly[8], M. Garcia[3], M. Wolf[4], R. Ernstorfer[4], and J. Biegert[1,9]; [1]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain; [2]European XFEL GmbH, Holzkoppel 4, Schenefeld, Germany; [3]Theoretische Physik, FB-10, Universität Kassel, Kassel, Germany; [4]Fritz Haber Institute of the Max Planck Society, Berlin, Germany; [5]4th Physical Institute - Solids and Nanostructures, University of Göttingen, Göttingen, Germany; [6]Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Berlin, Germany; [7]Max-Planck-Institut für Mikrostrukturphysik, Weinberg 2, Halle, Germany; [8]Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France; [9]ICREA-Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain

We show that core-level x-ray absorption near edge structure spectroscopy with attosecond soft x-ray pulses can image the energy flow between electrons, holes, and phonons inside a material in real time.

Room 7 Hall A1 (A11)

CJ-6.5 THU 9:30

Yellow Silica Fiber Laser Delivering an Output Power of $\sim$150 mW

•M.-P. Lord, L. Talbot, M. Bernier, and R. Vallée; Centre d'optique, photonique et laser (COPL), Université Laval, Québec, Canada

We report a dysprosium-doped silica fiber laser yielding an output power of 147 mW at 585 nm. To the best of our knowledge, this is the first demonstration of a monolithic visible silica fiber laser.

Room 8 Hall A1 (A12)

EB-10.5 THU 9:30

Scalable Quantum Memory Nodes using nuclear spins in Silicon Carbide

•S.K. Parthasarathy[1,2], B. Kallinger[1], F. Kaiser[3,4], P. Berwian[1], D.B.R. Dasari[3,4], J. Friedrich[1], and R. Nagy[2]; [1]Fraunhofer Institute for integrated Systems and Device Technology (IISB), Erlangen, Germany; [2]Group of Applied Quantum Technologies, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen, Germany; [3]3rd Institute of Physics and Stuttgart Research Center of Photonic Engineering (SCoPE), University of Stuttgart, Stuttgart, Germany; [4]Center for Integrated Quantum Science and Technology (IQST), Ulm, Germany

A distributed quantum network would require quantum nodes with high fidelity. We show here that using the solid-state spins in 4H-Silicon Carbide (4H-SiC) such a goal of Scalable Quantum memory node could be realized.

Room 1 ICM

EA-2.6 THU 9:45

Generation of over-8-dB squeezed light by a broadband waveguide optical parametric amplifier toward fault-tolerant quantum computers

•T. Kashiwazaki[1], T. Yamashima[2], K. Enbutsu[1], T. Kazama[1], A. Inoue[1], K. Fukui[2], M. Endo[2,3], T. Umeki[1], and A. Furusawa[2,3]; [1]NTT Corporation, Kanagawa, Japan; [2]The University of Tokyo, Tokyo, Japan; [3]RIKEN, Saitama, Japan

We achieved continuous-wave 8.3-dB quadrature squeezing using a THz-order-broadband waveguide optical parametric amplifier (OPA) without loss-correction. This is the first achievement of exceeding the fault-tolerant threshold of continuous-variable optical quantum computing by using waveguide OPAs.

10:30 – 12:00

EA-3: Photonic quantum technology

Chair: Martin Frimmer, ETH Zurich, Switzerland

EA-3.1 THU 10:30

Integrated microcavity optomechanics with a suspended photonic crystal mirror

•A. Ciers[1], S. Kini Manjeshwar[1], J. Monsel[1], C. Peralle[2], S.M. Wang[1], P. Tassin[2], and W. Wieczorek[1]; [1]Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden; [2]Department of Physics, Chalmers University of Technology, Gothenburg, Sweden

We realize a free-space microcavity from an AlGaAs heterostructure,

Room 4a ICM

CK-8.6 THU 9:45

On-Chip Inverse Designed Fabry-Pérot Resonators

•T. Bi[1,2], S. Zhang[1], A. Ghosh[1,2], O. Lohse[1], I. Harder[1], K.Y. Yang[3], and P. Del'Haye[1,2]; [1]Max Planck Institute for the Science of Light, 91058 Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, 91058 Erlangen, Germany; [3]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA

Fabrication supported by inverse-design unlocks a diverse range of applications by traversing through the full parameter space. One such example is highly-reflective mirrors. We use inverse-design to demonstrate on-chip silicon nitride Fabry-Pérot microresonators.

10:30 – 12:00

CK-9: Micro optical combs

Chair: Minhao Pu, Technical University of Denmark, DTU Fotonik, Lyngby, Denmark

CK-9.1 THU (Invited) 10:30

Optical Combs for High-Capacity Transmission and Energy-Optimization of Long-Haul Fiber Cables

•L. Oxenløwe ; Technical University of Denmark, Kgs. Lyngby, Denmark

Optical frequency combs have potential to replace many lasers in optical transmitters, and support Pbit/s-scale capacities for long and short links. Long-haul links can reduce the number of amplifiers by spatial data-distribution.

Room 4b ICM

EH-2.5 THU 9:45

Large-Area Sub-5nm Plasmonic Nanogap Arrays: Advanced Fabrication, Characterization and Applications

•J. Gour[1], S. Beer[1], P. Paul[1], A. Alberucci[1], A. Szeghalmi[1,2], U. Peschel[3], S. Nolte[1,2], and U.D. Zeitner[1,2,4]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [3]Friedrich Schiller University Jena, Institute of Solid State Theory and Optics, Jena, Germany; [4]Munich University of Applied Sciences, Department of Applied Sciences and Mechatronics, Munich, Germany

Our advanced fabrication technology creates large-scale, plasmonic nanogap arrays down to single-nanometer widths, enabling new insights in nanoscale physics and opening new possibilities for photonic devices based upon arrays of interacting nanogaps.

10:30 – 12:00

EH-3: Nonlinear and active metastructures

Chair: Andrea Bragas, Universidad de Buenos Aires, Argentina

EH-3.1 THU 10:30

Mid-infrared power limiters and saturable-absorber mirrors based on $\chi^{(3)}$ GaAsSb/InGaAs intersubband polaritonic metasurfaces.

•J. Krakofsky[1], M. Cotrufo[2], S.A. Mann[2], G. Böhm[1], A. Alú[2], and M.A. Belkin[2]; [1]Walter-Schottky Insitute (TU Munich), Munich, Germany; [2]City University of New York, New York, USA

We demonstrate a nonlinear polaritonic intersubband metasurface wich can be used to create saturable absorbers and optical power

Room 13a ICM

CA-10.6 THU 9:45

Sub-40 fs diode-pumped SESAM mode-locked Yb:Sc2SiO5 laser

L. Dong[1], Z.-L. Lin[2], P. Loiko[3], Y. Liu[1], G. Zhang[2], H.-J. Zeng[2], W.-Z. Xue[2], S. Liu[4], L. Zheng[5], X. Mateos[6], H. Lin[7], V. Petrov[8], L. Wang[8], and •W. Chen[2,8]; [1]Qingdao University of Technology, Qingdao, China; [2]Fujian Institute of Research on the Structure of Matter, Fuzhou, China; [3]Université de Caen, Caen Cedex, France; [4]Shandong University of Science and Technology, Qingdao, China; [5]Yunnan University, Kunming, China; [6]Universitat Rovira i Virgili, Tarragona, Spain; [7]Shenzhen University, Shenzhen, China; [8]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

In this work, we demonstrate sub-40 fs soliton pulse generation from a diode-pumped SESAM mode-locked Yb:Sc2SiO5 laser near 1070 nm.

10:30 – 12:00

CA-11: New laser designs

Chair: Richard Mildren, Macquarie University, Australia

CA-11.1 THU 10:30

Laser cooling of an Yb3+-doped KY3F10 crystal by 42 K

•S. Püschel, C. Kränkel, and H. Tanaka; Leibniz-Institute für Kristallzüchtung (IKZ), Berlin, Germany

We grew a high-quality Yb:KY3F10 crystal and demonstrate laser cooling by 42 K from room temperature under 4.1 W excitation. The cooling efficiency and power-dependent performance of the Yb:KY3F10 are comparable with state-of-the-art Yb:YLF.

Room 13b ICM

CB-8.6 THU 9:45

Two frequency-modulated comb regimes in quantum cascade laser rings

•A. Dikopoltsev, I. Heckelmann, P. Michelletti, G. Scalari, M. Beck, and J. Faist; ETH Zurich, Zurich, Switzerland

Gain mechanisms of quantum cascade lasers (QCL) enable frequency-comb generation without external nonlinear cavities. We study unidirectional lasing of radio-frequency modulated QCL rings and find two distinct frequency-comb regimes. We develop a near-resonance analytical solution.

10:30 – 12:00

CB-9: Quantum cascade lasers and frequency combs

Chair: Christian Jirauschek, Technical University of Munich, Germany

CB-9.1 THU 10:30

Picosecond pulses from a gain-switched quantum cascade laser

•P. Täschler, L. Miller, F. Kapsalidis, M. Beck, and J. Faist; Institute for Quantum Electronics, Zurich, Switzerland

We demonstrate short pulses (~ 30 ps) with Watt level peak power from a quantum cascade laser. Lasing on a single longitudinal mode is achieved via injection seeding. We interpret the results using rate equations.

Room 14a ICM

EF-3.6 THU 9:45

Direct temporal measurement of switching-waves in a normal dispersion Kerr resonator

M. Macnaughtan[1,2], M. Erkintalo[1,2], S. Coen[1,2], •S. Murdoch[1,2], and Y. Xu[1,2]; [1]Dodd-Walls Centre for Photonic and Quantum Technology, Dunedin, New Zealand; [2]Physics Dept, University of Auckland, Auckland, New Zealand

Nonlinear switching waves underpin the formation of frequency combs in normal dispersion Kerr resonators. We present direct measurements of the temporal profile of switching waves and compare these results to theoretical phasematching predictions.

10:30 – 12:00

EF-4: Spatiotemporal effects in optical systems

Chair: German de Valcarcel, University of Valencia, Burjassot, Spain

EF-4.1 THU (Keynote) 10:30

Physics and Application of Complex Lasers

•H. Cao; Yale University, New Haven, USA

A complex laser supports many spatio-temporal modes that interact nonlinearly with the gain material. We have controlled spatio-temporal dynamics of many-mode lasers and applied them to speckle-free imaging, holography and parallel ultrafast random number generation.

Room 14b ICM

CH-9.5 THU 9:45

Development and Characterization of an EUV/soft X-ray Single-Photon Sensitive sCMOS Camera

•N. Abdurakhimov[1,2,3] and C. Friedrich[1]; [1]greateyes GmbH, Berlin, Germany; [2]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [3]Freie Universität, Berlin, Germany

We are developing a EUV/soft X-ray sensitive sCMOS-sensor based detector suitable for high repetition rate imaging and spectroscopy as well as single photon detection experiments

10:30 – 12:00

CH-10: Fiber sensors I

Chair: Laurent Bigot, CNRS, University of Lille, France

CH-10.1 THU 10:30

Computational fluorescence imaging with multi-core fiber bundles – Towards high-speed imaging through bare optical fibers.

•S. Sivankutty[1], S. Guérit[2], O. Leblanc[2], M. Hofer[3], G. Bouwmans[1], E. Andresen[1], L. Jacques[2], and H. Rigneault[3]; [1]Univ. Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France; [2]ICTEAM Institute, UC Louvain, Louvain-la-Neuve, Belgium; [3]Aix-Marseille University,

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observe coherent oscillations in the photoexcited population.

JSI-5.5 THU 9:45

Free Electron Laser for the investigation of ultrafast chiral dynamics

•M. Bonanomi[1,2], D. Faccialà[2], M. Devetta[2], Y. Mairesse[3], O. Plekan[5], K.C. Prince[5], M. Di Fraia[5,7], V. Blanchet[3], L. Nahon[6], I. Powis[4], C. Callegari[5], and C. Vozzi[2]; [1]Politecnico di Milano, Milano, Italy; [2]Istituto di Fotonica e Nanotecnologie, Milano, Italy; [3]Université de Bordeaux-CNRS_CEA, CELIA, Talence, France; [4]School of Chemistry, University of Nottingham, Nottingham, United Kingdom; [5]Elettra-Sincrotrone Trieste, Basovizza - Trieste, Italy; [6]Synchrotron Soleil, Gif sur Yvette, France; [7]CNR-IOM, Basovizza - Trieste, Italy

Circular polarized XUV light from an FEL offers the possibility to investigate the ultrafast dynamic in chiral molecules combining the enantio-specificity of TR-PECD with the chemical and site specificity of TR-XPS.

10:30 – 12:00

CL-2: Flow cytometry and ultrasound

Chair: Xiaoming Wei, South China University of Technology, Guangzhou, China

CL-2.1 THU 10:30

High-speed field-resolved infrared fingerprinting of particles in flow

•D. Gerz[1,2,3], M. Huber[2,3], H. Mirkes[2], F. Lindinger[2,3], Y. Münzenmaier[2], A. Weigel[3,4], M. Kielpinski[1], T. Henkel[1], M. Zigman[2,3,4], F. Krausz[2,3,4], J. Popp[1,5], and I. Pupeza[1,2,3]; [1]Leibniz Institute of Photonic Technology, Jena, Germany; [2]Ludwig Maximilians University Munich, Garching, Germany; [3]Max Planck Institute of Quantum Optics, Garching,

Room 1 Hall B1 (B11)

CF-10.6 THU 9:45

Nonlinear Pulse Compression of a Yb-Doped Thin-Disk Amplifier at 156 mJ and 5 kHz Using a Gas-Filled Multipass Cell

•Y. Pfaff[1,2], G. Barbiero[1], M. Rampp[1], H. Wang[1], S. Klingebiel[1], C.Y. Teisset[1], R. Jung[1], A.H. Woldegeorgis[1], J. Brons[3], A.R. Maier[4], C.J. Saraceno[2], and T. Metzger[1]; [1]TRUMPF Scientific Lasers GmbH + Co. KG, Unterföhring, Germany; [2]Photonics and Ultrafast Laser Science, Ruhr-University Bochum, Bochum, Germany; [3]TRUMPF Laser GmbH, Schramberg, Germany; [4]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

We present spectral broadening of 156 mJ pulses from a Yb-doped thin-disk amplifier at 5 kHz repetition rate using a helium-filled Herriott-type multipass cell and show their compressibility from 461 fs to 39 fs.

10:30 – 12:00

CC-1: Nonlinear THz phenomena

Chair: Karl Unterrainer, Technical university of Vienna, Vienna, Austria

CC-1.1 THU (Invited) 10:30

THz Bandwidth Activation of Anharmonic Coupling in CdWO4

M. Nielson, B. Knighton, L. Davis, A. Alejandro, C. Rader, and •J. Johnson; Brigham Young University, Provo, USA

2D THz spectroscopy enables us to isolate anharmonic coupling between phonon modes in CdWO4. We show that the THz bandwidth activates this coupling, when we would not otherwise expect it to be efficient.

Room 6 Hall B3 (B32)

CG-3.6 THU 9:45

Vacuum laser acceleration of electrons injected from nanotips

•A. De Andres[1], S. Bhadoria[2], J. Marmolejo[2], A. Muschet[1], P. Fischer[1], A. Gonoskov[2], D. Hanstorp[2], M. Marklund[2], and L. Veisz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Department of Physics, University of Gothenburg, Göteborg, Sweden

We accelerated high-charge (nC) electron bunches to relativistic energies by placing a nanotip in the waist of a laser. The resulting electrons and the acceleration mechanism were studied against different focusing configurations (f#1 and f#3).

10:30 – 12:00

CG-4: Few-cycle drivers and harmonic sources

Chair: Mathieu Gisselbrecht, Lund University, Lund, Sweden

CG-4.1 THU 10:30

Multi-TW laser pulses in the single-cycle regime by single thin plate compression

S. Tóth[1], •I. Seres[1], L. Lehotai[1], J. Csontos[1], A. Farkas[1], Á. Mohácsi[1], Á. Börzsönyi[1], K. Osvay[2], and R.S. Nagymihály[1]; [1]ELI ALPS Research Institute, Szatymaz, Hungary; [2]National Laser Initiated Transmutation Laboratory, Szeged, Hungary

Single thin plate post-compression of the SYLOS lasers of ELI ALPS was experimentally demonstrated,

Room 7 Hall A1 (A11)

CJ-6.6 THU 9:45

Suppressing Stimulated Brillouin Scattering with High Beam Quality by Selective Multimode Excitation in Optical Fibers

C.-W. Chen[1], K. Wisal[2], S. Warren-Smith[3], P. Ahmadi[4], A.D. Stone[1], and •H. Cao[1]; [1]Department of Applied Physics, Yale University, New Haven, USA; [2]Department of Physics, Yale University, New Haven, USA; [3]Future Industries Institute, University of South Australia, Mawson Lakes, Australia; [4]Coherent, 1280 Blue Hills Ave., Bloomfield, USA

We experimentally demonstrate efficient suppression of stimulated Brillouin scattering in multimode fibers while maintaining high output-beam quality by shaping the input seed wavefront. SBS threshold is enhanced to three times the threshold for fundamental-mode-only excitation.

10:30 – 12:00

CE-5: Sensor materials and structures

Chair: Luca Vincetti, University of Modena, Italy

CE-5.1 THU 10:30

High numerical aperture optical bundle for biological imaging

•R. Kasztelanic[1,2], D. Pysz[2], R. Stepien[2], R. Czajkowski[3], and R. Buczynski[1,2]; [1]Faculty of Physics, Warsaw University, Warsaw, Poland; [2]Lukasiewicz Research Network, Institute of Microelectronics and Photonics, Warsaw, Poland; [3]Nencki Institute of Experimental Biology PAS, Warsaw, Poland

Imaging bundles with a high numerical aperture have been fabricated, tested, and used for two-

Room 8 Hall A1 (A12)

EB-10.6 THU 9:45

Optical Fractional Fourier Transform - experimental implementation

•M. Jastrzębski[1,2], B. Niewelt[1,2], S. Kurzyna[1,2], J. Nowosielski[1,2], W. Wasilewski[1,2], M. Mazelanik[1,2], and M. Parniak[1,3]; [1]Centre for Quantum Optical Technologies, Centre of New Technologies, University of Warsaw, Warsaw, Poland; [2]Faculty of Physics, University of Warsaw, Warsaw, Poland; [3]Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

We present the experimental implementation of optical Fractional Fourier Transform in quantum memory. It's a promising tool for superresolution and quantum communication. We perform the operations on Hermite-Gaussian modes which are the eigenfunctions of FrFT.

10:30 – 12:00

EB-11: Single photon sources and detectors

Chair: Alexander Sergienko, Boston University, USA

EB-11.1 THU 10:30

Optically-Coherent Color Center Ensembles Coupled to High Finesse Silicon Carbide Microresonators

•D. Lukin[1], D. Catanzaro[1], M. Guidry[1], M. Ghezellou[2], J. Yang[1], H. Abe[3], T. Ohshima[3], J. Ul-Hassan[2], and J. Vuckovic[1]; [1]Stanford University, Stanford, USA; [2]Linkoping University, Linkoping, Sweden; [3]National Institutes for Quantum Science and Technology, Takasaki, Japan

Small ensembles of silicon vacancy

Room 1 ICM

formed by a DBR and a suspended photonic crystal. We demonstrate tunability of the cavity resonance and observe optomechanical effects that deviate from canonical optomechanics.

EA-3.2 THU 10:45

Single-pass femtosecond parametric process towards continuous variables quantum networks

T. Kouadou, •F. Sansavini, M. Ansquer, J. Henaff, N. Treps, and V. Parigi; Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-PSL Research University, Collège de France , 75005 Paris, France

We demonstrate the generation of 21 squeezed spectral modes at 156 MHz, combining frequency- and time- multiplexing in multimode squeezing. This paves the way to the implementation of scalable and fully reconfigurable multipartite entangled states.

EA-3.3 THU 11:00

A high-fidelity reconfigurable photonic processor for NISQ computing

•A. Cavaillès[1], P. Boucher[1,2], S. Gigan[1,3], and K. Müller[1]; [1]LightOn, 3-5 Impasse Reille, Paris, France; [2]Quantonation, 58 rue d'Hauteville 75010, Paris, France; [3]Laboratoire Kastler Brossel, ENS–Université PSL, CNRS, Sorbonne Université, College de France, 24 Rue Lhomond, F-75005, Paris, France

Room 4a ICM

CK-9.2 THU 11:00

A Photonic Integrated High-power Soliton Microcomb Generator

•X. Ji, Y. Liu, Z. Qiu, A. Voloshin, and T.J. Kippenberg; Institute of Physics, Swiss Federal Institute of Technology Lausanne , Lausanne, Switzerland

We demonstrate a compact soliton microcomb light source, with an output power of 7.9 mW, at a compact device footprint of 12.5 mm^2.

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limiters in the mid-infrared regime with record high contrast ratio and a $\chi^{(3)}$ non-linearity of $10^{-12} m^2/V^2$.

EH-3.2 THU 10:45

Novel High-Q Metasurface Design for Second-Harmonic Generation

•G.Q. Moretti[1], B. Tilmann[2], A. Tittil[2], E. Cortés[2], S.A. Maier[2,3,4], A.V. Bragas[1], and G. Grinblat[1]; [1]Departamento de Física, FCEN, IFIBA-CONICET, Universidad de Buenos Aires, Buenos Aires, Argentina; [2]Chair in Hybrid Nanosystems, Nanoinstitute Munich, Faculty of Physics, Ludwig-Maximilians-Universität, München, Germany; [3]School of Physics and Astronomy, Monash University, Melbourne, Australia; [4]Department of Physics, Imperial College London, London, United Kingdom

We show numerically record-breaking SHG efficiencies for a novel GaP metasurface design, sustaining a very high-Q QBIC resonance. A coupler element is added instead of traditional approaches for the excitation of the mode.

EH-3.3 THU 11:00

Multiresonant Metasurfaces for Broadband Quadratic Spectral Phase Manipulations

•O. Tsilipakos[1] and T. Koschny[2]; [1]National Hellenic Research Foundation, Athens, Greece; [2]Ames National Laboratory, Ames, Iowa, USA

We propose multiresonant metasurfaces exhibiting a purely quadratic spectral phase to be utilized for temporal pulse shaping of broadband signals. This overcomes the funda-

Room 13a ICM

CA-11.2 THU 10:45

Efficient Tm:Lu2O3 laser at ~2250 nm

•K. Eremeev[1], P. Loiko[1], S. Balabanov[2], L. Guillemot[1], P. Camy[1], C. Kränkel[3], and A. Braud[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]G. G. Devyatykh Institute of Chemistry of High-Purity Substances of RAS, Nizhny Novgorod, Russia; [3]Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

Spectroscopic properties of Tm3+-doped sesquioxides A2O3 (A = Y, Lu, Sc) relevant for laser operation on the 3H4→3H5 transition were studied. A continuous-wave Tm:Lu2O3 laser generated 654 mW at 2238-2309 nm with 68.9% slope efficiency.

CA-11.3 THU 11:00

LED pumped alexandrite amplifier.

•E. Thellier[1], H. Taleb[1], C. Le Blanc[1,2], P. Pichon[1], F. Druon[1], P. Georges[1], and F. Balembois[1]; [1]Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, Palaiseau, France; [2]Laboratoire pour l'Utilisation des Lasers Intenses, CNRS, Ecole polytechnique, CEA, Palaiseau, France

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CB-9.2 THU 10:45

Strongly modulated QCLs as broadband Mid-IR sources

•A. Cargioli[1], M. Bertrand[1], S. Hakobyan[2], R. Maulini[2], S. Blaser[2], T. Gresch[2], A. Muller[2], and J. Faist[1]; [1]Institute for Quantum Electronics, ETH Zurich, Zurich, Switzerland; [2]Alpes Lasers, St Blaise, Switzerland

Compact and stable broadband Mid-IR sources are fundamental for spectroscopy applications. Here, we prove that we can stabilise and broaden the emission of a QCL up to 250cm^-1 by strongly injecting a low-frequency RF signal.

CB-9.3 THU 11:00

Low dissipation quantum cascade surface emitting lasers

•D. Stark[1], F. Kapsalidis[1], S. Markmann[1], M. Bertrand[1], Z. Wang[1], R. Wang[1], B. Meng[1], E. Gini[2], M. Beck[1], and J. Faist[1]; [1]Institute for Quantum Electronics, ETH Zürich, Zürich, Switzerland; [2]FIRST Center for Micro- and Nanoscience, ETH Zürich, Zürich, Switzerland

We report on the design, fabri-

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Room 14b ICM

CNRS, Institut Fresnel, Marseille, France

We present a high-speed fluorescence imaging technique through lensless endoscopes using a featuring a bending-resilient multicore fiber and computational imaging with a single pixel detector

CH-10.2 THU 10:45

Coherent Beam Shaping with Multicore Fiber Photonic Lanterns

•*A. Milne*[1], *H.E. Parker*[1], *T.A. Wright*[2], *A. Benoît*[1], *K. Harrington*[2], *J. Leach*[1], *D.B. Phillips*[3], *J.M. Stone*[2], *T.A. Birks*[2], *and R.R. Thomson*[1]; [1]*Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, EH14 4AS, United Kingdom*; [2]*Department of Physics, University of Bath, Bath, BA2 7AY, United Kingdom*; [3]*School of Physics and Astronomy, University of Exeter, Exeter, EX4 4QL, United Kingdom*

We demonstrate that photonic lanterns made from polarisation maintaining multicore fibre enable controlled coherent beam shaping at their multimode end without the requirement for access to the multimode end, opening up new opportunities in microendoscopy.

CH-10.3 THU 11:00

Improved Visible-guiding Anti-resonant Hollow-Core Fiber for Gas-phase Raman Spectroscopy

•*T. Kelly*[1], *S. Rikimi*[1], *I. Davidson*[1], *W. Brooks*[2], *M. Foster*[2], *F. Poletti*[1], *S.A. Mousavi*[1], *P. Horak*[1], *and N. Wheeler*[1]; [1]*University of Southampton, Southampton, United Kingdom*; [2]*IS-Instruments Ltd, Tonbridge, United Kingdom*

Here we report on the fabrication, characterization and testing

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Germany; [4]*Center for Molecular Fingerprinting, Budapest, Hungary*; [5]*Institute of Physical Chemistry and Abbe Center of Photonics, Friedrich-Schiller University, Jena, Germany*

We acquire infrared spectral fingerprints of a stream of 9-μm-sized particles flowing at ~20 μm/ms through a 30-μm-thick water channel, using high-dynamic-range field-resolved spectroscopy (FRS). This paves the way to high-throughput, label-free FRS flow cytometry.

CL-2.2 THU 10:45

Time-Stretched Imaging Flow Cytometry and Photonic Neuromorphic Processing for Particle Classification

I. Tsilikas[1], *A. Tsirigotis*[2], *S. Deligiannidis*[3], *G. Tsigaridas*[1], *A. Bogris*[3], *and* •*C. Mesaritakis*[2]; [1]*National Technical University of Athens, Dept. Physics, Athens, Greece*; [2]*University of the Aegean, Dept. Information and Communication Systems Engineering, Samos, Greece*; [3]*University of West Attica, Dept. Informatics and Computer Engineering, Egaleo, Greece*

We present experimental results concerning particle classification using a time-stretched imaging-cytometer followed by a photonic neuromorphic accelerator. The combined system offers an accuracy increase of 5% alongside a compression of parameters by a factor of 2.5.

CL-2.3 THU 11:00

Ultrasound Modulated Optical Tomography with Persistent Spectral Hole Burning Filter for In Vivo Deep Tissue Imaging

•*Q.M. Thai*[1,2], *G. Kalot*[3], *C. Venet*[1], *J. Seguin*[3], *M. Bocoum*[1], *N. Mignet*[3], *J.-L. Gennisson*[4], *F. Ramaz*[1], *and A. Louchet-Chauvet*[1]; [1]*Institut Langevin, ESPCI Paris, Université PSL, CNRS, Paris, France*; [2]*Cluster of Excellence Physics of Life (PoL), TU Dresden, Germany*; [3]*Université*

Room 1 Hall B1 (B11)

CC-1.2 THU 11:00

Ultrafast and Low-Threshold THz Mode Switching of Two-Dimensional Nonlinear Metamaterials

•*B.J. Kang*[1,3], *D. Rohrbach*[1], *F. Brunner*[1], *S. Bagiante*[1,2], *H. Sigg*[2], *and T. Feurer*[1]; [1]*University of Bern, Bern, Switzerland*; [2]*Paul Scherrer Institute, Villigen, Switzerland*; [3]*Korea Research Institute of Chemical Technology, Daejeon, South Korea*

We report ultrafast THz-field

Room 6 Hall B3 (B32)

yielding sub-2-cycle pulses with more than 3 TW peak power at the output. Pulse characterization shows high spatio-temporal quality after compression.

CG-4.2 THU 10:45

High energy, monocycle, CEP-stable IR pulse generation based on advanced DC-OPA

•*L. Xu*[1,2] *and E.J. Takahashi*[1,3]; [1]*Ultrafast Coherent Soft X-ray Photonics Research Team, RAP, RIKEN, Wako, Saitama, Japan*; [2]*Attosecond Science Research Team, RAP, RIKEN, Wako, Saitama, Japan*; [3] *Extreme Laser Science Laboratory, CPR, RIKEN, Wako, Saitama, Japan*

Based on the advanced DC-OPA scheme and two kinds of nonlinear crystals, a 53 mJ, 8.58 fs (nearly monocycle at 2.44 um), CEP-stable MIR laser source was developed.

CG-4.3 THU 11:00

Waveform Synthesizer-based Tunable Attosecond Beamline

•*G.M. Rossi*[1,2], *R.E. Mainz*[1,2], *F. Scheiba*[1,2], *M.A. Silva-Toledo*[1,2], *M. Kubullek*[1,2], *and F.X. Kärtner*[1,2]; [1]*Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*Physics Department and The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Hamburg, Germany*

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photon imaging of the fluorescence signal of latex beads, ex vivo hippocampal neurons, and in vivo cortical neurons.

CE-5.2 THU 10:45

Lithium-Niobate-On-Insulator-based electric field sensors

•*N. Courjal*[1], *A. Hoblos*[1], *M. Suarez*[1], *R. Salut*[1], *M. Amidullah*[2], *V. Kemlin*[3], *J. Schiellein*[2], *A. Boutin*[4], *A. Bouvier*[4], *V. Calero*[1], *B. Robert*[1], *L. Grosjean*[1], *F. Baida*[1], *and M.-P. Bernal*[1]; [1]*FEMTO-ST Institute, 25000 Besançon, France*; [2]*THALES LAS, 78990 Elancourt, France*; [3]*THALES Research & Technology, 91767 Palaiseau, France*; [4]*Exail - Integrated Systems, 75003 Paris, France*

We report on the nanostructuring and characterization of an LNOI-based electro-optical photonic crystal assembled at the tip of a fiber for non-intrusive electric field sensing. These developments pave the way for ultra-compact sensors and 3D photonic hybrid platforms.

CE-5.3 THU 11:00

Fabrication of Externally Microstructured Flat Optical Fibre for In-process Monitoring of Laminated Composite Structures

•*C. Holmes*[1], *S. Zahertar*[1], *B. Moog*[1], *M. Godfrey*[1], *T. Lee*[1], *A. Annunziato*[2], *F. Anelli*[2], *B. Shi*[1], *M. Beresna*[1], *M. Whitaker*[1], *F. Prudenzano*[2], *R. Day*[3], *and J. Barton*[4]; [1]*University of Southampton, Bristol, United Kingdom*; [2]*Politecnico di Bari, Bari, Italy*;

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color centers are integrated into high finesse whispering gallery mode resonators, fabricated using the Silicon Carbide-on-Insulator quantum photonic platform, towards realization of multi-emitter spin-spin coupling in Silicon Carbide.

EB-11.2 THU 10:45

Experimental Verification of Photon Pair Indistinguishability Enhancement via Heralded Post-Selection

•*R. Checchinato*[1], *J. Lee*[1], *F. Redivo Cardoso*[2], *J.-H. Littmann*[1], *J.R. Gonzales-Ureta*[1], *S. Höfling*[3], *C. Schneider*[4], *C.J. Villas-Boas*[2], *and A. Predojević*[1]; [1]*Department of Physics, Stockholm University, Sweden*; [2]*Departamento de Física, Universidade Federal de São Carlos, Brazil*; [3]*Technische Physik, Physikalisches Institut and Würzburg-Dresden Cluster of Excellence ct.qmat, Universität Würzburg, Germany*; [4]*Institute of Physics, University of Oldenburg, Germany*

We probe the indistinguishability of photon pairs generated in a cascade decay using Hong-Ou-Mandel interference. We present a method of enhancing the indistinguishability through heralded detection and post-selection.

EB-11.3 THU 11:00

Singly resonant frequency conversion for manipulation of a frequency-multiplexed single photon

•*R. Ikuta*[1,2], *M. Yokota*[1], *T. Kobayashi*[1,2], *N. Imoto*[2], *and T. Yamamoto*[1,2]; [1]*GSES, Osaka University, Toyonaka, Japan*; [2]*QIQB, Osaka University, Toyonaka, Japan*

Frequency-multiplexed entanglement distribution is important for high-speed and multi-user quantum network. In the situation, quantum

We present a low-footprint reconfigurable linear optical network for NISQ through complex mixing and wavefront shaping. We implement with high fidelity circuits ranging up to 8-inputs/38-outputs and present avenues to minimize losses and increase scalability.

EA-3.4 THU 11:15

Quantum-enhanced stimulated Raman scattering spectroscopy in dual-polarization scheme

•Z. Xu[1], K. Oguchi[1], S. Nitanai[2], Y. Taguchi[1], Y. Sano[1], and Y. Ozeki[1]; [1]Department of Electrical Engineering and Information Systems, The University of Tokyo, Tokyo, Japan; [2]Department of Electrical and Electronic Engineering, The University of Tokyo, Tokyo, Japan

In this report, we introduce a novel strategy for high-power quantum-enhanced stimulated Raman scattering spectroscopy in a dual-polarization scheme. A noise reduction level of 0.5 dB was achieved in both polarization modes.

EA-3.5 THU 11:30

A simulation framework for feedforward in quantum photonic systems

•J.C. Adcock[1], D.A. Quintero Dominguez[1], Q. Palmer[1,2], S.G. Currie[1,2], W.J. Munro[3], and J.W. Silverstone[1]; [1]Big Photon Lab, University of Bristol, Bristol, United Kingdom; [2]Quantum Engineering Center for Doctoral Training, University of Bristol, Bristol, United Kingdom; [3]NTT Basic Research Laboratories & Research Center for Theoretical Quantum Physics,

CK-9.3 THU 11:15

3D Integration of Microcombs

•M. Girardi, O.B. Helgason, A. Caut, M. Karlsson, A. Larsson, and V. Torres-Company; Department of Microtechnology and Nanoscience, Chalmers University of Technology, Göteborg, Sweden

We demonstrate the integration of a power efficient frequency comb with a wavelength demultiplexer, by three-dimensional integration of two Si3N4 core geometries optimized for nonlinear and linear operations.

CK-9.4 THU 11:30

Self-Injection-Locked Microcombs via Synthetic Reflection

•A. Ulanov[1], T. Wildi[1], N. Pavlov[2], J. Jost[2], M. Karpov[2], and T. Herr[1,3]; [1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Enlightra Sarl, Renens, Switzerland; [3]Physics Department, Universität Hamburg UHH, Hamburg, Germany

Self-injection locking to a photonic crystal ring-microresonator with synthetic reflection is demonstrated for the first time. The

mental limitations of conventional, non-resonant approaches (bulky) and modern, singly-resonant metasurfaces (narrowband).

EH-3.4 THU 11:15

Heavily doped semiconductors for integrated nonlinear plasmonics

•C. Ciracì[1], F. De Luca[1,2], and M. Ortolani[3]; [1]Istituto Italiano di Tecnologia, Arnesano, Italy; [2]Università del Salento, Lecce, Italy; [3]Sapienza University of Rome, Roma, Italy

In this talk we numerically investigate heavily doped semiconductors as a platform for integrated nonlinear plasmonics at mid-infrared frequencies. We study free-electron nonlinearities and use surface charge density modulation to control and enhance the nonlinear response.

EH-3.5 THU 11:30

Strong nonlinear efficiency enhancement in the visible and UV ranges from plasmonic gold nanogratings

•S. Mukhopadhyay[1], L. Rodriguez-Suné[1], C. Cojocaru[1], M.A. Vincenti[2], K. Hallman[3], G. Leo[4], M. Belchovski[2], D. de Ceglia[2], M. Scalora[5], and J. Trull[1]; [1]Department of Physics, Universitat Politècnica de Catalunya, Terrassa (Barcelona), Spain; [2]Department of Information Engineering – University of Brescia, Brescia, Italy; [3]PeopleTec, Inc. ,

We demonstrate a compact 28 passes alexandrite amplifier, pumped by a Ce:YAG luminescent concentrator at 2.5 kW peak power leading to a significant gain of 14.9.

CA-11.4 THU 11:15

Spectrally combined diodes-pumped femtosecond Ti:sapphire lasers and its application to two-photon & coherent anti-Stokes Raman scattering microscopy

•D.H. Song[1,2], C. Huh[1], and H.-S. Seo[1,2]; [1]Electronics and Telecommunications Research Inst., Daejeon, South Korea; [2]BlueTileLab, Daejeon, South Korea

We present a simpler and cost-effective technique to increase mode-locked (ML) power and pulse energy by exploiting spectrally combined pump diodes. These compact femtosecond Ti:S lasers were successfully applied to home-built video-rate two-photon & coherent anti-Stokes Raman scattering microscopes.

CA-11.5 THU 11:30

Progress in Blue Diode-Pumped Titanium:Sapphire Regenerative Amplifier at Room Temperature

•D. Hug[1], A. Dax[2], A. Trisorio[2], R. Carreto[3], T. Südmeyer[4], and B. Resan[1]; [1]Institute of Product and Production Engineering, University of Applied Sciences and Arts Northwestern Switzerland, 5210 Windisch, Switzerland; [2]Laboratory for Nonlinear Optics, Paul Scherrer Institute, 5232 Villigen PSI, Switzerland; [3]TLD Photonics AG, 5430 Wettingen, Switzerland; [4]Time and Fre-

cation and characterization of low dissipation quantum cascade surface emitting lasers (QCSEL) emitting at wavelengths of 4.5 μm or 8 μm. The results are an important step towards low-cost battery-driven QCLs.

CB-9.4 THU 11:15

Private free-space transmission based on chaos synchronisation in the 8-14 μm atmospheric transparency window

•P. Didier[1,2], S. Zaminga[1], O. Spitz[1,4], E. Awwad[1], G. Maison[2], M. Carras[2], and F. Grillot[1,3]; [1]Telecom Paris, Institut Polytechnique de Paris, Paris, France; [2]mirSense, Paris, France; [3]Center for High Technology Materials, University of New-Mexico, Albuquerque, USA; [4]College of Optics and Photonics, University of Central Florida, Orlando, USA

We demonstrate a 5 Mbit/s chaos-based free-space private transmission system at 9.3 μm, in one of the transparency windows of the atmosphere. This system is relevant for FSOC applications where security is of paramount importance.

CB-9.5 THU 11:30

High-Power Quantum Cascade Lasers for 8 μm spectral range

E. Cherotchenko[1], V. Dudelev[1], D. Mikhailov[1], G. Savchenko[1], D. Chistyakov[1], S. Losev[1], A. Babichev[1], A. Gladyshev[2,3], I. Novikov[2,3], A. Lutetskiy[1], D. Veselov[1], S. Slipchenko[1], D. Denisov[2], A. Andreev[4], I. Yarotskaya[4], K. Podgaetskiy[4], M. Ladugin[4], A. Marmalyuk[4], N. Pikhtin[1], L. Karachinsky[2,3], V. Kuchinskii[1], A. Egorov[5], and •G. Sokolovskii[1]; [1]Ioffe Institute, Saint-

EF-4.2 THU 11:15

Hexagonal patches and modes in degenerated nonlinear cavities: the role of aberrations

S.V. Gurevich[1], F. Maucher[2], N. Vigne[3], A. Garnache[3], I. Sagnes[4], A. Bartolo[5], M. Marconi[5], M. Guidici[5], and •J. Javaloyes[2]; [1]Institute for Theoretical Physics, University of Münster, Münster, Germany; [2]Departament de Física & IAC-3, Universitat de les Illes Balears, Palma, Spain; [3]Institut d'Electronique et des Systèmes, CNRS UMR5214, Montpellier, France; [4]Centre de Nanosciences et de Nanotechnologies, CNRS UMR 9001, Université Paris-Saclay, Paris, France; [5]Université Côte d'Azur, CNRS, Institut de Physique de Nice, Valbonne, France

We consider the transverse nonlinear dynamics of a nonlinear optical system in presence of spherical aberrations close to the degenerate self-imaging condition. Off axis emission and Turing patterns are observed in good agreement with the experiment.

EF-4.3 THU 11:30

Spatially localized structures in a self-imaging semiconductor laser cavity: diffraction and complex non-linearity management.

•N. Vigne[1], A. Bartolo[1,2], M. Marconi[2], G. Beaudoin[5], K. Pantzas[5], J. Javaloyes[3], S.V. Gurevich[4], I. Sagnes[5], M. Giudici[2], and A. Garnache[1]; [1]Institut d'Electronique et des Systèmes, Montpellier, France; [2]Institut de Physique de Nice, Nice, France; [3]Departament de Física , Universitat de les Illes Balears, Palma

Room 14b ICM

of a low-loss, large core visible guiding 10-element single-cladding ring anti-resonant hollow core fiber for spontaneous gas-phase Raman spectroscopy measurements.

CH-10.4 THU 11:15

Hollow-Core-Fibre-Delivered Attenuated Total Internal Reflection Heterodyne Spectroscopy

•P. Castro-Marin[1], K. Johnson[2], C. Farrel[2], I.A. Davidson[3], G.T. Jaison[3], N.V. Wheeler[3], F. Poletti[3], D.J. Richardson[3], and D.T. Reid[1]; [1]Heriot Watt University, Edinburgh, United Kingdom; [2]Chromacity LTD, Edinburgh, United Kingdom; [3]University of Southampton, Southampton, United Kingdom

We report the first example of attenuated total internal reflection Fourier-transform infrared heterodyne spectroscopy, delivered by a hollow-core fibre. Using broadband OPO illumination from 2600–3400 cm-1, we present an example measurement using LDPE plastic.

CH-10.5 THU 11:30

Optimized microstructure design of hollow-core photonic crystal fibres for ultra-sensitive optofluidic sensing

•C. Helfrich and F. Tani; Max Planck Institute for the Science of Light, Erlangen, Germany

We study the design of single-ring hollow-core fibres for optofluidic applications. We identify a route to maximise the polarisation purity of the guided light and derive an analytical expression for the loss of higher-order modes.

Room Osterseen ICM

de Paris Cité, INSERM, CNRS, UTCBS, Faculté de Pharmacie, Paris, France; [4]Laboratoire d'imagerie biomédicale multimodale, Université Paris-Saclay, CEA, CNRS, INSERM, Orsay, France

We report the first in vivo ultrasound modulated optical tomography (UOT) images on mice, using extremely selective persistent spectral hole burning filter. It demonstrates the potential of UOT for deep-tissue imaging for medical applications.

CL-2.4 THU 11:15

Cavitation Bubbles Generated In Water By A 2.9μm Laser For Sacrificial Layer-Free Bioprinting Applications

S. Mohajan[1], J.-C. Delagnes[1], B. Allisy[1], A. Iazzolino[2], B. Viellerobe[2], and •S. Petit[1]; [1]CELIA Centre Lasers Intenses et Applications UMR 5107 Université Bordeaux-CNRS-CEA, Talence, France; [2]POIETIS, Bioparc Bordeaux Métropole, 27 allée Charles Darwin, Pessac, France

We investigated, experimentally and theoretically, the bubble cavitation ruling the microjet generation for bioprinting applications during 2.9 μm laser–water interaction. Novel LAB system utilizing vibrational absorption of water in the middle-infrared has been investigated.

CL-2.5 THU 11:30

Hot-wire fibre optic flowmeter based on single mode-multimode-single mode structure as a sensing respiratory device

M. Cavagnetto, •M. Olivero, A. Vallan, and G. Perrone; Politecnico di Torino, dept. of Electronics and Telecommunications, Torino, Italy

A novel fibre optic flowmeter is presented, which relies on a single mode-multimode-single mode structure optically heated by a pump laser, acting as a hot-wire sensor for the monitoring of breath.

Room 1 Hall B1 (B11)

induced mode switching of two-dimensional nonlinear metamaterials on semiconductor substrates with different band gaps. We establish the dominant carrier generation mechanism and present detailed system dynamics.

CC-1.3 THU 11:15

Terahertz driven electron emission from designed metal structures and structured graphene

•T.O. Buchmann[1], M. Sebek[1], A. Shivayogimath[2], P. Bøggild[2], S. Lange[1], and P.U. Jepsen[1]; [1]Department of Electrical and Photonics Engineering, Kongens Lyngby, Denmark; [2]Department of Physics, Kongens Lyngby, Denmark

We demonstrate cold field electron emission from graphene and metallic surfaces driven by the electric field of lightwaves at terahertz frequencies. Electron energy, emission threshold, and field dependency for different structures are investigated.

CC-1.4 THU 11:30

Optical Rectification and Second Harmonic Generation of Intense Terahertz Pulses

•D.J.H. Ludlow, C. Rader, N.K. Green, and J.A. Johnson; Brigham Young University, PROVO, USA

Nonlinear optical processes with (terahertz) THz frequency light have rarely been measured and characterized. Using 2D THz spectroscopy, we clearly observe THz-optical rectification and THz-second harmonic generation in a variety of materials.

Room 6 Hall B3 (B32)

The development of an attosecond transient absorption beamline featuring tailored sub-cycle pump waveforms with spectrum spanning 700-2200 nm and tunable isolated attosecond probe pulses with photon energies in the 30-400 eV range is presented.

CG-4.4 THU 11:15

High Harmonic Generation in Neon Inside a Thin-Disk Laser Oscillator: Towards a Coherent Single-Stage 100-eV Source

•J. Drs[1], J. Fischer[1], M. Müller[1], N. Modsching[1], F. Trawi[1], T. Ullsperger[2], V.J. Wittwer[1], and T. Südmeyer[1]; [1]Laboratoire Temps-Fréquence (LTF), Institut de Physique, Université de Neuchâtel, Neuchâtel, Switzerland; [2]Institute of Applied Physics, (Friedrich Schiller University Jena), Jena, Germany

We show an ultrafast TDL oscillator capable of driving HHG in neon directly inside its cavity. The result paves the way toward a compact single-stage 100-eV coherent XUV source.

CG-4.5 THU 11:30

Compact, intense extreme-ultraviolet sources for attosecond science and absorption spectroscopy

•B. Major[1,2], K. Kovács[3], E. Svirplys[4], M. Anus[4], O. Ghafur[4], K. Varjú[1,2], M.J.J. Vrakking[4], V. Tosa[3], and B. Schütte[4]; [1]ELI ALPS, ELI-HU Non-profit Ltd.,, Szeged, Hungary; [2]Department of Optics and Quantum Electronics, University of Szeged, Szeged, Hungary; [3]National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj-Napoca,

Room 7 Hall A1 (A11)

[3]Wrexham Glyndwr University, Wrexham, United Kingdom; [4]University of Bristol, Bristol, United Kingdom

Using a stack-and-draw approach and physical micromachining externally microstructured flat optical fibre is fabricated and used for new monitoring capability in high-value composite materials, including carbon and glass fibre reinforced polymer.

CE-5.4 THU 11:15

Optical Sensing of Various Environmental Parameters Using Molecular Switches

A. Günther[1,2,4], •Y. Deja[1], P. Kotra[1], M. Kilic[3], K. Tran[3], F. Renz[3,4], W. Kowalsky[2,4], and B. Roth[1,4]; [1]Hannover Centre for Optical Technologies, Hannover, Germany; [2]Institute for High Frequency Technology, Braunschweig, Germany; [3]Institute of Inorganic Chemistry, Hannover, Germany; [4]Cluster of Excellence - PhoenixD, Hannover, Germany

We use Fe(II)-triazole complexes as optical switches and show their potential to detect changings in temperature, humidity or electric and magnetic fields, respectively. First results by embedding particles into optical waveguides will also be presented.

CE-5.5 THU 11:30

Fully Printed GaTe Based Photodetector on PET Substrate

•C. Odaci[1,2], M.S. Khan[2], D. Corzo[2], M. Jose[2], A. Roshanghias[2], and U. Aydemir[1]; [1]Bursa Uludag University, Bursa, Turkey; [2]Silicon Austria Labs GmbH, Villach, Austria

We report on a methodology for cost-effective fabrication of photodetector on flexible substrates. The fabrication is done using printing of solution processed III-VI monochalcogenide materials on PET sheets. The sensor is char-

Room 8 Hall A1 (A12)

frequency conversion applicable to frequency-multiplexed photons is required. For this purpose, we developed optical frequency tweezers.

EB-11.4 THU 11:15

Efficient converted single-photon source at telecom band for quantum communication

•M. Cohen[1], R. Dalidet[1], M. Billard[2], F. Pastier[2], V. Giesz[2], A. Martin[1], S. Tanzilli[1], P. Senellart[3], N. Somaschi[2], and L. Labonté[1]; [1]Universite Côte d'Azur, CNRS, Institut de Physique de Nice (INPHYNI), Nice, France; [2]Quandela SAS, Palaiseau, France; [3]Universite Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies (C2N), Palaiseau, France

We achieve a frequency conversion interface to convert single photons emitted by a single photon source toward telecommunication C-band. We demonstrate near 50 % of end-to-end efficiency and single photon properties conservation.

EB-11.5 THU 11:30

Autler-Townes effect and composite pulses based methods for single-shot measurements of phonon number states

•N. Kuk[1], M. Mallweger[1], M.H. Oliveira[1,2], R. Thomm[1], H. Parke[1], G. Higgins[1,3], R. Bachelard[2,4], C.J. Villas-Boas[2], B.T. Torosov[5], N.V. Vitanov[6], and M. Hennrich[1]; [1]Department of Physics, Stockholm University, Stockholm, Sweden; [2]Universidade Federal de São Carlos, Departamento de Física, São Carlos, Brazil; [3]Department of

Room 1 ICM

Tokyo, Japan

Quantum measurement and feedforward is the only viable path to build scalable quantum technology with linear optics. Here, we develop a multi-physics simulation framework to model quantum feedforward in the time domain.

EA-3.6 THU 11:45

Detection-loss tolerant real-time amplitude measurement for ultra-fast optical quantum processors: 5-dB squeezing from DC to 43 GHz

•*A. Inoue*[1], *T. Kashiwazaki*[1], *T. Yamashima*[2], *N. Takanashi*[2], *T. Kazama*[1], *K. Enbutsu*[1], *K. Watanabe*[1], *T. Umeki*[1], *M. Endo*[2,3], *and A. Furusawa*[2,3]; [1]*NTT Corporation, Kanagawa, Japan*; [2]*The University of Tokyo, Tokyo, Japan*; [3]*RIKEN, Saitama, Japan*

A broadband real-time amplitude measurement using an optical phase-sensitive amplifier and a high-speed optical communication detector has been proposed. In this study, 5 dB squeezing was successfully measured in real-time from DC to 43 GHz.

Room 4a ICM

chip-integrated system does not rely on random imperfection-based backscattering and permits deterministic and robust generation of single-soliton microcombs.

CK-9.5 THU 11:45

Soliton Microcomb Repetition-Rate locking via CW Laser Injection

•*T. Wildi*[1], *A. Ulanov*[1], *T. Voumard*[1], *M. Ludwig*[1], *and T. Herr*[1,2]; [1]*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*Physics Department, Universität Hamburg UHH, Hamburg, Germany*

Repetition-rate locking of soliton microcombs through the injection of an auxiliary continuous-wave laser in the spectral wing of the soliton is studied, resulting in significant phase-noise reduction and all-optical control.

Room 4b ICM

Huntsville, USA; [4]*Lab. Matériaux et Phénomènes Quantiques, Université Paris Cité&CNRS, Paris, France*; [5]*Aviation and Missile Center, US Army CCDC, Redstone Arsenal, Huntsville, USA*

We report a combined experimental/theoretical observation of dramatic enhancement (over three orders of magnitude) in second and third harmonic efficiencies from a plasmonic gold nanograting resonant at 800nm, relative to the flat metal layer.

EH-3.6 THU 11:45

Asymmetric Dielectric Metasurfaces for Upconversion Lasers

•*N. Sefidmooye Azar*[1], *M. Parry*[2,3], *W.S.L. Lee*[4,5], *D.-Y. Choi*[6], *D.N. Neshev*[2,3], *and K.B. Crozier*[1,4,5]; [1]*School of Physics, University of Melbourne, Victoria, Australia*; [2]*Australia National University, Research School of Physics, Canberra, Australia*; [3]*Australian Research Council (ARC) Centre of Excellence for Transformative Meta-Optical Systems, Research School of Physics, The Australian National University, Canberra, Australian Capital Territory, Australia*; [4]*Department of Electrical and Electronic Engineering, University of Melbourne, Victoria, Australia*; [5]*Australian Research Council (ARC) Centre of Excellence for Transformative Meta-Optical Systems, University of Melbourne, Victoria, Australia*; [6]*Laser Physics Centre, Research School of Physics, Australia National University, Canberra, Australia*

Previous work has demonstrated upconversion lasers that use lattice plasmons to provide a resonance at the lasing wavelength. Here, we experimentally demonstrate an asymmetric dielectric metasurface with high-Q resonances at both pump and lasing wavelengths.

Room 13a ICM

quency Laboratory, Université de Neuchâtel, 2000 Neuchâtel, Switzerland

We present progress in directly blue diode-pumped Titanium:Sapphire regenerative amplifier for ultra-short pulse amplification at room temperature. An optimized pump configuration is studied experimentally and theoretically to reach a small signal gain > 30 %.

CA-11.6 THU 11:45

10 mJ, 100 W, 10 kHz Hybrid Laser System Based on Rod-Type End-Pumped Yb:YAG Amplifiers Featuring Depolarization Compensation

•*A. Kazakevičius*[1,2], *R. Danilevičius*[2], *and A. Michailovas*[1,2]; [1]*National Center for Physical Sciences and Technology, Vilnius, Lithuania*; [2]*Ekspla ltd., Vilnius, Lithuania*

We present a high energy and average power hybrid laser system featuring amplification in end-pumped rod-type Yb:YAG and a novel depolarization loss reduction technique that is based on a spatially variable waveplate.

Room 13b ICM

Petersburg, Russia; [2]*Connector Optics LLC, Saint Petersburg, Russia*; [3]*ITMO University, Saint Petersburg, Russia*; [4]*JSC MF Stelmakh Polyus Research Institute, Moscow, Russia*; [5]*Alferov University, Saint Petersburg, Russia*

With two-step MBE-MOCVD epitaxy, we fabricated different high-power QCL structures for 8μm wavelength range. Under short-pulsed pumping, we demonstrated record-high peak power >16W, as a result of improved thermal conductivity of the upper contact layer.

CB-9.6 THU 11:45

Phase-locked and phase-tuned resonant-MOEMS external cavity QCLs and their application for fast and broadband mid-infrared reflectometry

•*Y.V. Flores*[1], *M. Schwarzenberg*[2], *A. Merten*[2], *B. Srocka*[3], *and M. Haertelt*[1]; [1]*Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany*; [2]*Fraunhofer Institute for Photonic Microsystems, Dresden, Germany*; [3]*Sentronics Metrology GmbH, Mannheim, Germany*

We present a multiplexed MOEMS EC-QCL module that combines three individual broadband resonant-MOEMS EC-QCLs with the goal of scaling up the broadband coverage without compromising the scanning time. We further discuss applications for wafer-based IC-manufacturing.

Room 14a ICM

de Mallorca, Spain; [4]*Institute for Theoretical Physics, Münster, Germany*; [5]*Centre for Nanosciences and Nanotechnology, Palaiseau, France*

We demonstrate the existence of spatially localized structure inside a self-imaging semiconductor laser cavity with the help of a thin chromium metasurface. This system is also suitable for the multiplexing of exotic light state.

EF-4.4 THU 11:45

Localization of spatiotemporal chaos in driven dissipative systems with parabolic potential

•*Y. Sun*[1], *P. Parra-Rivas*[1], *M. Ferraro*[1], *F. Mangini*[1], *M. Zitelli*[1], *and S. Wabnitz*[1,2]; [1]*Sapienza University of Rome, Rome, Italy*; [2]*Istituto Nazionale di Ottica, Pozzuoli, Italy*

We analyze the spatiotemporal dynamics arising in driven dissipative systems with parabolic potential and predict the existence of chaoticons, i.e., confined spatiotemporal chaos.

CH-10.6 THU 11:45

High-Resolution Distributed Acoustic Sensor and its Applications in Mechanical Engineering

•A. Masoudi[1], T. Furness[2], J. Williamson[2], T. Lee[1], M. Beresna[1], S. Fletcher[2], X.J. Jiang[2], and G. Brambilla[1]; [1]University of Southampton, Southampton, United Kingdom; [2]University of Huddersfield, Huddersfield, United Kingdom

In this study, the application of high-resolution distributed acoustic sensors (H-DAS) in mechanical engineering is studied. It is explained how such system can act as an artificial nervous system of mechanical structures.

CL-2.6 THU 11:45

A Smart Optofluidic Sensing Platform Ensuring Patients' Safety during Parenteral Nutrition Administration

•V. Bello, E. Bodo, and S. Merlo; Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia, Italy

We present an optofluidic sensing platform for monitoring the correctness of fluid nutritive drugs administered intravenously during parenteral nutrition, by measuring the displacement of a laser beam induced by the liquid refractive index.

CC-1.5 THU 11:45

Subcycle Surface Electron Emission by Strong-Field THz Waveforms

S. Li[1,2], A. Sharma[3], P.S. Nugraha[1,4], Z. Márton[3,5], C. Lombosi[1], Z. Ollmann[1,5], I. Márton[6,7], P. Dombi[3,6], J. Hebling[1,4,5], and •J.A. Fülöp[1,3]; [1]Szentágothai Research Centre, University of Pécs, Pécs, Hungary; [2]Tianjin University, Tianjin, China; [3]ELI-ALPS Research Institute, Szeged, Hungary; [4]MTA-PTE High-Field Terahertz Research Group, Pécs, Hungary; [5]Institute of Physics, University of Pécs, Pécs, Hungary; [6]Wigner Research Centre for Physics, Budapest, Hungary; [7]Institute for Nuclear Research (Atomki), Debrecen, Hungary

The confinement of single-cycle THz-waveform-driven surface electron emission to one of the two half cycles and the control of the active half cycle by changing the field polarity is demonstrated.

Romania; [4]*Max-Born-Institut, Berlin, Germany*

We present a new high-harmonic generation (HHG) scheme – termed as strongly overdriven regime – providing continuum radiation ranging from 18 to 140 eV albeit using long driving laser pulses, giving a flexible and compact HHG concept.

CG-4.6 THU 11:45

High order harmonic generation with spatially shaped flat top driver to control XUV chromatic aberrations

K. Veyrinas[1], M. Plach[2], J. Peschel[2], M. Hoflund[2], F. Catoire[1], C. Valentin[1], P. Smorenburg[3], H. Dacasa[2], S. Maclot[2], C. Guo[2], H. Wikmark[2], A. Zair[4], V. Strelkov[5,6], C. Picot[7], C. Arnold[2], P. Eng-Johnsson[2], A. L'Huillier[2], E. Mevel[1], and •E. Constant[7]; [1]University of Bordeaux, CNRS, CEA, Celia, Talence , France; [2]Lund University, Dept of Physics, Lund, Sweden; [3]ASML Research, Veldhoven, Netherlands; [4]King's college, London, United Kingdom; [5]Prokhorov institute Russian academy of sciences , Moscow, Russia; [6]Moscow institute of physics and technology, Dolgoprudny, Russia; [7]Univ. Lyon, CNRS, iLM, Villeurbanne, France

Generation of high order harmonics in gas with a spatially shaped flat-top beam allows us to control the XUV chromatic aberrations. Flat-top driver reduces the XUV chromatic aberrations as compared to a Gaussian driver.

acterized by four-probe measurements.

CE-5.6 THU 11:45

ZnO based, piezotronic optical fiber sensors for tracing volatile organic compounds

D. Lopez-Torres[1,3], C. Elosua Aguado[1], G.A. Pappas[2], M. Konstantaki[3], A. Klini[3], A. Lappas[3], F.J. Arregui[1], and •S. Pissadakis[3]; [1]Electric, Electronic and Communication Department, Public University of Navarre, Pamplona, Spain; [2]Composite Materials and Adaptive Structures, ETH Zurich, Zurich, Switzerland; [3]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology-Hellas, Heraklion, Greece

ZnO films are used as piezotronic transductors overlaid onto tilted optical fiber Bragg gratings for tracing volatile organic compounds vapours down to 10ppm. The ZnO piezotronic transduction is investigated using optical, structural and numerical methods.

Microtechnology and Nanoscience (MC2), Chalmers University of Technology, Gothenburg, Sweden; [4]Université Côte d'Azur, CNRS, Institut de Physique de Nice, Valbonne, France; [5]Institute of Solid State Physics, Bulgarian Academy of Sciences, Sofia, Bulgaria; [6]Department of Physics, St. Kliment Ohridski University of Sofia, Sofia, Bulgaria

We introduce two methods for detecting the motional state of a single trapped ion using the Autler-Townes effect and the composite pulses. They can be used for detection of a Fock or a thermal state.

EB-11.6 THU 11:45

Resolving photon numbers using ultra-high-resolution timing single-channel electronic readout of a conventional superconducting nanowire single-photon detector

•G. Sauer[1,2], M. Kolarczik[3], R. Gomez[1,2], H. Fedder[3], and F. Steinlechner[1,2]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [3]Swabian Instruments GmbH, Stuttgart, Germany

We show how ultra-high-resolution timing measurements of the rising and falling edges of electrical pulses generated from superconducting nanowire single-photon detectors enable to distinguish photon numbers of up to 5 in a single-shot measurement.

Foyer, 1st floor ICM

12:00 – 13:00

CLS-1: Career and diversity lunch for early postdocs

Chair: Rachel Grange, ETH Zurich, Switzerland

Postdocs looking for the next steps in their career will have the opportunity to share the challenges they are facing with their peers and more advanced researchers. Preregistration is mandatory.

NOTES

Room 1 ICM

14:00 – 15:30

EA-4: Quantum light sources I

Chair: Vindhiya Prakash, Centre for Quantum Technologies, NUS, Singapore

EA-4.1 THU 14:00

Quantum interference with single molecules: steps towards a competitive single-photon source

•*R. Duquennoy*[1,2,3], *M. Colautti*[2,3], *P. Lombardi*[2,3], *C. Toninelli*[2,3], *and R. Emadi*[2,3]; [1]*University of Naples Federico II, Naples, Italy*; [2]*CNR-INO, Sesto Fiorentino, Italy*; [3]*LENS, Sesto Fiorentino, Italy*

Single molecules are good single photon source (SPS) candidates thanks to their good photonic proper- ties. We here report on quantum interference in a Hong-Ou-Mandel (HOM) experiment: a fundamental process in both quantum computation and boson sampling protocols.

Room 4a ICM

14:00 – 15:30

CK-10: Metasurface technologies and applications

Chair: Leif Oxenløw, DTU Fotonik, Kgs. Lyngby, Denmark

CK-10.1 THU 14:00

Multiple Stimuli-Responsive Polymer Coated Metasurfaces

•*S.L. Walden*[1,2], *C. Zou*[1,2,3], *P. Poudel*[4,5], *K. Tanaka*[1,2], *A. Minovich*[1,2], *T. Pertsch*[2,6], *F.H. Schacher*[4,5], *and I. Staude*[1,2]; [1]*Institute of Solid State Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany*; [2]*Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany*; [3]*Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China*; [4]*Institute of Organic Chemistry and Macromolecular Chemistry, Friedrich Schiller University Jena, Jena, Germany*; [5]*Jena Centre for Soft Matter (JCSM), Friedrich Schiller University Jena, Jena, Germany*; [6]*6Fraunhofer Institute of Applied Optics and Precision Engineering, Jena, Germany*

Tuneable optical metasurfaces, employing an external stimulus, are promising platforms to achieve tailored, dynamic manipulation of electromagnetic fields. We show that combinations of stimuli can produce dynamic tuning over a wide transmission range.

Room 4b ICM

14:00 – 15:30

EH-4: Tunable and holographic metasurfaces

Chair: Victor Pacheco-Peña, University of Newcastle, United Kingdom

EH-4.1 THU 14:00

Sol-gel metasurfaces in barium titanate for electro-optic tuning

•*H. Weigand*[1], *Ü.-L. Talts*[1], *V.V. Vogler-Neuling*[1], *A. Karvounis*[1], *J. Winiger*[2], *P. Benedek*[3], *V. Wood*[3], *J. Leuthold*[2], *and R. Grange*[1]; [1]*ETH Zurich, Department of Physics, Institute for Quantum Electronics HPT H3, Auguste-Piccard-Hof 1, 8093 Zurich, Switzerland*; [2]*ETH Zurich, Department of Information Technology and Electrical Engineering, ETZ K82, Gloriastrasse 35, 8092 Zurich, Switzerland*; [3]*ETH Zurich, Department of Information Technology and Electrical Engineering, ETZ H96, Gloriastrasse 35, 8092 Zurich, Switzerland*

Nanofabrication of electro-optic devices is challenging in terms of material availability and scalability. We design and fabricate soft-nanoimprinted metasurfaces from low-cost, scalable sol-gel barium titanate, enabling fast electro-optic tuning in the visible and NIR.

Room 13a ICM

14:00 – 15:30

JSIII-1: Photonic reservoir computing, extreme learning and ising machines I

Chair: Kathy Lüdge, Ilmenau University of Technology, Germany

JSIII-1.1 THU 14:00

Unconventional Computing based on Four Wave Mixing in Highly Nonlinear Media

•*K. Sozos*[1], *S. Deligiannidis*[1], *C. Mesaritakis*[2], *and A. Bogris*[1]; [1]*University of West Attica, Dept. of Informatics and Computer Engineering. Aghiou Spiridonos, 12243, Egaleo, Athens, Greece*; [2]*University of the Aegean, Dept. of Information and Communication Systems Engineering, Palama 2, Karlovassi, 83200, Samos, Greece*

We propose a novel nonlinear processor for unconventional computing based on the nonlinear properties of four-wave mixing products in highly nonlinear media. The processor outperforms strong digital nonlinear algorithms in the mitigation of Kerr nonlinearities.

Room 13b ICM

14:00 – 15:30

CB-10: Single mode and narrow linewidth semiconductor lasers

Chair: Andrea Knigge, Ferdinand Braun Institute, Berlin, Germany

CB-10.1 THU 14:00

Sub-kHz linewidth, high power, frequency agile photonic integrated E-DBR laser

•*A. Siddharth, G. Lihachev, R. Ning Wang, X. Ji, Z. Qiu, J. Riemensberger, and T. Kippenberg*; *Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland*

We demonstrate an E-DBR laser based on hybrid integration of RSOA and Si_3N_4 chip with microheaters, reaching sub-kHz laser linewidth with more than 30 mW output power and mode-hop free tuning range upto 62.4 GHz.

Room 14a ICM

14:00 – 15:30

EF-5: Dissipative solitons and mode-locking I

Chair: Katarzyna Krupa, Institute of Physical Chemistry PAS, Warsaw, Poland

EF-5.1 THU 14:00

A Reliable Master Equation For Passively Mode-Locked Lasers

F. Prati[1], *A.M. Perego*[2], *J. Redondo*[3], *and* •*G.J. de Valcárcel*[4]; [1]*Università dell'Insubria, Como, Italy*; [2]*Aston University, Birmingham, United Kingdom*; [3]*Universitat Politècnica de València, Gandia, Spain*; [4]*Universitat de València, Valencia, Spain*

We present a universal master equation for modelling passively mode-locked lasers, valid for arbitrary time scales of gain and absorption dynamics, and describing Q-switching, Q-switched mode-locking, fundamental and harmonic mode-locking, and localised structures.

NOTES

Room 14b ICM

14:00 – 15:30

CH-11: Fiber sensors II

Chair: Florenta Costache,Fraunhoffer IPMS Dresden, Germany

CH-11.1 THU 14:00

Distributed Rayleigh Fiber Sensing Enabling Quantitative Monitoring in Real Time of the Refractive Index with a Sub-cm Resolution

•*L. Alliot de Borggraef*[1,2] *and H. Guillet de Chatellus*[1,2]; [1]*Laboratoire Interdisciplinaire de Physique, UGA/CNRS, 38000 Grenoble, France;* [2]*Univ Rennes, CNRS, Institut FOTON - UMR 6082, 35000 Rennes, France*

We report a system based on Rayleigh scattering enabling quantitative monitoring of the refractive index variations along a commercial single-mode fiber with a sub-cm spatial resolution and an interrogation rate of 20 kHz.

Room Osterseen ICM

14:00 – 15:30

CL-3: Lightmatter interaction

Chair: Johann Danzl, Institute of Science and Technology Austria, Klosterneuburg, Austria

CL-3.1 THU 14:00

On-chip nanotweezers for ultra-fast antibacterial susceptibility testing at the single-cell scale: the case of bacteriophages

•*E. Tartari*[1], *S. Glicenstein*[2], *N. Villa*[1], *E. Picard*[2], *E. Hadji*[2], *P. Marcoux*[3], *M. Zelsmann*[4], *G. Resch*[5], *and R. Houdré*[1]; [1]*Institut de Physique, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland;* [2]*Université Grenoble Alpes, CEA Grenoble, Grenoble INP, IRIG, PHELIQS, SiNaPS, Grenoble, France;* [3]*Université Grenoble Alpes, CEA, LETI, Minatec-Campus, Grenoble, France;* [4]*Université Grenoble Alpes, CNRS, CEA/LETI Minatec, Grenoble INP, LTM, Grenoble, France;* [5]*Laboratory of bacteriophages and phage therapy, Center for Research and Innovation in Clinical Pharmaceutical Sciences (CRISP), Lausanne University Hospital (CHUV), Lausanne, Switzerland*

In phage therapy, rapid and accurate selection of therapeutic phages is crucial. We report the use of photonic crystal cavities as on-chip nanotweezers for ultrafast analysis of phage susceptibility at the single-bacterium level.

Room 1 Hall B1 (B11)

14:00 – 15:30

CC-2: High power THz sources

Chair: Juliette Mangeney, ENS, Paris

CC-2.1 THU (Keynote) 14:00

High power ultrafast moves into the Terahertz domain

•*C. Saraceno, S. Mansourzadeh, T. Vogel, C. Millon, and M. Khalili; Ruhr University Bochum, Bochum, Germany*

We discuss latest advances in high average power laser driven THz sources, discuss limitations and present future applications.

Room 6 Hall B3 (B32)

14:00 – 15:30

CG-5: Ultrafast quantum physics and correlated systems

Chair: Adrian Pfeiffer, University Jena, Germany

CG-5.1 THU 14:00

Attosecond Chronoscopy of Many-Body Correlations between Bloch Electrons

•*J. Freudenstein*[1], *M. Borsch*[2], *M. Meierhofer*[1], *D. Afanasiev*[1], *C.P. Schmid*[1], *F. Sandner*[1], *M. Liebich*[1], *A. Girnghuber*[1], *M. Knorr*[1], *M. Kira*[2], *and R. Huber*[1]; [1]*Department of Physics, University of Regensburg, Regensburg, Germany;* [2]*Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan, USA*

Multi-terahertz fields force electron-hole pairs in semiconductors onto closed recollision paths. Precisely clocking these trajectories reveals first-ever attosecond signatures of many-body correlations between delocalized Bloch electrons, opening unprecedented views of quantum dynamics and phase transitions.

Room 7 Hall A1 (A11)

14:00 – 15:30

CE-6: Optical materials: Measurements

Chair: Martina Gerken, Kiel University, Germany

CE-6.1 THU 14:00

High-Accuracy Measurement of Refractive Indices in GaAs/AlGaAs Thin-Film Heterostructures

•*L.W. Perner*[1,2], *G.-W. Truong*[3], *D. Follman*[3], *M. Prinz*[1], *G. Winkler*[1], *S. Puchegger*[4], *G.D. Cole*[3], *and O.H. Heckl*[1]; [1]*Christian Doppler Laboratory for Mid-IR Spectroscopy and Semiconductor Optics, Faculty Center for Nano Structure Research, Faculty of Physics, University of Vienna, Vienna, Austria;* [2]*Vienna Doctoral School in Physics, University of Vienna, Vienna, Austria;* [3]*Thorlabs Crystalline Solutions, Santa Barbara, CA, USA;* [4]*Faculty Center for Nano Structure Research, Faculty of Physics, University of Vienna, Vienna, Austria*

We report a method to simultaneously measure the refractive index of two materials in as-deposited heterostructures by analysis of FTIR spectra and extraction of layer thicknesses via SEM, yielding excellent results for a GaAs/AlGaAs DBR.

Room 8 Hall A1 (A12)

14:00 – 15:30

EB-12: Quantum optics II

Chair: Alexander Sergienko, Boston University, USA

EB-12.1 THU 14:00

Observation of the quantum Gouy phase

•*M. Hiekkamäki, R.F. Barros, M. Ornigotti, and R. Fickler; Tampere University, Tampere, Finland*

Using the N00N state phase sensitivity, in conjunction with the intrinsic properties of transverse-spatial modes, allowed us to investigate the Gouy phase of Fock-states, in addition to highlighting important features and applications of spatial mode Fock-states.

Room 1 ICM

EA-4.2 THU 14:15

Tunable Single-Photon Generation in a Scanning Electron Microscope based on Silicon Photonics

•M. Sirotin, T. Chlouba, R. Shiloh, and P. Hommelhoff; Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

We report a method for generating quantum states of light inside the silicon-on-insulator microcavities with free electrons in a scanning electron microscope, resulting in tunable over the whole telecom range heralded single-photon source.

EA-4.3 THU 14:30

High-Brightness Narrowband Tunable Fiber Laser for Quantum Dot Excitation

•N.M. Lüpken, M. Brinkmann, S. Dobner, and T. Hellwig; Refined Laser Systems GmbH, Münster, Germany

We present a novel turn-key portable fiber laser for efficient quantum dot excitation to generate single photons. The laser combines a mode-hop-free and alignment-free tunability between 770 nm to 980 nm with a high pulse-to-pulse coherence and excellent stability.

Room 4a ICM

CK-10.2 THU 14:15

Tuneable Spatially Entangled Photon-Pair Emission from a Nonlinear Metasurface

•M.A. Weissflog[1], J. Ma[2], J. Zhang[2], S. Saravi[1], T. Pertsch[1,3], D.N. Neshev[2], F. Setzpfandt[1,3], and A.A. Sukhorukov[2]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany; [2]ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Department of Electronic Materials Engineering, Research School of Physics, The Australian National University, Canberra, Australia; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We experimentally demonstrate entangled photon-pair generation from a nonlinear metasurface with optically tuneable emission angles facilitated by nonlocal guided-mode resonances. We observe orders-of-magnitude enhanced emission compared to unpatterned films in transmission, reflection and counter-propagating geometries.

CK-10.3 THU 14:30

Large Area Plasmonic Metasurface for Augmented Reality

G. Cardoso, F. Hamouda, V. Yam, and •B. Dagens; Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France

We evaluate the impact of spatial arrangement of plasmonic nanostructures composing metasurfaces on their global optical characteristics in the visible spectrum. Considering two fabrication methods we discuss their relevance for Augmented Reality application.

Room 4b ICM

EH-4.2 THU 14:15

Mechanically Tunable Conformable Holographic Metasurfaces

•J. Xiao[1], R.I. Hunter[1], D.A. Robertson[1], G.M. Smith[1], S. Horsley[2], S.A. Schulz[1], and A.D. Falco[1]; [1]School of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, United Kingdom; [2]Department of Physics and Astronomy, University of Exeter, Stocker Road, Exeter, United Kingdom

We design, fabricate, and characterize shape-dependent flexible and conformable holographic metasurfaces which produce different images depending on the curvature of the substrate.

EH-4.3 THU 14:30

Nonlocal metasurfaces with giant tunability enabled by kirigami

•F. van Gorp, C. Coulais, and J. van de Groep; Van der Waals-Zeeman Institute, Institute of Physics, University of Amsterdam, Amsterdam, Netherlands

We demonstrate reconfigurable optical metasurfaces using flexible kirigami substrates to mechanically tune non-local resonances of silicon nanoparticle arrays. Using numerical simulations we show a near unity reflection with 45 times larger than the resonance linewidth.

Room 13a ICM

JSIII-1.2 THU 14:15

Ultrafast Boltzmann Sampling using Photonic Ising Machines for Machine Learning

•G. Van der Sande, F. Böhm, D. Alonso-Urquijo, and G. Verschaffelt; Applied Physics Research Group, Vrije Universiteit Brussel, Brussels, Belgium

Ising machines are a promising computational concept for solving resource intensive optimization problems. We experimentally demonstrate Boltzmann sampling on an optoelectronic Ising machine and apply it to the unsupervised training of stochastic generative neural networks.

JSIII-1.3 THU 14:30

Exploiting Kerr Nonlinearity for Photonic Extreme Learning Machines

•A. Lupo, M. Zajnulina, and S. Massar; Laboratoire d'Information Quantique, Université libre de Bruxelles, Bruxelles, Belgium

A fiber-based Extreme Learning Machine (ELM) is introduced. It exploits Kerr nonlinearity to processes information encoded in the input frequency-comb lines. We experimentally show that the Kerr-enhanced ELM outperforms its computer-based counterpart network.

Room 13b ICM

CB-10.2 THU 14:15

Threshold with photon recycling in nanolasers with extreme dielectric confinement

•M. Saldutti[1,2], Y. Yu[1,2], and J. Mørk[1,2]; [1]DTU Electro, Technical University of Denmark, Kongens Lyngby, Denmark; [2]NanoPhoton - Center for Nanophotonics, Technical University of Denmark, Kongens Lyngby, Denmark

We propose a new lasing threshold definition, valid all the way from the macro to the nanoscale and reflecting the recycling process that photons experience in emerging nanolasers with deep subwavelength optical confinement.

CB-10.3 THU 14:30

Sub-MHz linewidth UV laser diode for metrological applications

R. Kervazo[1], A. Congar[2], G. Perin[1], L. Lablonde[3], R. Butté[4], N. Grandjean[4], L. Bodiou[1], J. Charrier[1], and •S. Trebaol[1]; [1]Univ Rennes, CNRS, Institut FOTON - UMR 6082, Lannion, France; [2]Oxxius, 4 rue Louis de Broglie, Lannion, France; [3]Exail, rue Paul Sabatier, Lannion, France; [4]Institute of Physics, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

We report a compact sub-MHz linewidth UV laser diode laser based on a fiber bragg grating external cavity. The laser emits a single mode emission at 399.6 nm with a 40 dB side mode suppression ratio.

Room 14a ICM

EF-5.2 THU 14:15

Influence of time-delayed feedback on the dynamics of temporal localized structures in passively mode-locked semiconductor lasers

•T. Seidel[1], A. Bartolo[3], N. Vigne[4], A. Garnache[4], G. Beaudoin[5], I. Sagnes[5], M. Giudici[3], J. Javaloyes[2], S. Gurevich[1], and M. Marconi[3]; [1]Institute for Theoretical Physics & Center for Nonlinear Science (CeNoS), University of Münster, Germany; [2]Dpt. de Física, Universitat de les Illes Balears & IAC-3, Campus UIB, Palma de Mallorca, Spain; [3]Université Côte d'Azur, Centre National de La Recherche Scientifique, Institut de Physique de Nice, Valbonne, France; [4]Institut d'Electronique et des Systèmes, UMR5214, University of Montpellier, France; [5]Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, UMR 9001, Palaiseau, France

We analyze the effect of optical feedback on the dynamics of mode-locked semiconductor lasers operated in the regime of temporal localized structures. Depending on the feedback delay harmonic solutions can be either reinforced or hindered.

EF-5.3 THU 14:30

Simple scheme for generation of two-color photonic molecules

S. Willms[1,2], •S. Bose[2,3], O. Melchert[1,2], U. Morgner[1,2], I. Babushkin[1,2], and A. Demircan[1,2]; [1]Institute of Quantum Optics, Hannover, Germany; [2]Cluster of Excellence PhoenixD, Hannover, Germany; [3]Institute of Photonics, Hannover, Germany

The generation of two-color photonic molecules is challenging, due to the requirement of two incommensurable yet group-velocity matched frequencies. We propose a spectral tunneling based self-generation scheme from a single input pulse.

Room 14b ICM

CH-11.2 THU 14:15

Fibre optic distributed temperature sensing with a CMOS SPAD array

•*C. Tye, K. Ehrlich, A. Green, and M. Tanner; Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom*

Improvements to distributed temperature sensing measurements are demonstrated using a CMOS SPAD array offering multiplexed photon counting and therefore rapid measurement (10 s) with ∼1 °C accuracy, and the ability to measure over >100 m.

CH-11.3 THU 14:30

Whispering-gallery modes to investigate opto-mechanical interactions in optical fibers

•*L.A. Sánchez[1], M. Delgado-Pinar[1,2], A. Díez[1,2], and M.V. Andrés[1,2]; [1]Laboratory of Fiber Optics, ICMUV, Universidad de Valencia, Burjassot, Spain; [2]Departamento de Física Aplicada y Electromagnetismo, Universidad de Valencia, Burjassot, Spain*

A novel optical method to investigate opto-mechanical resonances in optical fibers is demonstrated. Based on the excitation of whispering-gallery modes, transverse acoustic mode resonances, which are responsible for the forward Brillouin scattering effect, are characterized.

Room Osterseen ICM

CL-3.2 THU 14:15

Cellular Level Resolution Ambient Mass Spectrometry Imaging using 3 μm Laser Ablation

•*R.A. Battle[1], D. Simon[2,3], Y. Xiang[2], K. Robinson[2,3], T.H. Runcorn[1], R.T. Murray[1], and Z. Takats[2,3]; [1]Femtosecond Optics Group, Department of Physics, Imperial College London, London, United Kingdom; [2]Department of Systems Medicine, Faculty of Medicine, Imperial College London, London, United Kingdom; [3]The Rosalind Franklin Institute, Didcot, United Kingdom*

We report a parametric 3 μm laser-based ambient mass spectrometry imaging platform. Single-cell level pixel size (10 μm) images of mouse brain samples acquired using our platform are presented.

CL-3.3 THU 14:30

Steering stable light fields through dynamic scattering media

•*C. Sharp[1], C. Mididoddi[1], P. del Hougne[2], S. Horsley[1], and D.B. Phillips[1]; [1]Department of Physics and Astronomy, University of Exeter, Exeter, United Kingdom; [2]Univ. Rennes, CNRS, IETR, Rennes, France*

We study light control through partially moving scattering systems. We present a suite of new methods to guide light around hidden moving regions, relying only on external camera measurements.

Room 1 Hall B1 (B11)

Room 6 Hall B3 (B32)

CG-5.2 THU 14:15

Quantum Beat Spectroscopy of Helium Photoelectrons

•*D. Hoff, S. Mikaelsson, S. Carlström, P.K. Maroju, N. Ouahioune, C. Guo, C.L. Arnold, A. L'Huillier, and M. Gisselbrecht; Department of Physics, Lund University, Lund, Sweden*

Quantum beat spectroscopy is a versatile method for studying excited states in matter. We apply it to Helium and study the interference pattern in the low kinetic energy region near ionization threshold.

CG-5.3 THU 14:30

Few-femtosecond Limit of the Floquet Theory

•*M. Lucchini[1,2], F. Medeghini[1], Y. Wu[1,2], F. Vismarra[1,2], R. Borrego-Varillas[2], A. Crego[2], F. Frassetto[3], L. Poletto[3], S.A. Sato[4,5], H. Hübener[5], U. De Giovannini[5,6], Á. Rubio[5,7], and M. Nisoli[1,2]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]Institute for Photonics and Nanotechnologies, IFN-CNR, Milano, Italy; [3]Institute for Photonics and Nanotechnologies, IFN-CNR, Padova, Italy; [4]Center for Computational Sciences, University of Tsukuba, Tsukuba, Japan; [5]Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany; [6]Università degli Studi di Palermo, Dipartimento di Fisica e Chimica-Emilio Segrè, Palermo, Italy; [7]Center for Computational Quantum Physics (CCQ), The Flatiron Institute, New York, USA*

Few-fs pulses of controlled time duration and intensity are used to create a Floquet state of a free electron. Comparison with an analytical model proves that the Floquet theory surprisingly holds in the few-cycle limit.

Room 7 Hall A1 (A11)

CE-6.2 THU 14:15

Mid-Infrared Dual-Comb Spectroscopy and FTIR Microscopy to Study Transparent Glasses Modified In-Bulk with Femtosecond Lasers

•*M. Singleton; Empa, Dübendorf, Switzerland*

We investigate in the mid-IR absorbance and refractive index changes of transparent glass samples, which have been irradiated with focused fs-laser pulses. The aim is to enable fast closed-loop control of the machining process.

CE-6.3 THU 14:30

Inverse calculation of liquid crystal parameters using scientific machine learning

•*C.P. Jisha[1], A. Alberucci[1], and S. Nolte[1,2]; [1]Friedrich Schiller University, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*

A novel method based on scientific machine learning to characterize a liquid crystal cell is developed.

Room 8 Hall A1 (A12)

EB-12.2 THU 14:15

Certification of Non-Gaussian States using Double Homodyne Detection

•*G. Roeland[1], N. Tripier-Mondancin[1], D. Barral[1], U. Chabaud[2,3], F. Grosshans[3], D. Markham[3,4], M. Walschaers[1], V. Parigi[1], and N. Treps[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, ENS-PSL Université, Collège de France, Centre National de la Recherche Scientifique, 4 place Jussieu, Paris, France; [2]Université de Paris, IRIF, CNRS, Paris, France; [3]Sorbonne Université, LIP6, CNRS, 4 place Jussieu, Paris, France; [4]JFLI, CNRS, National Institute of Informatics, University of Tokyo, Tokyo, Japan*

In this work, we report on the use of double homodyne detection on optical frequency comb pulses for the certification of non-Gaussian features of quantum states, without the need for full tomography.

EB-12.3 THU 14:30

Quantum Control and Coherence of Orbital Levels of a Tin-Vacancy Color Center in a Diamond Nanopillar

•*C.G. Torun[1], J.H.D. Munns[1], F.M. Herrmann[1], M. Isaza-Monsalve[1], V. Villafane[2], A. Thies[3], T. Pregnolato[1,3], G. Pieplow[1], and T. Schröder[1,3]; [1]Humboldt-Universität zu Berlin, Department of Physics, Berlin, Germany; [2]Walter Schottky Institut and Physik Department, Technische Universität München, Münich, Germany; [3]Ferdinand-Braun-Institut, Berlin, Germany*

We control two different qubits configurations selected from the orbital levels of a tin-vacancy center in diamond and measure their coherence. We implement experiments with coherent population trapping, ultrashort optical pulses, and quasi-continuous driving.

Room 1 ICM

EA-4.4 THU 14:45

GaAs Site-controlled Pyramidal Quantum Dots as Spin Qubit Sources for a Photonic Cluster State Construction: the Role of Light-hole-like Excited States

•F. Mattana[1], I. Ranjbar Jahromi[1], G. Ronco[2], M. Rota[2], F.B. Basset[2], R. Trotta[2], E. Pelucchi[1], and G. Juska[1]; [1]Tyndall National Institute, Cork, Ireland; [2]Sapienza University, Rome, Italy

We present a comprehensive spectroscopic study of highly uniform energetic structure of Pyramidal site-controlled GaAs quantum dots specifically directing our interest to their applicability to the photonic cluster state generation.

EA-4.5 THU 15:00

An ultra-broadband, integrated mid-infrared photon-pair source

•F. Roeder, R. Pollmann, A. Gnanavel, O. Brecht, C. Eigner, L. Padberg, M. Stefszky, B. Brecht, and C. Silberhorn; Paderborn University, Integrated Quantum Optics, Institute for Photonic Quantum Systems (PhoQS), Warburger Straße 100, 33098, Paderborn, Germany

We demonstrate a broadband, mid-infrared PDC source based on a periodically poled Ti:LiNbO$_3$ waveguide exceeding a bandwidth of 23 THz achieved via optimization of group velocity and group velocity dispersion for signal and idler photons.

Room 4a ICM

CK-10.4 THU 14:45

Halide perovskite metasurfaces with tunable exciton-polariton electroluminescence

*•Y. Wang[1,2], J. Tian[1,3], M. Klein[1,3], G. Adamo[1,3], H. Son Tung[4], and C. Soci[1,3]; [1]Centre for Disruptive Photonic Technologies, TPI, Nanyang Technological University, Singapore; [2]Interdisciplinary Graduate School, Energy Research Institute @NTU (ERI@N), Nanyang Technological University, Singapore; [3]School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore; [4]Institute of Materials Research and Engineering, Agency for Science Technology and Research (A*STAR), Singapore*

We report strong coupling between excitons and photonic bound states in the continuum in electrically-driven perovskite metatransistors. We show tunability of electroluminescence directivity by drain-source voltage and polarization control through metasurface design.

CK-10.5 THU 15:00

Addressable Metasurfaces by Electrically Driven Transparent Conducting Oxide Micro-Heaters

•K. Zangeneh Kamali[1], L. Xu[2], N. Gagrani[1], H.H. Hoe Tan[1], C. Jagadish[1], A. Miroshnichenko[3], D. Neshev[1], and M. Rahmani[2]; [1]ARC Centre of Excellence for Transformative Meta-Optical Systems, Research School of Physics, The Australian National University, Canberra, Australia; [2]Advanced Optics and Photonics Laboratory, Department of Engineering, School of Science and Technology, Nottingham Trent University, Nottingham , United Kingdom; [3]School of Engineering and Information Technology, University of New South Wales, Canberra, Australia

We demonstrate a rapid and programmable amplitude modulator based on the thermo-optical effect by integrating transparent conducting oxide micro-heaters with

Room 4b ICM

EH-4.4 THU 14:45

Tunable Chiral Electro-Optic Metasurfaces

•L. Wang and I. Shadrivov; Australian National University, Canberra, Australia

We numerically study polarisation conversion achieved by anisotropic metasurfaces made of electro-optic material on silica substrates and find the tunable cross-polarisation transmission coefficient is 0.5, while the tunability of circular dichroism is close to 0.8.

EH-4.5 THU 15:00

Security applications of laser-empowered plasmonic metamaterials

V.D. Le, H. Ma, N. Dalloz, F. Vocanson, and •N. Destouches; University Jean Monney, Laboratory Hubert Curien, Saint-Etienne, France

Image multiplexing enables a surface to display different images depending on the conditions of observation. Here laser processing of random plasmonic metasurfaces enables the encryption of up to four images observable under white light.

Room 13a ICM

JSIII-1.4 THU 14:45

Phase vs. Intensity Encoding in an Experimental Time Delay Reservoir Computing Scheme

•I. Estébanez, L. Talandier, I. Fischer, and A. Argyris; Instituto de Física Interdisciplinar y Sistemas Complejos IFISC (CSIC-UIB), Palma de Mallorca, Spain

We compare information encoding schemes in phase and intensity in a time delay RC with external optical information injection. We experimentally demonstrate smaller errors in a time series prediction task when encoding in phase.

JSIII-1.5 THU 15:00

Programming optical learning machines with spatial-spectral optimization

•L.J.-L. Hsieh[1,2], Y. Zhou[1,2,3], I. Oguz[1,2], M. Yildirim[1,2], N.U. Dinc[1,2], C. Gigli[2], K.K.Y. Wong[3], C. Moser[1], and D. Psaltis[2]; [1]Laboratory of Applied Photonics Devices, École Polytechnique Fédérale de Lausanne, Switzerland; [2]Optics Laboratory, École Polytechnique Fédérale de Lausanne, Switzerland; [3]Department of Electrical and Electronic Engineering, The University of Hong Kong, China

A multi-mode fiber-based optical processor is programmed with 99% fewer parameters compared to a digital counterpart.

Room 13b ICM

CB-10.4 THU 14:45

Red-Emitting Distributed Bragg Reflector Lasers for Strontium-Based Optical Atomic Clocks

•N. Goossen-Schmidt[1], C. Pyrlik[1,2], B. Arar[1], M.T. Hassan[1], A. Bawamia[1], J. Fricke[1], A. Knigge[1], A. Maaßdorf[1], M. Schiemangk[1], H. Wenzel[1], and A. Wicht[1]; [1]Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany; [2]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany

We developed compact, monolithic distributed Bragg reflector lasers at 689 nm and 707 nm for strontium optical clocks. At more than 40 mW output power, they provide a record spectral linewidth of only 0.4 MHz.

CB-10.5 THU 15:00

25-layer stacked 1.55 um-band Quantum Dot DFB Laser

•A. Matsumoto, T. Umezawa, S. Nakajima, and K. Akahane; National Institute of Information and Communications Technology (NICT), Koganei, Japan

In this paper, we report we fabricated a 1.55 μm-band QD-DFB-LD with a possibly unprecedented multi-stacked structure, such as 25 layers, and the obtained characteristics were much better than the results we reported previously.

Room 14a ICM

EF-5.4 THU 14:45

Switching dynamics of soliton molecular complexes in a 2 μm ultrafast fiber laser

•Y. Zhou[1], J. Shi[1], G. Hu[1], and K. K. Y. Wong[1,2]; [1]Department of Electrical and Electronic Engineering, The University of Hong Kong, Hong kong, China; [2]Advanced Biomedical Instrumentation Centre, Hong Kong Science Park, Hong kong, China

We report the switching dynamics of soliton molecular complexes around 2 μm that can be triggered by the collision of drifting soliton, simultaneously opening an emerging window in the longer wavelength.

EF-5.5 THU 15:00

Pump depletion limits the existence of Kerr solitons in singly-resonant optical parametric oscillators

•C. Mas Arabí[1], N. Englebert[1], P. Parra-Rivas[2], S.-P. Gorza[1], and F. Leo[1]; [1] OPERA-photonics, Université libre de Bruxelles, Brussels, Belgium; [2]Dipartimento di Ingegneria dell' Informazione, Elettronica e Telecomunicazioni, Sapienza Università di Roma, Rome, Italy

We analyze Kerr dissipative solitons in a parametrically driven resonator. We employ variational methods to analytically calculate the soliton existence region and use this result to obtain the pump-to-soliton power conversion.

Room 14b ICM

CH-11.4 THU 14:45

A Fibre Optic Force Sensing Method Based on the S2 Imaging Technique

A. Srikanthan[1], *•N. Vukovic*[1], *C. Codemard*[2], *and M. Zervas*[1]; [1]*Optoelectronics Research Centre, University of Southampton, Southampton SO17 1BJ, U.K., Southampton, United Kingdom*; [2]*TRUMPF Lasers UK Ltd, Wellington Park, Tollbar Way, Hedge End, Southampton SO30 2QU, U.K., Southampton, United Kingdom*

We report an implementation of a large-mode-area optical fibre combined with a self-interferometric spatial and spectral (S2) imaging technique for force sensing. The advantages of the method include the design simplicity and low temperature sensitivity.

CH-11.5 THU 15:00

X-ray profiling with an enhanced backscattering optical fibre in single mode-multimode-single mode configuration

•M. Olivero[1], *A. Bellone*[1], *A. Vallan*[1], *W. Blanc*[2], *M. Benabdesselam*[2], *F. Mady*[2], *and G. Perrone*[1]; [1]*Politecnico di Torino, dept. of Electronics and Telecommunications, Torino, Italy*; [2]*Université Côte d'Azur, CNRS, Institut de Physique de Nice, Nice, France*

A novel optical fibre sensor for commissioning in X –ray radiotherapy is presented. It relies on an enhanced backscattering fibre used in a single mode-multimode-single mode configuration that converts the dose into a wavelength shift.

Room Osterseen ICM

CL-3.4 THU 14:45

On-chip optical nanotweezers for phage trapping and identification

•S. Glicenstein[1], *N. Villa*[2], *E. Tartari*[2], *E. Picard*[1], *P.R. Marcoux*[3], *M. Zelsmann*[4], *G. Resch*[5], *R. Houdré*[2], *and E. Hadji*[1]; [1]*Univ. Grenoble Alpes, CEA Grenoble, Grenoble INP, IRIG, PHELIQS, SiNaPS, Grenoble, France*; [2]*Institut de Physique, École Polytechnique Fédérale de Lausanne, Switzerland*; [3]*University Grenoble Alpes, CEA, LETI-DTBS-SBSC-LCMI/LBAM, Grenoble, France*; [4]*University Grenoble Alpes, CNRS, CEA/LETI Minatec, Grenoble INP, LTM, Grenoble, France*; [5]*Laboratory of bacteriophages and phage therapy, CRISP, Lausanne University Hospital (CHUV), Lausanne, Switzerland*

For phage therapy the development of a fast phagogram to identify the optimal phages to administer is essential. We report the use of on-chip nanotweezers for phage trapping and distinguish them according to their family

CL-3.5 THU 15:00

Photo-activated Phosphate Minerals and Femto-second pulsed near-IR Lasers for the Restoration of Damaged Dental Enamels

•A. Jha[1], *N. Iqbal*[1], *S. Strafford*[1], *S.K. Lognathan*[1], *E.K. Barimah*[1], *A.D. Anastasiou*[3], *J. Wu*[2], *M. Malinowski*[2], *A. Nielson*[2], *S. Pavitt*[2], *B. Nattress*[2], *and T. Brown*[4]; [1]*School of Chemical & Process Engineering, University of Leeds, UK*; [2]*School of Dentistry and Leeds Dental Hospital, University of Leeds, UK*; [3]*Department of Chemical engineering & Analytical Sciences, Manchester, UK*; [4]*School of Physics and Astronomy, University of St. Andrews, UK*

We demonstrate a novel methodology for restoring acid-eroded enamel with photo-active minerals and a 100femto-second pulsed-laser, operating at 1040nm with 100MHz repetition rate. The

Room 1 Hall B1 (B11)

CC-2.2 THU 14:45

THz time-domain spectroscopy with a GHz single-cavity dual-comb laser

•B. Willenberg[1], *C.R. Phillips*[1], *J. Pupeikis*[1], *S.L. Camenzind*[1], *L. Liebermeister*[2], *R.B. Kohlhaas*[2], *B. Globisch*[2], *and U. Keller*[1]; [1]*Department of Physics, ETH Zurich, Zurich, Switzerland*; [2]*Fraunhofer Institute for Telecommunications, HHI, Berlin, Germany*

We present rapid THz-TDS with a free-running single-cavity dual-comb. Combined with efficient photoconductive antennas the system has competitive performance: 55 dB dynamic range in the THz spectrum at 2 GHz resolution and 2 s measurement time.

CC-2.3 THU 15:00

Broadband THz emission from LT-GaAs photoconductive antenna driven by Yb-doped fiber amplifier at 200 kHz repetition rate

•N. Nilforoushan[1], *C. Kidd*[2], *A. Fournier*[1], *S. Dhillon*[1], *J. Freeman*[2], *and J. Mangeney*[1]; [1]*Laboratoire de Physique de l'Ecole Normale Supérieure, ENS, Université PSL, CNRS, Sorbonne Université, Université de Paris, Paris, France*; [2]*School of Electronic and Electrical Engineering, University of Leeds, Woodhouse Lane, Leeds, United Kingdom*

We report on the broadband THz emission with peak electric field exceeding 10 kV/cm using conventional LT-GaAs photoconductive antenna driven by optical pulses at 1030 nm wavelength at a repetition rate of 200 kHz.

Room 6 Hall B3 (B32)

CG-5.4 THU 14:45

A look under the tunneling barrier via attosecond-gated interferometry

•O. Kneller[1], *D. Azoury*[1], *Y. Federman*[1], *M. Krueger*[1], *A.J. Uzan*[1], *G. Orenstein*[1], *B.D. Bruner*[1], *O. Smirnova*[2], *S. Patchkovski*[2], *M. Ivanov*[2], *and N. Dudovich*[1]; [1]*Weizmann institute of science , Rehovot, Israel*; [2]*Max-Born Institute, Berlin, Germany*

Attosecond-gated interferometry integrates subcycle gating with all-optical attosecond interferometry. It perturbs the tunneling dynamics and maps it into the phase of the emitted harmonics, probing the evolution of the wavefunction in the classically forbidden region.

CG-5.5 THU (Invited) 15:00

Engineering optical Schrödinger ”cat” and entangled states using intense laser-atom interactions

•P. Tzallas; *Foundation for Research and Technology-Hellas, Institute of Electronic Structure & Laser, GR-70013 Heraklion (Crete), Greece., Heraklion (Crete), Greece*

I will present our recently developed fully quantized approach, with which, optical Schrödinger ”cat” and entangled states have been produced by implementing quantum operations in the high harmonic generation process induced by intense laser-atom interactions.

Room 7 Hall A1 (A11)

CE-6.4 THU 14:45

Temperature dependence of emission cross section and fluorescence lifetime of Tm:YLF in the 78-300 K range

•M. Pergament[1], *U. Demirbas* [1,2], *J. Thesinga*[1], *M. Kellert*[1], *and F. Kärtner*[1,3]; [1]*Deutsches Elektronen-Synchrotron DESY,Center for Free-Electron Laser Science, Hamburg, Germany*; [2]*Antalya Bilim University,Laser Technology Laboratory , Antalya , Turkey*; [3]*University of Hamburg,Physics Department, Hamburg, Germany*

We present a detailed study of the spectroscopic properties of Tm:YLF to understand its amplification performance at cryogenic temperatures. Fluorescence lifetime and emission measurements suggest that cryogenic amplifiers on Tm:YLF can reach kW power levels.

CE-6.5 THU 15:00

Revelation and analysis of optical phase delay exhibited by Al-doped 4H-SiC due to current induction

•H. Du[1], *H. Takeda*[1], *T. Kadowaki*[2], *N. Tate*[1], *T. Kawazoe*[2], *Y. Oki*[1], *M. Ohtsu*[3], *and K. Hayashi*[1]; [1]*Department of Electronics, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka, 819-0395, Japan*; [2]*Nichia Corporation, 3-13-19 Moriya-cho, Kanagawa-ku, Yokohama, Kanagawa, 221-0022, Japan*; [3]*Research Origin for Dressed Photon, 3-13-19 Moriya-cho, Kanagawa-ku, Yokohama, Kanagawa, 221-0022, Japan*

This article discusses a SiC-SLM that exhibited an extremely large magneto-optical effect in the visible range, and examined the photophysical properties of this device, especifically the phase delay.

Room 8 Hall A1 (A12)

EB-12.4 THU 14:45

Quantum State Tomography of Qudits via Hong-Ou-Mandel Interference

•Y. Tsujimoto[1], *R. Ikuta*[2,3], *K. Wakui*[1], *T. Kobayashi*[2,3], *and M. Fujiwara*[1]; [1]*National Institute of Information and Communications Technology (NICT), Koganei, Tokyo, Japan*; [2]*Graduate School of Engineering Science, Osaka University, Toyonaka, Osaka, Japan*; [3]*Center for Quantum Information and Quantum Biology, Osaka University, Toyonaka, Osaka, Japan*

We propose and experimentally demonstrate a method to perform the quantum state tomography of an n-partite qudit state embedded in single photons based on the Hong-Ou-Mandel interference between the target photon and ancillary probe light.

EB-12.5 THU 15:00

Phase-noise-insensitive orthogonality verification of single-photon-level temporal modes

•J. Szuniewicz[1], *S. Sagona-Stophel*[2], *S. Thomas*[2], *I. Walmsley*[2], *and M. Karpiński*[1]; [1]*Faculty of Physics, University of Warsaw, Warszawa, Poland*; [2]*Quantum Optics and Laser Science, Blackett Laboratory, Imperial College London, London, United Kingdom*

A second-order interference technique for measuring the orthogonality of temporal modes at the single photon level is presented. It is resistant to phase fluctuations and allows for an infinite measurement length without loss of visibility.

Room 1 ICM

EA-4.6 THU 15:15

Purcell enhanced single-photon emission from a QD coupled to a Gaussian-shaped microcavity

•L. Engel, S. Kolatschek, T. Herzog, S. Vollmer, M. Jetter, S.L. Portalupi, and P. Michler; Institut für Halbleiteroptik und Funktionelle Grenzflächen, University of Stuttgart, Stuttgart, Germany

Gaussian-shaped microcavities are realized by epitaxial overgrowth of DBRs on wet-chemically etched microlenses. The mode structure is analysed and a quantum dot is tuned on resonance with the cavity mode showing Purcell-enhanced single-photon emission.

16:00 – 17:30

EA-5: Quantum light sources II

Chair: Alexei Ourjoumtsev, College de France, Paris, France

EA-5.1 THU 16:00

Novel unipolar quantum dot diode structures for advanced sources of quantum light

•S.L. Portalupi[1], T. Strobel[1], J.H. Weber[1], M. Schmidt[2], L. Wagner[1], L. Engel[1], M. Jetter[1], A.D. Wieck[2], A. Ludwig[2], and P. Michler[1]; [1]Institut für Halbleiteroptik und Funktionelle Grenzflächen, Center for Integrated

Room 4a ICM

metasurfaces. The system exhibits sub-millisecond rise-time and nine folds of amplitude modulation.

CK-10.6 THU 15:15

Second Harmonic Generation in Monolithic Gallium Phosphide Metasurfaces

•M. Yang[1,2], M. Weissflog[2], D. Arslan[1,2], T. Pertsch[2], and I. Staude[1,2]; [1]Institute of Solid State Physics, Friedrich Schiller University Jena, Jena, Germany; [2]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany

We numerically investigate second harmonic generation in resonant monolithic GaP metasurfaces with <110> crystal orientation, reaching a conversion efficiency of 5.5×10^(-4). The potential of the metasurfaces for nonlinear wavefront shaping applications is also explored.

16:00 – 17:30

CK-11: Photonic crystals and periodic structures

Chair: Mukundakumar Balasubrahmaniyam, Tel Aviv University, Israel

CK-11.1 THU 16:00

Wide-bandwidth and Low-Reflection High-efficiency Grating Couplers

•X. Zhou and H.K. Tsang; The Chinese University of Hong Kong, Hong Kong, China

We proposed photolithography-based grating coupler that has -0.95 dB coupling efficiency with 1 dB

Room 4b ICM

EH-4.6 THU 15:15

Environment-Dependent Holographic Metasurfaces In The Visible Range

•J. Xiao, L. Yan, T. Plaskocinski, M. Biabanifard, S. Persheyev, M. Askari, and A.D. Falco; School of Physics and Astronomy, University of St Andrews, North Haugh, St Andrews, United Kingdom

We discuss the properties of tunable holographic metasurfaces that encode different images on both the refractive index of the surrounding medium and the wavelength used to reveal them.

16:00 – 17:30

EH-5: Concepts and applications in plasmonics and metastructures

Chair: Andrea Bragas, Universidad de Buenos Aires, Argentina

EH-5.1 THU 16:00

Inverse-designed optical metagratings for free-space integral equations solving

•A. Cordaro[1], B. Edwards[2], V. Nikkhah[2], A. Alù[3], N. Engheta[2], and A. Polman[1]; [1]AMOLF, Amsterdam, Netherlands; [2]University of Pennsylvania, Philadelphia, USA; [3]City University of New York, New York,

Room 13a ICM

JSIII-1.6 THU 15:15

Optical Computing for Machine Learning with Integrated Waveguides

•M. Yildirim[1], I. Oguz[1], F. Kaufmann[2], M.R. Escale[2], R. Grange[2], D. Psaltis[1], and C. Moser[1]; [1]Ecole Polytechnique Federal de Lausanne - EPFL, Lausanne, Switzerland; [2]Eidgenössische Technische Hochschule Zurich -ETHZ, Zurich, Switzerland

We present a data transformation approach with nonlinear wave propagation inside lithium niobate waveguides to improve the performance of machine learning applications. The results indicate 10% accuracy increase compared to digital models on several datasets.

16:00 – 17:30

JSIII-2: Photonic reservoir computing, extreme learning and ising machines II

Chair: Daniel Brunner, Université de Franche-Comté, FEMTO, Besançon, France

JSIII-2.1 THU 16:00

Scalable Delay Line-Free All-Optical Reservoir

•I. Boikov[1], D. Brunner[2], and A. De Rossi[1]; [1]Thales Research and Technology, Palaiseau, France; [2]FEMTO-ST, Besançon, France

A highly compact (10^4 neurons/mm^2) reservoir computer composed of directly coupled

Room 13b ICM

CB-10.6 THU 15:15

Non-linear broad spectral tuning of a semiconductor laser and application to coherent dual frequency source

•B. Chomet[1], S. Blin[2], A. Bartolo[2], G. Beaudoin[3], I. Sagnes[3], and A. Garnache[2]; [1]Laboratoire de Physique de l'École Normale Supérieure, Paris, France; [2]IES, Univ Montpellier, CNRS, Montpellier, France; [3]C2N, CNRS UMR 9001, Université Paris-Saclay, Palaiseau, France

We report on non-linear broad spectral tuning of a low-noise single frequency laser based on III-V semiconductor technology. A fundamental study of non-linear multimode laser dynamics showed the route to red-shifted single-mode operation.

16:00 – 17:30

CB-11: High-performance diode lasers

Chair: Karl Häusler, Ferdinand Braun Institute, Berlin, Germany

CB-11.1 THU 16:00

GaAs-based wide-aperture single emitters with 68 W output power at 69% efficiency realized using a periodic buried-regrown-implant-structure

B. King, S. Arslan, A. Boni, P.S. Basler, C. Zink, P. Della Casa, D. Martin, A. Thies, A. Knigge, and •P. Crump; Ferdinand-Braun-

Room 14a ICM

EF-5.6 THU 15:15

Implications of tristability in dissipative Kerr soliton formation

•E.K. Akakpo[1], M. Haelterman [1], F. Leo[1], and P. Parra-Rivas[1,2]; [1]OPERA-photonics, Universit libre de Bruxelles, Bruxelles, Belgium; [2]Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni, Sapienza Universitá di Roma, Roma, Italy

We study the implications of tristability in dissipative soliton formation in dispersive Kerr optical cavities when second- and fourth-order chromatic dispersion are considered, unveiling the transition between standard-homoclinic-snaking- and collapsed-homoclinic-snaking-related states.

16:00 – 17:30

EF-6: Dissipative solitons and mode-locking II

Chair: Julien Javaloyes, University of Balearic Islands, Palma de Mallorca, Spain

EF-6.1 THU 16:00

Comb-driven cavity solitons – a multidimensional study in free-space enhancement cavities

•M. Högner[1,2], A. Hertlein[1,2], P. Sulzer[3,4], J. Schmuck[1,2], C. Hofer[3,4], A.K. Mills[3,4], D.J. Jones[3,4], and I. Pupeza[1,2,5]; [1]Max Planck Institute of Quantum Optics, Garching, Germany; [2]Ludwig-Maximilians-

Room 14b ICM

CH-11.6 THU 15:15

Integrated photonic interrogators for fiber-optic sensing systems

•S. Stopiński[1,2,3], K. Anders[1,2,3], A. Jusza[1,3], M. Słowikowski[4], A. Bieniek[1], and R. Piramidowicz[1,2,3]; [1]Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland; [2]LightHouse Sp. z o.o., Lublin, Poland; [3]VIGO Photonics S.A., Ożarów Mazowiecki, Poland; [4]Warsaw University of Technology, Centre for Advanced Materials and Technologies CEZAMAT, Warsaw, Poland

We present and discuss photonic integrated interrogators of fiber Bragg gratings, based on an arrayed waveguide grating (AWG) demultiplexer and asymmetric Mach-Zehnder interferometers (AMZI).

16:00 – 17:30

CH-12: Super-resolution imaging

Chair: Cristian Focsa, University of Lille, France

CH-12.1 THU 16:00

Lensless scanning super-resolved imaging of arbitrary shaped objects

•S. Kurdiumov[1], T. Grant[1], J.-Y. Ou[1], E. Plum[1], N. Papasimakis[1], K. MacDonald[1], and N.I. Zheludev[1,2]; [1]University of SouthamptonOptoelectronics Research Centre & Centre for Photonics Metamate-

Room Osterseen ICM

enamel wear rates were investigated from in vitro studies using healthy volunteers.

CL-3.6 THU 15:15

Femtosecond laser crosslinking of collagen for local increase of corneal stiffness

•A. Stoecker[1,2], T.J. Glandorf[2], T. Koch[3], R. Ackermann[3], S. Nolte[3,4], J. Missbach-Guentner[5], and C. Russmann[1,6]; [1]University of Applied Science and Arts, Faculty of Engineering and Health, Goettingen, Germany; [2]Georg-August-University, Faculty of Chemistry, Goettingen, Germany; [3]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University, Jena, Germany; [4]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [5]University Medical Center, Department of Diagnostic and Interventional Radiology, Goettingen, Germany; [6]Molecular-Biomarkers-Nanoimaging Laboratory, Brigham & Women's hostpital/Harvard Medical School, Boston, USA

Due to the rising demand for myopia correction, we introduce a laser application for vision correction without ablation. For that, we directly crosslink corneal collagen to increase the local stiffness and individually form the cornea.

16:00 – 17:30

CL-4: Photonic technology for biomedical applications

Chair: Thomas Huser, University of Bielefeld, Germany

CL-4.1 THU 16:00

Interferometric Gated Off-Axis Reflectometry (iGOR) - A Label Free Method to Measure Lipid Membrane Dynamics and Deduce Biophysical Properties

•F. Turley[1], D. Regan[2], P. Borri[2], and W. Langbein[1]; [1]School of Physics and Astronomy, Cardiff University, Cardiff, United Kingdom; [2]School

Room 1 Hall B1 (B11)

CC-2.4 THU 15:15

High-intensity single-cycle THz source driven by a high-power fiber laser

R. Becheker[1], L. Guiramand[2], •A. Martinez[3,4], S. Idlahcen[1], J. Houard[5], T. Godin[1], X. Ropagnol[2], D. Paparo[4], F. Blanchard[2], A. Vella[5], and A. Hideur[1]; [1]CORIA, UMR6614 CNRS, INSA Université de Rouen Normandie, Saint Etienne du Rouvray, France; [2]Département de génie électrique, École de technologie supérieure, Montréal, Québec H3C 1K3, Canada; [3]CNR-ISASI, Institute of Applied Sciences and Intelligent Systems 'E. Caianiello', 80078 Pozzuoli, Italy; [4]Scuola Superiore Meridionale, Largo S. Marcellino, 10, 80138 Napoli, Italy; [5]GPM UMR6634 CNRS, INSA Université de Rouen Normandie, Saint Etienne du Rouvray, France

We report on the generation of intense THz pulses by optical rectification in lithium niobate using a high-power ultrafast fibre laser. THz pulses with 800 fs duration and 114 mW average power are produced.

16:00 – 17:30

CC-3: Novel approach THz sources

Chair: Hartmut Roskos, University of Frankfurt, Germany

CC-3.1 THU 16:00

Single-Cycle THz Generation Inside a Modelocked Thin-Disk Laser

•Y. Wang, S. Mansourzadeh, T. Vogel, and C.J. Saraceno; Ruhr-Universität-Bochum, Bochum, Germany

We demonstrate the generation of single-cycle THz pulses intracavity

Room 6 Hall B3 (B32)

16:00 – 17:30

CG-6: Attosecond methods and fundamentals

Chair: Balasz Major, ELI ALPS, Szeged, Hungary

CG-6.1 THU 16:00

Breakdown of the Single-Collision Condition in Gas-Phase High-Harmonic Generation

P.-A. Chevreuil[1], F. Brunner[1], U. Thumm[2], U. Keller[1], and •L. Gallmann[1]; [1]ETH Zurich, Department of Physics, Zurich, Switzerland; [2]Kansas State University, Department of Physics, Manhattan, Kansas,

Room 7 Hall A1 (A11)

CE-6.6 THU 15:15

Illuminating Hidden Symmetries in Topological Insulator Thin Films

•B.C. Connelly, P.J. Taylor, and G.J. de Coster; DEVCOM Army Research Laboratory, Adelphi, Maryland, USA

Topological photocurrents in low-twinned Bi2Se3 are studied using THz spectroscopy and symmetry analysis of nonlinear optical photoresponses. We find emergent threefold symmetric responses of the intrinsic crystal are induced by the circular photon drag effect.

16:00 – 17:30

CE-7: Nonlinear optical materials

Chair: Virginie Nazabal, University of Rennes, Institute of Chemical Sciences, France

CE-7.1 THU (Invited) 16:00

Post-2000 nonlinear optical materials and their characterization: data tables and best practices

•N. Vermeulen[1], D. Espinosa[2], A. Ball[3], J. Ballato[4], P. Boucaud[5], G. Boudebs[6], C. Campos[7], P. Dragic[8], A. Gomes[7], M. Huttunen[9], N. Kinsey[3], R. Mildren[10], D. Neshev[11], L. Padilha[12], M. Pu[13], R. Secondo[3],

Room 8 Hall A1 (A12)

EB-12.6 THU 15:15

Experimental Demonstration of High-dimensional Hyper-entangled Quantum States

•L.J. Gonzalez Martin del Campo[1,2], N.E. Tangarife Villamizar[1,2], S. Sharma[1,2], C. Spiess[1,2], R. Sondenheimer[1,2], and F. Steinlechner[1,2]; [1]Fraunhofer IOF, Jena, Germany; [2]Friedrich Schiller University, Jena, Germany

We present the experimental demonstration of high-dimensional hyperentangled quantum states of up to an eight-dimensional Hilbert space in the time-energy and polarization degrees of freedom.

16:00 – 17:30

EB-13: Quantum simulation and computation

Chair: Fabrizio Piacentini, Istituto Nazionale di Ricerca Metrologica, Torino,

EB-13.1 THU 16:00

Experimental Demonstration of Entangled Photonic Qubits in a Continuous-Time Quantum Walk

•R.J. Chapman[1], S. Häusler[2], G. Finco[1], F. Kaufmann[1], and R. Grange[1]; [1]Optical Nanomaterial Group, Institute for Quantum Electronics, Department of Physics, ETH Zurich, Zurich, Switzerland;

Room 1 ICM

Quantum Science and Technology (IQST) and SCoPE, University of Stuttgart, Stuttgart, Germany; [2]Lehrstuhl für Angewandte Festkörperphysik, Ruhr-Universität Bochum, Bochum, Germany

A novel n-i-n diode structure embedding semiconductor quantum dots is demonstrated. Very low photon decoherence over timescales covering 6 orders of magnitude is proven combining three complementary spectroscopy techniques. Spectral and charge tuneability is shown.

EA-5.2 THU 16:15

Squeezed Light for Future Gravitational Wave Detectors

•F. Meylahn[1,2], B. Willke[1,2], and H. Vahlbruch[1,2]; [1]Max Planck Institute for Gravitational Physics, Hannover, Germany; [2]Leibniz Universität Hannover, Hannover, Germany

The application of squeezed light enables to reach sensitivities beyond the standard quantum limit in laser interferometry. We present today's highest squeezing level at 1550 nm wavelength covering the complete detection band of future gravitational-wave detectors.

Room 4a ICM

bandwidth 76 nm, and low reflection one with -0.73 dB coupling efficiency with minimum reflection low as -44 dB.

CK-11.2 THU 16:15

Scaling Theory of Wave Confinement in Classical and Quantum Periodic Systems

•M. Kozon[1,2], A. Lagendijk[1], M. Schlottbom[2], J.J.W. van der Vegt[2], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, University of Twente,, Enschede, Netherlands

We present a rigorous method to classify the dimensionality of wave confinement in periodic superlattices, applicable to any type of physical system: acoustic, electromagnetic, electronic, spin, etc.

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USA

Inverse-designed metasurfaces can solve prescribed Fredholm integral equations at optical wavelengths. To this end, a mirror is included to provide the feedback required to perform the Neumann series that solves the equation.

EH-5.2 THU 16:15

Mode-independent resonances in cascaded-mode resonators

•V. Ginis, I.-C. Benea-Chelmus, J. Lu, M. Piccardo, and F. Capasso; John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, USA

We introduce a new class of optical resonators that uses transverse mode coupling in a cascade process, established by mode-converting reflectors. The resonator characteristics differ from Fabry-Perot resonators and can be modified over wide ranges.

Room 13a ICM

nonlinear integrated microcavities is proposed, allowing real-time autonomous processing of high-speed optical signals in optical domain.

JSIII-2.2 THU 16:15

Speeding up a time-delay photonic reservoir

•M. Goldmann[1], I. Estebanez[1], E.A. Vlieg[2], C.R. Mirasso[1], I. Fischer[1], A. Argyris[1], and M.C. Soriano[1]; [1]Instituto de Física Interdisciplinar y Sistemas Complejos (IFISC, UIB-CSIC), Palma de Mallorca, Spain; [2]IBM Research, Zürich, Switzerland

We demonstrate numerically and experimentally significant accelerations of a photonic delay-based reservoir used for time series forecasting. Even for a constant long delay, we achieve near GHz data processing rates with high prediction accuracy.

Room 13b ICM

Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

915nm BRIS diode lasers using laterally periodic buried-regrown-implant-structuring deliver 68W pulsed power with 69% efficiency (500μs) from a single 1.2mm aperture in a miniaturized package and sustain a lateral super-mode to 30W continuous wave power.

CB-11.2 THU 16:15

High power, internally wavelength stabilized diode lasers with epitaxially-stacked multiple active regions for LiDAR applications

•A. Knigge, N. Ammouri, H. Christopher, M. Beier, J. Fricke, A. Maaßdorf, A. Ginolas, J. Glaab, A. Liero, and H. Wenzel; Ferdinand-Braun-Institut, Berlin, Germany

905nm-lasers with 3 active regions in common waveguides stabilized by Bragg gratings are reported with <0.5nm linewidth, 0.07nm/K thermal shift, 2.2kW ns-pulse-power from bars and 100W from single emitters. 5-active-zone lasers show further increased performance.

Room 14a ICM

Universität München, Garching, Germany; [3]Quantum Matter Institute, University of British Columbia, Vancouver, Canada; [4]Department of Physics and Astronomy, University of British Columbia, Vancouver, Canada; [5]Leibniz Institute of Photonic Technology—Member of the Research Alliance 'Leibniz Health Technologies', Jena, Germany

Free-space cavities enable high-peak-power, 250-nm-bandwidth dissipative solitons generated from a temporally-inhomogeneous pulse seed of 25 nm bandwidth. Seed parameters determine the formation of single solitons versus soliton molecules. Systematic variation yields a map of possible (multi-)soliton states.

EF-6.2 THU 16:15

Real-time evolution of passive free-space cavity solitons

•P. Sulzer[1,2], M. Högner[3,4], A. Hertlein[3,4], J. Schmuck[3,4], C. Hofer[1,2], A.K. Mills[1,2], I. Pupeza[3,4,5], and D. Jones[1,2]; [1]Quantum Matter Institute, University of British Columbia, Vancouver, Canada; [2]Department of Physics and Astronomy, University of British Columbia, Vancouver, Canada; [3]Max-Planck-Institut für Quantenoptik, Garching, Germany; [4]Ludwig-Maximilians-Universität München, Garching, Germany; [5]Leibniz Institute of Photonic Technology - Member of the Research Alliance 'Leibniz Health Technologies", Jena, Germany

We use shot-to-shot spectroscopy and interferometry to investigate the dynamics of dissipative high-peak-power temporal solitons in a free-space passive resonator driven by a mode-locked laser frequency comb. We discuss soliton generation, collision, and noise suppression.

Room 14b ICM

rials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonics Technologies, Nanyang Technological University, Singapore, Singapore

We build super-resolution images of arbitrary shaped and sized objects pixel-by-pixel via deep learning-enabled analysis of their light scattering patterns. First proof-of-principle experiments show resolution better that $\lambda/4$.

CH-12.2 THU 16:15

Flexible multicore-multimode fiber endoscope for super-resolution imaging

•Z. Lyu[1,2], K. Abrashitova[1], J.F. de Boer[2], E.R. Andresen[3], H. Rigneault[4], and L.V. Amitonova[1,2]; [1]Advanced Research Center for Nanolithography, Amsterdam, Netherlands; [2]Department of Physics and Astronomy, and LaserLaB, Vrije Universiteit, Amsterdam, Netherlands; [3]Univ. Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers, Lille, France; [4]Aix-Marseille Universit'e, CNRS, Centrale Marseille, Institut Fresnel, Marseille, France

A novel concept of super-resolution imaging through a flexible hair-thin fiber probe is demonstrated. The long-standing problem of multimode fiber imaging is solved by using a unique multicore-multimode probe and computational compressive sensing algorithms.

Room Osterseen ICM

of Biosciences, Cardiff University, Cardiff, United Kingdom

Interferometric Off-axis reflectometry is a novel label-free microscopy technique that allows observation at 327Hz of both the thickness and axial position of suspended lipid membrane. We have optimised methods for creating and observing model membranes.

CL-4.2 THU 16:15

Phase contrast imaging methods using laser based Kα X-ray source

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We present the first adaptation of multi-lateral shearing interferometry (MLSI) technique on laser-based K alpha X-ray source operating at a high repetition rate (100 Hz) with interesting potential for time resolved phase contrast imaging.

Room 1 Hall B1 (B11)

of a modelocked thin-disk laser using a simple and cost-efficient 50-μm thin LiNbO3 plate, reaching 1.2 mW THz average power from a compact and efficient setup.

CC-3.2 THU 16:15

New Standards in Intense, Broadband Terahertz Generation via Optical Rectification

•N.K. Green, C. Rader, D.J.H. Ludlow, B.W. Palmer, S.-H.(Ho, Z. Zaccardi, M.J. Lutz, A. Alejandro, M.F. Nielson, G.A. Valdivia-Berroeta, C. Chartrand, P. Peterson, D.J. Michaelis, and J.A. Johnson; Brigham Young University, Provo, USA

We present the nonlinear optical crystals PNPA and MNA and provide an analysis of their optical and THz properties. These crystals outperform industry standards in broadband THz generation through optical rectification.

Room 6 Hall B3 (B32)

USA

When producing soft x-ray high harmonics, interactions of photoelectrons with neighboring atoms may become important. We study this regime experimentally and theoretically and provide guidelines on how to mitigate those collisions.

CG-6.2 THU 16:15

Adjustable polarisation gate for High Order Harmonic Generation

•C. Picot[1], T. Nemec[2], F. Catoire[2], J. Vabek[2,3,4], and E. Constant[1]; [1]Institut Lumière Matière, UMR 5306 Université Lyon 1 - CNRS, Université de Lyon, Villeurbanne, France; [2]Centre des Lasers Intenses et Applications, Université de Bordeaux-CNRS-CEA,, Talence, France; [3]ELI Beamlines Centre, FZU- Institute of Physics of the Czech Academy of Sciences, Na Slovance 2, 182 21, Prague, Czech Republic; [4]Czech Technical University in Prague, FNSPE, Brehov´a 7, 115 19, Prague, Czech Republic

We generate high order harmonics with polarisation gating. We show that we can displace our narrow gate temporally without distorting it, which continuously shifts the central frequency of the harmonics, without changing the spectral width.

Room 7 Hall A1 (A11)

E. Tokunaga[14], D. Turchinovich[15], J. Yan[11], K. Yvind[13], K. Dolgaleva[2], and E. Van Stryland[16]; [1]Vrije Universiteit Brussel, Brussels, Belgium; [2]University of Ottawa, Ottawa, Canada; [3]Virginia Commonwealth University, Richmond, USA; [4]Clemson University, Clemson, USA; [5]Université Côte d'Azur, Sophia-Antipolis, France; [6]Univ Angers, Angers, France; [7]Universidade Federal de Pernambuco, Recife, Brazil; [8]University of Illinois at Urbana-Champaign, Urbana, USA; [9]Tampere University, Tampere, Finland; [10]Macquarie University, Sydney, Australia; [11]Australian National University, Canberra, Australia; [12]Universidade Estadual de Campinas, Sao Paulo, Brazil; [13]Technical University of Denmark, Lyngby, Denmark; [14]Tokyo University of Science, Tokyo, Japan; [15]Universität Bielefeld, Bielefeld, Germany; [16]University of Central Florida, Orlando, USA

On the occasion of 60 years of nonlinear-optical research, we present new data tables listing nonlinear-optical properties for different material categories as reported in the literature since 2000, and provide best practices for their characterization.

Room 8 Hall A1 (A12)

[2]Institute for Sensors and Electronics, University of Applied Sciences and Arts Northwestern Switzerland, Windisch, Switzerland

We experimentally demonstrate the quantum CNOT gate in a continuous-time quantum walk, realized in a lithium niobate-on-insulator waveguide array. We verify the two-qubit operation with 82.3 ± 4 % fidelity and prepare entangled Bell states with 88.9 ± 0.4 % fidelity.

EB-13.2 THU 16:15

Efficient photon conversion in a scalable microwave-to-optics transducer

M. Weaver, P. Duivestein, A. Bernasconi, S. Scharmer, M. Lemang, T. van Thiel, F. Hijazi, B. Hensen, S. Gröblacher, and •R. Stockill; QphoX B.V., Delft, Netherlands

We present a high-bandwidth, ultra-low noise microwave-to-optical transducer based on Lithium Niobate-on-SOI. We realise efficient transduction in the quantum ground state, adding 6.2±1.8 photons of input-referred noise.

Room 1 ICM

EA-5.3 THU 16:30

Two-photon emission and correlations from a superlattice-based superconducting light-emitting structure

•*S. Bouscher[1], D. Panna[1], K. Balasubramanian[2], R. Jacovi[1], A. Kumar[1], C. Schneider[3], S. Höfling[3], and A. Hayat[1]; [1]Department of Electrical Engineering, Technion, Haifa, Israel; [2]Electrical Engineering Faculty, Indian institute of technology, Kanpur, India; [3]Technische Physik, Physikalisches Institut and Wilhelm Conrad Röntgen Research Center for Complex Material Systems, Universität Würzburg, Würzburg, Germany*

We demonstrate evidence of two-photon emission and photon pair correlations, resulting from injected Cooper-pairs in superconductor-semiconductor structures. Such structures can be utilized for multiple applications including enhanced two-photon gain, electrically-driven entangled-photon generation and Bell-state analyzers.

EA-5.4 THU 16:45

Theory of Spontaneous Parametric Down-Conversion in Thin Etalons

•*E.A. Santos[1], F. Setzpfandt[1,2], and S. Saravi[1]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We develop a theoretical description of photon-pair generation in nonlinear etalons that can naturally treat internal Fabry-Pérot interference effects and study angular properties of pairs generated in forward and counter-propagating configurations in subwavelength thin etalons.

Room 4a ICM

CK-11.3 THU 16:30

Propagation-Invariant Two-Photon Suppression Induced by Polarization-Mediated Artificial Gauge Fields

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We construct artificial gauge fields in waveguide lattices with customized birefringence and experimentally demonstrate that, for a net phase of π, two-photon states remain steadily suppressed during propagation in square lattices.

CK-11.4 THU 16:45

Permanent Tailoring of BIC Resonances Using Temperature

•*A. Kuppadakkath[1], A. Barreda[1], L. Ghazaryan[1], T. Bucher[1], K. Koshelev[2], Y. Kivshar[2], T. Pertsch[1,3,4], D. Choi[2], I. Staude[1,4], and F. Eilenberger[1,3,4]; [1]Friedrich Schiller University Jena, Jena, Germany; [2] Australian National University, Canberra, Australia; [3]Fraunhofer-Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [4]Max Planck School of Photonics, Jena, Germany*

All-dielectric metasurfaces can support Quasi-Bound states in the continuum (BIC) resonances. We show that gradual and short-term heating can be utilized for thermal postprocessing-assisted permanent tailoring of BIC resonance in the visible and near-infrared range.

Room 4b ICM

EH-5.3 THU 16:30

Surface Roughness effects on ENZ media IR spectra

•*D. Navajas, J.M. Pérez-Escudero, and I. Liberal; Department of Electrical, Electronic and Comunnications Engineering, Insitute of Smart Cities (ISC), Public University of Navarre (UPNA), Pamplona, Spain*

We experimentally investigate the effect of surface roughness on ENZ media using SiC substrates. The ENZ band is found to be more robust than dielectric and SPhP bands across different roughness size-scales.

EH-5.4 THU 16:45

Ultrafast Dynamics of Gigahertz Nano-optomechanical Metasurface Array

•*I. Ajia[1], J.-Y. Ou[2], N. Zeludev[2], and O. Muskens[1]; [1]Physics and Astronomy, Faculty of Physical Sciences and Engineering, University of Southampton, Southampton, United Kingdom; [2]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom*

Using ultrafast transient spectroscopy, we investigate optomechanical modes in dielectric metasurface array. Here, we leverage the tunability of the pump wavelength to demonstrate precise control of the vibrational modes in a SiC based metasurface array.

Room 13a ICM

JSIII-2.3 THU 16:30

Delay-based reservoir computing with spin-VCSELs: Interplay between internal dynamics and performance

L. Mühlnickel, L. Jaurigue, and •K. Lüdge; Institut für Physik, Technische Universität Ilmenau, Ilmenau, Germany

We numerically investigate the time-series prediction performance of a delay-based reservoir computer based on a spin-VCSEL with optically-injected phase-modulated data. A strong dependence on the internal charge-carrier timescales is found which enables speed-up and optimization.

JSIII-2.4 THU 16:45

An autonomous semiconductor laser neural network

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We implemented a fully autonomous and parallel neural network of 350+ nodes using off-the-shelf componenets. Our system shows excellent performance in header recognition tasks. Our approach is highly relevant and scalable in size and bandwidth.

Room 13b ICM

CB-11.3 THU 16:30

High power CW 780 nm diode lasers for use in additive manufacturing

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780nm TM-polarized diode lasers for additive manufacturing application are demonstrated with 25W continuous wave power from 1200μm stripes and beam quality suitable for coupling into 1mm-core fiber, exploiting efficient epitaxial designs and low thermal-resistance mounting.

CB-11.4 THU 16:45

Monolithic MMI-coupler-based Dual-Wavelength MOPA at 830 nm for Spectroscopic Applications

•*A. Müller, J.-P. Koester, L.S. Theurer, J. Fricke, H. Wenzel, A. Knigge, and B. Sumpf; Ferdinand-Braun-Institut (FBH), Berlin, Germany*

A monolithic, multi-mode interference coupler-based master oscillator power amplifier at 830 nm is presented. It provides 500 mW narrowband, dual-wavelength laser emission in alternating or parallel operation, suitable for Raman and THz spectroscopy.

Room 14a ICM

EF-6.3 THU 16:30

Long-Range "Talking" of Vector Solitons and their Synchronization in Fabry-Pérot Resonators

•*L. Hill[1,2], E.-M. Hirmer[1,3], G. Campbell[2], T. Bi[1,3], A. Ghosh[1,3], G.-L. Oppo[2], and P. Del'Haye[1,3]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]University of Strathclyde, Glasgow, United Kingdom; [3]Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany*

We study Kerr interactions of differently polarized solitons in high-Q Fabry-Pérot cavities. With other results, we show how the maximum number of soliton pairs can be limited – useful for vectorial frequency comb generation and telecommunications.

EF-6.4 THU 16:45

Kerr cavity solitons in active $\mathscr{PT}$-symmetric dimers

•*J. Yelo-Sarrión[1], C. Mas Arabí[1], P. Parra-Rivas[2], F. Leo[1], and S.-P. Gorza[1]; [1]OPERA-photonics, Université libre de Bruxelles, Bruxelles, Belgium; [2]Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni, Sapienza Università di Roma, Roma, Italy*

We study the existence and stability of Kerr cavity solitons in coherently driven coupled ring resonators with gain and loss, for non-identical ring resonance frequencies and close to the $\mathscr{PT}$-symmetric regime.

Room 14b ICM

CH-12.3 THU 16:30

Surpassing the diffraction limit via Hermite-Gaussian Imaging for incoherent two-dimensional objects

•*J. Frank, A. Duplinskiy, K. Bearne, and A.I. Lvovsky*; *University of Oxford, Oxford, United Kingdom*

We present Hermite-Gaussian Imaging, a generally applicable super-resolution imaging scheme in the far field using linear optics and innovative passive measurements. We surpass the diffraction limit and achieve a resolution limited by photon shot noise.

CH-12.4 THU 16:45

Fabrication of a 3D-printed device for super-resolution light microscopy using two-photon polymerization

•*G. Zyla*[1]*, G. Maconi*[2]*, A. Nolvi*[2]*, D. Ladika*[3]*, V. Melissinaki*[1]*, J. Marx*[4]*, I. Kassamakov*[2]*, and M. Farsari*[1]; [1]*IESL/FORTH, Heraklion, Greece*; [2]*University of Helsinki, Helsinki, Finland*; [3]*Department of Materials Science and Technology, University of Crete, Heraklion, Greece*; [4]*Ruhr University Bochum, Bochum, Germany*

This work presents a novel approach to developing a flexible device for achieving spatial super-resolution in conventional light microscopes and scanning white light interferometers. The super-resolution was achieved using a microstructure printed by two-photon polymerization.

Room Osterseen ICM

CL-4.3 THU 16:30

Preservation of orbital angular momentum of light along propagation through a turbid tissue-like scattering medium

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We show that upon propagation through a turbid tissue-like scattering medium the orbital angular momentum of light is preserved with a noticeably different phase shift – twist of light, providing a high potential for tissue diagnosis.

CL-4.4 THU 16:45

Adaptive Metasurfaces for Smart Standalone Histopathology with Polarized Light using adaptive metasurfaces

•*C. Dirdal*[1]*, P. Thrane*[1]*, C. Meng*[2]*, O. Sieryi*[3]*, A. Bykov*[3]*, S. Bozhevolnyi*[2]*, and I. Meglinski*[3]; [1]*SINTEF Smart Sensors and Microsystems, Oslo, Norway*; [2]*Centre for Nano Optics, University of Southern Denmark, Odense, Denmark*; [3]*Optoelectronics and Measurement Techniques Unit, University of Oulu, Oulu, Finland*

We present a novel polarization sensitive histophatology modality for detection of cancer in tissue, and our ambition to further develop it towards a smart, standalone system by use of adaptive metasurfaces.

Room 1 Hall B1 (B11)

CC-3.3 THU 16:30

Multicycle Terahertz Generation Using High-energy Pulse Trains

•*C. Rentschler*[1,2]*, Z. Zhang*[1]*, U. Demirbas*[1]*, K. Ravi*[1]*, M. Pergament*[1]*, N.H. Matlis*[1]*, and F.X. Kärtner*[1,2,3]; [1]*Center for Free-Electron Laser Science CFEL, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*Department of Physics, University of Hamburg, Hamburg, Germany*; [3]*The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Hamburg, Germany*

We report on precise parameter control of multicycle terahertz generation by nonlinear optical conversion using a new approach based on tunable high-energy pulse trains and demonstrate its potential to boost current sub-percent conversion efficiencies.

CC-3.4 THU 16:45

Efficient Photoconductive Terahertz Generation with Tunable Pulse Compression and High-frequency Modulation

•*Y. Lampert, A. Tomasino, S. Rajabali, and I.-C. Benea-Chelmus*; *Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland*

We demonstrate a substantial improvement in generated Terahertz shape and intensity from photoconductive antenna in 7.5-meter telecom fiber link using a tunable prism pair. We achieve modulation frequencies up to 75 MHz with electro-optic modulation.

Room 6 Hall B3 (B32)

CG-6.3 THU (Invited) 16:30

Attosecond Interferometry

•*N. Dudovich*; *Weizmann Institute of Science, Rehovot, Israel*

Attosecond science encodes the subcycle dynamics of a quantum system in the coherent properties of attosecond pulses. Advanced interferometric schemes resolves such coherence and retrieves fundamental phenomena, from tunneling in atoms and molecules to ultrafast dynamics in solids.

Room 7 Hall A1 (A11)

CE-7.2 THU 16:30

Surface Second-Harmonic Generation in Molecularly Bonded InGaP Waveguides on Si Thermal Oxide

•*A. Peralta Amores and M. Swillo*; *School of Engineering Sciences, Royal Institute of Technology (KTH), Stockholm, Sweden*

Heterogeneous integration of 2 mm long and 235 nm thick double inverse-tapered InGaP waveguides on thermally grown SiO_2 via native oxide molecular bonding is demonstrated. Second-harmonic generation from the surface optical nonlinearity is verified experimentally.

CE-7.3 THU 16:45

Z-scan Measurements on non-linear absorption and refraction of physical vapor deposition-grown Cr_2Te_3 at a wavelength of 1560 nm

•*K. Lee*[1]*, I.H. Lee*[2,3]*, Y.G. Kim*[2,3]*, S.-y. Kwon*[1]*, G. Lim*[1]*, J. Jung*[1]*, Y.J. Chang*[2,3]*, and J.H. Lee*[1]; [1]*School of Electrical and Computer Engineering, Seoul, South Korea*; [2]*Department of Physics, Seoul, South Korea*; [3]*Department of Smart Cities, Seoul, South Korea*

Z-scan measurements were conducted to investigate the nonlinear optical responses of nanoscale-layered Cr_2Te_3 grown by physical vapor deposition. Nonlinear absorption coefficient and nonlinear refractive index were $-(1.91 \pm 0.08) \times 10^5$ cm/GW and -1.63 ± 0.06 cm^2/GW at 1560 nm, respectively..

Room 8 Hall A1 (A12)

EB-13.3 THU 16:30

Higher-Dimensional Hong-Ou-Mandel Effect with Linear-Optical Grover Multiports

•*A. Sergienko*[1]*, D. Simon*[2]*, S. Osawa*[1]*, and C. Schwarze*[1]; [1]*Boston University, Boston, USA*; [2]*Stonehill College, Easton, USA*

We expand traditional two-photon Hong-Ou-Mandel (HOM) effect onto a higher-dimensional set of spatial modes and introduce a quantum network switch providing controllable redistribution of entangled states over four modes using directionally unbiased linear-optical Grover four-ports.

EB-13.4 THU 16:45

Spectrally multimode squeezed states of light in the telecom band using waveguides

V.R. Rodriguez[1,2]*, •D. Fainsin*[1]*, G.L. Zanin*[1]*, N. Treps*[1]*, E. Diamanti*[2]*, and V. Parigi*[1]; [1]*Laboratoire Kastler Brossel, Sorbonne Université, ENS-Université PSL, CNRS, Collège de France, 4 place Jussieu, Paris, France*; [2]*Sorbonne Université, LIP6, CNRS, 4 place Jussieu, Paris, France*

We present and characterize a source of spectrally multimode squeezed state of light at telecom wavelength. The state is made out of a periodically-poled waveguide (PPKTP) pumped by a femtosecond laser.

Room 1 ICM

EA-5.5 THU 17:00

An integrated waveguide resonator squeezer for optical networks

•M. Stefszky, M. Santandrea, F. vom Bruch, V. Quiring, R. Ricken, C. Eigner, H. Herrmann, and C. Silberhorn; Integrated Quantum Optics, Institute for Photonic Quantum Systems (PhoQs), Paderborn University, Paderborn, Germany

In this paper we demonstrate a titanium indiffused lithium niobate waveguide resonator squeezer using that includes an on-chip electro-optic-modulator for cavity length stabilisation. This device is therefore suitable for use in many quantum networks.

EA-5.6 THU 17:15

Atom-mediated Nonlinear Sources of Quantum Light

•A. Krstić[1], P. Tiwari[1], F. Setzpfandt[1,2], U. Peschel[3], and S. Saravi[1]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller University Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [3]Institute of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller University Jena, Jena, Germany

We propose a scheme for a hybrid source of quantum light, consisting of a 2-level emitter embedded in a nonlinear cavity, that can generate multiple-pair number states with significantly enhanced probability compared to conventional sources.

Room 4a ICM

CK-11.5 THU 17:00

Photonic nanostructures for efficient coupling and light enhancement in semiconductor quantum technologies

•S. Bauer[1], S. Kolatschek[1], F. Hornung[1], C. Nawrath[1], N. Hoppe[2], R. Sittig[1], R. Joos[1], P. Vijayan[1], D. Wang[1], J. Fischer[1], C. Schweikert[2], N. Witz[1,3], M. Berroth[2], S.L. Portalupi[1], M. Jetter[1], and P. Michler[1]; [1] Institut fur Halbleiteroptik und Funktionelle Grenzflächen (IHFG), Center for Integrated Quantum Science and Technology (IQST) and SCoPE, 70569 Stuttgart, Germany; [2]Institute of Electrical and Optical Communications Engineering, 70569 Stuttgart, Germany; [3]Twenty-One Semiconductors, 72654 Neckartenzlingen, Germany

This work will focus on several photonic nanostructures to enhance the emission properties of semiconductor quantum dots.

CK-11.6 THU 17:15

Extreme Ultraviolet Metaoptics

•M. Ossiander[1], H.K. Hampel[2], M.L. Meretska[1], S.W.D. Lim[1], N. Knefz[2], T. Jauk[2], M. Schultze[2], and F. Capasso[1]; [1]John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, USA; [2]Institute of Experimental Physics, Graz University of Technology, Graz, Austria

We demonstrate the first dielectric metalens for light with 50 nm wavelength by exploiting that holes in Silicon guide extreme ultraviolet radiation. We experimentally achieve focusing of high-harmonic radiation down to 1.6 times the diffraction limit.

Room 4b ICM

EH-5.5 THU 17:00

The contribution has been withdrawn.

EH-5.6 THU 17:15

Design, Fabrication and Characterization of Double Helical Plasmonic Antennas

•A. Tsarapkin[1], S. Jürgensen[2], T. Feichtner[3], K. Mackosz[4], V. Deinhart[1], I. Utke[4], S. Reich[2], and K. Höflich[1]; [1]Ferdinand-Braun-Institut (FBH), Berlin, Germany; [2]Freie Universitat Berlin, Berlin, Germany; [3]University of Würzburg, Würzburg, Germany; [4]Empa-Swiss Federal Laboratories for Materials Science and Technology, Thun, Switzerland

A plasmonic double nano-helix can act as a sensitive antenna for circularly polarised light. In this work we analyse its excitation mechanism, fabrication by direct electron beam writing, and optical characterisation.

Room 13a ICM

JSIII-2.5 THU 17:00

Function enhancement of spatial photonic Ising machine by parallel processing using space-division multiplexing

•S. Shimomura, K.-i. Okubo, H. Yamashita, Y. Ogura, H. Suzuki, and J. Tanida; Osaka University, Osaka, Japan

We propose a method for expanding functions of a spatial photonic Ising machine by parallel processing using space-division multiplexing.

JSIII-2.6 THU 17:15

Time-Multiplexed Photonic Reservoir Computer for Recognition of Human Actions in Videos

•E. Picco[1], P. Antonik[2], and S. Massar[1]; [1]Laboratoire d'Information Quantique, CP 224, Université Libre de Bruxelles, Brussels, Belgium; [2]MICS EA-4037 Laboratory, CentraleSupélec, F-91192 Gif-sur-Yvette, France, Gif-sur-Yvette, France

We demonstrate the use of a photonic reservoir computer based on time-multiplexing for the classification of human actions in videos. Our fast and low complexity system has classification error comparable to state-of-the-art Machine Learning algorithms.

Room 13b ICM

CB-11.5 THU 17:00

Design strategies to optimize 660 nm DBR tapered laser performance

•G. Blume, O. Matalla, H. Wenzel, A. Maaßdorf, D. Feise, J. Fricke, P. Ressel, S. Kreutzmann, A. Ginolas, A. Sahm, A. Knigge, and K. Paschke; Ferdinand-Braun-Institut (FBH), Berlin, Germany

Tapered diode lasers with internal DBR gratings were developed for a single mode emission at 660 nm. Their intended use is as pump source for SPDC in a miniaturized quantum OCT scanner system.

CB-11.6 THU 17:15

High optical confinement green SLEDs and LDs with InAlN claddings

•M. Malinverni, A. Castiglia, M. Rossetti, A. Ferhatovic, D. Martin, M. Duelk, and C. Velez; Exalos AG, Schlieren, Switzerland

AlInGaN-based SLEDs and LDs emitting above 510nm with a bottom n-type InAlN cladding are demonstrated with increased optical confinement and improved performance with respect to conventional AlGaN cladding based devices.

Room 14a ICM

EF-6.5 THU 17:00

Conservative Solitons and Reversibility in Time-Delayed models for Optical Micro-Cavities

T. Seidel[1], J. Javaloyes[2], and •S. Gurevich[1]; [1]Institute for Theoretical Physics, University of Münster, Münster, Germany; [2]Departament de Fisica, Universitat de les Illes Balears, Palma de Mallorca, Spain

We discuss the existence of reversible conservative time-delayed systems in a dispersive micro-cavity with a Kerr medium coupled to an external mirror. At low energies, the equivalence with the nonlinear Schrödinger equation is demonstrated.

EF-6.6 THU 17:15

Frequency Combs and Photonic Snakes

S. Benadouda Ivars[1,2], Y. Kartashov[3,4], P. Fernández de Córdoba[1], J.A. Conejero[1], L. Torner[3,5], and •C. Milián Enrique[1]; [1]Institut Universitary de Matemàtica Pura i Aplicada, València, Spain; [2]Universitat Politècnica de Catalunya, Terrassa, Spain; [3]ICFO, The Barcelona Institute of Science and Technology, Barcelona, Spain; [4]Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Moscow, Russia; [5]Universitat Politècnica de Catalunya, Bareclona, Spain

We present a new type of stable nonlinear wave featuring two-dimensional zigzags, which we term Photonic Snakes. These represent the unprecedented arrest of the snake instability and naturally form two-dimensional frequency combs in cylindrical microresonators.

Room 14b ICM

CH-12.5 THU 17:00

Plasmonic Nano-aperture Label-free Imaging for Nano-Biosensing

S. Mallick and •W.-C. Shih; University of Houston, Houston, USA

We demonstrate ultra near-field index modulated PlAsmonic NanO-apeRture lAbel-free iMAging (PANORAMA) that addresses existing issues for both SPR and LSPR imaging techniques, and show its applicability for transparent nanoparticles and extracellular vesicles, e.g., exosomes.

CH-12.6 THU 17:15

Super-Resolution Multipole Decomposition Tomographic Microscopy

•T. Chang[1], J.-K. So[1], E.A. Chan[1], G. Adamo[1], N. Papasimakis[2], Y. Shen[2], and N.I. Zheludev[1,2]; [1]Centre for Disruptive Photonic Technologies, SPMS and TPI, Nanyang Technological University, Singapore, Singapore; [2]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom

Super-resolution imaging technique that overcomes the quantitative light detection accuracy limit is proposed. The spatial separation of a weaker multipole radiation mode from stronger modes followed by successive measurements of those coefficients is the key.

Room Osterseen ICM

CL-4.5 THU 17:00

Design of an optical bench for polychromatic characterisation of advanced intraocular lens designs with spatial light modulator

•V. Gonzalez-Fernandez[1], S. Fernandez-Nuñez[1], N. Garzon[2], M. García-Montero[2], C. Albarrán-Diego[3], and J.A. Gomez-Pedrero[1]; [1]Dpto.de Optica, Universidad Complutense de Madrid, Madrid, Spain; [2]Dpto. de Optometría y Visión, Universidad Complutense de Madrid, Madrid, Spain; [3]Dpto. de Óptica y Optometría y Ciencias de la Visión, Universitat de València, Burjassot, Spain

We propose the design of an optical bench system to measure the point spread function of advanced designs of intraocular diffractive lenses through focus, to characterize the extended focus and its chromatic aberration

CL-4.6 THU 17:15

High Numerical Aperture ZrO2 Holographic Metasurfaces for Biophotonics Applications

•M. Biabanifard, T. Plaskocinski, J. Xiao, and A. Di Falco; University of St Andrews, St Andrews, United Kingdom

We present the realization of ZrO2 holographic metasurfaces. We discuss critically the advantages and limitations of the platform and demonstrate its use as a replacement for high numerical aperture objectives for integrated optical trapping applications.

Room 1 Hall B1 (B11)

CC-3.5 THU 17:00

Giant Core-Shell Plasmonic Enhancement of Spintronic Terahertz Emission

•V. Cecconi[1,2], Y. Tian[1], L. Peters[1,2], L. Olivieri[1,2], A. Cutrona[1,2], J.S. Totero Gongora[1,2], A. Pasquazi[1,2], and M. Peccianti[1,2]; [1]University of Sussex, Brighton, United Kingdom; [2]Loughborough University, Loughborough, United Kingdom

We demonstrate orders-of-magnitude local enhancement of terahertz emission from a spintronic stack driven by plasmonic-enhanced optical coupling and ultrafast heating supported by a sparse core-shell nanoparticle layer.

CC-3.6 THU 17:15

0.8 mW of 10 – 39 THz mid-IR radiation generated in GaSe with an amplified Kerr-lens mode-locked Cr:ZnS oscillator

•J.G. Meyer and O. Pronin; Helmut-Schmidt-University, Hamburg, Germany

With an amplified Cr:ZnS oscillator we generate via IDFG 0.8 mW of radiation from 10 to 39 THz (7.7 – 30 μm). It represents a coherent light source for broadband spectroscopy deep in the mid-IR region.

Room 6 Hall B3 (B32)

CG-6.4 THU 17:00

Attosecond-pump attosecond-probe spectroscopy at kHz repetition rate

M. Kretschmar, E. Svirplys, T. Nagy, M.J.J. Vrakking, and •B. Schütte; Max-Born-Institut, Berlin, Germany

Attosecond-pump attosecond-probe spectroscopy is demonstrated for the first time at kHz repetition rates. Using a commercial laser and a compact setup, sequential two-photon absorption is demonstrated in a two-color pump-probe scheme.

CG-6.5 THU 17:15

A Polarization Insensitive Femtosecond Enhancement Cavity for Photoelectron Tomography at 100 MHz Repetition Rate

•J.-H. Oelmann[1,2], T. Heldt[1,2], L. Guth[1,2], N. Lackmann[1], V. Wössner[1], S. Kokh[1], J. Nauta[1,3], T. Pfeifer[1], and J.R. Crespo López-Urrutia[1]; [1]Max-Planck-Institut für Kernphysik, Heidelberg, Germany; [2]Heidelberg Graduate School for Physics, Heidelberg, Germany; [3]Current address: Department of Physics, College of Science, Swansea University, Swansea, United Kingdom

We present a novel polarization insensitive enhancement cavity for multi-photon ionization experiments at high laser intensity. Combined with a compact intracavity velocity-map imaging (VMI) spectrometer, the setup enables photoelectron tomography at 100 MHz repetition rate.

Room 7 Hall A1 (A11)

CE-7.4 THU 17:00

Shaping the nonlinear response of silica single-mode fibers with nanodiamonds volumetrically integrated in the core

G. Stępniewski[1,2], P. Hänzi[3], T. Kardaś[4], S. Łukasik[1], Y. Stepanenko[5], M. Głowacki[6], V. Romano[3], R. Buczyński[1,2], R. Bogdanowicz[6], A.M. Heidt[3], and •M. Klimczak[1]; [1]University of Warsaw, Faculty of Physics, Warsaw, Poland; [2]Łukasiewicz Research Network, Institute of Microelectronics and Photonics, Warsaw, Poland; [3]University of Bern, Institute of Applied Physics, Bern, Switzerland; [4]Fluence Sp. z o.o., Warsaw, Poland; [5]Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland; [6]Gdańsk University of Technology, Faculty of Electronics, Telecommunications and Informatics, Gdańsk, Poland

Negative nonlinearity fibers could open currently inaccessible regimes in ultrafast optics. Nonlinearity shaping in silica fibers is investigated by introducing nanodiamonds into the fiber core using tetraethyl orthosilicate hydrolysis, followed by z-scan and XFROG measurements.

CE-7.5 THU 17:15

ICP-CVD Silicon-rich silicon nitride for supercontinuum generation

•A. Jayantha, A. Andrieux, I. Gallet, C. Finot, and K. Hammani; Laboratoire ICB, CNRS/uB, Dijon 21000, France

We report the fabrication of ICP-CVD silicon-rich silicon nitride having a refractive index of 2.44 at telecommunications wavelength. The nonlinear properties of the material allow the demonstration of a supercontinuum.

Room 8 Hall A1 (A12)

EB-13.5 THU 17:00

Universal Photonic Quantum Gate by Cooper-pair-based Optical Nonlinearity

•S. Bouscher and A. Hayat; Department of Electrical Engineering, Technion, Haifa, Israel

We propose a new concept of Cooper-pair-nonlinearity-based photonic universal SWAP(ϕ) quantum gates. Phase is added only to the Ψ+ Bell-state through two-photon nonlinearity induced by the superconducting state.

EB-13.6 THU 17:15

Pulsed approach to reservoir computing towards quantum protocols

•J. Henaff, M. Ansquer, F. Sansavini, N. Treps, and V. Parigi; Sorbonne Université, Paris, France

Our work aims at the implementation of quantum enhanced machine learning protocols in a Continuous Variables photonics platform. It focuses on the implementation of protocols based on network structures, like quantum reservoir computing, via multimode quantum optics.

Room 13a ICM

17:45 – 19:15

PD-1: Postdeadline session I: Beam and pulse control and quantum physics

Chair: Daniele Brida, Université du Luxembourg, Luxembourg

PD-1.1 THU 17:45

Gigawatt-Scale Acousto-Optic Modulation in Ambient Air

•*Y. Schrödel*[1], *C. Hartmann*[2], *T. Lang*[1], *J. Zheng*[1], *M. Steudel*[3], *M. Rutsch*[2], *S.H. Salman*[1,4,5], *M. Kellert*[6], *M. Pergament*[6], *T. Hahn-Jose*[7], *S. Suppelt*[2], *J.H. Dörsam*[2], *A. Harth*[3], *W.P. Leemans*[1,8], *F.X. Kärtner*[6,8,9], *I. Hartl*[1], *M. Kupnik*[2], *and C.M. Heyl*[1,4,5]; [1]*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*Technische Universitat Darmstadt, Measurement and Sensor Technology, Darmstadt, Germany*; [3] *Hochschule Aalen, Department of Optics and Mechatronics, Aalen, Germany*; [4]*Helmholtz-Institute Jena, Jena, Germany*; [5]*GSI Helmholtzzentrum fur Schwerionenforschung GmbH, Darmstadt, Germany*; [6]*Center for Free-Electron Laser Science CFELL, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [7] *INOSON GmbH, St. Ingbert, Germany*; [8]*University of Hamburg, Department of Physics, Hamburg, Germany*; [9]*The Hamburg Centre for Ultrafast Imaging, Hamburg, Germany*

We employ intense ultrasound fields in gases enabling us to control laser light in extreme parameter ranges, acousto-optically modulating 1030 nm ultrashort pulses with peak power of 20 GW efficiently (> 50%) in ambient air.

PD-1.2 THU 17:55

On-Chip, On-Air Carrier-Envelope Phase Detector of nJ-Level Laser Pulses and Spatial CEP Sculpting

•*V. Hanus*[1], *B. Fehér*[1], *V. Csajbók*[1], *P. Sándor*[1], *Z. Pápa*[1,2], *J. Budai*[2], *Z. Wang*[3,4], *P. Paul*[5,6], *A. Szeghalmi*[5,6], *and P. Dombi*[1,2]; [1]*Wigner Research Centre for Physics, Budapest, Hungary*; [2]*ELI-ALPS Research Institute, Szeged, Hungary*; [3]*Physics Department, Ludwig-Maximilians-Universität, Munich, Germany*; [4]*Max Planck Institute of Quantum Optics, Garching, Germany*; [5]*Institute of Applied Physics, Friedrich Schiller University Jena, Jena, Germany*; [6]*Fraunhofer Inst. for App. Opt. and Prec. Eng., Centre of Excellence in Photonics, Jena, Germany*

We present an on-chip scanning CEP probe for on-air, single-beam measuring of 3D CEP maps of nJ-class few-cycle laser beam focus. We achieved a proof-of-concept sculpting of CEP distributions using an SLM-feedback loop.

PD-1.3 THU 18:05

Single-Shot, High-Repetition Rate Carrier-Envelope-Phase Detection via optical Fourier transform

•*C. Guo*[1], *M. Miranda*[2,3], *A.-K. Raab*[1], *A.-L. Viotti*[1], *P.T. Guerreiro*[2,3], *R. Romero*[2,3], *H. Crespo*[2,3], *A. L'Huillier*[2,3], *and C.L. Arnold*[2,3]; [1]*Department of Physics, Lund University, Lund, Sweden*; [2]*IFIMUP-IN and Departamento de Física e Astronomia, Universidade do Porto, Porto, Portugal*; [3]*Sphere Ultrafast Photonics, Porto, Portugal*

We propose a single-shot Carrier-Envelope Phase measurement scheme, based on detecting f-2f fringes using optical Fourier transform. This method is capable for high-repetition rate (>200 kHz) and low pulse energy lasers.

PD-1.4 THU 18:15

Dual-Oscillator Field-Resolved Infrared Spectroscopy with Individual-Scan Referencing

•*A. Maity*[1,2,3], *W. Schweinberger*[1,2,3], *C. Hofer*[1,2,3], *S. Hutter*[4], *S. Gröbmeyer*[2], *D. Potamianos*[1,2,3], *M. Trubetskov*[1], *H. Heydarian*[1], *M. Huber*[1,2], *M. Kowalczyk*[1,2,3], *P. Steinleitner*[1], *Z. Wei* [1,2], *A. Leitenstorfer*[4], *I. Pupeza*[1,2,5], *F. Krausz*[1,2,3], *and A. Weigel*[1,2,3]; [1]*Max-Planck-Institut of Quantum Optics, Garching, Germany*; [2]*Ludwig-Maximilians-Universität München, Garching, Germany*; [3]*Center for Molecular Fingerprinting, Budapest, Hungary*; [4]*Department of Physics and Center for Applied Photonics, University of Konstanz, Germany*; [5]*Leibniz Institute of Photonic Technology – Member of research alliance "Leibniz Health Technologies", Jena, Germany*

We present a dual-oscillator-based field-resolved mid-infrared spectrometer with individual-scan referencing. The system acquires electro-optic sampling traces at 4200 scans/s with octave-spanning mid-infrared coverage and can correct the mid-infrared excitation-pulse fluctuations on the individual-scan level.

PD-1.5 THU 18:25

Surprise in Highly Correlated Two-Electron System: Extended Secondary Plateau in X-ray High Harmonic Generation from Helium Due to Double Electron Recombination

S. Wang[1], *J. Yan*[1], *A. de las Heras*[2], *S. Song*[1], *A. Prodanov*[1], *Z. Wu*[1], *C. Hernández-García*[2], *L. Plaja*[2], *D. Popmintchev*[3], *and* •*T. Popmintchev*[1,3]; [1]*Department of Physics, Center for Advanced Nanoscience, University of California San Diego, La Jolla, USA*; [2]*Departamento de Física Aplicada, Universidad de Salamanca, Salamanca, Spain*; [3]*Photonic Institute, TU Wien, Vienna, Austria*

We observe experimentally a secondary plateau in UV-driven high-harmonic generation in the X-ray regime extending up to 300 eV, due to emission of a single X-ray photon at double-recombination of highly-correlated electrons of helium atoms.

PD-1.6 THU 18:35

Watt-class CMOS-compatible power amplifier

•*N. Singh*[1], *J. Lorenzen*[1], *M. Sinobad*[1], *K. Wang*[2], *M. Gaafar*[1], *H. Francis*[3], *M. Geiselmann*[3], *T. Herr*[1], *S. Garcia-Blanco*[2], *and F. Kaertner*[1]; [1]*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [2]*University of Twente, Twente, Netherlands*; [3]*Ligentec, Ecublens, Switzerland*

We demonstrate in silicon photonics watt-class large mode area power amplifier in a compact 3.6mm2 footprint. The output average power reached >0.9 W with 14.5 dB net gain around the signal wavelength of 1.85um.

PD-1.7 THU 18:45

Nanophotonic on-chip electron acceleration

•*R. Shiloh, T. Chlouba, S. Kraus, L. Brückner, J. Litzel, and P. Hommelhoff* ; *Physics Department, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Staudtstraße 1, Erlangen, Germany*

We experimentally demonstrate electron energy gain of 12.3keV on-chip using a 2μm femtosecond laser and 500μm-long silicon structure. Combined with a nanophotonic nearfield confinement scheme, this represents a milestone in the miniaturization of electron accelerators.

PD-1.8 THU 18:55

Bose-Einstein Condensation of Photons in a Four-Site Lattice Potential

•*A. Redmann, N. Wolf, F. Vewinger, J. Schmitt, and M. Weitz*; *Institute of Applied Physics, University of Bonn, Wegelerstr.8, D-53115 Bonn, Germany*

We have demonstrated Bose-Einstein condensation of photons into the ground state of a coupled four-site lattice potential. Both Bose-Einstein distributed spectra as well as fringe signals upon recombination, showing the coherence between wells, are observed.

PD-1.9 THU 19:05

Continuously Sustained Bose-Einstein Photon Condensate in a Semiconductor Quantum Well Open Microcavity

•*R.C. Schofield*[1], *M. Fu*[1], *E. Clarke*[2], *I. Farrer*[2], *H. Dhar*[3], *R. Mukherjee*[4], *J. Heffernan*[2], *F. Mintert*[1], *R.A. Nyman*[1], *and R.F. Oulton*[1]; [1]*Blackett Laboratory, Imperial College London, London, United Kingdom*; [2]*EPSRC National Centre for III-V Technologies, University of Sheffield, Sheffield, United Kingdom*; [3] *Department of Physics, Indian Institute of Technology, Bombay, India*; [4]*Zentrum fur Optische Quantentechnologien, Universitat Hamburg, Hambury, Germany*

We present the observation of photon Bose-Einstein condensation in a microcavity using thermalisation in a single semiconductor quantum well. This enables a continuous condensate to be sustained for the first time with strong photon-photon interactions.

Room 13b ICM

17:45 – 19:15

PD-2: Postdeadline session II: Nonlinear effects and electron physics

Chair: Crina Cojocaru, Universitat Politecnica de Catalunya, Barcelona, Spain

PD-2.1 THU 17:45

Ultra-low repetition rate frequency comb for precision spectroscopy

F. Canella[1,2,3], *J. Weitenberg*[2,4], *P. Dwivedi*[2,5], *F. Schmid*[2], *G. Galzerano*[3], *T.W. Hänsch*[2,5], *T. Udem*[2,5], *and* •*A. Ozawa*[2]; [1]*Dipartimento di Fisica, Politecnico di Milano, Milan, Italy*; [2]*Max-Planck-Institut für Quantenoptik, Garching, Germany*; [3]*Istituto di Fotonica e Nanotecnologie, Consiglio Nazionale delle Ricerche, Milan, Italy*; [4]*Fraunhofer-Institut für Lasertechnik ILT, Aachen, Germany*; [5]*Fakultät für Physik, Ludwig-Maximilians-Universität München, München, Germany*

We demonstrated a low-noise optical frequency comb with a 40 kHz repetition rate. Low repetition rate optical frequency combs are suitable for driving non-linear frequency conversion processes to perform precision spectroscopy at extreme ultraviolet wavelengths.

PD-2.2 THU 17:55

Unexpected phase-locked Brillouin Kerr Frequency comb in fiber Fabry Perot resonators

•*T. Bunel*[1], *M. Conforti*[1], *J. Lumeau*[2], *A. Moreau*[2], *A. Fernandez*[3], *O. Llopis*[3], *J. Roul*[3], *A. Perego*[4], *and A. Mussot*[1]; [1]*Universite de Lille, CNRS, UMR 8523-PhLAM, Villeneuve d'Ascq, France*; [2]*LAAS-CNRS, Universite de Toulouse, CNRS, Toulouse, France*; [3]*Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, Marseille,*

Room 13b ICM

France; [4]Aston Institute of Photonic Technologies, Aston University,, Birmingham, United Kingdom
We report the observation of a stable and broadband optical frequency comb in a high-Q fiber Fabry Perot resonator. We evidence it arises from an unexpected mode-locking phenomena.

PD-2.3 THU 18:05

Modifying the speed of light in vacuum with intense laser pulses: The DeLLight Experiment
•A.E. Kraych[1], M. Mailliet[1], S. Robertson[1,2], F. Couchot[1,2], and X. Sarazin[1]; [1]Université Paris-Saclay, CNRS/IN2P3, IJCLab, Orsay, France; [2]Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, Palaiseau, France
The DeLLight (deflection of light by light) experiment aims to observe the optically induced index change of vacuum, a nonlinear effect predicts by the Quantum electrodynamics theory which has never been explored.

PD-2.4 THU 18:15

Quantum Optical Tomography using a Time-Resolved and Mode-Selective Frequency-Up-Conversion Detector
•N. Namekata[1], N. Kobayashi[2], K. Nomura[3], T. Sako[3], N. Takata[4], and S. Inoue[1]; [1]Institute of Quantum Science, Nihon University, Tokyo, Japan; [2]Department of Precision Machinery Engineering, College of Science and Technology, Nihon University, Chiba, Japan; [3]Laboratory of Physics, College of Science and Technology, Nihon University, Chiba, Japan; [4]Division of Brain Science, Institute for Advanced Medical Research, Keio University School of Medicine, Tokyo, Japan
A 111-dB-sensitivity time-of-flight measurement system was developed to acquire a tomographic image of a mouse brain using an mode-selective frequency up-conversion single-photon detector.

PD-2.5 THU 18:25

The contribution has been withdrawn.

PD-2.6 THU 18:35

Co-levitation of an ultra-high-Q nanomechanical oscillator and an atomic qubit
•D.S. Bykov[1], L. Dania[1], F. Goschin[1], M. Teller[1,2], and T.E. Northup[1]; [1]Institut für Experimentalphysik, Universität Innsbruck, Technikerstraße 25, 6020, Innsbruck, Austria; [2]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, 08860, Castelldefels (Barcelona), Spain
We co-trap a nanoparticle and a calcium ion in the same Paul trap. We use a dual-frequency trap drive to achieve stable confinement of the particles, whose charge-to-mass ratios differ by six orders of magnitude.

PD-2.7 THU 18:45

Observation of polarization Faticons in a fibre Kerr resonator
•J. Fatome[1,4], E. Lucas[1], B. Kibler[1], L. Hill[2,3], G.-L. Oppo[2], G. Xu[4], S.G. Murdoch[4], M. Erkintalo[4], and S. Coen[4]; [1]Université de Bourgogne, Dijon, France; [2]University of Strathclyde, Glasgow, United Kingdom; [3]Max Planck Institute for the Science of Light, Erlangen, Germany; [4]The University of Auckland, Auckland, New Zealand
We report on the first experimental observation of a new type of localized vectorial structure in normal dispersion, coherently-driven, fiber Kerr resonators, namely, the temporal polarization faticon

PD-2.8 THU 18:55

Spontaneous Parametric Down-Conversion Beaming from a Lithium Niobate Nanostructured Resonator
•M. Celebrano[1], A. Zilli[1], V. Sultanov[2,3], M. Poloczek[1,3], M. Ferrera[4], Y. Luan[1], E. Kokkinakis[2], T. Santiago-Cruz[2,3], L. Carletti[5], A. Toma[4], M. Finazzi[1], and M. Chekhova[2,3]; [1]Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; [2]Max Planck Institute for the Science of Light, Erlangen, Germany; [3]Friedrich-Alexander Universitat Erlangen-Nurnberg, Erlangen, Germany; [4]Istituto Italiano di Tecnologia, Genova, Italy; [5]Department of Information Engineering, Università di Brescia and INO-CNR, Brescia, Italy
We report the design and fabrication of lithium niobate nanostructured resonators for directional beaming of spontaneous parametric down-conversion. Preliminary measurements achieved photon-pair production rates exceeding 100 Hz/W at telecom wavelengths

PD-2.9 THU 19:05

Coherent Nonlinear Up-Conversion Imaging with High-Q Metasurfaces
•L.D. Valencia Molina[1,2], R. Camacho Morales [1], J. Zhang[1], I. Staude[2], A.A. Sukhorukov[1], and D. Neshev[1]; [1]Australian National University, Canberra, Australia; [2]Friedrich Schiller University Jena, Jena, Germany
We demonstrate efficient upconversion imaging enabled by high-Q bound-state-in-the-continuum resonances in lithium niobate metasurfaces. We demonstrate coherent wavefront conversion in the Fourier plane of the optical system despite the nonlocal character of the metasurface.

Hall B0

13:00 – 14:00

CE-P: CE Poster session

CE-P.1 THU

Plasmon-driven Photochemistry for Metallic Nanopore Arrays Fabrication
G. Lanzavecchia[1], J. Kuttruff[2], A. Doricchi[1], A. Viejo Rodríguez[3], R. Krahne[1], •N. Maccaferri[4], and D. Garoli[1]; [1]Istituto Italiano di Tecnologia, Genova, Italy; [2]University of Konstanz, Konstanz, Germany; [3]University of Luxembourg, Luxembourg, Luxembourg; [4]Umeå University & Umeå Centre for Microbial Research, Umeå, Sweden
We show a process for the fabrication of nanopores arrays via photocatalysis triggered by electromagnetic field enhancement in plasmonic structures immersed in metallic salt solutions and generating hotspots causing pore diameter reduction below 5 nm.

CE-P.2 THU

Low-temperature and hydrogen-free silicon dioxide cladding for next-generation integrated photonics
Z. Li[1,2], •Z. Qiu[1,2], R.N. Wang[1,2], M. Divall[1,2], and T. Kippenberg[1,2]; [1]Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]Center for Quantum Science and Engineering, EPFL, Lausanne, Switzerland
We demonstrate a hydrogen-free low-loss silicon dioxide film deposited with $SiCl_4$ for cladding of photonic integrated circuits. A very wide low-loss window of 1260 nm to 1625 nm is achieved at deposition temperature as low as 300 °C.

CE-P.3 THU

Laser-Assisted Bonding Prototype Equipment for Hybrid Integration of Silicon Photonic Circuits
•A. Vlasov, T. Uusitalo, E. Lepukhov, H. Virtanen, S.-P. Ojanen, J. Viheriälä, and M. Guina; Tampere University, Physics Unit, Optoelectronic Research Centre, Korkeakoulunkatu 3, Tampere, FI-33720, Finland, Tampere, Finland
Hybrid integration on silicon substrate is promising way towards increased density and enhanced functionality. We introduce the self-developed laser-assisted bonding setup with bottom coaxial irradiation architecture, which combines the bonding beam delivery and microscopy channels.

CE-P.4 THU

Hybrid strip-loaded silicon rich nitride-thin film lithium niobate waveguides for PIC applications
•T.S. Meetei[1], S.-J. Son[1], B. Park[1], Y.-T. Lee[1], and N.E. Yu[1,2]; [1]Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, South Korea; [2]Research Centre for Photon Science and Technology, Gwangju Institute of Science and Technology, South Korea
We investigate the mode properties of a strip-loaded silicon-rich nitride and thin-film lithium-niobate hybrid waveguides at 1550 nm. The mode profiles of TE0 and TM0 satisfying simultaneous single-mode-condition and zero-birefringence are discussed for PIC applications.

CE-P.5 THU

Spectroscopic investigation of Tm3+-Dy3+ co-doped KY3F10 crystals for 3 μm laser applications
•F. Canbaz[1] and A. Butkus[2]; [1]University of Basel, Basel, Switzerland; [2]Optogama UAB, Vilnius, Lithuania
Emission characteristics of Tm3+-Dy3+:KY3F10 with various concentration combinations are investigated at the excitation wavelength of 1645nm. 3-μm emission is obtained when Tm3+ is present in the crystal matrix, suggesting successful energy transfer between the ions.

CE-P.6 THU

Three-photon and Four-photon Absorption in Lithium Niobate and Lithium Tantalate by Z-scan Technique
•I. Benabdelghani[1,2], G. Tóth[1,2,3], G. Krizsán[1,2,3], N. Mbithi[1,2,4], G. Bazsó[5], P. Rácz[5], P. Dombi[5], J. Hebling[1,2,3], and G. Polónyi[1,3]; [1]Szentágothai Research Centre, Pécs, Hungary; [2]University of Pécs, Pécs, Hungary; [3]ELKH-PTE High Intensity Terahertz Research Group, Pécs, Hungary; [4]Garissa University, Garissa, Kenya; [5]Wigner Research Centre for Physics, Budapest, Hungary
Intensity dependent three-photon and four-photon absorption of stoichiometric and congruent lithium niobate and lithium tantalate have been determined by z-scan technique for ordinary and extraordinary polarization states.

CE-P.7 THU

Estimation of photo-elastic coefficients in ion-exchanged borosilicate glass cavities through whispering gallery mode resonation
•N. Kokkinidis[1,2], N. Korakas[1,2], and S. Pissadakis[2]; [1]University of Crete, Heraklion, Greece; [2]Institute of Electronic Structure and Laser (IESL), Foundation for

Research and Technology-Hellas (FORTH), Heraklion, Greece
Whispering gallery mode resonation is used for estimating the Pockels' coefficients in pristine and potassium ion-exchanged borosilicate glass cylindrical cavities, in correlation with Young modulus measurements; the ion-exchange process glass significantly affects borosilicate glass photoelasticity.

CE-P.8 THU

Polarization Characteristics of Raman Scattering in KGW Raman Laser Crystals by Polarized Incident Light
•*J.-C. Tung, S.-C. Chen, and M.-H. Hou*; *Department of Electro-Optical Engineering, National Taipei University of Technology, Taipei, Taiwan*
Np-cut potassium gadolinium tungstate (KGW) crystals were demonstrated to excite scattered light under polarized incident light, exhibiting the unique properties of angle-resolved polarized Raman spectroscopy and Raman intensity polar plots.

CE-P.9 THU

Extensive study of magneto-optical and optical properties of Cd1–xMnxTe between 675 nm and 1025 nm
•*C. Tyborski, M.T. Hassan, M. Schiemangk, T. Flisgen, and A. Wicht*; *Ferdinand-Braun-Institut gGmbH, Berlin, Germany*
We show wavelength-dependent measurements of Faraday rotations and reflection/transmission values for various stoichiometric ratios of $Cd_{1-x}Mn_xTe$. From the data we derive Verdet constants and absorption coefficients helping to design miniaturized optical isolators.

CE-P.10 THU

Effects of Low-Temperature Annealing on $CsPbBr_3$ Thin-Films by Ultrafast THz Spectroscopy
•*L. Gatto*[1,2], *A. Treglia*[1,3], *G. Crippa*[1,2], *M. Devetta*[2], *G. Folpini*[3], *A. Petrozza*[3], *S. Stagira*[1,2], *C. Vozzi*[2], *and E. Cinquanta*[2]; [1]*Dipartimento di Fisica, Politecnico di Milano, Milano, Italy*; [2]*Istituto di Fotonica e Nanotecnologie, CNR, Milano, Italy*; [3]*Center for NanoScience and Technology, IIT, Milano, Italy*
We employed ultrafast terahertz spectroscopy to assess the effects of low-temperature annealing on $CsPbBr_3$ perovskite thin-films. We found counterintuitively faster dynamics and lower photoluminescence after the annealing, suggesting the unexpected formation of non-radiative recombination channels.

CE-P.11 THU

Au nanoparticle doped metal-free perovskites
•*A. Adappattu Ramachandran*[1], *H.C. Leo Tsui*[1], *P. Docampo*[2], *and N. Healy*[1]; [1]*School of Mathematics, Statistics and Physics, Newcastle University, United Kingdom, Newcastle Upon Tyne, NE1 7RU, United Kingdom*; [2]*School of Chemistry, University of Glasgow, Glasgow, G12 8QQ, United Kingdom*
We present the influence of gold nanoparticles (Au NPs) on the photoluminescence and non-linear optical properties of metal-free perovskites. The surface plasmon resonance effect results in the enhancement of photoluminescence and second harmonic generation.

CE-P.12 THU

Nonlinear Optical Characterization of $LiNb_{1-x}Ta_xO_3$ Solid Solution Nanoparticles: The Influence of Zero Birefringence
•*J. Klenen*[1,2], *L. Vittadello*[1,2], *F. Kodde*[1,2], *V. Hreb*[3], *V. Sydorchuk*[5], *U. Yakhnevych*[3], *D. Sugak*[3,4], *and M. Imlau*[1,2]; [1]*Department of Physics, Osnabrueck University, 49076 Osnabrueck, Germany*; [2]*Research Center for Cellular Nanoanalytics, Osnabrueck (CellNanOs), Osnabrueck University, 49076 Osnabrueck, Germany*; [3]*Department of Semiconductor Electronics, Lviv Polytechnic National University, 79013 Lviv, Ukraine*; [4]*Scientific Research Company 'Electron-Carat', 79031 Lviv, Ukraine*; [5]*Institute for Sorption and Problems of Endoecology, NASU, 03164 Kyiv, Ukraine*
We present a comprehensive study of the nonlinear optical properties of nanocrystalline $LiNb_{1-x}Ta_xO_3$ solid solutions with the goal to inspect the influence of zero birefringence on the mechanisms of second and third harmonic generation.

CE-P.13 THU

Potassium tantalate-niobate for electro-optically driven adiabatic frequency conversion
•*A. Mrokon*[1], *L. Kirste*[2], *K. Buse*[1,3], *and I. Breunig*[1,3]; [1]*Laboratory for Optical Systems, Department of Microsystems Engineering - IMTEK, University of Freiburg, Georges-Koehler-Allee 102, 79110 Freiburg, Germany*; [2]*Fraunhofer Institute for Applied Solid State Physics (IAF), Tullastrasse 72, 79108 Freiburg, Germany*; [3]*Fraunhofer Institute for Physical Measurement Techniques IPM, Georges-Koehler-Allee 301,, 79110 Freiburg, Germany*
We show how potassium tantalate-niobate crystals pave the way for more than 100 GHz of mode-hop-free tuning within nanoseconds via electro-optically driven adiabatic frequency conversion. This might outperform lithium-niobate based devices by orders of magnitude.

CE-P.14 THU

A saturable absorber of ternary low-dimensional material heterojunction and its application in fiber lasers
•*W. Zhu, Q. Wu, and X. Liu*; *College of Automation, Nanjing University of Information Science and Technology, Nanjing , China*
This contribution refers to a saturable absorber prepared by mixing three low-dimensional nanomaterials, and applies it to the fiber laser to check the characteristics of the output laser pulse.

CE-P.15 THU

Determination of the Inner Surface Area of 3D Wavelength Scale Structures by Using Angle-resolved Fourier Image Spectroscopy
•*N. Meethale Palakkool*[1], *M. Taverne*[1], *D. Rezaie*[1], *H. Awachi*[1], *Y.-S. Chen*[2], *J.G. Rarity*[2], *C.-C.K. Huang*[3], *and Y.-L.D. Ho*[1]; [1]*Northumbria University, Newcastle upon Tyne, United Kingdom*; [2]*University of Bristol, Bristol, United Kingdom*; [3]*University of Southampton, Southampton, United Kingdom*
This paper involves optical characterization using Fourier Image Spectroscopy to determine the inner surface area of 3D wavelength scale structures, with the aim of fabricating 3D electrodes with a large active surface area.

CE-P.16 THU

Material characterisation of LPCVD SiN and understanding loss behavior
•*C. Cummins*[1], *B. Pan*[2,3], *G. Roelkens*[2,3], *M. Dahlem*[1], *S. Saseendran*[1], *and P. Helin* [1]; [1]*imec, Leuven, Belgium, Belgium*; [2]*Photonics Research Group, INTEC, Ghent University - imec, Ghent, Ghent, Belgium*; [3]*Center for Nano- and Biophotonics, Ghent University - imec, Ghent, Ghent, Belgium*
The processing impact on LPCVD SiN waveguide loss (C-band) is discussed. TOF-SIMS identifies impurities (H, Cl) in the fabricated devices, and we discuss the rationale for the optical losses exhibited from a materials standpoint.

CE-P.17 THU

Improved photosensitive response of doped silica to a 213 nm pulsed laser using a multi-pass writing approach
•*Q.S. Ahmed, J.W. Field, P.C. Gow, C. Holmes, R.H.S. Bannerman, P.L. Mennea, C.B.E. Gawith, P.G.R. Smith, and J.C. Gates*; *Optoelectronics Research Centre, University of Southampton, Southampton, SO17 1BJ, UK, Southampton, United Kingdom*
We report a refractive index change increase of 1.4×10^{-3} in Ge-doped silica with a 1.6 times higher grating's strength when depositing the same total fluence over multiple passes using a 213 nm laser.

CE-P.18 THU

Second and third harmonic generation of millimeter-sized Zn(3-ptz)2 metal-organic framework crystals
•*D. Hidalgo-Rojas*[2,5], *R. Rojas*[3], *R. Wheatley*[1,2], *J. Enriquez*[2,4], *J. Garcia-Garfido*[2,4], *F. Herrera*[2,4], *D.P. Singh*[2,4], *and B. Seifert*[1,2]; [1]*Facultad de Física, Pontificia Universidad Católica de Chile, Santiago de Chile*; [2]*Millenium Institute for Research in Optics (MIRO), ANID, Santiago de Chile*; [3]*Department of Physics and Materials Science, University of Luxembourg, Luxembourg*; [4]*Departamento de Física, Universidad de Santiago de Chile, Chile*; [5]*Institute for Biological and Medical Engineering, Pontificia Universidad Católica de Chile, Santiago de Chile*
In this work we present for the first time the second and third harmonic generation of large, i.e., millimeter-sized non-centrosymmetric Zn(3-ptz)2 MOF crystals, which have recently been successfully produced and optically characterized in Chile.

CE-P.19 THU

The period chirp of optical gratings - Theory, Modeling and Measurement
•*F. Bienert, T. Graf, and M. Abdou Ahmed*; *IFSW - Universität Stuttgart, Stuttgart, Germany*
We present the theory, modelling, and measurement of the period chirp, a detrimental effect emerging from the fabrication of optical gratings when using laser interference lithography (LIL) and scanning beam interference lithography (SBIL).

CE-P.20 THU

Stochiometric engineering of reconfigurable photo-ionic chalcogenides for nanophotonic applications
•*A. Elfarash, A. Mandal, and B. Gholipour*; *University of Alberta, Edmonton, Canada*
We show, using high throughput physical vapor deposition techniques, that photo-ionic amorphous metal-doped chalcogenide semiconductors exhibit a stoichiometrically tunable optical response exhibiting both dielectric and plasmonic stoichiometries with precisely controllable modulation contrasts.

CE-P.21 THU

Multi-parameter fitting of quantum dot spectroscopy data using Markov Chain Monte Carlo methods
•*P.R. Ramesh*[1], *A.S. Kulkarni*[1], *W. Liu*[1], *J.I. Climente*[2], *H.Y. Ramirez*[3], *A.S. Bracker*[4], *D. Gammon*[4], *R. Zurakowski*[1], *and M.F. Doty*[1]; [1]*University of Delaware, Newark, USA*; [2]*Universitat Jaume I, Castello, Spain*; [3]*Universidad Pedagogica y Tecnologica de Colombia, Boyaca, Colombia*; [4]*U.S. Naval Research Laboratory, Washington, USA*

We present a Markov Chain Monte Carlo statistical method for fitting quantum dot spectroscopy data and extracting information about individual energetic parameters, such as the energies of confined quantum states and the many-body Coulomb interactions.

CE-P.22 THU

Characterisation of NIR Photoluminescence emission (1250-1450nm) in Nd3+-Sm3+ with fluorotellurite Glasses for Biophotonic Applications

•E. Kumi-Barimah, X. Wang, and A. Jha; School of Chemical and Process Engineering, University of Leeds, Woodhouse Lane, Leeds, LS2 9JT, UK, Leeds, United Kingdom

We report for the first time ultra-broadband NIR photoluminescence emission properties and energy transfer mechanism between Nd3+- Sm3+ ions codoped fluorotellurite glasses under 405 nm and 800 nm excitation sources

CE-P.23 THU

Dye Integrated Planar Guided Mode Resonators for Miniature On-chip High-Brightness Source

•S. Gali, D. Rout, V. P, and S.K. Selvaraja; Indian Institute of Science, Bangalore, India

A 200% amplified-emission and wavelength selective spectral narrowing from fluorophores integrated engineered silicon nitride metasurface-based on-chip guided mode resonator. This opens up avenues for efficient control of spontaneous emission towards realizing miniature CMOS-compatible high-brightness sources.

CE-P.24 THU

Fabry-Pérot Type Thin-Film Electro-Optical Modulator in the λ= 900 nm to 1000 nm Spectral Region

•A.K. Rüsseler[1,2], L. Zhao[1,3], F. Kurth[1,3], J. Matthes[2], G.-A. Hoffmann[1,2], M. Jupé[1,2], H.-H. Johannes[1,3], W. Kowalsky[1,3], T. Schwenke[1,4], H. Menzel[1,4], A. Wienke[1,2], and D. Ristau[1,2,5]; [1]Cluster of Excellence PhoenixD, Leibniz University Hannover, Hannover, Germany; [2]Laser Zentrum Hannover e.V., Hannover, Germany; [3]Institut für Hochfrequenztechnik, Technische Universität Braunschweig, Braunschweig, Germany; [4]Institut für Technische Chemie, Technische Universität Braunschweig, Braunschweig, Germany; [5]Institute of Quantum Optics, Leibniz University Hannover, Hannover, Germany

Integrating a Fabry-Pérot interferometer structure in thin-film optical coatings enables shifting the resonant transmission peak via refractive index changes of an active spacer layer. Our concept addresses wavelengths below 1000 nm and compact design requirements.

CE-P.25 THU

Sputtered PZT-on-SOI Acousto-Optic Modulator Using Remote Buffer crystallisation

•S. Suraj, D. Yumnam, and S.K. Selvaraja; Indian Institute of Science, Bangalore, India

We demonstrate remote buffered sputter deposited thin-film PZT-on-SOI acousto-optic phase modulation at 1550 nm. The measurement shows acousto-optic response up to 1 GHz supported by the simulation.

CE-P.26 THU

Semi-continuous Metal Films with Inhomogeneous Broadening: Experiment-based Statistical Convoluted Models for Plasmonic Colours

L.J. Prokopeva[1], S. Chowdhury[1], •P. Nyga[2], K. Pagadala[1], J. Simon[1], M.P. Nowak[2], C. Fruhling[1], S. Maćkowski[3], and A.V. Kildishev[1]; [1]Elmore Family School of Electrical and Computer Engineering and Birck Nanotechnology Center, Purdue University, West Lafayette, USA; [2]Institute of Optoelectronics, Military University of Technology, Warsaw, Poland; [3]Institute of Physics, Nicolaus Copernicus University, Torun, Poland

A new experiment-based model employing convolution of statistical absorption is used to characterize the optical dispersion of semi-continuous metal films and simulate the nano-structured plasmonic colour coatings in the time domain.

CE-P.27 THU

The contribution has been withdrawn.

CE-P.28 THU

Method for Separating the Relative Contributions to the Emission Spectrum of Overlapping Luminescence Bands Presenting Different Dependencies on the Excitation Power

•L.d.S. Menezes[1,2], J.A.O. Galindo[2], A.R. Pessoa[1,2], Y.E. Serge-Correales[3], S.J.L. Ribeiro[3], and A.M. Amaral[2]; [1]Chair in Hybrid Nanosystems, Faculty of Physics, Ludwig-Maximilians-University Munich, Munich, Germany; [2]Departamento de Física, Universidade Federal de Pernambuco, Recife-PE, Brazil; [3]Instituto de Química, Universidade Estadual Paulista, Araraquara-SP, Brazil

In spectroscopy, one often needs to distinguish overlapping luminescent bands. Rather complex procedures are commonly used. A method is proposed based on different dependencies of luminescent lines with the excitation power at single excitation wavelength.

CE-P.29 THU

LED-pumped Er:Cr:YSGG

L. Lopez, F. Druon, P. Georges, and •F. Balembois; Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, 91127, Palaiseau, France, Palaiseau, France

We demonstrate the first laser operation of a LED-pumped Er:Cr:YSGG at 2.79 μm. This luminescent concentrator is also a bright, broadband, incoherent source at 1.6 μm, overcoming the performance of classical sources in the SWIR.

CE-P.30 THU

FBGs in PCF for Four-Wave Mixing Sources for Quantum Optics

•A.I. Flint[1], W.A.M. Smith[2], A.C. Davis[2], R.H.S. Bannerman[1], P.C. Gow[1], J.C. Gates[1], D.H. Smith[3], P.J. Mosley[2], and P.G.R. Smith[1]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]Centre for Photonics and Photonic Materials, Department of Physics, University of Bath, Bath, United Kingdom; [3]Quix BV, Enschede, Netherlands

We present the fabrication of fibre Bragg gratings in solid-core photonic crystal fiber using small-spot direct 213nm UV writing. The use of these gratings, as applied to four-wave mixing sources for quantum optics, is discussed.

CE-P.31 THU

Doped Carbon Quantum Dots-Assisted Two-Photon Lithography: A Facile Technique for Fabricating Functional Micro/nanostructures

•S. RANI; IITB-Monash Research Academy, Mumbai, India

We report the application of doped carbon quantum dots for fabrication of threedimensional, highly fluorescent, and functional micro/nanostructures using femtosecond laserassisted two-photon lithography.

13:00 – 14:00

CG-P: CG Poster session

CG-P.1 THU

Attosecond Optical Spectroscopy of Monocrystalline Diamond

•G.L. Dolso[1], S.A. Sato[2], N. Di Palo[1], G. Inzani[1], R. Borrego-Varillas[3], M. Nisoli[1,3], and M. Lucchini[1,3]; [1]Department of Physics, Politecnico di Milano, Milano, Italy, Italy; [2]Center for Computational Sciences, University of Tsukuba, Tsukuba, Japan, Japan; [3]Institute for Photonics and Nanotechnologies, IFN-CNR, Milano, Italy, Italy

We measured attosecond electron dynamics in single-crystalline diamond induced by few-femtosecond optical light pulses. Our results, supported by TDDFT simulations, validate macroscopic models and identify the contribution of individual sub-bands to the total optical response.

CG-P.2 THU

Optical levitation of reflective shells using an LG01 vortex beam

•A.-H. Munj, R. Smith, and W. Kerridge-Johns; Imperial College, London, United Kingdom

We present optical levitation of reflective silver-coated glass shells ranging from 53-93μm in diameter, at large working distances (40-100mm) using a LG01 vortex laser. Minimum levitation powers ranged from 50mW to 100mW.

CG-P.3 THU

First operation phase of the 10 Hz 2 PW laser of ELI ALPS

•R.S. Nagymihály[1], J. Bohus[1], V. Pajer[1], A. Malakzadeh[1], L. Lehotai[1], B. Bussiere[2], F. Falcoz[2], M. Ravet-Senkans[2], O. Roy[2], P.-M. Paul[2], Á. Börzsönyi[1], K. Varjú[1], G. Szabó[1], and M. Kalashnikov[1]; [1]ELI ALPS Research Institute, Szeged, Hungary; [2]Amplitude , Evry, France

Performance and operation experiences of the novel 2 PW laser of ELI ALPS are presented in its first ramping up phase at the >400 TW peak power level at 2.5 and 10 Hz repetition rates.

CG-P.4 THU

Comparison of two spatial characterisation methods of XUV high-order harmonics for spatio-temporal control of attosecond pulses

•S. Prawdziak[1], C. Valentin[1], C. Péjot[1], F. Burgy[1], F. Catoire[1], E. Constant[2], and E. Mével[1]; [1]Centre Lasers Intenses et Applications (CELIA), Talence, France; [2]Institut Laser-Matière (ILM), Lyon, France

The spatial properties of XUV beams are measured and compared in two different ways: the SWORD method and a direct measurement using a Hartmann XUV wavefront sensor for further control of attosecond pulses.

CG-P.5 THU

Sub-atomic-unit Absolute Delay Calibration by the Analytical Fitting of Attosecond Streaking Measurements

•G. Inzani[1], N. Di Palo[1], G.L. Dolso[1], M. Nisoli[1,2], and M. Lucchini[1,2]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]Institute for Photonics and Nanotechnologies, IFN - CNR, Milano, Italy

Crucial prerequisites for measuring absolute timings in attosecond experiments are a proper characterization of the radiation and an absolute calibration of the delay axis. A novel analytical fit makes it possible with a sub-5-as accuracy.

CG-P.6 THU

Threshold Target Thickness in PW Laser Driven Ion Acceleration

•*S. Ter-Avetisyan* ; *University of Szeged, Szeged, Hungary*

A "threshold" target thickness for proton acceleration is observed. Above "threshold" proton energy almost independent on target thickness, below "threshold" it decreases. This observation, attributed to the pre-plasma, is confirmed analytically and by simulations.

CG-P.7 THU

Phase-Controlled Two-Color High-Order Harmonic Generation in Laser-Produced Plasmas

•*J. Mathijssen*[1,2], *K.S.E. Eikema*[1,2], *and S. Witte*[1,2]; [1]*Advanced Research Center for Nanolithography, Amsterdam, Netherlands*; [2]*Laserlab, Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

We have developed a setup for phase-controlled two-color high-order harmonic generation in laser-produced plasmas (LPP). This approach allows investigation of LPP dynamics, and determining HHG ionization and recombination times for atoms with complex level structures.

CG-P.8 THU

Backward Photoelectron Emission In Ionization

•*M.C. Suster, J. Derlikiewicz, F. Cajiao Vèlez, J.Z. Kamiński, and K. Krajewska*; *Institute of Theoretical Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland*

We proved that the mechanisms of the ionization process for low- and high-frequency laser pulses are different and, contrary to the status quo, the backward photoelectron emission in ionization is an inherently quantum effect.

CG-P.9 THU

Characterisation of a 200 nm Thick Liquid Jet Sheet for Ion Acceleration

•*A.P. Kovács*[1,2], *M. Karnok*[1], *T. Gilinger*[1], *M. Füle*[1,3], *and K. Osvay*[1,2]; [1]*National Laser-Initiated Transmutation Laboratory, University of Szeged, Szeged, Hungary*; [2]*Dept. of Optics and Quantum Electronics, University of Szeged, Szeged, Hungary*; [3]*Dept. of Experimental Physics, University of Szeged, Szeged, Hungary*

A system has been developed for measuring the thickness of ultrathin liquid jets in vacuum and on-line operation. The method is demonstrated with the characterisation of a 200 nm thick water liquid jet.

CG-P.10 THU

The Effect of Multi-Filamentation on Shock-Wave Generation inWater

•*S. Eardley, J. Marangos, M. Matthews, R. Smith, and J. Tisch*; *Imperial College London, London, United Kingdom*

In a study of laser-water filamentation an inverse relationship between pulse duration and shockwave energy was found. This relationship is attributed to the formation or lack of filament bundles and so-called super-filaments.

CG-P.11 THU

Moments Following Strong Field Ionization- Effect of the Coulomb Potential on Free-Electron's Trajectory in Atomic Gases

•*M. Agarwal*[1] *and V. Yakovlev*[2]; [1]*Max Planck Institute of Quantum Optics, Garching, Germany*; [2]*Ludwig Maximilian University of Munich, Munich, Germany*

We have found that the electron-ion Coulomb interaction plays an essential role in nonlinear photoconductive sampling, where strong-field ionization of atoms serves as a temporal gate for petahertz-scale measurements of optical fields.

CG-P.12 THU

Implementation of new frontend for PW-class PEARL laser facility

•*I. Mukhin, K. Glushkov, A. Soloviev, A. Shaykin, V. Ginzburg, I. Kuzmin, M. Martyanov, S. Stukachev, S. Mironov, I. Yakovlev, and E. Khazanov*; *Institute of Applied Physics RAS, Nizhny Novgorod, Russia*

The frontend laser with optical synchronization of OPCPA amplification stages, a broader femtosecond pulse spectrum, temporal shaping of pump pulse and a significant increase in the stability has been developed for PW-class PEARL laser

CG-P.13 THU

Second harmonic generation in a 140 fs Petawatt laser system

•*P. Fischer*[1], *B. Gonzalez-Izquierdo*[1], *V. Scutelnic*[1], *J. Hartmann*[1], *M. Speicher*[1], *S. Bruce*[2], *A. Helal*[2], *M. Spinks*[2], *E. Medina*[2], *H. Quevedo*[2], *M. Schollmeier*[1], *S. Steinke*[1], *G. Korn*[1], *and E. Gaul*[1]; [1]*Marvel Fusion GmbH, Munich, Germany*; [2]*Department of Physics, University of Texas, Austin, USA*

We reported on implementing efficient second harmonic generation of 140fs laser pulse from the Texas Petawatt system and the resulting ultra-clean temporal contrast. Experimental and simulation results are presented.

CG-P.14 THU

LED-pumped Ce:YAG luminescent concentrator for absolute calibration of streaks cameras at nanosecond sweep durations

M. Nourry-Martin[1,2], *A. Denoeud*[1], *C. Chollet*[1], *M. Bonneau*[1], *T. Vinci*[3], *A. Ravasio*[3], *S. Brygoo*[1], *S. Darbon*[1], *and* •*F. Balembois*[2]; [1]*CEA, DAM, DIF, Arpajon, France*; [2]*Université Paris-Saclay, Institut d'Optique Graduate School, Centre National de la Recherche Scientifique, Laboratoire Charles Fabry, Palaiseau, France*; [3]*LULI, CNRS, CEA, Sorbonne Université, Ecole Polytechnique–Institut Polytechnique de Paris, Palaiseau, France*

We demonstrate that a LED-pumped Ce:YAG luminescent concentrator is adapted to calibrate a streak optical pyrometer at the ns scale. Its properties helps also to reduce the uncertainty of temperature measurements by a factor 2.5.

CG-P.15 THU

Impact of electron-hole attraction on tunneling rate in crystalline solids based on quasi-Hartree-Fock equation

•*Y. Shinohara, H. Sanada, and K. Oguri*; *NTT Basic Research Laboratories, NTT Corporation, Atsugi, Japan*

We performed simulations to evaluate the influence of electron-hole interaction on tunneling ionization rate. The simulation results show the enhancement of the ionization rate depends on applied field strength, indicating field-dependent gap renormalization.

CG-P.16 THU

High-average Power, Soft X-ray Generation Driver at 2.1 μm

•*R. Maksimenka*[1], *T. Pinoteau*[1], *N. Forget*[1], *D. Walke*[2], *F. Gores*[2], *and I. Wilkinson*[2]; [1]*Fastlite, Antibes, France*; [2]*Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin, Germany*

We present a high-average power OPCPA system that produces CEP-stable, few-cycle pulses centered at 2.1 μm. The system was built at the Helmholtz-Zentrum Berlin and serves as a driver for a table-top, coherent, ultrashort-pulse soft X-ray source.

13:00 – 14:00

EA-P: EA Poster session

EA-P.1 THU

Measurements of Bohmian Trajectories

•*F. Huber*[1,2,3], *C. Versmold*[1,2,3], *J. Dziewior*[1,2,3], *L. Knips*[1,2,3], *E. Meyer*[4], *A. Szameit*[4], *H. Weinfurter*[1,2,3], *and J.D.A. Meinecke*[1,2,3]; [1]*Max-Planck-Institut für Quantenoptik, Garching, Germany*; [2]*Department für Physik, Ludwig-Maximilians-Universität, München, Germany*; [3]*Munich Center for Quantum Science and Technology (MCQST), München, Germany*; [4]*Institut für Physik, Universität Rostock, Rostock, Germany*

In contrast to standard quantum mechanics, Bohmian mechanics, allows definite trajectories, while being fully compatible with the standard theory in all empirical predictions. Using weak measurements we reconstruct trajectories in a double-slit and waveguide setup.

EA-P.2 THU

Theoretical investigation of superradiant laser on a transition in neutral Sr and design of active optical clock

•*S. Dubey*[1], *S. Zhou*[2], *S. Bennetts* [2], *F. Famà* [2], *C.B.S. Silva*[2], *B. Heizenreder*[2], *F. Schreck*[2], *G. Kazakov*[1], *and S.A. Schäffer*[2]; [1]*Atominstitut, Vienna University of Technology, Austria*; [2]*University of Amsterdam, Netherlands*

Active optical frequency standards provide interesting alternatives to their passive counterparts. Particularly, such a clock alone continuously generates highly stable narrow-line laser radiation. We report our study towards the realization of such a clock.

EA-P.3 THU

Observation of the Mollow Triplet from an optically confined single atom

•*B.L. Ng*[1], *C.H. Chow*[1], *and C. Kurtsiefer*[1,2]; [1]*Center for Quantum Technologies, Kent Ridge, Singapore*; [2]*Department of Physics, National University of Singapore, Kent Ridge, Singapore*

We characterize the atomic spectrum of a single ^{87}Rb atom at different excitation intensities. The preferred time-ordering of the emitted photons from opposite sidebands could be useful as a heralded narrowband single photon source.

EA-P.4 THU

The Squeeze Laser

•*A. Schönbeck, J. Südbeck, J. Zander, D. Berz-Vöge, and R. Schnabel*; *Universität Hamburg, Hamburg, Germany*

Photon shot noise imposes limits on high-precision laser-based measurements, which is often the case today even at the highest light output. Quantum squeezing is a technology that can circumvent the need for even higher powers.

EA-P.5 THU

Spin Noise Spectroscopy of Optical Light Shifts

•J. Delpy; ENS Paris-Saclay, Centrale Supélec, Université Paris-Saclay, CNRS, Orsay, France

A light-induced nonequilibrium regime is introduced in standard spin noise spectroscopy, which results in a splitting of the spin noise spectrum. This splitting is theoretically shown to originate from and to allow for the measurement of light shifts.

EA-P.6 THU

Measurement based CV parametrized quantum circuits.

•A. Verma; Technical University of Denmark, Kongens Lyngby, Denmark

In this submission, we show a deterministic and high fidelity generation of a large Haar random unitary parametrized by Homodyne measurement angles. Such an approach may promise scalable as well as high fidelity unitary design.

EA-P.7 THU

Single-mode Quantum Non-Gaussian Light from Warm Atoms

•J. Mika, L. Lachman, T. Lamich, R. Filip, and L. Slodička; Palacky University Olomouc, Olomouc, Czech Republic

We present the source of a single-mode quantum non-Gaussian light generated by the spontaneous four wave mixing in a warm atomic vapor.

EA-P.8 THU

Nonclassical light generation from laser-driven semiconductor intraband excitations

•R. Sondenheimer[1,2], I. Gonoskov[3], C. Hünecke[3], D. Kartashov[4], U. Peschel[1], and S. Gräfe[2,3]; [1]Institute of Solid State Theory and Optics, Friedrich Schiller University Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [3]Institute of Physical Chemistry, Friedrich Schiller University Jena, Jena, Germany; [4]Institute of Optics and Quantum Electronics, Friedrich Schiller University Jena, Jena, Germany

We investigate the generation of higher-order harmonics from a quantum optics perspective via laser-semiconductor interactions. All field modes are entangled, allowing for novel quantum information processing protocols with high photon numbers over large frequency ranges.

EA-P.9 THU

automatic relocking ecdl in optical tweezer machine for quantum computing and simulation

•m. zarei[1,2], i. knottnerus[2], a. urech[2], f. schreck[2], m. zawada[1], and p. morzyński[1]; [1]institute of physics, faculty of physics, astronomy and informatics, nicolaus copernicus university, torun, Poland; [2]institute of physics, university of amsterdam, amsterdam, Netherlands

we present a web application dedicated to redpitaya board for automatic and real-time relocking of the external-cavity diode lasers (ecdls) by cavity transmission and/or wavemeter signals in optical tweezer machine for quantum computing and simulation.

EA-P.10 THU

Towards the Development of an Optical Lattice Clock Testbed Setup for the iqClock Project

•A. Jha[1], A. Singh[1,2], Y. Kale[1], J. Wayland[1], Y. Huyan[1], Q. Sun[1,2], J. Jones[1,3], M. Gellesch[1], K. Bongs[1], and Y. Singh[1]; [1]University of Birmingham, Birmingham, United Kingdom; [2]British Telecommunications, Ipswich, United Kingdom; [3]ColdQuanta UK limited, Oxford, United Kingdom

We report the progress of the development of the optical lattice clock testbed system (lab-based) which aims at benchmarking another robust, field-deployable integrated optical lattice clock being developed under the iqClock project.

EA-P.11 THU

An Open-Access Optical Microcavity with Ultra-High Mechanical Stability

•M. Fisicaro, M. Witlox, H. van der Meer, M. Rost, and W. Löffler; Leiden University, Leiden, Netherlands

We have developed an open-cavity device with ultra-high stability of 6 pm rms at 4 K, allowing the operation of an optical cavity with Finesse 1800 in closed-cycle table-top cryostats without a mechanical low-pass filter.

EA-P.12 THU

Highly Pure and Bright Emission of Telecom C-Band Quantum Dots in Circular Bragg Grating Cavities

•R. Joos, C. Nawrath, S. Kolatschek, S. Bauer, P. Pruy, R. Sittig, P. Vijayan, J. Huang, M. Jetter, S.L. Portalupi, and P. Michler; Institut für Halbleiteroptik und Funktionelle Grenzflächen, Stuttgart, Germany

This work shows the first implementation of telecom C-band quantum dots coupled to circular Bragg gratings cavities. Excellent single-photon purity and ultra-high emission rate can be achieved paving the way towards complex quantum technology applications.

EA-P.13 THU

Spin-orbit coupling of light and cross-polarization extinction for single-photon sources

•P. Steindl and W. Löffler; Leiden University, Leiden, Netherlands

We show when and how mirror reflection Fresnel birefringence in combination with spin-orbit coupling can improve the cross-polarized extinction ratio for single quantum dot–cavity resonance fluorescence experiments and single-photon production.

EA-P.14 THU

Compact ULE reference cavity for stabilization of 2.6 μm DFB diode laser to study long-range interactions in ultracold Strontium atoms

•S. Ganesh, S. Zhang, B. Tiwari, K. Bongs, and Y. Singh; University of Birmingham, Birmingham, United Kingdom

We present a compact ULE reference cavity for stabilizing DFB laser at 2.6um which is employed as a probe for studying long-range induced electric dipolar interactions in ultracold Sr atoms trapped in deep optical lattice.

EA-P.15 THU

Dynamic Brillouin cooling for continuous optomechanical systems

•C. Zhu[1,2] and B. Stiller[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]University Erlangen-Nuremberg, Erlangen, Germany

We demonstrate that by periodically modulating a backward Brillouin process with a pulsed pump, a phonon cooling rate of several orders of magnitude can be achieved.

EA-P.16 THU

Photon subtraction from two-mode squeezed vacuum states using a waveguide trimer

•A.M. Datta[1], K. Tschernig[2], A. Perez-Leija[2], and K. Busch[1,3]; [1]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [2]CREOL, The College of Optics and Photonics, University of Central Florida, Orlando, USA; [3]Max-Born-Institut, Berlin, Germany

Recently, generating multiphoton quantum states using photon subtraction from a two-mode squeezed vacuum states was experimentally demonstrated. Here, we propose a new protocol where we reduce the number of photon-number-resolving detectors.

EA-P.17 THU

The contribution has been withdrawn.

EA-P.18 THU

Chiral Atomic Rydberg States

•S. Aull[1], S. Giesen[2], P. Zahariev[1,3], M. Debatin[1], R. Berger[2], and K. Singer[1]; [1]Experimentalphysik 1, Universität Kassel, Kassel, Germany; [2]Theoretische Chemie, Philipps-Universität Marburg, Marburg, Germany; [3]Institute of Solid State Physics, Bulgarian Academy of Sciences, Sofia, Bulgaria

It has been shown theoretically hat by combining Hydrogenic wavefunctions in superposition, the resulting electronic state can show chiral properties. We propose a protocol for experimentally creating those states in Rubidium.

EA-P.19 THU

Photon-Pair Recombination via Sum-Frequency Generation by Chirped, Aperiodically Poled LiNb Waveguide

•P. Hendra[1,2], J.R. León-Torres[1,2], and M. Gräfe[1,2,3]; [1]Fraunhofer Institute of Applied Optics and Precision Engineering IOF, Jena, Germany; [2]Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany; [3]Institute of Applied Physics, Technical University of Darmstadt, Darmstadt, Germany

Application of chirped, aperiodically poled Lithium Niobate waveguide in upconversion of entangled photon pairs.

EA-P.20 THU

Resonant Scattering and Quantum Modulation of a Coherent State with the Spin of a Quantum Dot

P. Androvitsaneas[1,2], A.B. Young[2], T. Nutz[2], J.M. Lennon[2], •S.T. Mister[2], C. Schneider[3], M. Kamp[4], S. Höfling[4], D.P.S. McCutcheon[2], E. Harbord[2], J.G. Rarity[2], and R. Oulton[2]; [1]Cardiff University, Cardiff, United Kingdom; [2]University of Bristol, Bristol, United Kingdom; [3]University of Oldenburg, Oldenburg, Germany; [4]Universität of Würzburg, Würzburg, Germany

We experimentally explore and theoretically model a dynamic QD spin-photon interaction. New scattered light properties and a discrete(quantised) phase modulation of the field are observed. These results have potential applications to quantum information processing tasks.

EA-P.21 THU

Fractional Fourier transform - Experimental implementation for spectro-temporal cat state

•S. Kurzyna[1,2], B. Niewelt[1,2], M. Jastrzębski[1,2], J. Nowosielski[1,2], W. Wasilewski[1], M. Mazelanik[1], and M. Parniak[1,3]; [1]Centre for Quantum Optical Technologies,Centre of New Technologies, University of Warsaw, Warsaw, Poland; [2]Faculty of Physics, University of Warsaw, Warsaw, Poland; [3]Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

By applying temporal and spectral modulation in gradient echo memory, we have performed experimental implementation of fractional Fourier transform in time frequency-domain. The results we have obtained may allow for spectro-temporal mode decomposition.

EA-P.22 THU

Hong-Ou-Mandel Effect between a Thermal Field and a Heralded Single-photon State: Improved visibility by Multiphoton Components

•A. Khodadad Kashi[1,2], L. Caspani[3], and M. Kues[1,2]; [1]Institue of Photonics, Leibniz University, Hannover, Germany; [2]Cluster of Excellence, Leibniz University, Hannover, Germany; [3]Institute of Photonics, Department of

Physics, University of Strathclyde, Glasgow, United Kingdom

Through the first experimental implementation of the spectral Hong-Ou-Mandel effect between a thermal field and a heralded state, we demonstrate that under certain statistical conditions, multiphoton components in the heralded state partially contribute to the HOM visibility.

EA-P.23 THU

Amplification and storage of orbital angular momentum of light via magnetically assisted optical gain

•J.W.R. Tabosa, R.S.N. Moreira, and J.C.A. Carvalho; Universidade Federal de Pernambuco, Recife, Brazil

We report on the amplification and storage of light carrying orbital angular momentum via magnetically assisted optical gain in a sample of cold atoms. This amplification mechanism allows to enhance the efficiency of the memory.

EA-P.24 THU

Quantum Self-Sustained Oscillator Arrays Towards Dissipative Time Crystals: Taming Phase Diffusion via Coherent Delayed Feedback

M. Li[1], •G.J. de Valcárcel[2], and C. Navarrete-Benlloch[2]; [1]Wilczek Quantum Center, Shanghai Jiao Tong University, Shanghai, China; [2]Departament d'Òptica i Optometria i Ciencies de la Visió, Universitat de València, Valencia, Spain

We analyze the possibility to dissipatively engineer time-crystalline states in arrays of self-sustained quantum oscillators. We find that this is feasible in 2D, 3D and mean-field geometries, with delayed coherent feedback helping towards this goal.

13:00 – 14:00

EB-P: EB Poster session

EB-P.1 THU

Deep Learning Based TEMPEST Attacks on a Quantum Key Distribution Sender

•A. Baliuka[1,2], M. Stöcker[1], M. Auer[1,2,3], P. Freiwang[1,2], H. Weinfurter[1,2,4], and L. Knips[1,2,4]; [1]Ludwig-Maximilian-University (LMU), Munich, Germany; [2]Munich Center for Quantum Science and Technology (MCQST), Munich, Germany; [3]Universität der Bundeswehr München, Neubiberg, Germany; [4]Max Planck Institute of Quantum Optics (MPQ), Garching, Germany

A side-channel attack on the electronics of a quantum key distribution sender is demonstrated analyzing radio-frequency emissions using neural networks. It can extract almost all secret key at a few centimeters from the device.

EB-P.2 THU

Real field clock synchronization for quantum key distribution using correlated photon pairs

•Y. Pelet, G. Sauder, O. Alibart, S. Tanzilli, and A. Martin; INPHYNI, université cote d'azur, Nice, France

We present the implementation of a time synchronization protocol on a real field quantum key distribution link spanning over 50km, managing to continuously keep the relative drift between two distant clocks below 12 ps.

EB-P.3 THU

Multi-Channel Time-Bin Quantum Key Distribution over a 70-km-long deployed Fiber Link

•N. Pavlovic Tucakovic[1], K. Paciorek[1], M. Cabrejo Ponce[1,2], C. Spiess[1,2], and F. Steinlechner[1,3]; [1]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [2]Friedrich Schiller University Jena, Jena, Germany; [3]Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany

We demonstrate a weak coherent pulse source scheme for time-bin encoded QKD with wavelength multiplexing. Multiple quantum channels are derived from a common laser source. The approach is verified over a 70-km-long deployed fiber link.

EB-P.4 THU

Countering detector manipulation attacks in quantum communication through detector self-testing

•L. Shen[1] and C. Kurtsiefer[1,2]; [1]Center for Quantum Technologies, Singapore, Singapore; [2]Department of Physics, National University of Singapore, Singapore, Singapore

We demonstrate a simple countermeasure to detect detector manipulation attacks using an auxiliary light source. This addresses a significant hardware vulnerability in practical quantum key distribution and is suitable for retrofitting onto existing systems.

EB-P.5 THU

Generative Adversarial Learning boosted by a Photonic Quantum Frequency Coprocessor

•P. Rübeling[1], T. Bækkegaard[1,2], N.T. Zinner[2], and M. Kues[1]; [1]Institute of Photonics, Hannover, Germany; [2]Department of Physics and Astronomy, Aarhus, Denmark

The potential of quantum Generative Adversarial Networks (qGANs) via Quantum Frequency Combs is explored numerically. Our results indicate that compared to a conventional GAN the qGAN needs fewer epochs to converge to the Nash equilibrium.

EB-P.6 THU

Novel Scheme for Clock Synchronisation in Continuous-Variable Quantum Key Distribution Systems with Discrete Modulation

•C. Schaeffer and S. Kleis; Helmut Schmidt University, Hamburg, Germany

At the distant locations of a CV-QKD system the time scales of free running electronics and lasers are synchronized with GPS stabilized oscillators. The software receiver operates reliable with a SNR = -26 dB.

EB-P.7 THU

Controlling the Recovery Time of the Superconducting Nanowire Single Photon Detector using a Tunable Resistor

•H. Wang[1], N. Noordzij[2], J.W.N. Los[2], and I.E. Zadeh[1]; [1] Department of Imaging Physics, Faculty of Applied Sciences, Delft University of Technology, Delft, Netherlands; [2]Single Quantum B.V., Delft, Netherlands

We outline a method using a tunable resistor in series with the superconducting nanowire detector to adjust its recovery time inside the cryostat. The resistance is determined by the heating effect on a superconducting wire.

EB-P.8 THU

Characterizing Polarization Switching in Gain-Switched Vertical-Cavity Surface-Emitting Lasers for Quantum Random-Number Generation

A. Quirce[1], •A. Valle[1], M. Valle-Miñon[1], and J. Gutierrez[2]; [1]Instituto de Fisica de Cantabria (IFCA), Universidad de Cantabria-CSIC, Santander, Spain; [2]Departamento de Matemática Aplicada y Ciencias de la Computación, Universidad de Cantabria, Santander, Spain

We characterize a quantum-random number-generator based on the excitation of the linearly polarized modes of a gain-switched VCSEL. We find good agreement between experiments and simulations incorporating the measured device intrinsic parameters.

EB-P.9 THU

DWDM-compatible entanglement distribution using a biphoton frequency comb

•T. Kobayashi[1,2], T. Yamazaki[1,2], R. Fujimoto[2], S. Miki[3,4], F. China[3], H. Terai[3], R. Ikuta[1,2], and T. Yamamoto[1,2]; [1]Center for Quantum Information and Quantum Biology, Osaka University, Osaka, Japan; [2]Graduate School of Engineering Science, Osaka University, Osaka, Japan; [3]Advanced ICT Research Institute, National Institute of Information and Communications Technology (NICT), Hyogo, Japan; [4]Graduate School of Engineering, Kobe University, Hyogo, Japan

We demonstrate a frequency-multiplexed polarization-entangled photon-pair distribution using 16-channel DWDM compatible filter with 25 GHz spacing. The photon pairs is generated by a singly resonant periodically poled lithium niobate waveguide resonator inside a Sagnac-type interferometer.

EB-P.10 THU

Long-distance entanglement distribution with ultra-bright polarization-entangled photon source and frequency division multiplexing

S. Sharma[1,2], K. Lozano-Mendez[1,2], R. Gomez[1,2], A. Kržič [1,2], C. Spiess[1,2], L. Gonzalez[1,2], C.A. Melo Luna[1], M. Gräfe[1], E. Beckert[1], and •F. Steinlechner[1,3]; [1]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [2]Friedrich Schiller University Jena, Jena, Germany; [3]Abbe Center of Photonics, Friedrich Schiller University Jena, , Jena, Germany

An ultra-bright polarization-entangled photon source based on SPDC, demonstrating high entanglement fidelity, presents a generation rate of ~1e8 Million pairs/s/mW/nm. We experimentally investigate the performance of the source in simulated attenuation scenarios upto 60 dB.

EB-P.11 THU

Distributing High Rate of Polarization-Entangled Photon Pairs over Long Distance through Standard Telecommunication Fiber

L. Shen[1], C.H. Chow[1], •J.Y.X. Peh[1], X.J. Yeo[1], P.K. Tan[1], and C. Kurtsiefer[1,2]; [1]Center for Quantum Technologies, Singapore, Singapore; [2]Department of Physics, National University of Singapore, Singapore, Singapore

We demonstrate entanglement distribution over 50km of standard telecommunication fiber with >10,000/s pair rate using a non-degenerate photon source. The modest hardware requirements make it practical for quantum key distribution deployment in existing metropolitan networks.

EB-P.12 THU

GaSb-based 1.5 μm quantum dot emitters for quantum photonic integration and communication

T. Hakkarainen[1], J. Hilska[1], •A. Chellu[1], L. Leguay[2], E. Luna[3], A. Schliwa[2], and M. Guina[1]; [1]Optoelectronics Research Centre, Physics Unit, Tampere University, Tampere, Finland; [2]Institute for Solid State Physics, Technical University of Berlin, Berlin, Germany; [3]Paul-Drude-Institut für Festkörperelektronik Leibniz-Institut im Forschungsverbund Berlin e.V, Berlin, Germany

Epitaxial fabrication, energy structure, and emission properties of GaSb quantum dots formed by filling droplet-etched nanoholes are presented. These quantum-photonics building blocks emit at 1.5 μm enabling wavelength compatibility with fiber optics and Si-photonics.

EB-P.13 THU

Adaptive optics enabled entanglement distribution over atmospheric turbulence channels.

•V. Nafria and I.B. Djordjevic; University of Arizona, TUCSON, USA

We present results from our experiment of an entangled distributed system over a 1.5km long retroreflector-based free-space optical communication link. Our results demonstrate significant improvement in coincidence counts with the help of adaptive optics in a strong turbulence regime.

EB-P.14 THU

Resilience of Quantum Key Distribution Source against Laser-Damage Attack by a Variety of Lasers

D. Ruzhitskaya[1,2], I. Zhluktova[3,4], A. Ponosova[1,2,3], •D. Trefilov[1,2,5], P. Chaiwongkhot[6], A. Huang[7], V. Kamynin[3], and V. Makarov[1,2,8]; [1]Russian Quantum Center, Moscow, Russia; [2]NTI Center for Quantum Communications, National University of Science and Technology MISiS, Moscow, Russia; [3]Prokhorov General Physics Institute of Russian Academy of Sciences, Moscow, Russia; [4]MIREA – Russian Technological University, Moscow, Russia; [5]University of Vigo,, Vigo, Spain; [6]Mahidol University, Bangkok, Thailand; [7]College of Computer Science and Technology, National University of Defense Technology, Changsha, China; [8]University of Science and Technology of China, Shanghai, China

We show an overview of our progress in investigation of the laser-damage attack on QKD sources. Harm to the security of QKD systems caused by exposure to 1550-nm CW and 1061-nm pulsed lasers is analyzed.

EB-P.15 THU

Second-order duality of light and its nonclassical complementarity

•R. Ikuta; GSES, Osaka University, Toyonaka, Japan; QIQB, Osaka University, Toyonaka, Japan

We introduce a concept of wave-particle duality in the context of second-order interference based on intensity correlation measurement known as the Hong-Ou-Mandel interference and show the nontrivial property of its complementarity.

EB-P.16 THU

Hybrid Integrated Photonic/Electronic Homodyne Detector for GHz Baud Rate Continuous Variable Quantum Key Distribution.

•A. Boubriak[1], R. Kumar[2], J. Frazer[1], J. Matthews[1], and E. Allen[3]; [1]University of Bristol, Bristol, United Kingdom; [2]University of York, York, United Kingdom; [3]University of Bath, Bath, United Kingdom

Making use of integrated photonics and integrated electronics allows for the possibility of GHz bandwidth homodyne detectors. In this work we demonstrate such a device and its prospective use in a CV-QKD system.

EB-P.17 THU

Coherent Raman spin control for the generation of high fidelity entangled photonic states with group-IV vacancies

•G. Pieplow[1], J.H.D. Munss[2], M.I. Monsalve[1], and T. Schröder[1,3]; [1]Humboldt Universit ät Berlin, Berlin, Germany; [2]PsiQuantum, Palo Alto, USA; [3] Ferdinand-Braun-Institut, Berlin, Germany

We analyze the potential of group-IV vacancies for the generation of highly entangled photonic states. The work focuses on the Raman spin gates, which can be, in principle, ultrafast and produce ultra-high-fidelity spin gates.

EB-P.18 THU

Robust Time Transfer with Single Photons on Hybrid Quantum Communication Scenarios in Fiber and Free-Space

•C. Spiess[1,2], K. Paciorek[2], N.L. Döll[2], A. Kržič[1,2], and F. Steinlechner[1,2]; [1]Friedrich Schiller University Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

Single photons are great timing carriers to synchronize communicating parties. We show robust time transfer on a 1.7 km free-space link. The time deviation is 100 ps at 1-second integration time with only unstable crystal oscillators.

EB-P.19 THU

Entangled photon source for satellite communications: Arguments in wavelength selections

•C.A. Melo-Luna[1], A. Kržič[1], S. Sharma[1,2], R. Mouchel[1], D. Heinig[1], and F. Steinlechner[1,2]; [1]Fraunhofer Institute for Applied Optics and Precision Engineering, IOF, Jena, Germany; [2]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University, Jena, Germany

We analyze in a modular approach the proper selection of the wavelength involving all the relevant input parameters for the Entangled Photon Sources and the Optical Ground Stations features in satellite QKD protocols.

EB-P.20 THU

Spectral purity characterization of telecom wavelength photons generated in aperiodically poled KTP

•J. Conrad[1,2], R. Gómez[1,2], M. Leipe[1,2], M. Cabrejo Ponce[1], G. Sauer[1,2], and F. Steinlechner[1,2]; [1]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [2]Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany

We characterize parametric down conversion emission from periodically- and aperiodically poled KTP crystals for spectral purity, heralding efficiencies, and Hong-Ou-Mandel interference visibility and study the influence of the pump spectrum.

EB-P.21 THU

Phase-only temporal mode transformations with complex spectral and temporal phases

J. Szuniewicz, F. Sośnicki, and •M. Karpiński; Faculty of Physics, University of Warsaw, Warsaw, Poland

We show that an arbitrary phase-only transformation between temporal modes can be performed using only two arbitrary phase patterns: one temporal and one spectral. The phases can be found using a standard phase retrieval algorithm.

EB-P.22 THU

Efficient Implementation of Time-Bin BB84-QKD Protocol with Phase-Randomized Weak Coherent States

•S. Francesconi[1], N. Biagi[1], I. Vagniluca[1], D. Ribezzo[2,3], T. Occhipinti[1], A. Zavatta[1,2], and D. Bacco[1,4]; [1]QTI s.r.l., Florence, Italy; [2]National Institute of Optics (CNR-INO), Florence, Italy; [3]University Federico II, Naples, Italy; [4]University of Florence, Florence, Italy

In this work we propose a novel scheme for implementing the time-bin QKD BB84 protocol with one-decoy method employing phase-randomized weak coherent states and we test the setup performances over a 20 dB-attenuation channel.

EB-P.23 THU

Measurement device independent entanglement witness of continuous variable states

•B.L. Larsen[1], S. Izumi[2], J.S. Neergaard-Nielsen[1], and U.L. Andersen[1]; [1]Technical university of Denmark , Kongens Lyngby, Denmark; [2]Xanadu Quantum Technologies Inc, Ontario, Canada

We experimentally demonstrate measurement device independent entanglement verification of a two-mode squeezed entangled state using a protocol found in [1]. With -1.5 dB of squeezing we are able to demonstrate the effectiveness of the protocol.

EB-P.24 THU

Characterization Method for Excitation Efficiency of Semiconductor Quantum Dots

•J.-H. Littmann[1], J. Lee[1], J.R. Gonzales-Ureta[1], R. Checchinato[1], S. Höfling[2], C. Schneider[3], and A. Predojević[1]; [1]Department of Physics, Stockholm University, 10691 Stockholm, Sweden; [2]Technische Physik, Physikalisches Institut and Würzburg-Dresden Cluster of Excellence ct.qmat, Universität Würzburg, 97074 Würzburg, Germany; [3]Institute of Physics, University of Oldenburg, 26129 Oldenburg, Germany

We present our measurements performed on quantum dots emitting photon pairs where we establish a method for accurate characterization of the excitation efficiency.

EB-P.25 THU

Long Time-Delay Quantum Interference of Single Photons Produced by a Quantum Dot - Cavity System

•K. Kanneworff[1], P. Steindl[1], J. Bowers[3], D. Bouwmeester[1,2], and W. Löffler[1]; [1]Huygens-Kamerlingh Onnes Laboratory, Leiden University, Leiden, Netherlands; [2]Dept. of Physics, University of California, Santa Barbara, USA; [3]Dept. of Electrical & Computer Engineering, University of California, Santa Barbara, USA

Quantum interference of photons is essential for many beyond-QKD applications of quantum networks – here we investigate the interference of single photons created more than a thousand lifetimes apart.

EB-P.26 THU

Single-Pixel Imaging LiDAR with Random-Modulated CW Laser for Application to 3D LiDAR

•D. Lim, D. Kim, K. Park, and Y.-s. Ihn; Emerging Science and Technology Directorate, Agency for Defense Development, Daejeon, South Korea

We present a single-pixel LiDAR system using random-modulated CW laser. Our work will be useful for 3D single-pixel imaging for long unambiguous range.

EB-P.27 THU

Atomic Frequency Comb Memory in Warm Rubidium Vapour

•Z. Schofield, A. Christan-Edwards, O. Mor , V. Laurindo Jr, and P.M. Ledingham; University of Southampton, Southampton, United Kingdom

The Atomic Frequency Comb quantum memory based in warm Rubidium vapour allows for the storage and on demand retrieval of quantum photonic information by tailoring the spectra into equally spaced combs.

EB-P.28 THU

Underwater transmission of mesoscopic twin-beam states for applications in Quantum Communication

A. Allevi[1], *•M. Lamperti*[1], *and M. Bondani*[2]; [1]*University of Insubria and IFN-CNR, Como, Italy*; [2]*Institute for Photonics and Nanotechnologies, IFN-CNR, Como, Italy*

We demonstrate that mesoscopic twin-beam states exhibit good robustness against any kind of external degradation, such as losses and noise sources. In particular, we experimentally investigate the possibility of using them for underwater Quantum Communication.

EB-P.29 THU

Noise types in correlation-based target detection

•V. Kornienko and I. Tittonen; *Aalto University, Helsinki, Finland*

We demonstrate analytically and with a model experiment that target detection protocols based on entangled states are vulnerable towards the correlated noise from a partially reflecting jamming object, in contrast to the thermal background noise.

EB-P.30 THU

Quantum Randomness Certification Through Three-state Discrimination

•L. Nunes Faria, C. Rock i Carceller, Z. Liu, U. Andersen, J. Neegaard-Nielsen, and J. Brask; *Danmarks Tekniske Universitet, Kongens Lyngby, Denmark*

Randomness is extracted by sending to a single-photon detector three possible time bin encoding of coherent states. Considering measurement outcomes which may discriminate only two of the inputs, randomness is extracted from the other one.

EB-P.31 THU

Modulated Entangled Photon Source for Quantum Secret Sharing

•P. Ancsin, M. Cabrejo Ponce, and F. Steinlechner; *Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*

Quantum secret sharing is a multi-party quantum key distribution scheme, which can be implemented by using two-photon states only. Its feasablity has been demonstrated by the use of an actively modulated polarization-entangled photon source.

EB-P.32 THU

Towards Single-Photon Emitters (SPE) Integration with Optical Fibers

•J.P. Berti Ligabô[1], *T. Heindel*[2], *S. Reitzenstein*[2], *J.N. Donges*[2], *C. Schneider*[3], *M.A. Schmidt*[4], *and F. Eilenberger*[5]; [1]*Institute of Applied Physics, Friedrich Schiller University, Jena, Germany*; [2]*Technische Universität Berlin, Berlin, Germany*; [3]*Carl von Ossietzky University of Oldenburg, Oldenburg, Germany*; [4]*Leibniz Institute of Photonic Technology, Jena, Germany*; [5]*Fraunhofer IOF, Jena, Germany*

A complete framework using custom design mechanics and metalenses for coupling strain engineered TMD (Transition-Metal Dichalcogenide) monolayers containing SPE (Single-Photon Emitters) into optical fibers is described.

EB-P.33 THU

Photoluminescence (PL) imaging of QDs for deterministic fabrication of on-demand single-photon sources

•A. A. Madigawa, B. Gaal, N. Gregersen, and B. Munkhbat; *Technical University Of Denmark, Lyngby, Denmark*

In this study, we aim to investigate the photoluminescence imaging (PL) technique to determine the best approach to extract and position with high accuracy the randomly positioned quantum dots (QD) in photonic nanostructures.

EB-P.34 THU

Experimental Classification of Samples with Few Coincidence Measurements Using Polarization-Entangled Photon Pairs

•V.R. Besaga[1], *L. Zhang*[1], *A. Vega*[1], *P.S. Chauhan*[1,2], *T. Pertsch*[1,2], *A. Sukhorukov*[3], *and F. Setzpfandt*[1,2]; [1]*Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany*; [2]*Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*; [3]*ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Department of Electronic Materials Engineering, Research School of Physics, The Australian National University, Canberra, Australia*

We demonstrate experimental non-local identification of different polarization objects regardless of their orientation by performing only few coincidence measurements using the polarization-entangled photon pairs and only one fixed polarization analyzed in the sample arm.

EB-P.35 THU

Control of Ion Motion using Rydberg Excitation

•M. Mallweger[1], *A. Cidrim*[1,2], *H. Parke*[1], *S. Salim*[1], *N. Kuk*[1], *R. Thomm*[1], *A. Santos*[1,2], *C. Zhang*[1], *and M. Hennrich*[1]; [1]*Stockholm University, Stockholm, Sweden*; [2]*Universidade Federal de Sao Carlos, Sao Carlos, Brazil*

The properties of trapped Rydberg ions, such as the polarizability, scale drastically with increasing quantum number. We can therefore employ a shifted trapping potential to perform coherent phase operations with the ion motion.

13:00 – 14:00

EH-P: EH Poster session

EH-P.1 THU

Holographic Optical Metasurfaces with High Trap Stiffness

•T. Plaskocinski, J. Xiao, M. Biabanifard, S. Persheyev, and A. Di Falco; *University of St Andrews, St Andrews , United Kingdom*

Photonic metasurfaces have been proposed to create on-chip solutions for optical trapping applications. We present a metasurface-enabled on-chip system, capable of trapping extended objects, with performance comparable to a system using high numerical aperture objectives.

EH-P.2 THU

The contribution has been withdrawn.

EH-P.3 THU

Parametric Metadevices for Electromagnetic Wave Amplification

•F. Kovalev and I. Shadrivov; *ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Research School of Physics, The Australian National University, Canberra, Australia*

We propose and study a parametric metadevice for amplification of electromagnetic waves. We found that our subwavelength thin metadevices can provide amplification of up to 10 dB and analysed its stability.

EH-P.4 THU

Giant circular dichroic SHG behaviors of doubly SP resonant asymmetric Al nanorod dimer structures

•A. Sugita and S. Tamotsu; *Shizuoka University, Hamamatsu, Japan*

Nonlinear chiroptics are reported about doubly SP resonant asymmetric aluminum nanodimers. SHG circular dichroism as large as ~0.6 was observed from artificial, chiral plasmonic systems. The value and sign were tunable by changing geometric parameters.

EH-P.5 THU

Deterministic nanoantenna array design for stable plasmon-enhanced harmonic generation

•T.-I. Jeong[1], *S. Kim*[1], *S. Kim*[1], *and S. Kim*[1,2]; [1]*Department of Cogno-Mechatronics Engineering, PUSAN, South Korea*; [2]*Department of Optics and Mechatronics Engineering, PUSAN, South Korea*

Deterministic design for stable plasmon-enhanced harmonic generation by analysis of the beam position-dependent THG yield with the density of a nanoantenna array.

EH-P.6 THU

Hyper Rayleigh Scattering on Gold Nanoparticles : Insights into the Origin of the Response from a Polarization Analysis

•M. Slemp[1], *E. Salmon*[1], *C. Jonin*[2], *and P.-F. Brevet*[1]; [1]*Non-Linear Optical Equipment and Interfaces Group (ONLI), Institut Lumière Matière ILM, UMR CNRS 5306, Université Claude Bernard Lyon 1, Villeurbanne, France*; [2]*Laboratoire Charles Coulomb, UMR CNRS 5221, Université Montpellier, Montpellier, France*

We present a polarization-resolved analysis of the Hyper-Rayleigh Scattering Response for spherical gold nanoparticles differing in size (200 down to 2 nm) to reveal the contributions to this response.

EH-P.7 THU

Topology for the classification and design of disordered metasurfaces

•T. Madeleine, N. Podoliak, O. Buchnev, G. D'Alessandro, J. Brodzki, and M. Kaczmarek; *University of Southampton, Southampton, United Kingdom*

We built topological tools to characterise positional correlated disorder in metasurfaces. These tools can be used for the fast design of complex physical systems and to numerically investigate fundamental phenomena such as Anderson localisation.

EH-P.8 THU

FaSST: a Frequency-agile Spintronic Superlattice Terahertz Metasurface for non-contact detection of magnetic fields

S. Karmakar[1], *•R.K. Varshney*[2], *and D. Roy Chowdhury*[3]; [1]*Department of Electrical and Computer Engineering, Princeton University, New Jersey, 08544, USA*; [2]*Department of Physics, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, 110016, India*; [3]*Department of Physics, Ecole Centrale School of Engineering - Mahindra University, Hyderabad, Telangana, 500043, India*

We propose novel spintronic superlattice (FaSST) metasurface operating by terahertz magneto-transport mechanism. We detect presence of low-intensity magnetic field (~ 30 mT) with capability of both frequency (~ 20 GHz) and intensity modulation of resonances.

Hall B0

EH-P.9 THU

Modulating the Temporal Dynamics of Nonlinear Ultrafast Plasmon Resonances

•*H. Asif and R. Sahin; Akdeniz University , Antalya, Turkey*

We propose the lifetime enhancement of the second harmonic (SH) plasmon mode exclusively after the natural decay time of the fundamental mode (FM), which distinguishes SH mode irrespective of its spatial convolution with elementary modes.

EH-P.10 THU

Efficiency Characterization of Optical Vortex Generation with Nanoplasmonic Media

•*E.I. Albar[1], F. Bonafe[1], V. Kosheleva[1], A. Rubio[1,2], and H. Appel[1]; [1]Max Planck Institute for Structure and Dynamics of Matter, Hamburg, Germany; [2]Center for Computational Quantum Physics (CCQ), New York, USA*

We perform numerical simulations where we employ Archimedean spirals and other gold nanoplasmonic structures in order to generate optical vortices . We characterize efficiencies of such structures and address the generation mechanism of orbital angular momentum in electromagnetic fields.

EH-P.11 THU

Minimizing the Focal Shift Effect on 2D Metalenses

•*S. Aksu; Koç University, Istanbul, Turkey*

We show that the numerical aperture is fundamentally critical to minimize the focal shift effect on 2D metalenses to obtain symmetric focal intensity distribution, which leads to better performing dielectric metalenses in near and mid-IR.

EH-P.12 THU

Hydrodynamic Model of Plasmonic Crystal in Magnetic Field

•*I. Gorbenko and V. Kachorovskii; Ioffe Institute, St. Petersburg, Russia*

We discuss terahertz excitation of plasmonic crystal (multigated structure with periodic modulation of electron density) placed in magnetic field. We demonstrate that transmission spectrum of such a structure can be controlled by the magnetic field.

EH-P.13 THU

High entropy alloy for midinfrared metasurfaces

•*Y. Nishijima and T. Sudo; Yokohama National University, Yokohama, Japan*

We have evaluated the optical permittivity of High entropy alloys and their components for mid-infrared plasmon applications

EH-P.14 THU

Plasmon-Mediated Singlet Fission Dynamics in TIPS-PEN near Silver-Organic interface

•*P. Kolesnichenko[1,2], M. Hertzog[1], F. Hainer[1,2], F. Deschler[1,2], J. Zaumseil[1], and T. Buckup[1,2]; [1]Institute of Physical Chemistry, Heidelberg, Germany; [2]Centre for Advanced Materials, Heidelberg, Germany*

Plasmon-mediated singlet fission dynamics near silver-organic interface was observed. Changing the local electric field energy in the organic layer allows for tuning the singlet fission yield in the broad range from ~70% to ~180%.

EH-P.15 THU

Magnetoelectric coupling in partial double-slotted all-dielectric resonator

•*M. Pradhan, S. Sharma, S.B.N. Bhaktha, and S.K. Varshney; Indian Institute Of Technology Kharagpur, Kharagpur, India*

Magnetoelectric coupling parameters in conjunction with the anapole state are obtained in a partial double-slotted all-dielectric silicon nanodisk resonator to enhance the bianisotropy for applications in nonreciprocity and metachirality in the near-infrared region.

EH-P.16 THU

Self-Assembled Deep Ultraviolet Rhodium nanogap antenna to enhance single protein autofluorescence

•*P. Roy[1], S. Zhu[2], J.B. Claude[1], J. Liu[2], and J. Wenger[1]; [1] Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, AMUTech,13013, Marseille, France; [2]Department of Chemistry, Duke University, Durham,27708, North Carolina, USA*

Self-assembled label-free detection platform for single proteins in DUV range using natural autofluorescence and Rh Dimer gap antenna design, showing 2 orders higher enhancement than confocal methods and 1 order higher than current state-of-the-art techniques.

EH-P.17 THU

Excitation wavelength-dependent study to investigate the mechanism of light-induced spectral redshift of a single gold nanorod

•*P. Ghosh[1], A.L. Chakraborty[1], and S. Khatua[2]; [1]Department of Electrical Engineering, Indian Institute of Technology Gandhinagar, Gandhinagar, India; [2]Department of Chemistry, Indian Institute of Technology Gandhinagar, Gandhinagar, India*

We report experimental observations of a light-induced wavelength-dependent reaction on a single gold nanorod and demonstrate the possible mechanism behind by study of spectral redshift in the photoluminescence spectrum of gold nanorods.

EH-P.18 THU

Graphene-based optically transparent metasurfaces for smart windows

•*G. Magno[1], L. Caramia[1], G.V. Bianco[2], G. Bruno[2], A. D'Orazio[1], and M. Grande[1,2]; [1]Polytechnic University of Bari, Bari, Italy; [2]CNR-NANOTEC, Bari, Italy*

We investigate optically transparent programmable digital mmWaves metasurfaces for smart windows and urban surfaces, using CVD graphene elements. Electromagnetic response depending on the specific encoding shows beam splitting and RCS reduction capabilities.

EH-P.19 THU

Graphene enhanced absorption entailed by the electromagnetic field localization in a photonic structure

•*E. Otero[1], M. Grande[2,3], J. Trull[1], N. Akozbek[4], A. D'Orazio[2], G.V. Bianco[3], G. Bruno[3], M. Scalora[4], and C. Cojocaru[1]; [1]Department of Physics, Universitat Politècnica de Catalunya, Terrassa, Spain; [2]Department of Electrical and Information Engineering, Politecnico di Bari, Bari, Italy; [3]CNR-NANOTEC, Bari, Italy; [4]Aviation and Missile Center, US Army CCDC, Redstone Arsenal, USA*

We measure a 3.6-fold optical absorbance enhancement in graphene monolayers when placed onto a photonic structure designed to localize the electromagnetic field at its surface, with respect to the same layers without the structure.

EH-P.20 THU

Graphene plasmonics: a comprehensive atomistic modeling

•*L. Nicoli, P. Lafiosca, T. Giovannini, and C. Cappelli; Scuola Normale Superiore, Pisa, Italy*

We present a novel atomistic model, namely ωFQ, capable of predicting the optical properties of graphene-based substrates in a colloidal dispersion with application to plasmonics and plamson-mediated surface enhanced spectroscopies.

NOTES

Room 1 ICM

8:30 – 10:00

CM-8: Laser-based surface functionalization and sensors

Chair: Nathalie Destouches, Hubert Curien Laboratory, St. Etienne, France

CM-8.1 FRI 8:30

GlassHarp - A Micromechanical Device for Direct Measurement of Momentum Transfer and Mass Removal During Laser Ablation

•*B. Hermann and Y. Bellouard*; *Ecole Polytechnique Fédérale de Lausanne (EPFL), Neuchâtel, Switzerland*

Understanding laser ablation is not only of fundamental interest but also relevant for material processing and novel concepts for space debris removal. We use a micro-mechanical oscillator made of glass to directly detect momentum transfer and mass removal during ablation.

CM-8.2 FRI 8:45

Textile Strain Sensor by Femtosecond-Laser-Induced Graphene Formation on Kevlar

•*D. Yang, H.K. Nam, T.-S.D. Le, Y. Lee, Y.-R. Kim, S.-W. Kim,*

Room 2 ICM

8:30 – 10:00

CJ-7: Mid-IR fiber sources

Chair: Jesper Laegsgaard, Technical University of Denmark, Lyngby, Denmark

CJ-7.1 FRI (Invited) 8:30

All soft glass fiber components and sources

•*M. Rochette*; *McGIll University, Montreal, Canada*

This presentation highlights the latest progress at McGill University towards the fabrication of optical fiber components and optical fiber sources made of soft glasses. Optical fiber couplers and all fiber sources will be presented.

Room 3 ICM

8:30 – 10:00

EA-6: Quantum optics in imaging

Chair: Olivier Dulieu, Université Paris-Saclay, Paris

EA-6.1 FRI (Keynote) 8:30

Imaging at the single-photon limit using homodyne detection

O. Wolley[1], S. Mekhail[1], P.-A. Moreau[2,3], T. Gregory[1], G. Gibson[1], G. Leuchs[4,5], and •M. Padgett[1]; [1]*University of Glasgow, Glasgow, United Kingdom*; [2]*National Cheng Kung University, Tainan, Taiwan*; [3]*Center for Quantum Frontiers of Research and Technology, Tainan, Taiwan*; [4]*Max Planck Institute for the Science of Light, Erlangen, Germany*; [5]*Friedrich-Alexander-Universität , Erlangen-, Germany*

Using homodyne detection we obtain images in the short-wave infrared region of the spectrum with an illumination flux of order one photon per image pixel despite the camera having a noise floor one to two order of magnitude higher.

Room 4a ICM

8:30 – 10:00

CK-12: Photonic crystals

Chair: Marcus Ossiander, Graz University of Technology / Harvard University, Austria

CK-12.1 FRI 8:30

Direct Determination of Optomechanical Photonic Crystal Mechanical Mode Profile via Quasi Near-Field Perturbation

•*T. Martel[1] and R. Braive[1,2,3]*; [1]*Centre de Nanosciences et de Nanotechnologies, Palaiseau, France*; [2]*Université Paris Cité, Paris, France*; [3]*Institut Universitaire de France, Paris, France*

We describe preliminary results of a novel method allowing the direct measurment of mechanical mode spatial repartition in optomechanical photonic crystals through the local pertubation of the optical and mechanical modes.

CK-12.2 FRI 8:45

Supersymmetric Compactification and Higher-Dimensional Rearrangement of Photonic Lattices

•*T.A.W. Wolterink, M. Heinrich, and A. Sza-*

Room 4b ICM

8:30 – 10:00

EI-1: 2D van der Waals materials: fundamentals and applications

Chair: Chiara Trovatello, Columbia University, New York, USA

EI-1.1 FRI (Invited) 8:30

Top down exfoliation of 2D materials and creation of their artificial structures

•*F. Liu*; *Stanford University, Stanford, USA*

We have developed scalable and controllable top-down techniques to exfoliate van der Waals crystals and create 2D flakes, nanoribbons, and artificial stacks, which are used for studies of static and dynamic properties.

Room 5 ICM

8:30 – 10:00

CC-4: THz QCL

Chair: Ileana-Cristina Benea-Chelmus, EPFL, Lausanne, Switzerland

CC-4.1 FRI 8:30

THz optical solitons in planarized quantum cascade double ring lasers

•*P. Micheletti[1], U. Senica[1], A. Forrer[1], S. Cibella[2], G. Torrioli[2], M. Beck[1], J. Faist[1], and G. Scalari[1]*; [1]*ETH Zurich, Zurich, Switzerland*; [2]*CNR-Istituto di Fotonica e Nanotecnologie, Rome, Italy*

We report THz optical soliton formation in double-waveguide ring QCL featuring anomalous dispersion. Free-running spectra with sech2 envelopes are presented together with SWIFT measurement showing 12 ps pulses in the reconstructed emission time-profile.

CC-4.2 FRI 8:45

Heterogeneous Terahertz Quantum Cascade Laser For Ultra-Broadband Emission

•*M. Jaidl[1,2], M. Beiser[2,3], M. Giparakis[2,3], M.A. Kainz[1,2], D.*

Room 11 ICM

8:30 – 10:00

CI-5: Quantum and free-space communications

Chair: Peter Horak, University of Southampton, Soutampton, United Kingdom

CI-5.1 FRI 8:30

High-Speed Interband Cascade Infrared Photodetectors for Free-Space Communication

•*R. Szedlak[1], A. Lardschneider[1], H. Knötig[1], R. Weih[2], P. Didier[3], O. Spitz[3], J. Koeth[2], F. Grillot[3], and B. Schwarz[1]*; [1]*Institute of Solid State Electronics, TU Wien, Vienna, Austria*; [2]*nanoplus Nanosystems and Technology GmbH, Gerbrunn, Germany*; [3]*Institut Polytechnique, LTCI Telecom, Paris, France*

We analyze the high-speed performance and electrical bandwidth of interband cascade infrared photodetectors. Limitations are investigated and an application in a free-space communication system is demonstrated.

CI-5.2 FRI 8:45

Mapping relations between the polarization, the higher-order and the orbital angular momentum Poincaré spheres for inner points

•*D. Marco[1,2], M.d.M.*

Room 12a ICM

8:30 – 10:00

CE-8: Photonic integrated circuits

Chair: Christopher Holmes, University of Southampton, United Kingdom

CE-8.1 FRI 8:30

Low-loss lithium tantalate photonic integrated circuits

C. Wang[1,2], •Z. Li[1], Y. Chen[2], K. Huang[2], X. Ke[2], J. Riemensberger[1], R.N. Wang[1], X. Ou[2], and T.J. Kippenberg[2]; [1]*Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland*; [2]*State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai, China*

We show the first LiTaO3 photonic integrated circuits (PICs) fabricated on a 4-inch LiTaO3-on-insulator (LTOI) wafer with optical loss as low as 5.5 dB m-1 and high-yields at the wafer scale.

CE-8.2 FRI 8:45

Wafer-scale Manufacturing of Ultra-low Loss, High-density Si_3N_4 Photonic Integrated Circuits

•*X. Ji, R.N. Wang, Z. Qiu, and T.J. Kippenberg*; *Institute of*

Room 12b ICM

8:30 – 10:00

ED-5: Precision metrology

Chair: Lucile Rukowski, Institute of Physics of Rennes, Rennes, France

ED-5.1 FRI (Invited) 8:30

Entanglement-enhanced frequency comparison of two optical atomic clocks

B.C. Nichol, R. Srinivas, D.P. Nadlinger, P. Drmota, D. Main, G. Araneda, C.J. Ballance, and •D.M. Lucas; *Oxford University, Oxford, United Kingdom*

We demonstrate entanglement-enhanced frequency comparison of two trapped-ion optical atomic clocks, which are connected via a 4m optical fibre quantum network link. We approach the ultimate precision allowed by quantum mechanics – the Heisenberg limit.

Room 13a ICM

8:30 – 10:00

JSIII-3: Photonic accelerators I

Chair: Volker Sorger, George Washington University, Washington and Optelligence, Upper Marlboro, USA

JSIII-3.1 FRI (Invited) 8:30

Motivation and challenges for applying photonic neuromorphic computing technologies

•*B. Offrein, E. Vlieg, F. Hermann, L. Carraria Martinotti, and F. Horst; IBM Research Europe - Zurich, Rueschlikon, Switzerland*

New concepts are required to improve the power efficiency of neural networks. Analog in-memory computing signal processing can improve the efficiency by several orders of magnitude. The prospects of photonic concepts will be discussed.

Room 13b ICM

8:30 – 10:00

CD-11: Nonlinear metasurfaces

Chair: Thomas Zentgraf, Paderborn University, Germany

CD-11.1 FRI (Invited) 8:30

Localized States in Nonlinear Topological Photonics

•*D. Smirnova; Australian National University, Canberra, Australia; RIKEN, Wakoshi, Japan*

We discuss nonlinear effects in topological photonic lattices. This covers nonlinear dynamics of edge wavepackets propagating along the domain walls and scenarios of modulational instability development, linked to topological properties of energy bands.

Room 14a ICM

8:30 – 10:00

EF-7: Complex fiber dynamics II

Chair: A. Pasquazi, University of Loughborough, United Kingdom

EF-7.1 FRI 8:30

Experimental observation of phase mode-locking in multimode graded-index optical fiber

•*F. Mangini[1], M. Ferraro[1], Y. Sun[1], M. Zitelli[1], P. Parra-Rivas[1], T. Hansson[2], V. Couderd[3], and S. Wabnitz[1]; [1]Sapienza University of Rome, Rome, Italy; [2]Linköping University, Linköping , Sweden; [3]Université de Limoges, Limoges, France*

In this work, we have experimentally demonstrated, using a holographic mode decomposition technique, that the beam self-cleaning is associated with both a well-defined thermodynamic distribution of the intensities and a spatial phase-locking among the modes.

EF-7.2 FRI 8:45

Phase conjugation and focusing in non-Hermitian fibers

•*K. Makris[1,2] and D. Psaltis[3]; [1]ITCP-Physics Department, University of Crete, Heraklion, Greece;*

Room 14b ICM

8:30 – 10:00

CH-13: IR & Raman sensing

Chair: Christoph Haisch, Technical University of Munich, Germany

CH-13.1 FRI 8:30

Standardising electric-field-resolved molecular fingerprints

•*M. Huber[1,2], M. Trubetskov[1,2], W. Schweinberger[1,2,3], P. Jacob[1,2], M. Zigman[1,2,3], F. Krausz[1,2,3], and I. Pupeza[1,2,4]; [1]Max Planck Institute of Quantum Optics, Garching, Germany; [2]Ludwig Maximilian University Munich, Garching, Germany; [3]Center for Molecular Fingerprinting, Budapest, Hungary; [4]Leibniz Institute of Photonic Technology, Jena, Germany*

Electric-field-resolved spectroscopy (FRS) of impulsively-excited molecular vibrations enables background-free detection of sample-specific information. Here, we present a data processing procedure that preserves the consequent sensitivity advantage while removing instrument-specific excitation information, thereby standardizing FRS fingerprints.

Room 14c ICM

8:30 – 10:00

EE-2: Ultrafast processes in ionised media

Chair: Francesco Tani, MPI for the Science of Light, Erlangen, Germany

EE-2.1 FRI (Keynote) 8:30

Air Photonics

•*S. Skupin; Institut Lumière Matière, UMR 5306 Université Lyon 1 - CNRS, Université de Lyon, 69622 Villeurbanne, France*

Interacions of ionizing ultrashort laser pulses in ambient air are frequenly exploited in nonlinear photonics. We review major applications ranging from femtosecond filamentation and pulse compression to broadband THz generation and describe challenges and trends.

Room Osterseen ICM

8:30 – 10:00

CL-5: Spectroscopy

Chair: Dario Polli, Politecnico di Milano, Milano, Italy

CL-5.1 FRI (Invited) 8:30

Unconventional SERS: from metal/plasmon-free to wearable/flexible SERS

•*K. Goda; The University of Tokyo, Tokyo, Japan*

I present two types of unconventional surface-enhanced Raman spectroscopy (SERS) with high measurement reproducibility, namely porous carbon nanowires and gold nanomesh as SERS substrates for metal/plasmon-free and wearable/flexible SERS applications.

Room 21 ICM

8:30 – 10:00

EJ-3: Nonlinear optics modeling & artificial intelligence

Chair: Stefan Skupin, Université de Lyon, Lyon, France

EJ-3.1 FRI (Invited) 8:30

Complete computation of macroscopic high harmonic generation using artificial intelligence

•*J.M. Pablos-Marín, J. Serrano, and C. Hernández-García; Universidad de Salamanca, Salamanca, Spain*

Artificial intelligence allows us to perform full macroscopic calculations of high harmonic generation based on the TDSE. We apply our method to retrieve complex topological EUV harmonic structures, revealing characteristics that usual approximations don't resolve.

Room 22a ICM

8:30 – 10:00

EC-1: Non-linear and non-hermitian topological photonics

Chair: Daria Smirnova, Australian National University, Canberra, Australia

EC-1.1 FRI (Invited) 8:30

Topological photonics with cavity polaritons

•*J. Bloch; Center for Nanoscience and Nanotechnology, Palaiseau, France*

This talk will address the exploration of topological photonics using cavity polaritons. The general properties of this driven dissipative non-linear platform will be discussed together with the new ooportunities they offer.

NOTES

and Y.-J. Kim; KAIST (Korea Advanced Institute of Science and Technology), Daejeon, South Korea

Strain sensors are used in the field of advanced healthcare, structural monitoring, and human-machine interface. Here, we introduce the direct-laser conversion of Kevlar textile to laser-induced graphene by femtosecond laser for implementing a strain sensor.

CM-8.3 FRI 9:00

Full control of surface roughness when engraving transparent materials using femtosecond laser ablation

•*E. Kažukauskas*[1], *S. Butkus*[1,2], *V. Jukna*[1], *D. Paipulas*[1], *and V. Sirutkaitis*[1]; [1]*Laser Research Center, Faculty of Physics, Vilnius University, Vilnius, Lithuania*; [2]*Light Conversion, Vilnius, Lithuania*

In this study, we investigate the surface roughness of laser-engraved fused silica samples and search for ways to control it.

CJ-7.2 FRI 9:00

FBG-stabilized Dysprosium:fluoroindate mid-infrared fiber laser

Y. Ososkov, J. Lee, T. Fernandez, •*A. Fuerbach, and S. Jackson; MQ Photonics (Macquarie University), Sydney, Australia*

We report a narrow-linewidth laser operation with a first-reported high-reflectivity FBG inscribed in the Dy-doped fluoroindate glass. The result suggests significant improvements in fluoroindate fiber quality and implies future development of high-power wavelength stabilized MIR laser sources.

meit; University of Rostock, Rostock, Germany

Self-imaging photonic lattices enable perfect transfer of quantum and classical states, yet are challenging to implement at scale. We harness supersymmetry to engineer compacted two-dimensional systems exhibiting equivalent characteristics and experimentally investigate their dynamics.

CK-12.3 FRI 9:00

Spectral topological edge state transfer in diamond photonic lattices

G. Cáceres-Aravena[1,2], *B. Real*[1,2], *D. Guzmán-Silva*[1,2], •*P. Vildoso*[1,2], *I. Salinas*[1,2], *A. Amo*[3], *T. Ozawa*[4], *and R.A. Vicencio*[1,2]; [1]*Departamento de Física, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile*; [2]*Millenium Institute for Research in Optics - MIRO, Santiago, Chile*; [3]*Univ. Lille, CNRS, UMR 8523-PhLAM-Physique des Lasers Atomes et Molécules, F-59000 Lille, France, Lille, France*; [4]*Advanced*

EI-1.2 FRI 9:00

Control of electron density in WSe2 monolayers via photochlorination

•*E. Katsipoulaki*[1,2], *I. Demeridou*[1], *G. Vailakis*[1,3], *P. Patsalas*[4], *G. Kopidakis*[1,3], *G. Kioseoglou*[1,3], *and E. Stratakis*[1,2]; [1]*Institute of Electronic Structure and Laser, Foundation for Research and Technology, Heraklion, Crete, Greece*; [2]*Department of Physics, University of Crete, Heraklion, Crete, Greece*; [3]*Department of Materials Science and Technology, University of Crete, Heraklion, Crete, Greece*; [4]*Department of Physics, Aristotle University of Thessaloniki, Thessaloniki, Greece*

This work is focused on the study of the effect of photochemical doping and thus the electron/hole density on the optoelectronic properties of single layers transition metal dichalcogenides and their heterostructures.

Theiner[1,2], *B. Limbacher*[1,2], *M.C. Ertl*[1,2], *A.M. Andrews*[2,3], *G. Strasser*[2,3], *J. Darmo*[1,2], *and K. Unterrainer*[1,2]; [1]*Photonics Institute, TU Wien, Vienna, Austria*; [2]*Center for Micro- and Nanostructures, TU Wien, Vienna, Austria*; [3]*Institute of Solid State Electronics, TU Wien, Vienna, Austria*

We present a heterogeneous terahertz quantum cascade laser consisting of five individual active regions. The devices emit in a spectral range from 1.9 to 4.5 THz, covering a bandwidth of 1.37 octaves.

CC-4.3 FRI 9:00

Surface-Emitting Broadband THz Quantum Cascade Laser Frequency Combs with Inverse-Designed Waveguide Facets

•*S. Gloor, U. Senica, P. Micheletti, M. Beck, J. Faist, and G. Scalari; ETH Zürich, Zürich, Switzerland*

We present a surface emitting THz Quantum Cascade Laser with inverse designed facet showing frequency comb emission over 800 GHz with 13mW of peak power and an antenna with beam divergence below 20° at 20K.

Sánchez-López[1,3], *C. Hernández-García*[4], *and I. Moreno*[1,5]; [1]*Instituto de Bioingeniería, Universidad Miguel Hernández de Elche, E-03202 , Elche, Spain*; [2]*Aix Marseille Université, CNRS, Centrale Marseille, Institut Fresnel, UMR 7249, 13397, Marseille Cedex 20, France*; [3]*Departamento de Física Aplicada, Universidad Miguel Hernández de Elche, E-03202, Elche, Spain*; [4]*Grupo de Investigación en Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, Universidad de Salamanca, E-37008, Salamanca, Spain*; [5]*Departamento de Ciencia de Materiales, Óptica y Tecnología Electrónica, Universidad Miguel Hernández de Elche, 03202, Elche, Spain*

We study theoretically and experimentally the mapping between the points inside the Poincaré sphere (PS), the orbital angular momentum PS, and the higher-order PS for vector beams and present a new partially polarized light generator.

CI-5.3 FRI (Invited) 9:00

High-rate quantum key distribution over free-space links

•*T. Roger, R. Singh, C. Perumangatt, D. Marangon, P.R. Smith, M. Sanzaro, and A. Shields; Toshiba Eu-*

Physics, Swiss Federal Institute of Technology Lausanne, Lausanne, Switzerland

We demonstrate Si_3N_4 photonic integrated circuits featuring ultra-low propagation loss and tight optical confinement, fabricated with a subtractive process. We show an intrinsic quality factor as high as $20{\times}10^6$ at 1.55 μm across a 100 mm wafer.

CE-8.3 FRI 9:00

High-Efficiency Grating Fiber-Chip Couplers at Telecom Wavelength in Gallium Nitride-on-Sapphire Waveguide Platform

•*S. Kaniyar Prasanna Kumar, S. Raghavan, and S.K. Selvaraja; IISc, Bengaluru, India*

Abstract: Fiber-chip grating couplers in GaN-on-Sapphire platform with Coupling efficiency of -4.1 dB/coupler is demonstrated, best reported so far. This enables development of possible strategies to harness nonlinear photonics with GaN platform

ED-5.2 FRI 9:00

Ultrafast and Sub-nanometer-Precision Time-of-Flight Detection of >1000 Space-to-Wavelength-Encoded Optical Pulses

•*Y. Na and J. Kim; KAIST, Daejeon, South Korea*

We demonstrate ultrafast time-of-flight detection with sub-nm-precision and ~6-mm non-ambiguity-range by electro-optic sampling of optical frequency combs. When combined with space-to-wavelength encoding, massively parallel time-of-flight detection of >1000 pulses can be realized with 260-megapixels/s pixel-rate.

Room 13a ICM

JSIII-3.2 FRI 9:00

Impact of Photonic Integration Platforms on the Performance of Neuromorphic Accelerators

•L. De Marinis[1], N. Andriolli[2], S. Gupta[3], and G. Contestabile[1]; [1]Scuola Superiore Sant'Anna, Pisa, Italy; [2]CNR-IEIIT, Pisa, Italy; [3]Indian Institute of Technology Patna, Bihta, India

We discuss how different photonic integration technologies affect the performance of photonic neuromorphic processors in terms of resolution, power consumption and footprint efficiency. The investigation highlights trade-offs between the technolo-

Room 13b ICM

CD-11.2 FRI 9:00

Ultra-Fast High-Contrast Optical Modulation in Si Metasurfaces

A. Trifonov[1], K. Zangeneh Kamali[2], K. Georgiev[1], L. Xu[3], G. Crotti[4], U. Arregui Leon[4], M. Rahmani[3], G. Della Valle[4], •I. Buchvarov[1], and D. Neshev[1,2]; [1]Sofia University , Sofia, Bulgaria; [2]Australian National University, Canberra, Australia; [3]Nottingham Trent University, Nottingham, United Kingdom; [4]Politecnico di Milano, Milano, Italy

We demonstrate ultra-fast high-contrast optical modulation of high-quality factor crystalline silicon metasurfaces, ex-

Room 14a ICM

[2]Institute of Electronic Structure and Laser (IESL)-FORTH, Heraklion, Greece; [3]Optics Laboratory, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland

Phase conjugation and reverse propagation in media that contain gain or loss is impossible. By introducing the concept of Parity-Phase conjugation ($\mathscr{P}$PC), we achieve perfect phase conjugation and focusing in non-Hermitian multimode optical fibers.

EF-7.3 FRI 9:00

Optoacoustic active cooling in waveguides

•L. Blázquez Martínez[1,2], P. Wiedemann[1,2], A. Geilen[1,2], C. Zhu[1], and B. Stiller[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany

We report the experimental realization of active cooling of GHz acoustic phonons via backward Brillouin scattering in a chalcogenide photonic crystal fiber. We measured an effective cooling of 219 K from room temperature.

Room 14b ICM

CH-13.2 FRI 8:45

Rotational Fourier-Transform Mid-IR spectroscopy with a Quantum Cascade Laser frequency comb

S. Markmann, M. Franckié, M. Bertrand, M. Shamohammadi, A. Forrer, P. Jouy, M. Beck, J. Faist, and •G. Scalari; Institute for Quantum Electronics, Department of Physics, ETH Zürich, Zürich, Switzerland

We demonstrate fast, high-resolution Mid-Ir spectroscopy employing a quantum cascade laser frequency comb and a fast rotational delay line.

CH-13.3 FRI 9:00

Mobile Raman sensors for on-site measurements to address agri-photonic and life science applications

•K. Sowoidnich, M. Maiwald, T. Filler, L. Wittenbecher, and B. Sumpf; Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

Dual-wavelength diode laser based light sources for shifted excitation Raman difference spectroscopy and their implementation into portable Raman sensor systems is presented. Application examples on agricultural fields and in

Room 14c ICM

Room Osterseen ICM

CL-5.2 FRI 9:00

Breath-Resolved Monitoring of Metabolic Trace Gases with Photothermal Spectroscopy

•S. Wolf[1], C. Lindner[1], T. Trendle[1], J. Kießling[1], J. Wöllenstein[1,2], and F. Kühnemann[1]; [1]Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg, Germany; [2]Laboratory for Gas Sensors, Department of Microsystems Engineering, University of Freiburg, Freiburg, Germany

We present a photothermal sensing system for metabolic products in breath gas trace analysis. The key features of the used method

Room 21 ICM

EJ-3.2 FRI 9:00

Nonlinear Propagation of Extreme Pulsed Light: Ab initio Computational Study

A. Yamada[1], •S. Yamada[2], and K. Yabana[3]; [1]Research Organization for Information Science and Technology, Tokyo, Japan; [2]Kansai Photon Science Institute, Kyoto, Japan; [3]University of Tsukuba, Tsukuba, Japan

Ab initio computational method for propagation of high-intensity ultrashort pulsed light has been developed. Change from dielectric response to plasma reflection as well as propagation of high harmonics are

Room 22a ICM

EC-1.2 FRI 9:00

Edge state optical frequency combs in the microresonator based Su-Schrieffer-Heeger model

•A. Tusnin[1], X. Ji[1], J. Riemensberger[1], A. Stroganov[2], A. Tikan[1], and T. Kippenberg[1]; [1] Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]LIGENTEC SA, Lausanne, Switzerland

We demonstrate the first observation of optical frequency combs in the edge state of the Su-Schrieffer-Heeger model of coupled optical microresonators. We show soliton-induced edge-bulk interaction and edge-state hopping

NOTES

Room 1 ICM

CM-8.4 FRI 9:15

Laser-Induced Engineering of Nanomaterial Phase and Shape for 3D Light Control at the Nanoscale

•M. Elizarov, N. Li, and A. Fratalocchi; King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

We present a three-dimensional platform leveraging light-induced control over nanomaterials' phase and geometry. We demonstrate this technology in heterogeneous oxide-polymer rigid and flexible nanostructures, reporting the highest wide-gamut structural color for large-scale laser color printing.

Room 2 ICM

CJ-7.3 FRI 9:15

Tapered chalcogenide-glass rods for multi-octave mid-infrared supercontinuum generation

•E. Serrano[1], D. Bailleul[1], F. Désévédavy[1], A. Nakatani[2], T. Cheng[2], Y. Ohishi[2], B. Kibler[1], and F. Smektala[1]; [1]Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303 CNRS-UBFC, Dijon, France; [2]Research Center for Advanced Photon Technology, Toyota Technological Institute, Nagoya, Japan

We demonstrate that tapered Ge-Se-Te glass rods with femtosecond pumping enables efficient mid-infrared supercontinuum generation from 1.7 to 16 μm. This alternative approach opens up a new way of stepping into the 15-20 μm waveband.

Room 3 ICM

EA-6.2 FRI 9:15

Quantum Holography with Heralded Single-photon Source

•D. Abramović[1,2], N. Demoli[1,2], M. Stipčević[2], and H. Skenderović[1,2]; [1]Institute of Physics, Zagreb, Croatia; [2]Rudjer Boskovic Institute, Zagreb, Croatia

We introduce holographic quantum imaging scheme based on single-photon states and basic holographic setup. Our results with single photons show enhancement of contrast in both amplitude and phase image compared to classical light.

Room 4a ICM

Institute for Materials Research (WPI-AIMR), Tohoku University, Sendai 980-8577, Japan, Sendai, Japan

We study the edge to edge transfer of topological states in diamond photonic lattices via modifying the wavelength of the input laser. In this way, we observe the dynamical evolution of the system.

CK-12.4 FRI 9:15

Mesoscopic Self-Collimation under oblique incidence in hexagonal-lattice mesoscopic photonic crystal

S.I. Flores Esparza, •O. Gauthier-Lafaye, and A. Monmayrant; LAAS-CNRS, Toulouse, France

We demonstrate numerically mesoscopic self-collimation under arbitrary oblique incidence in hexagonal-lattice mesoscopic photonic crystal and propose a fast and simple methodology for design and parametric exploration of such geometries.

Room 4b ICM

EI-1.3 FRI 9:15

Nonlinear all-optical coherent manipulation and read-out of valleys in atomically thin semiconductors

•P. Herrmann[1], S. Klimmer[1,2], T. Lettau[3], M. Monfared[3], U. Peschel[3,4], and G. Soavi[1,4]; [1]Institute of Solid State Physics, Friedrich Schiller University Jena, Jena, Germany; [2]ARC Centre of Excellence for Transformative Meta-Optical Systems, Department of Electronic Materials Engineering, Research School of Physics, The Australian National University, Canberra, Australia; [3]Institute of Condensed Matter Theory and Optics, Friedrich Schiller University Jena, Jena, Germany; [4]Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany

We report the coherent ultrafast generation and detection of valleys in atomically thin semiconductors, based on optical Stark shift and second harmonic generation. Our results are supported by simulations based on time-dependent density functional theory.

Room 5 ICM

CC-4.4 FRI 9:15

Cryogen-free, QCL-based Free Space THz Communication link

•A. Sorgi[1], M. Meucci[1], M.A. Umair[1], F. Cappelli[1], L. Viti[2], M. Vitiello[2], J. Catani[1], and L. Consolino[1]; [1]National Institute of Optics-CNR (CNR-INO) and LENS, Sesto Fiorentino (Florence), Italy; [2]NEST, CNR - Istituto Nanoscienze and Scuola Normale Superiore, Pisa, Italy

Realization of a cryogen-free Free Space Optical Communication (FSOC) link between a 2.83 THz Quantum Cascade Laser (QCL) as the source and a Graphene based field-effect transistor (GFET) as the room-temperature receiver.

Room 11 ICM

rope Ltd, Cambridge, United Kingdom

Practical applications of satellite QKD require high encoding rates in order to distribute sufficient key material in a short period of time. We show our efforts in building high-rate QKD systems operating over free-space links.

Room 12a ICM

CE-8.4 FRI 9:15

Microscope Projection Photolithography-Enabled Structuring with Subwavelength Resolution

•L. Zheng[1,2], C. Reinhardt[3], and B. Roth[1,2]; [1]Leibniz University Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering–Innovation Across Disciplines), Hannover, Germany; [3]Bremen University of Applied Science, Bremen, Germany

In this work, a low-cost UV-LED-based projection lithography technique is proposed for rapid and efficient high-resolution structuring. Gratings and crossed waveguides with subwavelength feature sizes are demonstrated.

Room 12b ICM

ED-5.3 FRI 9:15

Nanometric Position Metrology with Topologically Structured Light

•R.T. Sam[1], J.-Y. Ou[1], K.F. MacDonald[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang Technological University, Singapore, Singapore

We introduce an 'optical ruler' for single-shot, real-time detection of nanometric displacements, down to $\lambda/400$, through the visualization of singularities in the field generated by a Pancharatnam-Berry phase metasurface, using a polarization-sensitive camera.

Room 13a ICM

gies without a clear winner.

JSIII-3.3 FRI 9:15

Artificial Neural Network Training on an Optical Processor via Direct Feedback Alignment

•*K. Müller*[1], *J. Launay*[1], *I. Poli*[1], *M. Filipovich*[1], *A. Capelli*[1], *D. Hesslow*[1], *I. Carron*[1], *L. Daudet*[1], *F. Krzakala*[1,2], *and S. Gigan*[1,3]; [1]*LightOn, Paris, France*; [2]*École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*; [3]*Laboratoire Kastler Brossel, Paris, France*

We train neural networks up to one million parameters with an optical processor via Direct Feedback Alignment. Simulations show it can scale to over half a billion parameters. We compare its performance to traditional backpropagation.

Room 13b ICM

hibiting asymmetric bound-state in the continuum mode. Over 25% amplitude modulation is observed with 25ps relaxation time, driven by carrier injection.

CD-11.3 FRI 9:15

Second harmonic generation in periodical metal-insulator-metal nanoparticle arrays

•*S. Beer*[1], *J. Gour*[1], *U. Mir*[1], *A. Alberucci*[1], *U.D. Zeitner*[1,2,3], *and S. Nolte*[1,2]; [1]*Friedrich Schiller University Jena, Institute of Applied Physics, Jena, Germany*; [2]*Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*; [3]*Munich University of Applied Sciences, Department of Applied Sciences and Mechatronics, Munich, Germany*

We experimentally investigate second-harmonic generation from periodic arrays of nano-bars featuring vertically stacked metal-insulator-metal nano-junctions. We prove how the propagation of nonlocal plasmons strongly affects the emission by determining the phase of the nonlinear dipoles.

Room 14a ICM

EF-7.4 FRI 9:15

Spatio-temporal Mode Characterization of Disordered Weakly Nonlinear Graded-index Multimode Fibers

•*M. Zitelli*[1], *V. Couderc*[2], *M. Ferraro*[1], *F. Mangini*[1], *P. Parra-Rivas*[1], *Y. Sun*[1], *and S. Wabnitz*[1]; [1]*Department of Information Engineering, Electronics and Telecommunications, Università degli Studi di Roma Sapienza, Rome, Italy*; [2]*Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France*

We experimentally analyze the steady-state output modal distribution produced by linear random mode-coupling and weak nonlinearity in multimode fibers. The modal distribution is reconstructed by a novel 3D propagation method, accounting for dispersive effects and loss of coherence.

Room 14b ICM

clinical environments will be discussed.

CH-13.4 FRI 9:15

Detecting the hybridization of circulating tumor DNA by nitride surface-enhanced Raman spectroscopy

•*T.A.N. Nguyen, C.-L. Luo, F.-C. Chien, and K.-Y. Lai*; *National Central University, Taoyuan , Taiwan*

Surface-enhanced Raman spectroscopy (SERS) is a promising tool for cancer diagnosis. However, SERS biosensors face the challenges of tedious process and signal fluctuation. InGaN quantum wells can address the issues and achieve the single-molecule sensitivity.

Room 14c ICM

EE-2.2 FRI (Invited) 9:15

Ultrafast physics of Bessel beam interaction with solid dielectrics: dense plasma formation, second harmonic and THz radiation

K. Ardaneh, M. Hassan, B. Morel, L. Furfaro, L. Froehly, R. Giust, and •*F. Courvoisier*; *FEMTO-ST Institute, Univ. Franche-Comte and CNRS, Besancon, France*

When propagating inside sapphire, an ultrafast Bessel beam creates a high aspect ratio cylinder of plasma with a subwavelength diameter that extends over several tens of micrometers. Particle-in-cell simulations reveal SHG and THz radiation.

Room Osterseen ICM

and the implications of breath-resolved measurements are discussed at the example of breath N2O.

CL-5.3 FRI 9:15

Rapid raster-scanning field-resolved infrared spectroscopy

•*H. Mirkes*[1], *D. Gerz*[1,2,3], *F. Lindinger*[1,2], *M. Huber*[2,3], *and I. Pupeza*[1,2,3]; [1]*Ludwig Maximilians University Munich, Faculty of Physics, Garching, Germany*; [2]*Max Planck Institute of Quantum Optics, Garching, Germany*; [3]*Leibniz Institute of Photonic Technology, Jena, Germany*

By raster-scanning a probe in a high-speed electro-optic-sampling spectrometer, we demonstrate broadband infrared spectro-microscopy with spatial resolution of 18 μm and an intensity dynamic range of 315000 for 45x5000-pixel images acquired in 140 seconds.

Room 21 ICM

described in a unified way.

EJ-3.3 FRI 9:15

Dissipative light bullets and 3D breathers in a passive coherently driven multimode Kerr cavity

•*Y. Sun*[1], *P. Parra-Rivas*[1], *C. Milián*[2], *Y.V. Kartashov*[3], *M. Ferraro*[1], *F. Mangini*[1], *M. Zitelli*[1], *R. Jauberteau*[1], *F.R. Talenti*[1], *and S. Wabnitz*[1,4]; [1]*Sapienza University of Rome, Roma, Italy*; [2]*Universitat Politècnica de València, València, Spain*; [3]*Russian Academy of Sciences, Moscow, Russia*; [4]*Istituto Nazionale di Ottica, Pozzuoli, Italy*

We study the formation and bifurcation structure of robust light bullets and 3D breathers in a coherently driven, passive multimode Kerr cavity with a three-dimensional potential.

Room 22a ICM

EC-1.3 FRI 9:15

PT-Symmetric Topological Insulator in a Photonic Waveguide Array

•*A. Fritzsche*[1,2], *T. Biesenthal*[1], *L. Maczewsky*[1], *K. Becker*[1], *M. Ehrhardt*[1], *M. Heinrich*[1], *R. Thomale*[2], *Y. Joglekar*[3], *and A. Szameit*[1]; [1]*Institute of Physics, University of Rostock, Rostock, Germany*; [2]*Department of Physics and Astronomy, Julius-Maximilians-Universität Würzburg, Würzburg, Germany*; [3]*Department of Physics, Indiana University-Purdue University Indianapolis (IUPUI), Indianapolis, USA*

We present a two-dimensional PT-symmetric topological insulator experimentally realized in a photonic waveguide array. The discussed model is based on a periodically driven topological insulator and relies on the spatiotemporal distribution of gain and loss.

NOTES

Room 1 ICM

CM-8.5 FRI 9:30

Laser-induced surface metallisation for the fabrication of 3D printed electronics

•*E. Kabouraki[1], A. Chrostek-Mroza[2], T.L. See[2], C. Powley[2], M. Farsari[1], and R.N. Esfahani[2]; [1]IESL/FORTH, Heraklion, Greece; [2]Manufacturing Technology Centre, Coventry, United Kingdom*

The manufacturing of 3D printed electronics is presented, involving laser patterning on i) a commercial polymer used in 3D printing and ii) a synthesized resin that can be spray coated on any 3D printed part.

CM-8.6 FRI 9:45

Progress in Preforming Whispering Gallery Mode Resonant Disks via Femtosecond Laser Machining

•*P.-A. Lacourt[1], F. Courvoisier[1], J. Safioui[2], L. Furfaro[1], and L. Larger[1]; [1]Institut FEMTO-ST, Université de Franche-Comté, Besançon, France; [2]Femto Engineering, Besançon, France*

A novel production technique of Whis-

Room 2 ICM

CJ-7.4 FRI 9:30

Towards Watt-level, Spectrally Flat Supercontinuum from mid-IR Mode-locked Fibre Laser

•*B. Dutta Gupta[1,2,3], I. Hendry[1,2,3], S. Tang[1,2,3], M. Erkintalo[1,2], and C. Aguergaray[1,2,3]; [1]Department of Physics, University of Auckland, Auckland, New Zealand; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [3]The Photon Factory, University of Auckland, Auckland, New Zealand*

We numerically demonstrate supercontinuum generation in Erbium-doped ZBLAN fibres from a 2.8 μm seed source. We achieve significantly improved spectral flatness with more than 60% of output power converted to 3-4.8 μm region.

CJ-7.5 FRI 9:45

Mid-Infrared All-Spliced Cascaded Supercontinuum Generation

•*C.R. Petersen[1,2] and O. Bang[1,2]; [1]DTU Electro, Kgs. Lyngby, Denmark; [2]NORBLIS ApS, Virum, Denmark*

We present an investigation into all-spliced supercontinuum generation based on silica, germania, fluoride, and chalcogenide fibers. We review the literature and present

Room 3 ICM

EA-6.3 FRI 9:30

Quantum Ghost Imaging in reverse START-STOP with a 2D SPAD array

•*V.F. Gili[1], D. Dupish[1], A. Vega[2], M. Gandola[2], E. Manuzzato[2], M. Perenzoni[2], L. Gasparini[2], T. Pertsch[1,3], and F. Setzpfandt[1,3]; [1]Friedrich-Schiller-Universität Jena, Institute of Applied Physics, Abbe Center of Photonics, Jena, Germany; [2]Fondazione Bruno Kessler, Trento, Italy; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We present a quantum ghost imaging implementation based on a 2D SPAD array, enabling to image an object in 10 seconds, without frame-rate and delay line limitations, advancing the state-of-the-art.

EA-6.4 FRI 9:45

Rydberg Atomic Microwave-to-Optical Converter in a Free-Space Continuous-Wave Operation Mode

•*S. Borówka[1,2,3], U. Pylypenko[1,2], M. Mazelanik[1,2], and M. Parniak[1,4]; [1]Centre for Quantum Optical Technologies, Centre of New Technologies, University of Warsaw, Warsaw, Poland; [2]Faculty of Physics, University*

Room 4a ICM

CK-12.5 FRI 9:30

Watching Polaritons on the Fly: From Enhanced Diffusion to Ultrafast Ballistic Motion

•*M. Balasubrahmaniyam, A. Simkhovich, A. Golombek, G. Sandik, and T. Schwartz; Physical Chemistry Department, Faculty of Exact Sciences, Tel Aviv University, Tel Aviv, Israel*

Using ultrafast microscopy, we reveal that strong light-matter coupling can enhance the diffusion of excitons by 10^6 and even boost their transport to ballistic at 2/3 the speed of light over macroscopic distances, completely overcoming different scattering processes.

CK-12.6 FRI 9:45

FRET-mediated collective blinking of self-assembled stacks of semiconducting nanoplatelets

Z. Ouzit[1], •G. Baillard[1], J. Pintor[1], L. Guillemey[2], B. Wagnon[2], B. Abecassis[2], and L. Coolen[1]; [1]Institut des Nanosciences de Paris, Paris, France; [2]Ecole normale supérieur , Lyon, France

We use micro-photoluminescence

Room 4b ICM

EI-1.4 FRI 9:30

Radiative suppression of exciton-exciton annihilation in a two-dimensional semiconductor

•*L. Sortino[1], M. Gülmüş[1], B. Tilmann[1], L. de Souza Menezes[1], and S.A. Maier[2,3,1]; [1]Chair in Hybrid Nanosystems, Faculty of Physics, Ludwig-Maximilians-Universität München, Munich, Germany; [2]School of Physics and Astronomy, Monash University, Clayton, Australia; [3]The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom*

Exciton-exciton annihilation (EEA) processes set a fundamental limit for the applications of 2D semiconductors. Here, we demonstrate suppression of EEA in a monolayer WS_2 via enhancement of light-matter interaction in hybrid 2D-dielectric nanophotonic platforms.

EI-1.5 FRI 9:45

High-speed acousto-optic modulation at optical communication band by ultrafast-laser-induced hypersonic vibrational coherence

•*T.G. Park[1], E.T. Oh[1], H.R. Na[2], S.-H. Chun[2], S. Lee[2], and F. Rotermund[1]; [1]Department of Physics, Korea Advanced Institute of*

Room 5 ICM

CC-4.5 FRI 9:30

High-performance Frequency Combs with Planarized THz Quantum Cascade Lasers

•*U. Senica[1], A. Forrer[1], T. Olariu[1], P. Micheletti[1], S. Gloor[1], S. Cibella[2], G. Torrioli[2], M. Beck[1], J. Faist[1], and G. Scalari[1]; [1]Institute for Quantum Electronics, Zurich, Switzerland; [2]Istituto di Fotonica e Nanotecnologie, CNR, Rome, Italy*

We present several new planarized waveguide components for high-performance THz quantum cascade laser frequency combs with improved comb bandwidths, high-temperature operation and high-power surface emission into a narrow beam.

CC-4.6 FRI 9:45

Improving the performance of terahertz quantum cascade laser sources based on Cherenkov difference-frequency mixing through phase matching

•*W. Oberhausen[1], I. Lubianskii[1], G. Boehm[1], A. Strömberg[2], B. Manavaimaran[2], D. Burghart[1], Y.-T. Sun[2], and M.A. Belkin[1]; [1]Walter Schottky Institut and Depart-*

Room 11 ICM

CI-5.4 FRI 9:30

Cylindrical Vector Vortex Beams Generation with a Single Phase Encoded Spatial Light Modulator

•*A. Srinivasa Rao[1,2,3], P. Kumar[1,2], and T. Omatsu[1,2]; [1]Graduate School of Engineering, Chiba University, Chiba, Japan; [2]Molecular Chirality Research Centre, Chiba University, Chiba, Japan; [3]Institute for Advanced Academic Research, Chiba University, Chiba, Japan*

We demonstrate a compact, robust and low-cost technique to convert a Gaussian laser beam into a cylindrical vector vortex beam of all possible orders through the modulation of a single-phase pattern with an SLM.

CI-5.5 FRI 9:45

Characterizing all-optical biasing and readout of a superconducting optoelectronic circuit

•*F. Thiele, T. Hummel, J. Brockmeier, M. Protte, S. Lengeling, V. Quiring, C. Eigner, C. Silberhorn, and T. Bartley; Institute for Photonic Quantum Systems, Paderborn, Germany*

We demonstrate all-optical operation of an SNSPD. Us-

Room 12a ICM

CE-8.5 FRI 9:30

Liquid Phase Epitaxy growth and spectroscopy of Tb3+-doped LiYF4 crystalline layers for visible waveguide lasers

•*A. Baillard[1], P. Loiko[1], G. Brasse[1], R.M. Solé[2], M. Aguiló[2], F. Díaz[2], X. Mateos[2], A. Benayad[1], A. Braud[1], and P. Camy[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]Universitat Rovira i Virgili (URV), Tarragona, Spain*

Tb3+,Gd3+-codoped LiYF4 single-crystalline layers were grown on LiYF4 substrates by Liquid Phase Epitaxy. The polarized spectroscopic properties of Tb3+ ions were studied showing a great potential for the development of green and yellow waveguide lasers.

CE-8.6 FRI 9:45

Ductile dicing for optical facets and waveguides in silicon nitride

•*P.C. Gow, G.M. Churchill, V. Vitali, T. Dominguez Bucio, P. Petropoulos, F.Y. Gardes, C.B.E. Gawith, and J.C. Gates; Optoelectronics Research Centre, University of Southampton, Southampton, United*

Room 12b ICM

ED-5.4 FRI 9:30

Dual-comb laser interferometer for temperature independent strain sensing

•*H.J. Kbashi[1], B. Sheil[2], and A.M. Perego[1]; [1]Aston University, Aston Institute of Photonics Technologies, Birmingham, United Kingdom; [2]University of Cambridge, Laing O'Rourke Centre for Construction Engineering and Technology, Cambridge, United Kingdom*

We experimentally demonstrate a mode-locked fiber laser exhibiting dual-comb interference due to an intracavity Mach-Zehnder interferometer. Suitably stretching the laser cavity causes changes in the optical and RF spectrum hence enabling temperature-independent strain sensing.

ED-5.5 FRI 9:45

Single-Shot, Wavelength-Resolved Polarization Measurement of Ultrafast Lasers based on Dispersed Division-of-Amplitude

•*L. Gao[1], Q. Wu[1], Y. Cao[1], S. Wabnitz[2,3], Z. Chang[1], A. Liu[1], J. Huang[1], L. Huang[1], and T. Zhu[1]; [1]Chongqing University, Chongqing, China; [2]Sapienza Università di Roma, Roma, Italy; [3]Istituto*

Room 13a ICM

JSIII-3.4 FRI 9:30

Photonic Neuromorphic Accelerator Com- bined with an Event-Based Neuromorphic Camera for High-Speed Object Classification

•A. Tsirigotis[1], I. Tsilikas[2], K. Sozos[3], A. Bogris[3], and C. Mesaritakis[1]; [1]University of the Aegean, Dept. Information and Communication Systems Engineering, Samos, Greece; [2]National Technical University of Athens, Dept. Applied Physics and Mathematics, Athens, Greece; [3]3. University of West Attica, Dept. Informatics and Computer Engineering, Egaleo, Greece

Here we provide experimental evidence that an unconventional photonic convolutional accelerator based on optical spectrum slicing, when combined with a high-speed neuromorphic camera can offer a classification accuracy increase by 19% in object classification.

JSIII-3.5 FRI 9:45

Performance enhancement via synaptic plasticity in an integrated photonic recurrent neural network with phase-change materials

•A. Lugnan[1], S. Aggarwal[2], F. Brückerhoff-Plückelmann[3], W.H.P. Pernice[3],

Room 13b ICM

CD-11.4 FRI 9:30

Enhancing Nonlinear Effects through Lattice Plasmon Excitation in Plasmonic Metasurfaces

•J. Gour[1], S. Beer[1], A. Alberucci[1], C. David[2], S. Nolte[1,3], and U.D. Zeitner[1,3,4]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Jena, Germany; [2]Friedrich Schiller University Jena, Institute of Condensed Matter Theory and Optics, Jena, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany; [4]Munich University of Applied Sciences, Department of Applied Sciences and Mechatronics, Munich, Germany

We conduct a parametric study and show an enhancement of second and third harmonic generation from plasmonic metasurfaces. The maximum enhancement occurs either at the double resonance condition or when two counter-propagating lattice plasmons exist.

CD-11.5 FRI 9:45

Bandwidth-Engineered Ultra-Fast Time-Variant Metasurfaces

•Z. Yang[1], M. Liu[1], D. Smirnova[1], A. Komar[1], M. Shcherbakov[2], and D. Neshev[1]; [1]Australian National University, Canberra, Aus-

Room 14a ICM

EF-7.5 FRI 9:30

Light-by-light control enabled by incoherent beam superpositions in multimode fibres

T. Mansuryan[1], Y. Arosa Lobato[2], •A. Tonello[1], M. Ferraro[3], M. Zitelli[3], F. Mangini[3], Y. Sun[3], K. Krupa[4], B. Wetzel[1], S. Wabnitz[3], and V. Couderc[1]; [1]University of Limoges , Limoges, France; [2]University of Santiago de Compostela, Santiago de Compostela, Spain; [3]DIET, Sapienza, University of Rome, Rome, Italy; [4]Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland

We demonstrate light-by-light control of a weak wave by a strong pump at a different wavelength in GRIN multimode fibre. We obtained an increasing or decreasing M2 as a function of the pump power.

EF-7.6 FRI 9:45

Advanced spatio-temporal manipulation of nonlinear waves and solitons using a recirculating fiber loop

•F. Copie, P. Suret, and S. Randoux; Laboratoire PhLAM, Université de Lille, Villeneuve d'Ascq, France

We present experiments realized in a recirculating fiber loop demonstrating spatiotemporal manipulation of

Room 14b ICM

CH-13.5 FRI 9:30

Single-source FM SRS with pixel-to-pixel contrast improvement

•K. Wallmeier[1], T. Würthwein[1], T. Hellwig[2], M. Brinkmann[2], N. Lemberger[1], and C. Fallnich[1,3]; [1]Institute of Applied Physics, University of Münster, Münster, Germany; [2]Refined Laser Systems GmbH, Münster, Germany; [3]Cells in Motion Interfaculty Centre, University of Münster, Münster, Germany

Frequency modulation stimulated Raman scattering is presented with a single light source only by exploiting pulse-to-pulse wavelength-switching with the result of up to 8.3-fold contrast improvement and 50 % lower pixel dwell time.

CH-13.6 FRI 9:45

A highly sensitive SERS substrate for detection of nanoplastics in water

•A. Bibi[1], J. Tate[2], D. Hill[1], and C. Cao[2]; [1]Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom; [2]Institute for Global Food Security, School of Biological Sciences, Queen's University of Belfast, Belfast, United Kingdom

Room 14c ICM

EE-2.3 FRI 9:45

Retrieving Optical Information Through Propagation in Strongly Nonlinear and Turbulent Systems Using Neural Networks

•P. Konstantakis[1,2], M. Manousidaki[1], V.Y. Fedorov[3], and S. Tzortzakis[1,2,3]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology Hellas (FORTH), Heraklion, Greece;

Room Osterseen ICM

CL-5.4 FRI 9:30

Dual-Color Confocal Fluorescence Characterizations of Antibody Loading in Bioengineered Nanovesicles

•M. Sanaee[1], K.G. Ronquist[2], J.M. Morrell[2], E. Sandberg[1], J. Widengren[1], and K. Gallo[1]; [1]Department of Applied Physics, KTH Royal Institute of Technology, Stockholm, Sweden; [2]Department of Clinical Sciences, SLU Swedish University of Agricultural Sciences, Uppsala, Sweden

An ad-hoc experimental methodology based on dual-color confocal fluorescence microscopy has been developed for quantitative characterizations of bioengineered nanovesicles loaded with Ab and dUTP molecules, demonstrating their successful loading at single vesicle level.

CL-5.5 FRI 9:45

Inclusive development of Raman-based prostate cancer diagnostic device: lessons from an ethnically-diverse clinical trial

•S.J. van Breugel[1,2,3], I. Low[4], M.L. Christie[4], M.R. Pokorny[4], H.U. Holtkamp[1,3], M.K. Nieuwoudt[1,2,3], M.C. Simpson[1,2,3,5], K. Zargar-Shoshtari[4,6], and C. Aguergaray[2,3,5]; [1]School of Chemical

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EJ-3.4 FRI 9:30

Deep-Learning-based VCSEL transmitter emulator

S. Deligiannidis[1], N. Argyris[2], S. Dris[2], D. Kalavrouziotis[2], P. Bakopoulos[2], C. Mesaritakis[3], and •A. Bogris[1]; [1]University of West Attica, Department of Informatics and Computer Engineering, Egaleo, Greece; [2]NVIDIA, Athens, Greece; [3]University of the Aegean, Dept. Information and Communication Systems Engineering, Samos, Greece

We train two recurrent neural network models to mimic the nonlinear dynamics of a directly PAM-4 modulated VCSEL. The prediction accuracy in different operating regimes achieves mean square error down to 2%.

EJ-3.5 FRI 9:45

Long-range Prediction of Nonlinear Dynamics in Fibre Optics Using Transformer-based Neural Network

•R.K.Y. Chan[1], Y. Zhou[1], and K.K.-Y. Wong[1,2]; [1]Department of Electrical and Electronic Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong, China; [2]Advanced Biomedical Instrumentation Centre, Hong Kong

Room 22a ICM

EC-1.4 FRI 9:30

Efficient and direct design of edge and interface states

•H. Schomerus; Lancaster University, Lancaster, United Kingdom

I describe an efficient approach that allows to design edge states at arbitrary energies. The approach can make effective use of topological symmetries, but also applies to non-Hermitian and nonreciprocal systems.

EC-1.5 FRI 9:45

Exploring the non-Hermitian topology of exceptional points in lasers and fibre loops

A. Schumer[1,2], H. Nasari[2,3], Y.G.N. Liu[2], G. Lopez-Galmiche[3], J. Leshin[3], H.E. Lopez-Aviles[3], L. Ding[2], Y. Alahmadi[3,4], A.U. Hassan[3], Q. Zhong[3], •S. Rotter[1], P. Likam Wa[3], D.N. Christodoulides[3], and M. Khajavikhan[2]; [1]TU Wien, Vienna,

NOTES

Room 1 ICM

pering Gallery Mode Resonators from bulk calcium fluoride is proposed, based on femtosecond laser processing. Processing times are halved while maintaining performance and improving reliability.

10:30 – 12:00

CM-9: Laser-induced periodic surface structures

Chair: Jörn Bonse, Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany

CM-9.1 FRI 10:30

Impact of plasmonic modes and metal thermophysical properties on the formation of self-organised nano-patterns in thin films

Room 2 ICM

our own results with splicing different combinations of fibers.

10:30 – 12:00

CJ-8: Pulsed fiber sources

Chair: Jakub Boguslawski, Wrocław University of Science and Technology, Poland

CJ-8.1 FRI (Invited) 10:30

Omitting conventional saturable absorbers in mode-locked fibre lasers

•*M. Chernysheva and D.C. Kirsch*; *Leibniz Institute of Photonic*

Room 3 ICM

of Warsaw, Warsaw, Poland; [3]*Doctoral School of Exact and Natural Sciences, University of Warsaw, Warsaw, Poland*; [4]*Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark*

We present an experimental realization of free-space continuous microwave-to-optical photonic conversion in room-temperature Rydberg rubidium-85 atomic vapours. We achieve unprecedented 51dB dynamic range and 16MHz bandwidth at 13.9GHz microwave frequency.

10:30 – 12:00

EA-7: Atomic systems

Chair: Sebastian Blatt,Ludwig-Maximilians-Universität, München, Germany

EA-7.1 FRI 10:30

Driving the Superfluid-supersolid Phase-transition by Heating

J. Sánchez-Baena[1,2], *C. Politi*[3,4], •*F. Maucher*[5,1], *F.*

Room 4a ICM

to demonstrate collective blinking of self-assembled stacks of around 70 semiconducting nanoplatelets. This effect is explained and modelled as Förster-resonant energy tranfer (FRET) funneling all the excitons from a chain portion to a single blinking quencher.

10:30 – 12:00

CK-13: Advanced photonic devices

Chair: Stéphane Clemmen, Ghent University, Belgium

CK-13.1 FRI 10:30

Observation of Brillouin spin-orbit interaction in a silica optical nanofiber

•*M. Zerbib*[1], *M. Romanet*[1], *T. Sylvestre*[1], *C.*

Room 4b ICM

Science and Technology, Daejeon, South Korea; [2]*Department of Physics and Astronomy, Sejong University, Seoul, South Korea*

We present interlayer-vibration-assisted acousto-optic modulation of Bi2Se3 at optical communication band, initiated by ultrashort pulses. High-speed (~102 GHz) and strong modulation of optical properties can be achieved by light-driven nanomechanical interactions at ultrafast timescale.

10:30 – 12:00

EI-2: Nonlinear and quantum optics with van der Waals layered materials

Chair: Fang Liu, Stanford University, San Francisco, USA

EI-2.1 FRI 10:30

Towards compact phase-matched and waveguided nonlinear optics in atomically layered semiconductors

X. Xu[1], •*C.*

Room 5 ICM

ment of Electrical and Computer Engineering, Technische Universität München, Garching, Germany; [2]*Department of Applied Physics, KTH-Royal Institute of Technology, Stockholm, Sweden*

We theoretically and experimentally investigate the effect of phase matching for terahertz generation in terahertz quantum cascade laser sources based on intra-cavity Cherenkov difference-frequency generation. The results indicate significant device performance improvement via phase-matching.

10:30 – 12:00

CC-5: THz spectroscopy and techniques

Chair: Giacomo Scalari, ETH, Zurich, Switzerland

CC-5.1 FRI (Invited) 10:30

Miniaturised terahertz photonic chips

Y. Lampert[1], *F. Bertot*[1], *A. Herter*[2], *A. Shams-Ansari*[3], *A. Tomasino*[1], *S. Rajabali*[1], *M.*

Room 11 ICM

ing only cryogenic opto-electronic components and optical interconnects, we operate the SNSPD electrically decoupled from room temperature electronics and with a heatload of 75μW at 1K.

10:30 – 12:00

CI-6: Modulation and demodulation

Chair: Thomas Roger, Toshiba Research Europe, Cambridge, United Kingdom

CI-6.1 FRI 10:30

Kerr Nonlinearity Tolerance with Reference Constellation Adaptation

S.A. Mir[1], *L.N. Venkatasubramani*[1,2], •*S. S J*[1], *L. Barry*[2],

Room 12a ICM

Kingdom

Ultra-precision dicing was used to define waveguides and perform optical quality facet cuts in a silicon nitride platform, without need for further polishing. These methods can be extended to other platforms such as silicon-on-insulator.

10:30 – 12:00

CE-9: Lithium niobate platform

Chair: Katia Gallo, KTH, Stockholm, Sweden

CE-9.1 FRI 10:30

A heterogeneously integrated lithium niobate-on-silicon nitride photonic platform

•*M. Churaev*[1], *R.N. Wang*[1], *V. Snigirev*[1],

Room 12b ICM

Nazionale di Ottica, Pozzuoli , Italy

We propose a new method for single-shot, wavelength-resolved polarization measurement by exploiting division-of-amplitude method under the far-field transformation. As a proof-of-concept demonstration, we reveal the complex polarization dynamics in the build-up of dissipative solitons.

10:30 – 12:00

ED-6: Frequency combs: Sources and characterization

Chair: Oliver Heckl, Vienna University, Vienna, Austria

ED-6.1 FRI 10:30

Microresonator Soliton Frequency Combs Enabled by Quintic Dispersion

•*T. Bi*[1,2], *S. Zhang*[1], *L. Hill*[3], *and P. Del'Haye*[1,2]; [1]*Max*

Room 13a ICM

H. Bhaskaran[2], and P. Bienstman[1]; [1]Photonics Research Group, INTEC Department, Ghent University – imec, Ghent 9052, Belgium; [2]University of Oxford, Department of Materials, Parks Road, Oxford OX1 3PH, United Kingdom; [3]University of Münster, Department of Physics, CeNTech, Heisenbergstraße 11, 48149 Münster, Germany

We experimentally demonstrate synaptic plasticity in an integrated photonic recurrent neural network, employed for reservoir computing. The performance on a time series classification task is improved by plastic adaptation of the reservoir network.

10:30 – 12:00

JSIII-4: Photonic accelerators II

Chair: Bert Offrein, IBM Research - Zürich, Rüschlikon, Switzerland

JSIII-4.1 FRI (Invited) 10:30

Photonic tensor core and convolution chip for machine learning acceleration

•V. Sorger; George Washington University, Washington,

Room 13b ICM

tralia; [2]University of California, Irvine, USA

We present and numerically demonstrate ultra-fast time-variant metasurfaces with time-engineered bandwidth. This engineering is achieved by the interplay between geometric and photo-carrier induced asymmetries to control the radiation of bound-state-in-the-continuum modes.

10:30 – 12:00

CD-12: Stimulated Brillouin scattering

Chair: Anderson S L Gomes, Federal University of Pernambuco, Brazil

CD-12.1 FRI 10:30

Inter-vortex forward Brillouin scattering by chiral phonons

•X. Zeng[1], P. Russell[1], and B. Stiller[1,2]; [1]Max-Planck institute for the science of

Room 14a ICM

the dynamics of nonlinear waves via synchronous phase modulation. Among other things, we show that quadratic modulations can expulse or trap solitons.

10:30 – 12:00

EF-8: Symmetry breaking in coupled resonators

Chair: Mathias Marconi, Université Côte d'Azur, Nice, France

EF-8.1 FRI (Invited) 10:30

Symmetry breaking and zero modes in photonic crystal cavity arrays

•A.M. Yacomotti, K. Ji, M. Hedir, B. Garbin, and J.A.

Room 14b ICM

A simple and cost-effective method for forming a hydrophobic SERS substrate is presented. The substrate was characterised using R6G and used to detect ultra-low concentrations (0.001 mg/ml) of 50nm and 100nm diameter nanoplastics in water.

10:30 – 12:00

CH-14: Photothermal and photoacoustic sensing

Chair: Christoph Haisch,Technical University of Munich, Germany

CH-14.1 FRI (Invited) 10:30

Imaging Circular Dichroism of Single Nanoparticles Using Photothermal Microscopy

•S. Adhikari, P. Spaeth, and M. Orrit; Lei-

Room 14c ICM

[2]Department of Materials Science and Technology, University of Crete, Heraklion, Greece; [3]Arts & Sciences, Texas A&M University at Qatar, Doha, Qatar

Neural networks are shown to successfully retrieve optical information encoded in the spatial intensity of laser holograms that propagate in strongly nonlinear and turbulent media resulting in the formation of speckle patterns.

10:30 – 12:00

EE-3: Ultrafast XUV and soft X-ray spectroscopy

Chair: Jens Biegert, ICFO, Barcelona, Spain

EE-3.1 FRI (Invited) 10:30

Ultrafast Dynamics in Donor-Acceptor Prototype Molecules by XUV-IR Attosecond Spectroscopy

•F. Vismarra[1,2], R. Borrego-Varillas[2], Y.

Room Osterseen ICM

Sciences, University of Auckland, Auckland, New Zealand; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [3]The Photon Factory, University of Auckland, Auckland, New Zealand; [4]Counties Manukau District Health Board, Auckland, New Zealand; [5]Department of Physics, University of Auckland, Auckland, New Zealand; [6]Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Raman spectroscopy data of prostate cancer tissue is assessed to ensure ethnic bias in the data set is minimized. Results show differences in Raman spectra but similar classification performance for NZ-European, Māori, and Pasifika men.

10:30 – 12:00

CL-6: Advanced microscopy I

Chair: Keisuke Goda, University of Tokyo, Japan

CL-6.1 FRI 10:30

Multimodal Coherent Raman and Multiphoton Nonlinear Optical Microscopy Reveals Early Risk of Tumour Recurrence after Anticancer Therapy in Human Cells

Room 21 ICM

Science Park, Shatin, New Territories, Hong Kong, China

We demonstrate the use of transformer-based deep learning model in predicting nonlinear dynamics in fibre optics over a long distance. It is almost 4 times more accurate and 10 times faster than recurrent neural network.

10:30 – 12:00

EJ-4: Tailored light and optical design

Chair: Joerg Goette, University of Glasgow, United Kingdom

EJ-4.1 FRI 10:30

Supertoroidal anapoles

•R. Ravi Kumar[1], N. Papasimakis[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre & Centre

Room 22a ICM

Austria; [2]University of Southern California, Los Angeles, USA; [3]The College of Optics and Photonics (CREOL), Orlando, USA; [4]Cemter of Excellence for Telecomm Applications, Riyadh, Saudi Arabia

We investigate the topological aspects of encircling an exceptional point. Specifically, we show how to create topological lasing modes in a waveguide-laser and how to observe a chiral state transfer without encircling the singularity.

10:30 – 12:00

EC-2: Photonic band topology

Chair: Henning Schomerus, Lancaster University, United Kingdom

EC-2.1 FRI (Invited) 10:30

Three-dimensional topological light transport induced by lattice dislocations

•J. Beck[1], E. Lustig[2], L. Maczewsky[1], T. Biesenthal[1], M.

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Room 1 ICM

P. Lingos[1], G. Perrakis[1], O. Tsilipakos[2,1], •G. Tsibidis[1,3], and E. Stratakis[1,4]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Greece; [2]Theoretical and Physical Chemistry Institute National Hellenic Research Foundation, Athens, Greece; [3]Department of Material Science, University of Crete, Heraklion, Greece; [4]Department of Physics, University of Crete, Heraklion, Greece

we demonstrate that the excitation of coupled SPPs in air/metal and metal/substrate interfaces , along with other parameters dictate the spatial modulation of the absorbed energy that account for LIPSS formation in thin films.

CM-9.2 FRI 10:45

Influence of Substrate and Film Thickness on Polymer LIPSS Formation

J. Prada-Rodrigo[1,2], R.I. Rodriguez-Beltrán[1,3], T.A. Ezquerra[4], P. Moreno[1], and •E. Rebollar[2]; [1]Grupo de Aplicaciones del Láser y Fotónica (ALF-USAL), Universidad de Salamanca, Salamanca, Spain; [2]Instituto de Química Física Rocasolano, IQFR-CSIC, Madrid,

Room 2 ICM

Technology, Jena, Germany

Principle limitations for achieving stable ultrashort pulse generation and broad tuning wavelength ranges are generally defined by traditional mode-locking. This presentation discusses pathways to highly integrated and effective self-mode-locking methodologies for advanced ultrafast fibre lasers.

Room 3 ICM

Ferlaino[3,4], and T. Pohl[1]; [1]Center for Complex Quantum Systems, Department of Physics and Astronomy, Aarhus University, Denmark; [2]Departament de Física, Universitat Politècnica de Catalunya, Campus Nord B4-B5, Barcelona, Spain; [3]Institut für Quantenoptik und Quanteninformation, Österreichische Akademie der Wissenschaften, Innsbruck, Austria; [4]Institut für Experimentalphysik, Universität Innsbruck, Austria; [5]Departament de Física, Universitat de les Illes Balears & IAC-3, Campus UIB, Palma de Mallorca, Spain

We show that generalising the extended Gross-Pitaevskii equation for dipolar Bose-Einstein condensates to include temperature-fluctuations employing Bogoliubov theory with local density approximation permits the description of recent experiments, including heating a superfluid into a supersolid.

EA-7.2 FRI 10:45

Conversion of laser light into (anti)-bunched light in an atom-based two-photon interferometer

•M. Cordier, M. Schemmer, P.

Room 4a ICM

Wolff[2], B. Stiller[3], J.-C. Beugnot[1], and K.P. Huy[1]; [1]FEMTO-ST Institute, CNRS-Université de Franche-Comté and SupMicrotech ENSMM, Besancon, France; [2]Center for Nano Optics, University of Southern Denmark, Odense, Denmark; [3]Max Planck Institute for the Science of Light, University of Erlangen-Nuremberg, Erlangen, Germany

We report the observation of a Brillouin spin-orbit interaction in an optical nanofiber in which the backscattered signal by the acoustic TR21 vortex mode undergoes a circular polarization handedness reversal due to angular momentum conservation.

CK-13.2 FRI 10:45

A nonlinear activation function for optical neural networks using a Mach-Zehnder interferometer with a III-V-on-Si amplifier

•Y. Zhang[1,2], H. Deng[1,2], E. Soltanian[1,2], J. Zhang[1,2], G. Roelkens[1,2], and W. Bogaerts[1,2]; [1]Photonics Research Group, INTEC-department, Ghent University-IMEC, Ghent, Belgium;

Room 4b ICM

Trovatello[1], F. Mooshammer[1], Y. Shao[1], S. Zhang[1], K. Yao[1], D.N. Basov[1], G. Cerullo[2], and P.J. Schuck[1]; [1]Columbia University, New York, USA; [2]Politecnico di Milano, Milano, Italy

Here we achieve record nonlinear optical enhancement from 3R-MoS2, >10^4 stronger than a monolayer, and we show broadly tunable SHG in a waveguide geometry, highlighting the potential of 3R-MoS2 for integrated nonlinear optical devices.

EI-2.2 FRI 10:45

Four-Wave Mixing at Excitonic Resonances in the Telecom Spectral Range

•S. Klimmer[1,2], A. Sinelnik[1,3,4], T. Pertsch[3,4,5], I. Staude[1,3,4], H. Rostami[6,7], and G. Soavi[1,4]; [1]Institute of Solid State Physics, Univ. Jena, Jena, Germany; [2]ARC Centre of Excellence for Transformative Meta-Optical Systems, Department of Electronic Materials Engineering, Research School of Physics, The Australian National Univ., Canberra, Australia; [3]Institute of Applied Physics, Univ. Jena, Jena, Germany; [4]Abbe Center of Photonics, Univ. Jena, Jena, Germany; [5]Fraunhofer Institute for Applied Optics and

Room 5 ICM

Loncar[3], and •I.-C. Benea-Chelmus[1]; [1]Hybrid Photonics Laboratory, EPFL, Lausanne, Switzerland; [2]Quantum Optoelectronics Group, ETHZ, Zurich, Switzerland; [3]Laboratory for Nanoscale Optics, Harvard University, Cambridge, USA

This talk will highlight opportunities for terahertz science and technology from nonlinear integrated photonic circuits by exploring waveguides, resonators and terahertz antennas. Their present and future applications in metrology, emission and waveform control are discussed.

Room 11 ICM

R.D. Koilpillai[1], and D. Venkitesh[1]; [1]Department of Electrical Engineering, Indian Institute of Technology Madras , Chennai, India; [2]Radio and Optical Communication Laboratory, Dublin City University, Dublin, Ireland

We demonstrate the use of a simple learning approach to the reference constellations to tolerate the phase perturbation due to fiber Kerr-nonlinearity, while simultaneously performing carrier phase recovery.

CI-6.2 FRI 10:45

Nonlinearity Free Operation of SOA for Co-Packaged Optics Based on Advanced Modulation Format

•T. Kurosu, S. Suda, S. Namiki, and T. Amano; National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan

Toward high-capacity co-packaged optics based on digital coherent transmission, we demonstrate

Room 12a ICM

A. Riedhauser[2], T. Blésin[1], C. Möhl[2], Y. Popoff[2], U. Drechsler[2], D. Caimi[2], J. Riemensberger[1], P. Seidler[2], and T. Kippenberg[1]; [1]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]IBM Research - Europe, Zurich, Switzerland

We present a $LiNbO_3$ integrated photonic platform with <0.1 dB/cm optical propagation loss and <2.5 dB/facet fiber-chip coupling loss based on a silicon nitride PIC. We demonstrate electro-optic modulators, frequency-agile lasers, optical splitters, and other devices on the platform.

CE-9.2 FRI 10:45

Developing Zinc-Indiffused Periodically Poled Lithium Niobate Ridge Waveguides for Quantum Applications at Visible Wavelengths

•N. Palomar Davidson[1], G. Tawy[1], G.M. Churchill[1], P.L. Mennea[1], R.H.S. Bannerman[1], P.G.R. Smith[1], L.D. Wright[2], G. Blanchard-Emmerson[2], J.C. Gates[1], and C.B.E. Gawith[1,2]; [1]Optoelectronics

Room 12b ICM

Planck Institute for the Science of Light, 91058 Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, 91058 Erlangen, Germany; [3]SUPA and Department of Physics, University of Strathclyde, Glasgow, G4 0NG, Scotland,, United Kingdom

Soliton combs at near-zero group velocity dispersion are the key to broadband frequency combs. Here, we present the first solitons mediated by fifth-order dispersion and the first zero-dispersion microcombs pumped by a continuous-wave laser.

ED-6.2 FRI 10:45

Thermal-Controlled Scanning of a Bright Soliton in a Photonic Molecule

•I. Rebolledo-Salgado[1,2], V. Durán[3], Ó. Bjarki Helgason[1], M. Girardi[1], M. Zelan[2], and V. Torres-Company[1]; [1]Dept. Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden; [2]Measurement Science and Technology, RISE Research Institutes

Room 13a ICM

USA; Optelligence , Upper Marlboro, USA

Here we present our architecture for Silicon Photonic Tensor Core (PTC) capable of accelerating computational needs of neural networks and augmented/virtual reality applications. We present a novel fully-integrated PTC including chip-based lasers, modulators, and photodetectors.

Room 13b ICM

light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany

We report forward Brillouin scattering between orthogonal first-order vortex modes in chiral photonic crystal fibre. The interaction is mediated by chiral "screw" flexural phonons, which induce linear birefringence and have acoustic topological charge of 2.

CD-12.2 FRI 10:45

Wide-range stimulated Brillouin scattering in a z-cut magnesium fluoride whispering gallery mode resonator

•*G. Lin and J. Tian; Harbin Institute of Technology, Shenzhen, China*

We report over 2.5 GHz wide-range stimulated Brillouin scattering (SBS) in a z-cut magnesium fluoride resonator. A broad Brillouin gain is revealed due

Room 14a ICM

Levenson; Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France

Photonic crystal nanolasers can be engineered to enhance nonlinear and non-Hermitian phenomena in coupled cavity arrays. Here I will discuss three examples: spontaneous symmetry breaking, exceptional points and zero-mode lasing, with applications in optical computing.

Room 14b ICM

den University, Leiden, Netherlands

Photothermal circular dichroism microscopy of single nanoobjects presents two major advantages: (i) a high degree of polarization control by using low-NA pump illumination and (ii) a high spatial resolution using high-NA illumination of the probe.

Room 14c ICM

Wu[1,2], D. Mocci[1,2], F. Fernández-Villoria[3,7], L. Colaizzi[1], M. Reduzzi[1], F. Holzmeier[4], L. Carlini[5], P. Bolognesi[5], R. Ritcher[6], L. Avaldi[5], J. González-Vázquez[7], A. Palacios[7], J. Santos[3,8], M. Lucchini[1,2], L. Bañares[3,9], N. Martin[3,8], F. Martin[3,7], and M. Nisoli[1,2]; [1]Dep. of Physics, Politecnico of Milano, Italy; [2]IFN-CNR, Milano, Italy; [3]IMDEA-Nanoscience, Madrid, Spain; [4]imec, Leuven, Belgium; [5]ISM-CNR, Roma, Italy; [6]Sincro- trone Trieste, Basovizza, Italy; [7]D. de Quimica, U. Autonoma de Madrid, Spain; [8]D. de Quimica Organica I, U. Complutense de Madrid, Spain; [9]D. de Quimica Fisica, U. Complutense de Madrid, Spain

The dynamics triggered by photo-ionization in nitroanilines, the simplest donor/acceptor systems, are investigated by combining ultrafast spectroscopy with PEPICO measurements and theoretical simulations. We appoint the ultrafast processes to wave-packet spreading in the cation.

Room Osterseen ICM

•*A. Bresci[1], F. Manetti[1], S. Ghislanzoni[2], F. Vernuccio[1], S. Sorrentino[1], C. Ceconello[1], R. Vanna[3], I. Bongarzone[2], G. Cerullo[1,3], and D. Polli[1,3]; [1]Politecnico di Milano, Department of Physics, Milan, Italy; [2]IRCCS Istituto Nazionale dei Tumori, Milan, Italy; [3]CNR Institute for Photonics and Nanotechnology (IFN), Milan, Italy*

We combine vibrational and multiphoton nonlinear optical techniques to distinguish and non-invasively monitor therapy-induced senescent cells, recently discovered to drive cancer recurrence in humans, at an unprecedentedly early stage of phenotype commitment.

CL-6.2 FRI (Invited) 10:45

Thermal wavefront shaping: Application in fluorescent microscopy

•*H.M.L. Robert[1], C. Liu[1], N. Rutz[2], G. Faini[1], A. Aggoun[1], F. Del Bene[1], G. Tessier[1], R. Quidant[2], and P. Berto[1,3]; [1]Sorbonne Université, Institut de la Vision, Paris, France; [2]Nanophotonic Systems Laboratory, ETH , Zürich, Switzerland; [3]Université Paris-cité, Paris, France*

Room 21 ICM

for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, The Photonics Institute, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, Singapore

We report on a new type of non-radiating, anapole excitations in dielectric particles under illumination with toroidal light pulses. We show that such anapoles are linked to supertoroidal currents induced in the particle.

EJ-4.2 FRI 10:45

Propagation of shaped light carrying orbital angular momentum through turbid tissue-like scattering medium

•*I. Lopushenko[1], A. Sdobnov[1], A. Bykov[1], and I. Meglinski[1,2]; [1]Optoelectronics and Measurement Techniques Unit, ITEE, University of Oulu, Oulu, Finland; [2]College of Engineering and Physical Sciences, Aston University, Birmingham,*

Room 22a ICM

Heinrich[1], Z. Yang[3], Y. Plotnik[2], M. Segev[2], and A. Szameit[1]; [1]Institute for physics, University Rostock, Rostock, Germany; [2]Physics Department and Solid State Institute, Technion – Israel Institute of Technology, Haifa, Israel; [3]Department of Physics, Zhejiang University, Hangzhou, China

We experimentally demonstrate the first three-dimensional photonic topological insulator comprising two spatial and one synthetic dimensions. The 3D dynamics of edge states induced by lattice dislocations are observed using laser-written waveguides.

NOTES

Room 1 ICM

Spain; [3]CONACYT-Centro de Investigación Científica y de Educación Superior de Ensenada, Unidad Foránea Monterrey, Apodaca, Mexico; [4]Instituto de Estructura de la Materia, IEM-CSIC, Madrid, Spain

Femtosecond Laser Induced Periodic Surface Structures (LIPSS) formation on the surface of polymer materials is studied as a function of the substrate at which the polymer is deposited and of the film thickness.

CM-9.3 FRI 11:00

Fresnel reflection reduction of standard single mode fiber end surfaces via fs laser induced surface structuring

•R.G. Krämer[1], M.P. Siems[1], D. Richter[1], and S. Nolte[1,2]; [1]Friedrich Schiller University Jena, Abbe Center of Photonics, Institute of Applied Physics, Jena, Germany; [2]2Fraunhofer Institute for Applied optics and Precision Engineering IOF, Center of Excellence in Photonics, Jena, Germany

We present the implementation of femtosecond laser induced periodic surface structures on standard fused silica fiber end surfaces for successful Fresnel reflection reduction.

Room 2 ICM

CJ-8.2 FRI 11:00

7x7 multicore fiber, nanosecond laser system delivering 60 mJ pulse energy

•M. Bahri[1], C. Aleshire[1], A. Steinkopff[1], A. Klenke[1,2,3], C. Jauregui[1], S. Kuhn[4], J. Nold[4], N. Haarlammert[4], T. Schreiber[4], A. Tünnermann[1,2,3,4], and J. Limpert[1,2,3,4]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität, Jena, Germany; [2]Helmholtz-Institute Jena, Jena, Germany; [3]GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany; [4]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

This work presents a 49-core Ytterbium-

Room 3 ICM

Schneeweiss, J. Volz, and A. Rauschenbeutel; Humboldt-Universität zu Berlin, Berlin, Germany

We present a novel type of interferometer, which realizes interference in the two-photon component of an incoming laser light. As a consequence, it converts the laser light into a antibunched or bunched light.

EA-7.3 FRI (Invited) 11:00

Graph States of Atomic Ensembles Entangled by Light

E. Cooper, P. Kunkel, A. Periwal, and •M. Schleier-Smith; Stanford University, Stanford, CA, USA

We engineer continuous-variable graph states of atomic spin ensembles. Our approach combines global light-mediated interactions in an optical cavity with local addressing to generate a programmable network of entanglement.

Room 4a ICM

[2]Center for Nano- and Biophotonics (NB-Photonics), Ghent University, Ghent , Belgium

We experimentally demonstrate a reconfigurable all-optical nonlinear activation function for neural networks based on a silicon Mach-Zehnder interferometer with a heterogeneously integrated optical amplifier. It shows both low activation input power and significant optical amplification.

CK-13.3 FRI 11:00

Near-infrared Light-sensing and Emitting III-V Micro- and Nanopillar Unipolar LEDs without p-type Doping

•B. Jacob[1], F. Camarneiro[1], J. Borme[1], J. Figueiredo[2], J. Nieder[1], and B. Romeira[1]; [1]INL - International Iberian Nanotechnlogy Laboratory, Braga, Portugal; [2]Universidade de Lisboa, Lisboa, Portugal

We demonstrate seamless integration of electroluminescence, light-sensing and negative differential conductance in unipolar micro/nanopillar-LEDs. The light-sensing-emitting static and dynamic properties are studied paving the way for

Room 4b ICM

Precision Engineering, Jena, Germany; [6]Department of Physics, University of Bath, Claverton Down, Bath, United Kingdom; [7]Nordita, KTH Royal Institute of Technology and Stockholm Univ., Stockholm, Sweden

We theoretically and experimentally investigate broadband and resonant four-wave mixing in the telecom O-band in monolayer MoS_2, where we exploit excitonic transitions to enhance the nonlinear emitted signal while keeping the linear absorption negligible.

EI-2.3 FRI 11:00

Light topology interplay in high harmonic generation from graphene

•A. García-Cabrera, R. Boyero-García, Ó. Zurrón-Cifuentes, J. Serrano, J. San Román, L. Plaja, and C. Hernández-García; Grupo de Investigación en Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, Universidad de Salamanca, Salamanca, Spain

We explore the topology of the high-order harmonics from graphene driven by linearly polarized vector beams with a well-defined Poincaré index. Graphene's nonlinear anisotropy leads to a harmonics' complex spatial

Room 5 ICM

CC-5.2 FRI 11:00

A wide-band photonic spectrum analyser for terahertz frequencies

•B.L. Krause, F. Reschke, and S. Preu; TU Darmstadt, Darmstadt, Germany

We show a photonic spectrum analyser based on optical frequency down-conversion for the terahertz frequency range. It achieves competitive performance, close to established electronic spectrum analysers, yet with a larger bandwidth in an affordable module.

Room 11 ICM

amplification of non-phase-locked multi-wavelength light by SOA. 16QAM signals could be generated without quality degradation due to four-wave mixing by using uneven channel spacing.

CI-6.3 FRI 11:00

Optical Eigenvalue Demodulation Using Neural Network and Estimation of the Number of Eigenvalues in the Preset Region

•K. Nishida, Y. Terashi, D. Hisano, K. Mishina, and A. Maruta; Osaka University, Suita, Japan

We propose a demodulation method of a neural network and an estimation of the number of eigenvalues. The back-to-back experiments transmitting a four-eigenvalue signal achieved the error-free operation < 2-dB penalty compared with the conventional method.

Room 12a ICM

Research Centre, Southampton, United Kingdom; [2]Covesion Ltd., Southampton, United Kingdom

Zinc-indiffused PPLN diced ridge waveguides for 1st-order 532nm and 3rd-order 375-390nm generation have been modelled and fabricated, yielding peak crystal conversion efficiencies of 40% and 0.7% respectively, with ongoing optimisation through characterisation and numerical modelling.

CE-9.3 FRI 11:00

Characterization of ring resonators in thin-film lithium niobate photonic integrated circuit platform

•J. César Cuello[1], A. Money[2], J. Leo[2], H. Zarebidaki[2], G. Choong[2], Y. Petremand[2], I. Prieto[2], O. Dubochet[2], M. Despont[2], H. Sattari[2], G. Carpintero[1], and A. Ghadimi[2]; [1]University Carlos III of Madrid, Leganes, Spain; [2]Swiss Center for Electronics and Microtechnology (CSEM), Neuchatel, Switzerland

Here we present high-yield fabrication of lithium niobate PICs based on 6-inch lithium niobate on insulator wafers and the statistical measurements of hun-

Room 12b ICM

of Sweden, Borås, Sweden; [3]GROC-UJI, Institute of New Imaging Technologies, University Jaume I, Castellón, Spain

We report the tuning of the modes of a bright soliton comb by thermally tuning the resonances of a photonic molecule. We implement a thermal-control feedback system to maintain a soliton state over 60 GHz.

ED-6.3 FRI 11:00

Long-Term Frequency Stability of Laser Cavity Solitons

•A. Cutrona[1,2], M. Rowley[2], A. Bendahmane[2], V. Cecconi[1,2], L. Peters[1,2], L. Olivieri[1,2], B. Little[3], S. Chu[4], S. Stivala[5], R. Morandotti[6], D. Moss[7], J.S. Totero Gongora[1,2], M. Peccianti[1,2], and A. Pasquazi[1,2]; [1]Emergent Photonics Research Centre, Dept. of Physics, Loughborough University, UK; [2]Emergent Photonics (Epic) Lab, Dept. of Physics and Astronomy, Brighton, UK; [3]QXP Technologies, Xi'an, China; [4]Department of Physics, City University of Hong Kong, China; [5]Dipartimento di Ingegneria, Universita' degli Studi di Palermo, Italy; [6]INRS-EMT, Varennes, Canada; [7]Optical Sciences Centre, Swinburne

Room 13a ICM

JSIII-4.2 FRI 11:00

Rapidly convergent fabrication-error-tolerant unitary processor using few-layer-redundant multi-plane light conversion

•*Y. Taguchi[1], Y. Wang[2], R. Tanomura[1], T. Tanemura[1], and Y. Ozeki[1]; [1]The University of Tokyo, Bunkyo-ku, Japan; [2]Preferred Networks Inc., Chiyoda-ku, Japan*

We propose a new architecture for programmable unitary transformation that is robust to fabrication errors on integrated photonics platforms. Compared to previous studies, our architecture achieves orders of magnitude better accuracy and a 20-fold speed-up.

Room 13b ICM

to the large variation of the acoustic phase velocity.

CD-12.3 FRI 11:00

Switchable analogue of Electromagnetic induced Absorption and Transmission-like filter responses using Stimulated Brillouin Scattering

•*M. Jha, R. Dhawan, R. Parihar, and A. Choudhary; Indian Institute of Technology, Delhi, India*

We propose a novel technique for generating an analogue of electronically induced transmission/Absorption -like response using stimulated Brillouin scattering in a phase-modulated link. EIT depth of 35 dB and EIA depth of 30dB is achieved.

Room 14a ICM

EF-8.2 FRI 11:00

Tracking Exceptional Point above Laser Threshold

•*K. Ji[1], Q. Zhang[2], L. Ge[3], G. Beaudoin[1], I. Sagnes[1], F. Raineri[1], R. El-Ganainy[2,4], and A.M. Yacomotti[1]; [1] Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France; [2]Department of Physics, Michigan Technological University, Houghton, USA; [3]Department of Physics and Astronomy, College of Staten Island, CUNY, New York, USA; [4]Henes Center for Quantum Phenomena, Michigan Technological University, Houghton, USA*

We experimentally observe and track

Room 14b ICM

CH-14.2 FRI 11:00

Trace-molecule detection below the ppt level with doubly-resonant cantilever-enhanced photoacoustic spectroscopy

•*J. Pelini[1,2], M. Siciliani de Cumis[3], Z. Wang[4], I. Galli[2], I. Lopez Garcia[2], M. Concetta Canino[5], P. Cancio Pastor[3], N. Akikusa[6], W. Ren[4], P. De Natale[2], and S. Borri[2]; [1]University of Naples ”Federico II”, Naples, Italy; [2]CNR-INO (National Instirute of Optics) and LENS (European Laboratories for Non Linear Spectroscopy), Florence , Italy; [3]ASI (Italian Space Agency), Matera, Italy; [4]The Chinese University of Hong Kong, Hong Kong, China; [5]CNR-IMM, Bologna, Italy; [6]Hamamatsu Pho-*

Room 14c ICM

EE-3.2 FRI 11:00

Ultrafast Photo-dissociation Dynamics of NO_2 Probed at the N K-Edge

•*Z.-Y. Zhang[1], L. Restaino[2], A. Sen[1], M.-O. Winghart[1], M.J.J. Vrakking[1], M.R. Coates[2], M. Odelius[2], M. Kowalewski[2], E.T.J. NIbbering[1], and A. Rouzée[1]; [1]Max-Born-Institute for Nonlinear Optics and Short Pulse spectroscopy, Max-Born-Strasse 2A, 12489, Berlin, Germany; [2]Department of Physics, Stockholm University, SE-106 91, Stockholm, Sweden*

Femtosecond N K-edge X-ray absorption spectroscopy of photoexcited NO_2 monitors the electronic structural dynamics of NO_2 following the pathway of a conical inter-

Room Osterseen ICM

I will describe a novel wavefront shaping concept where the transmitted light is shaped using thermo-optics effect. I will present our arrays of electrically tuneable lenses and illustrate the potential of this technique for microscopy.

Room 21 ICM

United Kingdom

A Monte Carlo model is developed and utilized to trace the evolution of light with orbital angular momentum propagating within the turbid medium in order to study its potential for biomedical diagnostics and tissue characterization.

EJ-4.3 FRI 11:00

Inverse design of integrated phase-tunable beam couplers

•*A. Nanda[1,2], M. Kues[1,3], and A.C. Lesina[1,2]; [1]Hannover Centre for Optical Technologies, Cluster of Excellence PhoenixD, Leibniz University Hannover, Welfengarten 1, 30167 Hannover, Germany; [2]Institute of Transport and Automation Technology, Leibniz University Hannover, Welfengarten 1, 30167 Hannover, Germany; [3]Institute of Photonics, Leibniz University Hannover, Nienburger Strasse 17, 30167 Hannover, Germany*

Beam splitters are fundamental component for integrated linear quantum optics. However, phase control is not present

Room 22a ICM

EC-2.2 FRI 11:00

Anomalous topology in strongly amorphous networks

•*Z. Zhang[1], P. Delplace[2], and R. Fleury[1]; [1]Laboratory of Wave Engineering, School of Electrical Engineering, EPFL, Lausanne, Switzerland; [2]Ens de Lyon, CNRS, Laboratoire de physique, Lyon, France*

Topological insulators are crystalline materials with exceptional immunity to local disorder and random structural deformations but only in small levels. We predict and observe a novel topological photonic phase, surviving arbitrarily strong levels of amorphism.

NOTES

Room 1 ICM

CM-9.4 FRI 11:15

Robustness of anti-adhesion between nanofibers and surfaces covered with nanoripples of varying spatial period

G. Buchberger[1], *M. Meyer*[2], *C. Plamadeala*[1], *M. Weissbach*[2], *G. Hesser*[1], *W. Baumgartner*[1], *•J. Heitz*[1], *and A.-C. Joel*[2]; [1]*Johannes Kepler University Linz, 4040 Linz, Austria*; [2]*RWTH Aachen University, Institute for Biology II, 52074 Aachen, Germany*

PET foils with biomimetic ripples, derived from anti-adhesive nanostructures on spider legs, shows the same pronounced anti-adhesive effect against threads from the spider webs. This effect is robust against changes in spatial period.

Room 2 ICM

doped multicore fiber (MCF) in a MOPA system, achieving a pulse energy of up to 60 mJ in ns-class at a repetition rate of 5 kHz from 3 mJ seed.

CJ-8.3 FRI 11:15

Generation of femtosecond 1.3 μm pulses through chirped pulse amplification based on praseodymium-doped fluoride fibers

K. Yamaizumi, F. Hondo, and •T. Fuji; *Toyota Technological Institute, Nagoya, Japan*

We have investigated the design of a chirped pulse amplification system based on praseodymium-doped fluoride fibers. We have successfully compressed the amplified 1.3 μm pulse down to 220 fs without serious phase distortion.

Room 3 ICM

Room 4a ICM

a new-class of III-V n-type optoelectronic emitters and detectors.

CK-13.4 FRI 11:15

Monolithically Integrated Waveguide-Coupled Single-Photon Avalanche Photodetector in a Visible-Light Silicon Photonics Platform

•A. Govdeli[1,2], *J.N. Straguzzi*[1], *W.D. Sacher*[1], *and J.K.S. Poon*[1,2]; [1]*Max Planck Institute of Microstructure Physics, Halle (Saale), Germany*; [2]*Department of Electrical and Computer Engineering, University of Toronto, Canada*

We demonstrate a waveguide-coupled single-photon avalanche detector in a visible-light photonics platform. Dark count rates <19 kHz and a photon detection probability of 5% were measured at λ=488nm for an average photon number of <1

Room 4b ICM

structure breaking the topological conservation.

EI-2.4 FRI 11:15

Many-Body driven extreme nonlinear interactions in quasi-2D materials

•J.V. Moloney[1], *J. Hader*[1], *J. Neuhaus*[2], *and S.W. Koch*[1,2]; [1]*Wyant College of Optical Sciences, University of Arizona, Tucson, USA*; [2]*Department of Physics and Material Sciences Center, Philipps University Marburg, Germany*

Semiconductor Dirac Bloch simulations with many-body Coulomb contributions included of nonperturbative higher harmonic generation in quasi-2D transition metal dischalcogenides promote enhanced emission signals and spectral broadening primarily at energies between the first exciton and bandgap.

Room 5 ICM

CC-5.3 FRI 11:15

Optical cavity-referenced ultra-stable terahertz frequency generation

•G. Kang, D.-C. Shin, S.-W. Kim, and Y.-J. Kim; *Korea Advanced Institute of Science and Technology (KAIST), Department of Mechanical Engineering, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, South Korea*

Optical cavity-referenced terahertz generation with an extended frequency range of 0.1–1.1 THz is demonstrated, yielding a 15-digit frequency instability at 1-s.

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CI-6.4 FRI 11:15

Modulation and Demodulation Method Robust against Laser Phase Noise

•R. Higuchi, T. Kuno, R. Shiraki, Y. Mori, and H. Hasegawa; *Nagoya University, Nagoya, Japan*

We propose a joint modulation and demodulation method that achieves high phase noise tolerance and low modulation loss simultaneously. Simulations and experiments show that 32 Gbaud 16QAM signals can be transmitted using low-cost lasers.

Room 12a ICM

dreds of resonators, demonstrating intrinsic quality factor >2.5 millions, corresponding to linear propagation losses <0.14dB/cm.

CE-9.4 FRI 11:15

Erbium implantation in thin film Lithium Niobate

M. Adshead[1], *M. Sanaee*[2], *D. Blight*[1], *•A. Prencipe*[2], *R.J. Curry*[1], *and K. Gallo*[2]; [1]*Photon Science Institute University of Manchester, Manchester, United Kingdom*; [2]*KTH Royal Institute of Technology, Stockholm, Sweden*

We demonstrate Erbium implantation in lithium niobate on insulator and measure the brightest photoluminescence peak at 1530nm (at 4K) from a doped area showing comparable surface quality (verified through AFM imaging) before and after implantation.

Room 12b ICM

University of Technology, Hawthorn, Australia

We characterise the long-term frequency stability of free running laser cavity-soliton states. We demonstrate Allan deviations at one second averaging time of 3.55×10^{-10} (carrier) and 4.95×10^{-9} (repetition rate), paving the way for metrological applications.

ED-6.4 FRI 11:15

Mid-Infrared Quantum Cascade Laser Frequency Comb Tightly Locked by Near-Infrared Light Modulation

•K.N. Komagata[1], *A. Parriaux*[1], *M. Bertrand*[2], *J. Hillbrand*[2], *V.J. Wittwer*[1], *J. Faist*[2], *and T. Südmeyer*[1]; [1]*Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, 2000 Neuchâtel, Switzerland*; [2]*Institute for Quantum Electronics, ETH Zurich, 8093 Zurich, Switzerland*

We demonstrate a near-infrared actuator for tight-locking mid-infrared quantum cascade laser frequency combs with a 1-MHz actuation bandwidth, which surpasses conventional drive-current modulation. We thus achieve high spectral purity pertinent for mid-infrared metrological applications.

Room 13a ICM

JSIII-4.3 FRI 11:15

Lithium Niobate on Insulator Photonic Networks as an Integrated Multiple Scattering Platform

•*X.S. Wang*[1], *R. Savo*[2], *A. Maeder*[1], *F. Kaufmann*[1], *J. Kellner*[1], *A. Morandi*[1], *S. Rotter*[3], *R. Sapienza*[4], *and R. Grange*[1]; [1]*ETH,Department of Physics, Institute for Quantum Electronics, Optical Nanomaterial Group, Zurich, Switzerland*; [2]*Centro Ricerche Enrico Fermi, Rome, Italy*; [3]. *Institute for Theoretical Physics, Vienna University of Technology , Vienna, Austria*; [4]*The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom*

We develop a graph-based numerical model for lithium niobate on insulator waveguide networks, whose validity is verified experimentally on small devices; larger networks are investigated numerically as an on-chip multiple scattering platform with designed randomness.

Room 13b ICM

CD-12.4 FRI 11:15

Optimised Microwave Phase Shifter using Brillouin-Induced Low Biasing

•*R. Parihar, R. Dhawan, and A. Choudhary*; *Ultrafast Optical Communications and High-Performance Integrated Photonics (UFO-CHIP) Group, Department of Electrical Engineering, Indian Institute of Technology (IIT) , Delhi, India*

Optimisation of the performance metrics of a microwave photonic phase shifter is demonstrated by low-biasing the carrier through Brillouin scattering with improvement in noise figure and compression dynamic range by >2dB.

Room 14a ICM

the exceptional point above the laser threshold in coupled photonic crystal cavities.

EF-8.3 FRI 11:15

Frequency control and nonlinearity in a small array of electro-optomechanical resonators

•*G. Jara-Schulz*[1], *S. Barbay*[1], *M.G. Clerc*[2], *and R. Braive*[1,3,4]; [1]*Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, C2N, Palaiseau, France*; [2]*Departamento de Física and Millennium Institute for Research in Optics, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile*; [3]*Université Paris Cité, Paris, France*; [4]*Institut Universitaire de France (IUF), Paris, France*

Thanks to optics, we studied the mechanical response of a small array of electro-optomechanical photonic crystal resonators. The impact of external and internal parameters on the dynamics and synchronization regime are characterized numerically and experimentally.

Room 14b ICM

tonics K.K, Shizuoka, Japan

We present a new approach to cantilever-enhanced photo-acoustic spectroscopy based on a double standing wave e effect (acoustic and optical). Our task is to push the in-air trace-gas detection limit below the part-per-trillion.

CH-14.3 FRI 11:15

Phase-controlled Fourier-transform infrared spectroscopy with cantilever-enhanced photo-acoustic detection

•*S. Larnimaa*[1], *M. Roiz*[1], *and M. Vainio*[1,2]; [1]*Department of Chemistry, University of Helsinki, Helsinki, Finland*; [2]*Photonics Laboratory, Physics Unit, Tampere University, Tampere, Finland*

A 13-fold speed improvement in broadband cantilever-enhanced photoacoustic spectroscopy (CEPAS) has been obtained using Phase-controlled Fourier-transform spectroscopy (PC-FTS). The absorption spectrum of methane in the mid-infrared region has been measured as proof of concept.

Room 14c ICM

section towards the photodissocation channel.

EE-3.3 FRI 11:15

Ultrafast Soft X-ray Spectroscopy of Water-Mediated Photoacid-Base Proton Transfer Reactions

•*M.-O. Winghart*[1], *P. Han*[1], *Z.-Y. Zhang*[1], *C. Kleine*[1], *S. Das*[2], *D. Garratt*[3], *A.A. Cordones*[3], *G.L. Dakovski*[4], *D. DePonte*[4], *K. Kunnus*[4], *E. Ryland*[3], *M. Fondell*[5], *R. Mitzner*[5], *K.J. Gaffney*[3], *M. Odelius*[2], *E. Pines*[6], *P. Wernet*[7], *and E.T.J. Nibbering*[1]; [1]*Max Born Institute, Berlin, Germany*; [2]*Stockholm University, Sweden*; [3]*PULSE Institute, Menlo Park, USA*; [4]*SLAC National Accelerator Laboratory, Menlo Park, USA*; [5]*Helmholtz-Zentrum Berlin, Germany*; [6]*Ben Gurion University of the Negev, Beersheva, Israel*; [7]*Uppsala Universiy, Sweden*

Employing transient soft X-ray spectroscopy, we explore the role of electronic-structural changes in reactants during elementary acid-base proton transfer events in solution phase, providing novel insights to the underlying microscopic mechanisms of proton transport.

Room Osterseen ICM

CL-6.3 FRI 11:15

Focus-ISM enhances optical sectioning in super-resolution microscopy

•*A. Zunino*[1], *G. Tortarolo*[1,2], *F. Fersini*[1,3], *G. Garrè*[1,3], *and G. Vicidomini*[1]; [1]*Molecular Microscopy and Spectroscopy, Istituto Italiano di Tecnologia, Genoa, Italy*; [2]*Laboratory of Experimental Biophysics, EPFL, Lausanne, Switzerland*; [3]*DIBRIS, University of Genoa, Genoa, Italy*

We increase the optical sectioning capabilities of image scanning microscopes with a novel data processing technique. We study the light distribution on the detector array to classify and discard the background without losing any signal.

Room 21 ICM

in prevalent lossless beam splitters. Thus, we demonstrate symmetric beam splitter designs with phase control using adjoint-based topology optimization.

EJ-4.4 FRI 11:15

Influence of surface roughness on the resonance frequencies and quality factors of optical cavities and plasmonic nanoparticles

•*P.T. Kristensen*[1,2], *T. Kiel*[3], *K. Busch*[3,4], *and F. Intravaia*[3]; [1]*DTU Electro, Technical University of Denmark, Kgs. Lyngby, Denmark*; [2]*NanoPhoton - Center for Nanophotonics, Kgs. Lyngby, Denmark*; [3]*Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany*; [4]*Max-Born-Institut, Berlin, Germany*

We present a semi-analytical approach to assess the influence of surface roughness on the distribution of resonance frequencies and quality factors of general electromagnetic resonators such as leaky optical cavities and plasmonic nanoparticles.

Room 22a ICM

EC-2.3 FRI 11:15

Observation of the bulk-edge correspondence in anomalous Floquet-Chern insulators in a synthetic photonic lattice

•*R. El Sokhen*[1], *A. Adiyatullin*[1], *A. Gómez de León*[2], *S. Randoux*[1], *P. Deplace*[3], *and A. Amo*[1]; [1]*Univ. Lille, CNRS, UMR 8523 – PhLAM – Physique des Lasers Atomes et Molécules, Lille, France*; [2]*Institute of Fundamental Physics IFF-CSIC, Calle Serrano 113b, Madrid, Spain*; [3]*ENS de Lyon, CNRS, Laboratoire de Physique (UMR CNRS 5672), Lyon, France*

We experimentally measure the topological invariants of a two-dimensional synthetic photonic lattice by integrating the Berry curvature over the Brillouin zone. The invariants match the observed number of edge states.

NOTES

Room 1 ICM

CM-9.5 FRI 11:30

Tailoring surface topographies on solids with Mid-IR femtosecond laser pulses

S. Maragkaki[1], •G. Tsibidis[1,2], L. Heizer[3], Z. Papa[3], R. Flender[3], B. Kiss[3], Z. Papa[3], and E. Stratakis[1,4]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Greece; [2]Department of Material Science, University of Crete, Heraklion, Greece; [3]ELI-ALPS, Szeged, Hungary; [4]Department of Physics, University of Crete, Heraklion, Greece

We investigate both experimentally and theoretically the impact of laser sources on the generation of surface modification related effects and on the subsequent surface patterning of metallic and semiconducting materials.

CM-9.6 FRI 11:45

Coherence Effects in LIPSS Formation on Silicon upon Picosecond Laser Pulse Irradiations

•I. Mirza[1], Y. Levy[1], J. Sladek[1], H. Papadaki[2], E. Kaselouris[2], V. Dimitriou[2], and N. Bulgakova[2]; [1]HiLASE

Room 2 ICM

CJ-8.4 FRI 11:30

Towards high-power ultrafast short-wavelength-band Tm-doped fiber laser

•X. Liu[1], J. Sahu[2], and R. Gumenyuk[1,3]; [1]Laboratory of photonics, Tampere University, Tampere, Finland; [2]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [3]Tampere Institute for Advanced Study, Tampere University, Tampere, Finland

We report an ultrabroadband tunable dissipative soliton Tm-doped fiber laser operating from 1.7μm to 1.9μm. Power scalability of the laser is demonstrated by a single-stage amplifier delivering 480fs pulses with 141mW of output power.

CJ-8.5 FRI 11:45

Sub-100 fs all-fiber polarisation maintaining tunable laser from 1870 nm up to 2050 nm

•A. Grande[1,2], D. Darwich[1], V. Freysz[2], J. Boullet[2], and E. Cormier[1]; [1]Laboratoire Photonique

Room 3 ICM

EA-7.4 FRI 11:30

A robust half-W1 photonic crystal waveguide platform for interfacing trapped cold atoms with slow light

•A. Bouscal[1], A. Chochon[1], M. Kemiche[2,3], S. Mahapatra[2], N. Fayard[4], J. Berroir[1], T. Ray[1], J.-J. Greffet[4], F. Raineri[2], A. Levenson[2], K. Bencheikh[2], A. Urvoy[1], and J. Laurat[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-PSL, Collège de France, Paris, France; [2]Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France; [3]IMEP-LAHC, Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, Grenoble INP, Grenoble, France; [4]Laboratoire Charles Fabry, Université Paris-Saclay, IOGS, CNRS, Palaiseau, France

We present a proposal for trapping cold Rubidium atoms near a novel high-index photonic crystal waveguide, with a design optimized against fabrication imperfections. The predicted Purcell factor is 100 times higher than for optical nanofibers.

EA-7.5 FRI 11:45

Two-photon optical shielding of collisions between ultra-

Room 4a ICM

CK-13.5 FRI 11:30

Infrared-to-THz sensors based on whispering gallery mode microresonators

D. D'Ambrosio[1], M. Capezzuto[1], S. Avino[1], A. Giorgini[1], P. Malara[1], A. Sorgi[2], L. Consolino[2], M. Vitiello[3], P. De Natale[2], and •G. Gagliardi[1]; [1]Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica (INO), Pozzuoli (NA), Italy; [2]Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica (INO), Firenze, Italy; [3]Consiglio Nazionale delle Ricerche, Istituto di Nanoscienze (NANO), Pisa, Italy

A room-temperature photodetector is demonstrated from mid-infrared to terahertz window using a silica microsphere. Whispering-gallery modes are excited with a free-space visible laser without guided-optics devices. The readout relies on laser-frequency locking to the microcavity

CK-13.6 FRI 11:45

Active Exciton Resonance Tuning in Hybrid-2D Photodetectors

•T. Hoekstra and J. van de Groep; Van der Waals-Zeeman Institute, University of Amsterdam, Amsterdam, Netherlands

Room 4b ICM

EI-2.5 FRI 11:30

Coherent State Manipulation of Single Hexagonal Boron Nitride Quantum Emitters

J.A. Preuß[1], D. Groll[2], R. Schmidt[2], T. Hahn[2], P. Machnikowski[3], T. Kuhn[2], R. Bratschitsch[1], •D. Wigger[3,4], and S. Michaelis de Vasconcellos[1,5]; [1]University of Münster, Department of Physics and Center for Nanotechnology, Münster, Germany; [2]University of Münster, Institute of Solid State Theory, Münster, Germany; [3]Wrocław University of Science and Technology, Department of Theoretical Physics, Wrocław, Poland; [4]School of Physics, Trinity College Dublin, Dublin , Ireland; [5]TU Dortmund University, Dortmund, Germany

We demonstrate coherent state manipulation of hBN color centers and investigate coherence dynamics and coupling between electronic and phononic excitations. Our study reveals the effects of spectral jitter on ultrafast coherence dynamics and internal phonon quantum dynamics.

EI-2.6 FRI 11:45

Bright single photon source based on a WSe$_2$ monolayer in an open cavity

•V. Mitryakhin[1], J.-C. Drawer[1], H.

Room 5 ICM

CC-5.4 FRI 11:30

Time-domain detection of multi-terahertz field vector with polarization-modulated electro-optic sampling

•N. Kanda, M. Nakagawa, and R. Matsunaga; The Institute for Solid State Physics, The University of Tokyo, Kashiwa, Japan

We demonstrated a method for time-domain measurement of multi-terahertz electric field as a vector value by modulating the polarization of gate pulses for electro-optical sampling with a photoelastic modulator.

CC-5.5 FRI 11:45

Quantitative Measurement of the dispersion of third-order nonlinearity in silica in the 1-25 THz range

B. Zhou, M. Rasmussen, S. Yan, N.K. Noori, O. Nagy, Y. Ding, S.J. Lange, and

Room 11 ICM

CI-6.5 FRI 11:30

Ring Modulator Based High-Sampling Rate Integrated Photonic Sampler

•M.I. Hosni[1], A. Vilson[2], K. Singh[1], J. Meier[1], Y. Mandalawi[1], and T. Schneider[1]; [1]Technische Universität Braunschweig, Braunschweig, Germany; [2]Leibniz Universität Welfengarten 1, Hannover, Germany

We demonstrate a compact, integrated 9-branch photonic sampler based on silicon ring modulators. By the convolution of the signal spectrum with a 9-line, flat frequency comb a sampling rate of 18 GSa/s was achieved

CI-6.6 FRI 11:45

Coherent PolMux reception using a low-cost Heterodyne Receiver

M. Barrio, •D. Izquierdo, P. Sevillano, and I. Garcés; Universidad de Zaragoza, Zaragoza, Spain

We present the digital

Room 12a ICM

CE-9.5 FRI 11:30

Redeposition-free Inductively-Coupled Plasma Etching of Thin-Film Lithium Niobate on Insulator

•F. Kaufmann, G. Finco, A. Maeder, and R. Grange; Optical Nanomaterial Group, Institute for Quantum Electronics, Department of Physics, ETH Zurich, Zurich, Switzerland

We investigate the behaviour of redeposited material left after argon etching of lithium niobate with respect to etch parameters and show how to reach a regime, where the redeposition is removed already during etching.

CE-9.6 FRI 11:45

Statistical characterization of MMI beam splitters on thin film lithium niobate on insulator (LNOI) platform at telecom wavelength

•A. Monney[1], J. Leo[1], G. Li[2], H. Zarebidaki[1], G. Choong[1], Y.

Room 12b ICM

ED-6.5 FRI 11:30

Feed-Forward Integration of an Optical Frequency Comb and a Single-Frequency DPSS Laser Operating at the 87Sr Magic Wavelength

•Y.S. Cheng[1], B. Szutor[2], and D. Reid[1]; [1]Scottish Universities Physics Alliance, Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]Skylark Lasers Ltd, Ratho Park Phase One, 88 Glasgow Rd, Ratho Station, Newbridge, Edinburgh, United Kingdom

A Pr:YLF-Cr:LiCAF solid-state laser operating at 813.42 nm, the Sr-clock "magic wavelength", is integrated with a Ti:sapphire frequency comb through a feed-forward / feedback combination. Beat-note measurements demonstrate a linewidth as low as 65 kHz.

ED-6.6 FRI 11:45

Highly coherent triple frequency comb generation in a tri-core fiber for four-wave-mixing experiments

•E.-L. Bancel[1], E. Genier[1], R. Santagata[2], M. Conforti[1], A. Kudlinski[1], G. Bouw-

Room 13a ICM

JSIII-4.4 FRI 11:30

The Demonstration of Photorefractive Synaptic Connections for an Integrated Photonic Crossbar Array

•E.A. Vlieg, F. Horst, R. Dangel, and B.J. Offrein; IBM Research - Zurich, Rüschlikon, Switzerland

We demonstrate programmable optical synaptic connections in an integrated photorefractive interconnect circuit. These provide the basic elements for an integrated photonic crossbar array for fast and efficient signal processing in artificial neural networks.

JSIII-4.5 FRI 11:45

Combining (3+1)D printed photonic circuits and CMOS technology for future high-performance integration

•A. Grabulosa[1], J. Moughames[1], X. Porte[1,2], and D. Brunner[1]; [1]Institute

Room 13b ICM

CD-12.5 FRI 11:30

Temporal Dynamics of On-Chip Quasi-Light Storage

•M. Merklein[1], L. Goulden[1], M. Kiewiet[1], Y. Liu[1], C.K. Lai[1], D.-Y. Choi[2], S.J. Madden[2], C.G. Poulton[3], and B.J. Eggleton[1]; [1]University of Sydney Nano Institute (Sydney Nano), The University of Sydney, Sydney, Australia; [2]Laser Physics Centre, The Australian National University, Canberra, Australia; [3]School of Mathematical and Physical Sciences, University of Technology Sydney, Sydney, Australia

We investigate the temporal dynamics of on-chip quasi-light storage based on stimulated Brillouin scattering and show signal delays of over 100ns, exceeding the chip transit time and intrinsic phonon lifetime by an order of magnitude.

CD-12.6 FRI 11:45

Order of magnitude increase in storage time of Brillouin-based memory

•A. Geilen[1,2], S. Becker[1,2], and B. Stiller[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany;

Room 14a ICM

EF-8.4 FRI 11:30

Spectral Control of Coupled InP Nanolasers around Exceptional Points through Selective Excitation

•A. Fischer[1,2], T.V. Raziman[2], J. Dranczewski[1,2], D. Saxena[2], H. Schmid[1], K. Moselund[3,4], and R. Sapienza[2]; [1]IBM Research Europe - Zurich, Zurich, Switzerland; [2]Department of Physics, Imperial College London, London, United Kingdom; [3]Paul Scherrer Institut, Villigen, Switzerland; [4]EPFL Lausanne, Lausanne, Switzerland

We experimentally study coupled semiconductor nanolasers, that are selectively excited, and explore their mode landscape which is described by coupled mode theory. We demonstrate virtual exceptional points, reversed pump dependence, wavelength switching and PT-symmetry breaking.

EF-8.5 FRI 11:45

Mapping Chaotic Switching in a ring resonator

•R. Dikande Bitha[1], A. Giraldo[2], B. Krauskopf[1], and N.G.R. Broderick[1]; [1]Dodd-Walls Centre for Photonic and Quantum Technolo-

Room 14b ICM

CH-14.4 FRI 11:30

Optical Fiber Ferrule-Top Spirally-Suspended Optomechanical Microresonators for Photoacoustic Spectroscopic Gas Sensing

•T. LI, K.V. Krishnaiah, P.C. Zhao, and A.P. Zhang; Photonics Research Institute, Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong, China

An optical fiber ferrule-top spirally-suspended optomechanical microresonator is presented for photoacoustic spectroscopic gas sensing. It is fabricated by an in-house optical 3D μ-printing technology and its frequency response is measured and compared with numerical simulation.

CH-14.5 FRI 11:45

Sensitive Detection of Ultrafast Photoacoustics Using Modulated Asynchronous Optical Sampling

•M. Velsink, M. Illienko, P. Sudera, and S. Witte; Advanced Research Center

Room 14c ICM

EE-3.4 FRI 11:30

Control of ultrafast XUV-induced dynamics in amino acids by halogen functionalization

•D. Mocci[1], R. Borrego Varillas[2], F. Vismarra[1,2], Y. Wu[1,2], L. Colaizzi[1], M. Reduzzi[1,2], M. Lucchini[1,2], J. Segarra-Martí[3], V. Dichiarante[4], P. Metrangolo[4], and M. Nisoli[1,2]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]IFN-CNR, Milano, Italy; [3]Instituto de Ciencia Molecular, Universitat de Valencia, Paterna, Spain; [4]Department of Chemistry, Materials and Chemical Engineering ”Giulio Natta”, Politecnico di Milano, Milano, Italy

We investigate by ultrafast pump-probe spectroscopy the role of halogen functionalization in a small amino acid following XUV photo-ionization. We demonstrate that the photo-induced dynamics are dictated by the electron affinity of the substituting halogen.

EE-3.5 FRI 11:45

Attosecond Rabi oscillations revealed in EUV-driven high harmonic spectroscopy

•A. de las Heras[1], C. Hernández-García[1], J. Serrano[1], T. Popmintchev[2,3], and L. Plaja[1];

Room Osterseen ICM

CL-6.4 FRI 11:30

High-resolution Multiscale Imaging of Unstained Histological Paraffin Embedded Tissue Blocks with Hyperspectral Stokes Polarimetry

•A. Bykov[1], O. Sieryi[1], V. Dremin[1,2], M. Borovkova[1], and I. Meglinski[1,2]; [1]University of Oulu, Oulu, Finland; [2]Aston University, Birmingham, United Kingdom

We demonstrate a dual-mode hyperspectral-polarization-based imaging approach for the characterization of paraffin-embedded tissue blocks at different spatial scales with high accuracy. The results are validated via the comparison to the gold standard histopathological analysis.

CL-6.5 FRI 11:45

Plug-and-play stimulated Raman microscopy system for broadband coherent vibrational imaging

F. Crisafi[1], B. Talone[1], A. Ragni[1], G. Di Noia[1], M. Rahman[2], J. He[3], J. Marcellino[3], G. Kar[3], Y. Samad[3],

Room 21 ICM

EJ-4.5 FRI 11:30

Designing Silicon-Germanium Photodetectors with Numerical Optimization: The Tradeoff Between Quantum Efficiency & Phase Noise

R. Islam, I.M. Anjum, C.R. Menyuk, and •E. Simsek; University of Maryland Baltimore County, Baltimore, USA

The tradeoff between quantum efficiency and phase noise of Si-Ge photodetectors is studied with modern numerical optimization methods.

EJ-4.6 FRI 11:45

Semi-analytical Approach for Modeling Strong Coupling of Quantum Emitters in Electromagnetic Resonators

•M. Abutoama[1,2], G. Kountouris[1,2], J. Mørk[1,2], and P.T. Kristensen[1,2]; [1]DTU

Room 22a ICM

EC-2.4 FRI 11:30

Extracting the Berry phase of dimer chains in a synthetic dimension

P. St-Jean[1], •F. Pellerin[1], J. De Leon Mayeu[1], M. Boisvert[2], W. Coish[2], and I. Carusotto[3]; [1]Université de Montréal, Montréal, Canada; [2]McGill University, Montréal, Canada; [3]Universita di Trento, Trento, Italy

We emulate topological dimer chains with nearest-neighbor and long-range couplings in the synthetic frequency dimension of an optical fiber loop, and present a novel experimental scheme for extracting the Berry phase.

EC-2.5 FRI 11:45

Backscattering in slow-light valley-Hall photonic topological waveguides

•G. Arregui[1], C.A. Rosiek[1], A. Vladimirova[1,2], M. Albrechtsen[1], B. Vosoughi Lahijani[1,2], R. Ellebæk

NOTES

Room 1 ICM

Centre, Institute of Physics of the Czech Academy of Sciences, Za Radnicí 828, 25241, Dolní Břežany, Czech Republic; [2]Institute of Plasma Physics & Lasers - IPPL, Hellenic Mediterranean University Research Center, Tria Monastiria 74100, Rethymno, Greece

We demonstrate suitable regime where SPP excitation along with Fresnel diffraction lead to LIPSS formation and their replication on Si by carefully tuning distance between adjacent laser irradiation spots and their relative laser field polarization

Room 2 ICM

Numérique et Nanosciences (LP2N), UMR 5298, CNRS-IOGS-Université Bordeaux, Talence, France; [2]ALPhANOV, Talence, France

We present an all-fiber polarization maintaining tunable laser system delivering sub-100 femtosecond pulses from 1870 nm up to 2050 nm soliton pulses using commercially available optical fiber.

Room 3 ICM

cold polar molecules

C. Karam[1], M. Meyer zum Alten Borgloh[2], R. Vexiau[1], M. Lepers[3], S. Ospelkaus[2], N. Bouloufa-Maafa[1], L. Karpa[2], and •O. Dulieu[1]; [1]Laboratoire Aimé Cotton, CNRS, U. Paris-Saclay, Orsay, France; [2]3Institut für Quantenoptik, Leibniz Universität, Hannover, Germany; [3]Laboratoire interdisciplinaire Carnot de Bourgogne, Dijon, France

We propose a method to engineer long-range interactions between ultracold ground-state molecules using optical fields, to prevent short-range collisional losses. It maps the microwave shielding onto a two-photon transition.

Room 4a ICM

By leveraging exciton resonances in atomically thin WS_2, we realize actively tunable hybrid-2D photodetectors. The tuning efficiency is greatly enhanced through integration with a Van der Waals heterostructure cavity and a non-local dielectric metasurface.

Room 4b ICM

Shan[1], S. Stephan[1,2], M. Gittinger[1], L. Lackner[1], B. Han[1], F. Eilenberger[3], R. Banerjee[4], S. Tongay[4], K. Watanabe[5], T. Taniguchi[5], C. Lienau[1], M. Silies[2], C. Anton-Solanas[6], M. Esmann[1], and C. Schneider[1]; [1]Carl von Ossietzky University, Oldenburg, Germany; [2]Hochschule Emden/Leer, Emden, Germany; [3]Friedrich Schiller University Jena, Jena, Germany; [4]Arizona State University, Temple, USA; [5]National Institute for Materials Science, Tsukuba, Japan; [6]Universidad Autónoma de Madrid, Madrid, Spain

We report and inspect the properties of a bright and high purity single photon source based on an atomically thin crystal coupled to a tunable asymmetrical cavity boosting the spontaneous emission of single photons.

Room 5 ICM

•P.U. Jepsen; DTU Electro, Technical University of Denmark, Kongens Lyngby, Denmark

Novel measurements of the third-order nonlinearity of silica responsible for THz-driven second-harmonic generation are performed by comparing the upconversion signal in Air Biased Coherent Detection with the detection signal in a silica-based solid-state detector.

Room 11 ICM

demultiplexing of PolMux channels using a polarization independent coherent heterodyne receiver. The data is successfully demultiplexed with a reduced penalty and sensitivities better than -28 dBm for 32 Gbps multiCAP signals.

Room 12a ICM

Petremand[1], I. Prieto[1], O. Dubochet[1], M. Despont[1], R. Grange[2], H. Sattari[1], and A.H. Ghadimi[1]; [1]Swiss Center for Electronics and Microtechnology (CSEM), Neuchâtel, Switzerland; [2]ETH Zurich, Department of Physics, Institute for Quantum Electronics, Optical Nanomaterial Group,, Zurich, Switzerland

Lithium niobate on insulator (LNOI) is among the promising integrated photonics platform that offers unique important optical properties. In this work we present the statical characterization of our multi-mode interferometer (MMI) beam splitters at C-band.

Room 12b ICM

mans[1], O. Vanvincq[1], A. Cassez[1], and A. Mussot[1]; [1]Univ. Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France; [2]ONERA, Palaiseau, France

We present a highly coherent self-phase-locked tri-comb light source, based on spatial light multiplexing in a tri-core non-linear fiber. We demonstrate the coherence between the combs with a Four Wave Mixing spectroscopy experiment.

Foyer, 1st floor ICM

12:00 – 13:00

CLS-2: Career and diversity lunch for PhD candidates

Chair: Crina Cojocaru, Universitat Politecnica de Catalunya, Barcelona, Spain

PhD candidates looking for the next steps in their career will have the opportunity to share the challenges they are facing in their research with their peers and more advanced researchers. Pre-registration is mandatory.

NOTES

Room 13a ICM

Femto-ST, Université de Franche-Comté, CNRS UMR6174, Besançon, France; [2]Institue of Photonics, Department of Physics, University of Strathclyde, Glasgow G1 1RD, United Kingdom

Using additive and CMOS compatible one- and two-photon polymerization, i.e. flash-TPP printing, we create low-loss 3D integrated photonic waveguides and single-mode splitters for scalable, dense and parallel interconnects, which is challenging to realize in 2D.

Room 13b ICM

[2]Department of Physics, Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany

We experimentally demonstrate a cryogenic optoacoustic memory with an intrinsic storage time beyond 135 ns. Our scheme exceeds previous results by a factor of 13, paving the way towards a 1 μs coherent all-optical storage.

Room 14a ICM

gies, University of Auckland, Auckland, New Zealand; [2]School of Computational Sciences, Korea Institute for Advanced Study, Seoul, Korea

We investigate the changing symmetry properties of delocalized chaotic attractors in a ring resonator as the parameters are varied. We find spontaneous symmetry breaking along with the merging of chaotic attractors and suggest this is a universal feature.

Room 14b ICM

for Nanolithography, Amsterdam, Netherlands

Asynchronous optical sampling (ASOPS) is inefficient if the pump-probe measurement range of interest is shorter than the pulse-to-pulse time. We demonstrate a frequency modulated ASOPS scheme for detecting ultrafast photoacoustics, enabling 20 times faster measurements.

Room 14c ICM

[1]Universidad de Salamanca, Salamanca, Spain; [2]University of California, San Diego, USA; [3]Photonics Institute, TU Wien, Vienna, Austria

We report high-harmonic generation driven by extreme ultraviolet pulses showing a trace of attosecond Rabi oscillations. This demonstrates, for the first time, that ultrafast resonant dynamics are a relevant feature in strong-field interactions using short-wavelength lasers.

Room Osterseen ICM

B. Mao[3], R. Vanna[4], F. Hoffmann[5], O. Guntinas-Lichius[5], S. Ghislanzoni[6], I. Bongarzone[6], S.Y. Set[3], A.C. Ferrari[3], G. Cerullo[7], and •M. Negro[1,2]; [1]Cambridge Raman Imaging S.r.l., Milano, Italy; [2]Cambridge Raman Imaging Ltd., Cambridge, UK; [3]Cambridge Graphene Centre, University of Cambridge, UK; [4]CNR IFN, Milano, Italy; [5]Jena University Hospital, Jena, Germany; [6]Department of Advanced Diagnostics, Fondazione IRCCS Istituto Nazionale dei Tumori, Milano, Italy; [7]Dipartimento di Fisica, Politecnico di Milano, Italy

We combine an all-fiber dual wavelength, self-synchronized laser and a dedicated multi-channel detection unit to perform state-of-the-art broadband SRS microscopy. Our synergistic design simplifies SRS implementation enabling plug-and-play broadband coherent vibrational imaging.

Room 21 ICM

Electro, Technical University of Denmark, Lyngby, Denmark; [2]NanoPhoton - Center for Nanonphotonics, Lyngby, Denmark

We present a semi-analytical approach to calculate the coupling strength between a quantum emitter and an electromagnetic resonator without the need for fitting parameters and find an extraordinary quantitative agreement with independent reference calculations.

Room 22a ICM

Christiansen[2,3], and S. Stobbe[1,2]; [1]DTU Electro, Department of Electrical and Photonics Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]NanoPhoton – Center for Nanophotonics, Technical University of Denmark, Kgs. Lyngby, Denmark; [3]DTU Construct, Department of Civil and Mechanical Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark

We measure the propagation losses and scattered fields in state-of-the-art slow-light valley-Hall waveguides and find backscattering to dominate over other loss mechanisms, therefore raising questions about the value of topological protection for reciprocal slow light.

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Room 1 ICM

14:00 – 15:30

CM-10: Dynamics of laser-induced processes

Chair: Jan Siegel, Instituto de Optica - Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain

CM-10.1 FRI (Invited) 14:00

The switching cycle of Phase-Change Materials: Time-resolved diffraction after laser excitation

•P. Zalden; European XFEL, Schenefeld, Germany

Phase-Change Materials can be cycled by laser-excitation between an amorphous and a crystalline state. Time-resolved X-ray diffraction reveals how glass formation and fast crystallization is possible in these materials.

Room 2 ICM

14:00 – 15:30

CJ-9: Novel fibers

Chair: Laurent Bigot, CNRS-University of Lille, France

CJ-9.1 FRI (Invited) 14:00

Development of active fibres with nano-structured cores

•R. Buczynski[1,2], M. Franczyk[1], D. Pysz[1], J. Aubrecht[3], G. Stępniewski[1,2], A. Filipkowski[1,2], M. Kamrádek[3], I. Kasik[3], and P. Peterka[3]; [1]Lukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland; [2]University of Warsaw, Warsaw, Poland; [3]. Institute of Photonics and Electronics of the Czech Academy of Sciences, Prague, Czech Republic

Nanostructured optical fibres are a new class of fibres with a core composed of various glass nanorods ordered in arbitrary structures. With this approach refractive index, gain and photosensitivity distribution can be independently shaped.

Room 3 ICM

14:00 – 15:30

EA-8: Nonclassical states of light

Chair: Valentina Parigi, Sorbonne Université, Laboratoire Kastler Brossel, Paris, France

EA-8.1 FRI 14:00

Multiport Cyclic Interferometer For Genuine n-photon Indistinguishability Assessment

•R. Albiero[1,2], M. Pont[3], S.E. Thomas[3], N. Spagnolo[4], F. Ceccarelli[2], G. Corrielli[2], A. Brieussel[5], N. Somaschi[5], H. Huet[3], A. Harouri[3], A. Lemaître[3], I. Sagnes[3], N. Belabas[3], F. Sciarrino[4], R. Osellame[2], P. Senellart[3], and A. Crespi[1,2]; [1]Dipartimento di Fisica - Politecnico di Milano, Milano, Italy; [2]Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN-CNR), Milano, Italy; [3]Centre for Nanosciences and Nanotechnology, CNRS, Université Paris-Saclay, Palaiseau, France; [4]Dipartimento di Fisica, Sapienza Università di Roma, Roma, Italy; [5]Quandela SAS, Massy, France

We introduce a novel method to measure the genuine indistinguishability of n photons states using a low-depth, cyclic multiport interferometer and demonstrate experimentally this technique for the case $n = 4$.

Room 4a ICM

14:00 – 15:30

CK-14: Recent advances in laser technology

Chair: Mahmoud Gaafar, Deutsches Elektron-Synchrotron, DESY, Hamburg, Germany

CK-14.1 FRI 14:00

A fully photonic integrated circuit based Erbium laser

•Y. Liu[1,2], Z. Qiu[1,2], X. Ji[1,2], A. Bancora[1,2], G. Lihachev[1,2], J. Riemensberger[1,2], R.N. Wang[1,2], A. Voloshin[1,2], and T.J. Kippenberg[1,2]; [1]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), CH-1015 , Lausanne, Switzerland; [2]Center for Quantum Science and Engineering,Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

We present a fully photonic integrated circuit-based Erbium-doped waveguide Vernier laser that can achieve 50 Hz intrinsic linewidth, > 72 dB side mode suppression ratio, output power up to 17 mW, and 40 nm wide wavelength tunability.

Room 4b ICM

14:00 – 15:30

EI-3: Novel low-dimensional and functional materials

Chair: Nicolò Maccaferri, Umeå University, Umeå, Sweden

EI-3.1 FRI (Invited) 14:00

Optomechanics of suspended magnetic van der Waals materials

•J. Wolff, L. Moczko, J. Thoraval, M. Romeo, S. Berciaud, and A. Gloppe; Institut de Physique et Chimie des Matériaux de Strasbourg, Université de Strasbourg, CNRS, UMR 7405, Strasbourg, France

We probe magnetic phase transitions of drum-like suspended magnetic van der Waals heterostructures combining nano-optomechanics and optical spectroscopies and investigate the tuning of their light emission and magnetic properties by strain.

Room 5 ICM

14:00 – 15:30

CC-6: THz devices

Chair: Clara Saraceno, University of Bochum, Bochum, Germany

CC-6.1 FRI (Invited) 14:00

Holographic THz Imaging by Fourier-Domain Detection with Field-Effect Transistors, and the Quest for Phase Retrieval by Physics-Informed Deep Learning

H. Yuan[1], M. Xiang[1,2,3,4], A. Lisauskas[1,5,6], L. Wang[2,3], M. Thomson[1], K. Zhou[2,3], and •H. Roskos[1]; [1]Physikalisches Institut, Goethe-Universität, Frankfurt am Main, Germany; [2]Frankfurt Institute of Advanced Studies (FIAS), Frankfurt am Main, Germany; [3]Xidian-FIAS International Joint Research Center, Frankfurt am Main, Germany; [4]Xidian University, Xi'an, China; [5]Institute of Applied Electrodynamics and Telecommunications, Vilnius University, Vilnius, Lithuania; [6]Center for Terahertz Research and Applications (CENTERA), Institute of High Pressure Physics, Polish Academy of Sciences, Warsaw, Poland

This presentation describes THz holographic imaging based on Fourier-plane heterodyne detection with CMOS field-effect transistors. We then discuss the potential for less complex imaging systems with

Room 11 ICM

14:00 – 15:30

CI-7: Satellite and radio

Chair: Victor Torres Company, Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden

CI-7.1 FRI 14:00

An Efficient Multiband Transponder for Satellite Ground Station based on Photonics

•M. Imran[1], F. Scotti[2], A. Bogoni[1], M. Presi[3], and P. Ghelfi[2]; [1]Scuola Superiore Sant'Anna, TeCIP Institute,via Moruzzi 1, 56124, Pisa, Italy; [2]CNIT, PNT-lab, via Moruzzi 1, 56124, Pisa, Italy; [3]Aerospazio Tecnologie Srl, via Provinciale Nord 42a, 53040, Rapolano Terme , Siena, Italy

An innovative Multiband Transponder for satellite Ground Stations is proposed, managing simultaneous bidirectional communications in X and Ka band with a single reference oscillator. Experimental tests show relevant performance of conversion loss and SNR.

Room 12a ICM

14:00 – 15:30

CE-10: Doped optical materials

Chair: Nadia Boetti, LINKS Foundation, Torino, Italy

CE-10.1 FRI (Invited) 14:00

Glass-based materials for (bio)photonic applications

•L. Petit; Tampere University, Tampere, Finland

In this presentation, we will review our work on the development of new bioactive glasses suitable for the fabrication of optically active fibers and 3D printed scaffolds.

Room 13a ICM

14:00 – 15:30

JSIII-5: Brain-inspired photonic dedvices and computing I

Chair: Antonio Hurtado, University of Strathclyde, Glasgow, United Kingdom

JSIII-5.1 FRI (Invited) 14:00

Photonic neuromorphic computing

•*W. Pernice*; *Heidelberg University, Heidelberg, Germany*

In reconfigurable photonic architectures in-memory computing allows for overcoming separation between memory and central processing unit as a route for designing artificial neural networks, which operate entirely in the optical domain.

Room 13b ICM

14:00 – 15:30

CD-13: Nonlinear imaging and microscopy

Chair: Anderson S L Gomes, Federal University of Pernambuco, Brazil

CD-13.1 FRI 14:00

Polarization-resolved third harmonic generation (P-THG) imaging of myelin inside optic nerves

•*M. Kefalogianni*[1,2], *L. Mouchliadis*[1], *N. Ktena*[3,4], *S.-I. Kaplanis*[3,4], *I. Kalafatakis*[3,4], *S. Psilodimitrakopoulos*[1], *D. Karagogeos*[3,4], *and E. Stratakis*[1,2]; [1] *Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas, HERAKLION, Greece*; [2] *Department of Physics, University of Crete, HERAKLION, Greece*; [3] *Department of Basic Sciences, Faculty of Medicine, University of Crete, HERAKLION, Greece*; [4] *Institute of Molecular Biology and Biotechnology, Foundation for Research and Technology-Hellas, HERAKLION, Greece*

Intrinsic optical third-harmonic generation (THG) signal and its polarization sensitivity are exploited for extracting quantitative information on the content and orientation of myelin in normal and abnormal nervous tissues.

Room 14a ICM

14:00 – 15:30

EF-9: Topological and nonlinear effects

Chair: Sylvain Barbay, C2N, Université Paris Saclay, France

EF-9.1 FRI 14:00

Nonlinear Photonic Topological Pump

•*M.S. Kirsch*[1], *Y.V. Kartashov*[2], *V. Konotop*[3], *A. Szameit*[1], *and M. Heinrich*[1]; [1] *Institut für Physik, Universität Rostock, Rostock, Germany*; [2] *Institute of Spectroscopy, Russian Academy of Sciences, Moscow, Russia*; [3] *Universidade de Lisboa, Lisbon, Portugal*

We experimentally observe light transport dynamics in a nonlinear photonic Thouless pump. The Kerr effect enables excitations initially placed in the topologically trivial band to enter a regime of topological transport for sufficient excitation powers.

Room 14b ICM

14:00 – 15:30

CH-15: Bio-sensing

Chair: Marco Grande, Politecnico di Bari, Italy

CH-15.1 FRI (Invited) 14:00

Optical sensing in the brain with tapered optical fibers: from photoelectric free optrodes to implantable neuroplasmonics

•*F. Pisano*[1], *A. Balena*[1], *B. Spagnolo*[1], *S. Andriani*[1,2], *M. Bianco*[1], *D. Zheng*[1], *L. Collard*[1], *R. Peixoto*[3], *M. Grande*[4], *M. Valiente*[5], *L.M. De La Prida*[6], *B.L. Sabatini*[3], *M. De Vittorio*[1,2,7], *and F. Pisanello*[1,7]; [1] *Istituto Italiano di Tecnologia, Center For Biomolecular Nanotechnologies, Lecce, Italy*; [2] *Dipartimento di Ingegneria dell'Innovazione, Università del Salento, Lecce, Italy*; [3] *Howard Hughes Medical Institute, Department of Neurobiology, Harvard Medical School, Boston, USA*; [4] *Dipartimento di Ingegneria Elettrica e dell'Informazione Politecnico di Bari, Bari, Italy*; [5] *Brain Metastasis Group, Spanish National Cancer Research Center (CNIO), Madrid, Spain*; [6] *Instituto Cajal, CSIC, Madrid, Spain*; [7] *Equally Contributing, Lecce, Italy*

Here we present the tapered optical fibers (TFs) technology, which combines the peculiar optical and photonic properties of narrowing waveg-

Room 14c ICM

14:00 – 15:30

EE-4: Ultrafast nonlinear optics in gases

Chair: Valentina Shumakova, Class 5 Photonics GmbH, Hamburg, Germany

EE-4.1 FRI 14:00

A single-stage dispersion-controlled multipass cell setup to efficiently drive resonant dispersive wave emission

•*L. Silletti*[1], *T.F. Grigorova*[2], *C. Brahms*[2], *A.b. Wahid*[1], *E. Escoto*[3], *P. Balla*[3,4,5], *S. Rajhans*[3,6], *K. Horn*[7,8], *L. Winkelmann*[3], *V. Wanie*[1], *A. Trabattoni*[1,9], *C.M. Heyl*[3,4,5], *J.C. Travers*[2], *and F. Calegari*[1,10,11]; [1] *CFEL, DESY, Hamburg, Germany*; [2] *School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom*; [3] *DESY, Hamburg, Germany*; [4] *Helmholtz-Institut Jena, Germany*; [5] *GSI, Darmstadt, Germany*; [6] *Universität Jena, Germany*; [7] *Department of Chemistry and Applied Biosciences, Laboratory of Physical Chemistry, ETH Zürich, Switzerland*; [8] *CMWS, DESY, Hamburg, Germany*; [9] *Institute of Quantum Optics, University Hannover, Germany*; [10] *The Hamburg Centre for Ultrafast Imaging, Universität Hamburg, Germany*; [11] *Institut für Experimentalphysik, Universität Hamburg, Germany*

We demonstrate post-compression of an

Room Osterseen ICM

14:00 – 15:30

CL-7: Advanced microscopy II

Chair: Giuseppe Vicidomini, Istituto Italiano di Tecnologia, Molecular Microscopy and Spectroscopy, Center for Human Technologies, Genova, Italy

CL-7.1 FRI 14:00

Two- and three-photon microscopy of genetically encoded fluorescent indicators of oxidative stress in mouse brain cells in vivo

•*A.S. Chebotarev*[1,2], *A.A. Lanin*[1,2], *V.A. Katrukha*[3], *G.N. Martynov*[1,2], *Y.V. Khramova*[3], *I.V. Kelmanson*[3], *M.S. Pochechuev*[1,2], *G.P. Linovskiy*[1], *D.S. Bilan*[3], *V.V. Belousov*[3,4], *and A.B. Fedotov*[3]; [1] *Physics Department, M. V. Lomonosov Moscow State University, Vorob'evy gory, Moscow, Russia*; [2] *Russian Quantum Center, 143025 Skolkovo, Moscow Region, Russia*; [3] *M.M. Shemyakin and Yu.A. Ovchinnikov Institute of Bioorganic Chemistry, RAS, Moscow, Russia*; [4] *Federal Center of Brain Research and Neurotechnologies, Moscow, Russia*

We performed deep two- and three-photon microscopy studies of mouse brain cells in fixed-slice, ex-vivo, and in-vivo formats using optogenetic fluorescent protein pH and hydrogen peroxide sensors, revealing the dynamics of oxidative stress during stroke

Room 21 ICM

14:00 – 15:30

CF-11: Parametric ultrafast sources

Chair: Yoann Pertot, Fastlite, Antibes, France

CF-11.1 FRI 14:00

Sub-8 fs Pulses in the Visible to Near Infrared from a Single Stage Degenerate Optical Parametric Amplifier

T. Deckert, •*A. Vanderhaegen, and D. Brida*; *University of Luxembourg, Luxembourg, Luxembourg*

A single-stage degenerate optical parametric amplifier (DOPA) with broad amplification bandwidth produces sub-10 femtosecond pulses with excellent shot-to-shot stability. It complements the existing array of OPAs in the visible to near infrared for advanced spectroscopy.

Room 22a ICM

14:00 – 15:30

EC-3: Emerging trends and singular photonic topology

Chair: Stefan Rotter, Technical University of Wien, Austria

EC-3.1 FRI 14:00

Topological insulator quantum cascade laser in synthetic space: towards a realization

•*A. Dikopoltsev, P. Micheletti, U. Senica, M. Beck, J. Faist, and G. Scalari*; *ETH Zurich, Zurich, Switzerland*

Topological insulators in synthetic dimensions present protection for the dynamics of spectral components. When employed to lasers, it unlocks super-stable lasing of mode-locked laser arrays. We suggest a first realization, using RF modulated QCL rings

Room 1 ICM

Room 2 ICM

Room 3 ICM

EA-8.2 FRI (Invited) 14:15

Quantum engineering of light with an intracavity Rydberg superatom

V. Magro, J. Vaneecloo, S. Garcia, and •A. Ourjoumtsev; *JEIP, CNRS UAR 3573, College de France, PSL University, Paris, France*

We achieved the first fully deterministic preparation of Wigner-negative free-propagating states of light, by mapping the internal state of an intracavity Rydberg superatom onto a coherent superposition of 0 and 1 photons.

Room 4a ICM

CK-14.2 FRI 14:15

Spectral Control of Random Network Lasers

•T.V. Raziman[1,2], D. Saxena[1], A. Arnaudon[1,3], O. Cipolato[1], M. Gaio[1], N.V. Trivino[4], J. Dranczewski[1,4], A. Fischer[1,4], A. Quentel[1], S. Yaliraki[5], D. Pisignano[6,7], A. Camposeo[6], H. Schmid[4], K. Moselund[8,9], M. Barahona[2], and R. Sapienza[1]; *[1]The Blackett Laboratory, Department of Physics, Imperial College London, UK; [2]Department of Mathematics, Imperial College London, UK; [3]Blue Brain Project, École Polytechnique Fédérale de Lausanne (EPFL), Campus Biotech, Geneva, Switzerland; [4]IBM Research Europe - Zurich, Rüschlikon, Switzerland; [5]Department of Chemistry, Imperial College London, UK; [6]NEST, Istituto Nanoscienze-CNR and Scuola Normale Superiore, Pisa, Italy; [7]Dipartimento di Fisica, Università di Pisa, Italy; [8]Paul Scherrer Institut, Villigen, Switzerland; [9] École Polytechnique Fédérale de Lausanne (EPFL), Switzerland*

We show both theoretically and experimentally that networks made of dye-based polymer and Indium Phosphide are versatile random lasing sources with fine spectra that can be controlled by non-uniform pumping, and driven by machine learning.

Room 4b ICM

Room 5 ICM

phase retrieval from power-detection data using physics-informed deep learning.

Room 11 ICM

CI-7.2 FRI 14:15

Pulse sharpened On-Off Keying Optical modulation for Power Efficient Satellite Optical Communication

•Y.-J. Hyun and S.-K. Han; *Yonsei University, Seoul, South Korea*

Satellite optical communication requires high power and spectral efficiency. A new modulation method which provides 3dB enhanced optical power without additional bandwidth using half-bit Mach-Zehnder delay interferometer is proposed. A proof-of-concept experiment has been conducted.

Room 12a ICM

Room 13a ICM

Room 13b ICM

CD-13.2 FRI 14:15

Ultrabroadband Coherent Anti-Stokes Raman Scattering Microscopy For Biological Applications Via Supercontinuum Generation in Bulk Crystals

•*F. Vernuccio*[1], *C. Ceconello*[1], *A. Bresci*[1], *F. Manetti*[1], *S. Sorrentino*[1], *R. Vanna*[2], *G. Cerullo*[1,2], *and D. Polli*[1,2]; [1]*Department of Physics, Politecnico di Milano, P.zza Leonardo da Vinci 32, 20133 , Milano, Italy*; [2]*CNR-Institute for Photonics and Nanotechnologies (IFN-CNR), P.zza Leonardo da Vinci 32, 20133 , Milano, Italy*

We demonstrate ultra-broadband (500–3100 cm^{-1}) coherent-anti Stokes Raman scattering microscopy of cancer cells and tissues using a 2-MHz Ytterbium fiber laser system to produce sub-20-fs pre-compressed Stokes pulses via supercontinuum generation in bulk media.

Room 14a ICM

EF-9.2 FRI 14:15

Nonlinear optical dynamics probed with free electrons

•*J.-W. Henke*[1,2], *Y. Yang*[3,4], *F.J. Kappert*[1,2], *A.S. Raja*[3,4], *G. Arend*[1,2], *G. Huang*[3,4], *A. Feist*[1,2], *Z. Qiu*[3,4], *R.N. Wang*[3,4], *A. Tusnin*[3,4], *A. Tikan*[3,4], *T.J. Kippenberg*[3,4], *and C. Ropers*[1,2]; [1]*Max Planck Institute for Multidisciplinary Sciences, Göttingen, Germany*; [2]*4th Physical Institute, University of Göttingen, Göttingen, Germany*; [3]*Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland*; [4]*Center for Quantum Science and Engineering, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland*

We probe the formation of nonlinear optical states like solitons in a photonic chip-based microresonator using free electrons. The nonlinear dissipative structures imprint unique features on the electron spectra related to the time-dependent intracavity field.

Room 14b ICM

uides to non-planar micro and nanofabrication methods to explore unconventional approaches to interface with brain tissue

Room 14c ICM

Ytterbium fibre laser to sub-20 fs based on spectral broadening in a single-stage gas-filled multi-pass cell. Additionally, we generate few-femtosecond UV pulses by directly driving a resonant dispersive wave setup.

EE-4.2 FRI 14:15

Multipass cell pulse post-compression at 515nm wavelength as HHG driver efficiently targeting 92 eV photon energy

•*M. Karst*[1,2,3], *P. Pfaller*[1], *R. Klas*[1,2,3,4], *P. Gierschke*[1,4], *M. Abdelaal*[1], *Z. Wang*[1], *J. Rothhardt*[1,2,3,4], *and J. Limpert*[1,2,3,4]; [1]*Institute of Applied Physics, Jena, Germany*; [2]*Helmholtz-Institute Jena, Jena, Germany*; [3]*GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany*; [4]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We present a multipass cell based post-compression delivering 15.7 fs pulses with 0.44 mJ of pulse energy at 22.4 W of average power and demonstrate its capability as a highly efficient HHG driver around 92 eV.

Room Osterseen ICM

CL-7.2 FRI 14:15

Imaging Intracellular Metabolic Activity of Mammalian Oocytes by Dynamic Full-field Optical Coherence Microscopy

•*S. Morawiec*[1], *P. Stremplewski*[1], *A. Ajduk*[2], *B. Kennedy*[3,4], *and M. Szkulmowski*[1]; [1]*Institute of Physics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University in Torun, Torun, Poland*; [2]*Department of Embryology, Faculty of Biology, University of Warsaw, Warsaw, Poland*; [3]*BRITElab, Harry Perkins Institute of Medical Research, QEII Medical Centre, Perth, Australia*; [4]*Department of Electrical, Electronic & Computer Engineering, School of Engineering, The University of Western Australia, Perth, Australia*

Dynamic full-field optical coherence microscopy (FF-OCM) of living oocytes provides high-quality images of the intracellular structures based solely on their scattering potential. The spatiotemporal analysis of OCM images reveals intracellular motion dynamics, hence the information on the cell's metabolic activity.

Room 21 ICM

CF-11.2 FRI 14:15

Ultrashort-pulse OPAs: Bridging the gap in UV–VIS

T. Juodagalvis[1], *K. Jurkus*[1], •*J. Berzinš*[1], *V. Sinkus*[1], *and R. Budriūnas*[1,2]; [1]*Light Conversion, Vilnius, Lithuania*; [2]*Vilnius University Laser Research Center, Vilnius, Lithuania*

We will present several techniques (alternative to 3H-pumped NOPAs) to obtain gapless wavelength tunability for ultrashort pulses in UV–VIS range using Yb-based lasers.

Room 22a ICM

EC-3.2 FRI 14:15

Experimental demonstration of gauge confinement in point-wise shifted periodic potentials

•*A. Alberucci*[1], *C.P. Jisha*[1], *M. Monika*[2], *U. Peschel*[2], *and S. Nolte*[1,3]; [1]*Friedrich Schiller University Jena, Institute of Applied Physics, Jena, Germany*; [2]*Friedrich Schiller University Jena, Institute of Solid State Physics and Optics, Jena, Germany*; [3]*Fraunhofer Institute for Applied Optics and Precision IOF Engineering, Jena, Germany*

We investigate experimentally and theoretically the optical propagation in a periodic potential subject to a point-dependent delay. The action of the delay is interpreted as a gauge field.

Room 1 ICM

CM-10.2 FRI 14:30

Carrier transport after ultrashort-pulse-laser excitation of dielectric materials leads to the formation of 10 MV/m electric fields

S.H. Møller, P.S. Sneftrup, B. Julsgaard, and •P. Balling; Aarhus University, Aarhus, Denmark

Solving the transport equations in a model dielectric (SiO2) shows that ultrashort-pulse-laser excitation is associated with the formation of a strong electric field, manifesting itself by transient birefringence and emission of THz radiation.

CM-10.3 FRI 14:45

Photomechanical Laser Fragmentation of Iridium Oxide Microparticles Revealed by Pump-Probe Microscopy

•M. Spellauge[1,2], A.R. Ziefuss[2], S. Reichenberger[2], S. Barcikowski[2], and H.P. Huber[1]; [1]Lasercenter, Department of Applied Sciences and Mechatronics, Munich University of Applied Sciences HM, Munich, Germany; [2]Technical Chemistry I and Center for Nanointegration Duisburg-Essen (CENIDE), University of Duisburg-Essen, Essen,

Room 2 ICM

CJ-9.2 FRI 14:30

Yellow (575 nm) laser by single-mode double-clad structured Dy3+-doped waterproof fluoro-aluminate glass fiber

•A. Koganei[1], H. Katsuragawa[1], K. Takahashi[1], O. Ishii[2], M. Yamazaki[2], and Y. Fujimoto[1]; [1]Chiba Institute of technology, Narashino, Japan; [2]Sumita Optical Glass, Inc., Saitama, Japan

We demonstrated a yellow laser using a single-mode double-clad structured Dy3+-doped waterproof fluoro-aluminate glass fiber. The maximum output power of 169.2 mW was achieved with slope efficiency of 33.6% at 575 nm wavelength.

CJ-9.3 FRI 14:45

Low-loss Fused Silica Hollow-Core Fiber Delivery of Mid-infrared Light at 6-μm

•Q. Fu, I.A. Davidson, G.T. Jasion, L. Xu, F. Poletti, N.V. Wheeler, and D.J. Richardson; Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

We report record low-loss, ~7-dB/m, delivery of 6.045μm light via fused silica, single cladding-ring hollow-core fiber. Quasi-single-mode beams (3.4mW) were delivered through a ~1m fiber from quantum cas-

Room 3 ICM

EA-8.3 FRI 14:45

Anyonic two-photon coincidence statistics in birefringent waveguide circuits

•M. Ehrhardt, M. Heinrich, and A. Szameit; Institute for Physics, University of Rostock, Rostock, Germany

We synthesize fractional coincidence statistics for photon pairs in laser-written waveguide networks. To this end, we show that arbitrary exchange phases can be created by tailoring waveguides birefringence and an appropriate choice of input polarizations.

Room 4a ICM

CK-14.3 FRI 14:30

Dynamic Random Lasers of Reconfigurable Active Colloidal Assemblies

•W.K. Ng[1], M. Trivedi[2], D. Saxena[1], R. Sapienza[1], and G. Volpe[2]; [1]The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom; [2]Department of Chemistry, University College London, London, United Kingdom

Self-organized lasers are achieved through the reversible out-of-equilibrium self-assembly of reconfigurable colloidal systems. These lasers demonstrate active and programmable behaviours that can potentially be developed for sensing and display purposes.

CK-14.4 FRI 14:45

Perovskite quantum dot topological laser based on a one-dimensional cavity

•J. Tian[1,2], Q.Y. Tan[1,3], Y. Wang[1,3], Y. Yang[1,2], G. Yuan[1,2], G. Adamo[1,2], and C. Soci[1,2]; [1]Centre for Disruptive Photonic Technologies School of Physical and Mathematical Sciences Nanyang Technological University, Singapore, Singapore; [2]PAP, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, Singapore; [3]ERI@N, Interdisciplinary Graduate School,

Room 4b ICM

EI-3.2 FRI 14:30

Measuring the bolometric response of superconducting magic-angle twisted bilayer graphene

•G. Di Battista[1], P. Seifert[2], K. Watanabe[3], T. Taniguchi[4], K.-C. Fong[5], A. Prinicpi[6], and D. K. Efetov[1]; [1]Fakultät für Physik, Ludwig-Maximilians-Universität, Munich, Germany; [2]Institute of Physics, Faculty of Electrical Engineering and Information Technology, Universität der Bundeswehr , Munich, Germany; [3]Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan; [4]International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Tsukuba, Japan; [5]Quantum Engineering and Computing Group, Raytheon BBN Technologies, Cambridge, USA; [6]Department of Physics and Astronomy, The University of Manchester, Manchester, United Kingdom

We measure the bolometric response of magic-angle twisted bilayer graphene and extract the temperature dependence of the thermal conductance in the superconducting state. Our work lays the foundation for future thermal transport studies on this system.

EI-3.3 FRI 14:45

2D high-temperature superconducting nanodetectors

Room 5 ICM

CC-6.2 FRI 14:30

Ultrabroadband single-shot waveform detection of air-plasma based THz sources

A. Ohrt, S. Zhou, Y. Ding, P.U. Jepsen, and •B. Zhou; Department of Electrical and Photonics Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark

We demonstrate the first single-shot THz waveform detection with a two-color air-plasma based THz source via a non-collinear optical probe-THz beam geometry. Single-shot THz detection up to 12 THz is realized.

CC-6.3 FRI 14:45

Achieving Large and Broadband THz Optical Activity via 3D Chiral Metamaterials

•A.D. Koulouklidis[1,2], I. Katsantonis[1,3], M. Manousidaki[1], A.C. Tasolamprou[1,4], C. Daskalaki[1], C. Kerantzopoulos[2], I. Spanos[5], S. Tzortzakis[1,3], M. Farsari[1], and M. Kafesaki[1,3]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas, Heraklion, Greece; [2]Department of Physics, University of Crete, Heraklion, Greece; [3]Department of Materials

Room 11 ICM

CI-7.3 FRI 14:30

Performance Optimization of a Frequency Quadrupler based Analog Radio-over-Fiber Fronthaul for 5G mmWave

•S. S J, L. B, R. Ganti, D. Koilpillai, and D. Venkitesh; Indian Institute of Technology Madras, Chennai, India

An analog optical frequency quadrupling system is realized for transport of 5G mmWave (26.4 GHz) over 2 km fiber. Optimization of operating conditions for 100 MHz, upto 256QAM is demonstrated experimentally.

CI-7.4 FRI 14:45

Stabilization of fast laser chirps with multi-stage correction control for time-reversal of broadband radio-frequency signal

•T. Llauze and A. Louchet-Chauvet; Institut Langevin, ESPCI Paris, Universit´e PSL, CNRS, Paris, France

A multi-stage correction scheme allows for fast and precise frequency chirps with a DBR laser, that will be used for the future demonstration of analog time-reversal of broadband radiofrequency signals.

Room 12a ICM

CE-10.2 FRI 14:30

A pathway to Er sites in Si with long spin and optical coherence times

•A. Lyasota[1], I.R. Berkman[1], G.G. de Boo[1], J.G. Bartholomew[2,3], B.C. Johnson[4,5], J.C. McCallum[4], B.-B. Xu[1], S. Xie[1], R.L. Ahlefeldt[6], M.J. Sellars[6], C. Yin[1,7], and S. Rogge[1]; [1]Centre of Excellence for Quantum Computation and Comm. Tech., School of Physics, Univ. of New South Wales, Sydney, Australia; [2]Centre for Engineered Quantum Systems, School of Physics, The Univ. of Sydney, Australia; [3]Nano Institute, The Univ. of Sydney, Australia; [4]Centre of Excellence for Quantum Computation and Comm. Tech., School of Physics, Univ. of Melbourne, Australia; [5]School of Science, RMIT Univ., Melbourne, Australia; [6]Centre of Excellence for Quantum Computation and Comm. Tech., Research School of Physics, Australian Nat. Univ., Canberra, Australia; [7]Hefei Nat. Lab. for Physical Sciences at the Microscale, CAS Key Lab. of Microscale Magnetic Resonance and School of Physical Sciences, Univ. of Science and Technology of China, Hefei, China

We present key parameters affecting optical and spin properties of Er in Si. By optimising co-dopant types and Er concentrations, we achieved long Er coherence times making Er a promising candidate for future quantum applications.

Room 13a ICM

JSIII-5.2 FRI 14:30

III-V nanowire based neuromorphic nanophotonic circuits

•V. Flodgren, D. Winge, D. Alcer, M. Borgstrom, and A. Mikkelsen; NanoLund and Department of Physics, Lund University, Lund, Sweden

We explore an artificial nanophotonic neural network circuit derived from the insect brain as implemented using highly efficient III-V semiconductor nanowires broadcasting in a single quasi 2D waveguide.

JSIII-5.3 FRI 14:45

A Large Photonic Spiking Neural Network

•R. Talukder, A. Skalli, and D. Brunner; FEMTO-ST Institute, Besancon, France

We have experimentally implemented a large scale photonic neural network, comprising of more than 30,000 neurons in it. This proof-of-concept experiment serves as next generation bio-inspired learning test bed for photonic neural networks.

Room 13b ICM

CD-13.3 FRI 14:30

CARS imaging allowed by Four-Wave-Mixing widely tunable by chirped pulses

C. Corso Silva[1], T. Mansuryan[2], A. Tonello[2], Y. Arosa-Lobato[2,3], Y. Stepanenko[1], V. Couderc[2], and •K. Krupa[1]; [1]Institute of Physical Chemistry Polish Academy of Sciences, Warsaw, Poland; [2]XLIM UMR CNRS 7252 Université de Limoges, Limoges, France; [3]Departamento de Fisica Aplicada, Universidade de Santiago de Compostela, Santiago de Compostella, Spain

We developed a new tunable light source using input stretched pulses with a linear chirp propagating in a concatenation of a standard and a microstructure fibers. We apply this light source for selective CARS microscopy.

CD-13.4 FRI 14:45

Smart Control of Supercontinuum Generation by Machine Learning Towards Multiphoton Microscopy Applications

V.T. Hoang, Y. Boussafa, L. Sader, S. Février, V. Couderc, and •B. Wetzel; XLIM Research Institute, CNRS UMR 7252, University of Limoges, Limoges, France

We numerically study how the suitable adjustment of femtosecond pulse patterns in combination with machine learning can be leveraged to maximize the output spectral intensities and

Room 14a ICM

EF-9.3 FRI 14:30

Octave spanning supercontinuum generation in water at multi-kilohertz repetition rates

•K.R. Keller[1], R. Rojas-Aedo[1], A. Vanderhaegen[1], M. Ludwig[2], and D. Brida[1]; [1]Université du Luxembourg, Luxembourg, Luxembourg; [2]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

Water can be harnessed as an effective medium for octave spanning supercontinuum (SC) generation with high signal stability and superior spectral broadening compared to crystals in multi-kHz platforms by means of controlled water flow rate.

EF-9.4 FRI 14:45

Two-Photon Pumped Exciton-Polariton Condensation

•N. Landau[1], D. Panna[1], S. Brodbeck[2], C. Schneider[3], S. Höfling[2], and A. Hayat[1]; [1]Department of Electrical and Computer Engineering, Technion – Israel Institute of Technology, Haifa, Israel; [2]Technische Physik, Universität Würzburg, Germany; [3]Institute of Physics, Carl von Ossietzky Universität Oldenburg, Germany

We report the first experimental observation of two-photon pumped polariton condensa-

Room 14b ICM

CH-15.2 FRI 14:30

Non-Contact Photoacoustic Lipid Imaging by Remote Sensing on First Overtone of C-H Bond

•G. Hu[1], X. Dong[1], Y. Zhou[1], J. Kang[1,2], and K.K.Y. Wong[1,2]; [1]The University of Hong Kong, Faculty of Engineering, Department of Electrical and Electronic Engineering, Hong Kong, China; [2]Advanced Biomedical Instrumentation Centre, Hong Kong Science Park, Hong Kong, China

A label-free and bond-selective photoacoustic remote sensing microscopy targeting at the first overtone of C-H bond for lipid imaging is proposed, which enables high-performance tissue scale lipid imaging in phantom samples and model organism.

CH-15.3 FRI 14:45

A Dual-Region Fiber-Optic SPR Biosensor with Self-Referencing Compensation of Bulk Refractive Index and Temperature Effects

•V. Bello[1,2], W. Vandezande[2,3], D. Daems[2], and J. Lammertyn[2]; [1]Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Italy; [2]MeBioS-Biosensor Group, Department of Biosystems, KU Leuven, Belgium; [3]Centre for Membrane Separations, Adsorption, Catalysis and Spectroscopy for Sustainable Solutions,

Room 14c ICM

EE-4.3 FRI 14:30

Generation and Compression of High Energy Sub-10fs Pulses at MHz Repetition Rates

•A. Alangattuthodi, M. Emons, R. Fabbri, J. Meier, J. Montano, R.-C. Secareanu, S. Venkatesan, U. Wegner, D. Rompotis, M. Lederer, M. Meyer, T. Mullins, and D.E. Rivas; European XFEL, Hamburg, Germany

We report on the development of high repetition rate ultrafast laser to be used in synchronization with European XFEL pulses for providing new experimental capabilities and hence having unprecedented access to fundamental science.

EE-4.4 FRI 14:45

The Effect of Nitrogen Rotational Response on Ultra-Flat Supercontinuum Generation in Gas-Filled Hollow-Core Photonic Crystal Fiber

•M. Sabbah, F. Belli, C. Brahms, and J.C. Travers; School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom

We demonstrate flat supercontinuum generation in argon and nitrogen-filled anti-resonant hollow-core fibre. In nitrogen, we observe reduced spectral power density in the

Room Osterseen ICM

CL-7.3 FRI 14:30

Ultrasound-induced light focusing inside scattering media

•B. Mestre Torà and M. Duocastella; Universitat de Barcelona, Barcelona, Spain

We present an extended study of the capability that shaped ultrasonic waves offer to guide light inside turbid media. Our results demonstrated an enhancement in light-confinement of a factor of 7 compared to conventional methods.

CL-7.4 FRI 14:45

Metabolic Imaging of 2D and 3D live cell models using a beam-scanning SyncRGB-FLIM microscope

•M.L. Ribeiro[1], C. Maibohm[1], T. Magalhães[3], M. Miranda[2], V. Amorim[2], P.T. Guerreiro[2], R. Romero[2], H. Crespo[2,3], and J.B. Nieder[1]; [1]INL - International Iberian Nanotechnology Laboratory, Ultrafast Bio- and Nanophotonics group, Braga, Portugal; [2]Sphere Ultrafast Photonics, Porto, Portugal; [3]IFIMUP-IN and Dept. of Physics and Astronomy, Porto,

Room 21 ICM

CF-11.3 FRI 14:30

Visible NOPO with Broadband Intracavity Sum-Frequency Mixing for the Generation of Rapidly Tunable Femtosecond Near-UV Pulses

•F.J. Geesmann[1], R. Mevert[1,2], D. Zuber[1,2], and U. Morgner[1,2,3]; [1]Institute of Quantum Optics, Leibniz Universität Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering-Innovation Across Disciplines), Hannover, Germany; [3]Laser Zentrum Hannover e.V., Hannover, Germany

Femtosecond pulses from 333-413 nm with average powers up to 90 mW were generated via non-collinear SFG in a NOPO producing visible light. Rapid tuning over the entire spectral range was demonstrated with 43.9 Hz.

CF-11.4 FRI 14:45

Compact Low Repetition Rate Optical Parametric Oscillators Enabled By Herriott Cells

•E. Allan[1], D. Bajek[2], and R.A. McCracken[1]; [1]Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]Photodynamic Therapy, Ninewells Hospital, Division of Molecular and Clinical Medicine, University of Dundee, Dundee, United Kingdom

Room 22a ICM

EC-3.3 FRI 14:30

Dirac Points Embedded in the Continuum of hyperbolic waveguides

•P. Pujol-Closa[1], L. Torner[1,2], and D. Artigas[1,2]; [1]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain; [2]Department of Signal Theory and Communications, Universitat Politècnica de Catalunya, Barcelona, Spain

Dirac Points embedded in the continuum are a new topological entity raising from the interaction of two bound states in the continuum. The result is a single Hermitian Dirac point surrounded by non-hermitian radiating states.

EC-3.4 FRI 14:45

Measuring the topological aberration of optical vortices

•R. Barros, S. Bej, R. Fickler, and M. Ornigotti; Tampere University, Tampere, Finland

We report the first experimental observation of the topological aberration of optical vortices upon reflection. We show that topological aberrations can be measured for imperfect vortices by computing their acquired orbital angular momentum sidebands.

Room 1 ICM

Germany

The role of photo-mechanical processes during ultrashort laser fragmentation of iridium oxide microparticles was investigated by pump-probe microscopy. The results aid in the understanding of microparticle fragmentation dynamics on timescales ranging from ps to μs.

CM-10.4 FRI 15:00

From femtosecond laser-induced plasma formation inside glass to stress wave generation and propagation: Experiments and modelling

•*A. Mouskeftaras*[1], *O. Koritsoglou*[1], *G. Duchateau*[2], *and O. Uteza*[1]; [1]*Aix-Marseille Université, CNRS, LP3, UMR7341, Marseille, France*; [2]*CEA-CESTA, Le Barp, France*

In this work, we are addressing the need for better understanding of the mechanical effects involved in the femtosecond laser processing of transparent materials by combined experimental and theoretical investigation.

Room 2 ICM

cade laser at a coupling efficiency of 85%.

CJ-9.4 FRI 15:00

Er-Ce Co-doped Aluminosilicate Fibres for C and L-Band Amplifiers

•*Z. Zhai, A. Halder, and J.K. Sahu*; *Optoelectronics Research Centre, University of Southampton, United Kingdom*

We report the gain and NF of Er/Ce-doped aluminosilicate fibre amplifiers with different Ce concentrations, demonstrating a maximum 48dB gain and corresponding 5.6dB NF in the C-band and >20dB gain across the L-band of 1565-1615nm.

Room 3 ICM

EA-8.4 FRI 15:00

Order-Invariant Two-Photon Quantum Correlations in PT-Symmetric Interferometers

•*T.A.W. Wolterink, M. Heinrich, S. Scheel, and A. Szameit*; *University of Rostock, Rostock, Germany*

We identify types of sequences of concatenated two-mode linear optical transformations whose two-photon behavior is invariant under reversal of the order. We experimentally verify this systematic behavior in parity-time-symmetric complex interferometer arrangements of varying composition.

Room 4a ICM

Nanyang Technological University, Singapore, Singapore

Current realizations of topological lasers often require complex design and fabrication that hinder their operation at small wavelengths. Here we demonstrate a lithography-free, one-dimensional vertical-cavity perovskite quantum dot topological laser emitting in the green.

CK-14.5 FRI 15:00

Narrow-linewidth frequency-agile integrated laser sources using thin-film lithium niobate

•*V. Snigirev*[1], *A. Riedhauser*[2], *G. Likhachev*[1], *J. Riemensberger*[1], *R. Ning Wang*[1], *C. Moehl*[1], *M. Churaev*[1], *A. Siddharth*[1], *G. Huang*[1], *Y. Popoff*[2,3], *U. Drechsler*[2], *D. Caimi*[2], *S. Hoenl*[2], *J. Liu*[2], *P. Seidler*[2], *and T.J. Kippenberg*[1]; [1]*EPFL, Lausanne, Switzerland*; [2]*IBM Research Europe, Zurich, Switzerland*; [3]*ETH Zurich, Switzerland*

We demonstrate thin film lithium niobate-based frequency-agile integrated laser source with lasing frequency tuning rates up to 12 PHz/s and intrinsic linewidth of 3 kHz. We also make a system-level demonstration of FMCW LiDAR.

Room 4b ICM

•*R. Luque Merino*[1,2,3], *P. Seifert*[1,4], *J. Durán Retamal*[1,5], *R. Hadfield*[6], *and D.K. Efetov*[2,3]; [1]*ICFO - Institute of Photonic Sciences, Barcelona, Spain*; [2]*Fakultät für Physik Ludwig-Maximilians-Universität, Munich, Germany*; [3]*Munich Center for Quantum Science and Technology (MCQST), Munich, Germany*; [4]*Universität der Bundeswehr München, Munich, Germany*; [5]*Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona, Spain*; [6]*University of Glasgow, Glasgow, Scotland*

We combine van der Waals fabrication techniques with novel non-destructive nanopatterning to define 2D cuprate nanostructures that enable ultrasensitive photodetection at telecom wavelengths at moderate cryogenic temperatures.

EI-3.4 FRI 15:00

Giant switchable broadband volatile thermo-optic properties of phase change semiconductors

•*K. Kim and B. Gholipour*; *University of Alberta, Edmonton, Canada*

We show that common chalcogenide phase change semiconductors currently being explored widely for inclusion as data storage elements in silicon photonic circuits possess giant switchable broadband thermo-optic coefficients across visible to telecom frequencies.

Room 5 ICM

Science and Technology, University of Crete, Heraklion, Greece; [4]*Section of Electronic Physics and Systems, Department of Physics, National and Kapodistrian University of Athens, Athens, Greece*; [5]*Department of Engineering Science, University of Oxford, Oxford, United Kingdom*

We demonstrate a 3D chiral metamaterial structure that presents a large and ultra-broadband pure THz optical activity up to 25 degrees accompanied by zero ellipticity for a frequency range over 1 THz.

CC-6.4 FRI 15:00

Fano to BIC Resonances Transitions in 3D Printed Photonic Crystals

L. Pilozzi[1,2], •*M. Missori*[1,3], *and C. Conti*[1,2,3]; [1]*Institute for Complex Systems, National Research Council of Italy (ISC-CNR) , Rome, Italy*; [2]*Research Center Enrico Fermi, Rome, Italy*; [3]*Department of Physics, University Sapienza, Rome, Italy*

We have designed and realized, by means of three-dimensional printing technology, of THz photonic crystal slab exhibiting bound states in the continuum (BIC) to be used as highly sensitive and low-cost THz sensors.

Room 11 ICM

CI-7.5 FRI 15:00

Coherent beam combining of very high power optical amplifiers for optical feeder links

•*V. Billault*[1], *S. Leveque*[2], *A. Maho*[2], *M. Welch*[3], *J. Bourderionnet*[1], *E. Lallier*[1], *M. Sotom*[2], *A. Le Kernec*[2], *and A. Brignon*[1]; [1]*Thales Research and Technology, Palaiseau, France*; [2]*Thales Alenia Space, Toulouse, France*; [3]*G&H, Torquay, United Kingdom*

We present the coherent beam combination of high power optical amplifiers for optical feeder links. We obtained 90W output power, 98% combining efficiency, with 25Gb/s telecom signals on the optical carrier with <1dB power penalty.

Room 12a ICM

CE-10.3 FRI 14:45

Evidencing the resonant and non-resonant contributions to the index of refraction of a Nd:YAG rod amplifier

•*M. Maillard*[1,2], *G. Amiard-Hudebine*[1], *M. Tondusson*[1], *M. Orain*[2], *and E. Freysz*[1]; [1]*Univ. Bordeaux,CNRS, LOMA UMR 5798, Talence, France*; [2]*ONERA/DMPE, Université de Toulouse, Toulouse, France*

Measuring at both 532 nm and 1064.5 nm the temporal evolution of the lens induced in a Nd:YAG rod amplifier, we reveal the resonant and non-resonant contribution of the Nd3+ ions to the refractive index.

CE-10.4 FRI 15:00

Metal transition doped Zn1.3Ga1.4Sn0.3O4 persistent phosphors for anti-counterfeiting applications

•*G. Cai*[1,2], *L. Giordano*[1], *T. Delgado*[1], *C. Richard*[2], *and B. Viana*[1]; [1]*PSL University, Chimie ParisTech, IRCP-CNRS,, Paris, France*; [2]*Université Paris Cité, CNRS, INSERM, UTCBS, Faculté de Pharmacie,, Paris, France*

Persistent luminescence (PersL) property offers great potential for anti-counterfeiting applications. We propose Zn1.3Ga1.4Sn0.3O4 nanoparticles (NPs) with strong PersL at 700 nm (NIR-I) and at 1300 nm (NIR-II) and evaluate a multi-level anti-counterfeiting technology in dual-windows.

Room 13a ICM

JSIII-5.4 FRI 15:00

Synaptic weighting of spiking VCSEL-neurons using integrated photonic microring weight banks

•M. Hejda[1], E.A. Doris[2], S. Bilodeau[2], J. Robertson[1], L. Xu[2], B. Shastri[3], P.R. Prucnal[2], and A. Hurtado[1]; [1]Institute of Photonics, SUPA Department of Physics, University of Strathclyde, Glasgow, United Kingdom; [2]Department of Electrical Engineering, Princeton University, Princeton, USA; [3]Department of Physics, Engineering Physics and Astronomy, Queen's University, Kingston, Canada

We present an experimental neuromorphic system, combining together a spiking photonic VCSEL-neuron and an integrated, silicon photonics microring-based weightbank. Synaptic weighting functionality of the sub-ns optical spikes from VCSEL-neuron is demonstrated.

Room 13b ICM

temporal waveforms at wavelengths relevant for multi-photon imaging.

CD-13.5 FRI 15:00

Diminishing Speckle Noise during Nonlinear Phase-Only Beam Shaping

•L. Ackermann[1,2], C. Roider[1], K. Cvecek[1,2], N. Barré[1,2], and M. Schmidt[1,2]; [1]Institute of Photonic Technologies, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany; [2]School of Advanced Optical Technologies (SAOT), Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany

The combination of nonlinear beam shaping and highly efficient speckle averaging enables tailoring beam profiles of high quality and uniformity beyond the spectral limits of the liquid crystal spatial light modulator (LC-SLM).

Room 14a ICM

tion, demonstrated by angle-resolved photoluminescence in a GaAs-based microcavity. Our results pave the way towards polariton-based THz lasing and coherent control of collective quantum states with individual qubits.

EF-9.5 FRI 15:00

Refraction of a soliton by a soliton gas in a recirculating fiber loop

P. Suret [1], M. Dufour[1], G. Roberti[2], G. El[2], F. Copie[1], and •S. Randoux[1]; [1]Laboratoire PhLAM, Université de Lille, Villeneuve d'Ascq, France; [2] Northumbria University, Newcastle upon Tyne, United Kingdom

We report an optical fiber experiment where we investigate the interaction between an individual (tracer) soliton and a dense soliton gas. This results in a refraction phenomenon interpreted using the kinetic theory of soliton gases.

Room 14b ICM

Department of Microbial and Molecular Systems, KU Leuven, Belgium

We have designed and investigated an innovative dual-region self-referencing fiber-optic surface plasmon resonance biosensor with two different configurations to study binding reactions and compensate for bulk refractive index changes or temperature oscillation, simultaneously.

CH-15.4 FRI 15:00

Voltage Driven Surface Plasmon Resonance Biosensors with integrated Nanoholes Array

• Rohit[1] and J.-J. Huang[1,2]; [1]Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei City, Taiwan; [2]Department of Electrical Engineering, National Taiwan University, Taipei City, Taiwan

A novel optical-biosensor was designed using a hybrid-plasmonic and electrochemical phenomenon. Gold nanohole-array on glass-substrate was fabricated and tested for CRP-concentrations ranging from 1-1000μg/mL, with a concentration-dependent response modulated by varying DC-voltages or AC-bias frequencies.

Room 14c ICM

visible region due to gain suppression of the rotational Raman Stokes generation.

EE-4.5 FRI 15:00

Supercontinuum Generation in Methane-Filled Hollow-Core Fibres through a Combination of Modulation Instability and Stimulated Raman Scattering

•B. Plosz, A. Lekosiotis, M. Sabbah, F. Belli, and J.C. Travers; Heriot-Watt University, Edinburgh, United Kingdom

We report the generation of exceptionally flat Raman-enhanced supercontinuum spanning from 300 nm to 1.7 μm by pumping a methane-filled hollow-core fibre in the anomalous dispersion regime at 1030 nm with 220 fs 5μJ pulses.

Room Osterseen ICM

Portugal

The patented SyncRGB-FLIM microscopy method, which deploys a sub-10 fs ultrabroadband laser for multi-color excitation, was used to track the efficiency of cancer treatments through metabolic imaging of 2D and 3D live cell cancer models.

CL-7.5 FRI 15:00

Flexible and tunable nonlinear microscopy platform

•G. Hehl[1], A. Tripathi[1], S. Goncharov[1], K. Fritsch[1,2], and O. Pronin[1]; [1]Helmut Schmidt University, Hamburg, Germany; [2]n2-Photonics, Hamburg, Germany

In this study, we performed two, and three-photon imaging with varying pulse duration, repetition rate and average power and systematically investigated the fluorescence signal strength depending on those parameters.

Room 21 ICM

We propose an ultrafast optical parametric oscillator as a laser source for three-photon fluorescence microscopy. Employing an intracavity Herriott cell we can meet the performance required at a lower cost while maintaining a compact footprint.

CF-11.5 FRI 15:00

Ultrafast Optical Parametric Oscillator Employing High Refractive Index Brewster Mirrors

•D.E. Hunter and R.A. McCracken; Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom

We present a highly-stable ultrafast optical parametric oscillator cavity employing a pair of high refractive index inverted prisms acting as Brewster mirrors. The cavity is robust against misalignment with promise for applications in harsh environments.

Room 22a ICM

EC-3.5 FRI 15:00

Nano-optical Metrology with Phase Singularities

•T. Grant[1], E. Plum[1], K.F. MacDonald[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore, Singapore

We show how the exploitation of phase singularities in topologically structured light fields can enable dramatic sensitivity improvements in diffraction-based optical displacement and dimensional metrology.

Room 1 ICM

CM-10.5 FRI 15:15

Towards an Experimentally Validated Model of Ultrafast Laser Ablation

J. Winter, M. Spellauge, D. Redka, G.E. Hallum, and •H.P. Huber; Laser-center, Department of Applied Sciences and Mechatronics, Munich University of Applied Sciences HM, Munich, Germany

We validate a new model of aluminum laser ablation with predicted time-resolved and final-state observables. In addition, we emphasize the strong photo-mechanical nature of laser fragmentation of iridium oxide microparticles immersed in water.

Room 2 ICM

CJ-9.5 FRI 15:15

Design and characterization of thulium-doped fiber with depressed cladding for amplifiers operating in the region from L-band to 1.8 um

•J. Aubrecht[1], J. Pokorný[1,2], M. Kamrádek[1], B. Jiříčková[1,2], and P. Peterka[1]; [1]Institute of Photonics and Electronics of the Czech Academy of Sciences, Prague, Czech Republic; [2]Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Prague, Czech Republic

A novel design of a depressed-cladding thulium-doped fiber for tunable laser and amplifier applications is reported. This design results in blue-shifted gain spectrum in the sub-1.8-μm region and highly suppressed amplified spontaneous emission.

Room 3 ICM

EA-8.5 FRI 15:15

Ultra-efficient resonant generation of time-energy entangled photon pairs in a InGaP Photonic Crystal Cavity

•A. Chopin[1,2], A. Barone[3], I. Ghorbel[1], S. Combrié[1], D. Bajoni[4], F. Raineri[2,5], M. Galli[3], and A. De Rossi[3]; [1]Thales Research & Technology, 1 Avenue Augustin Fresnel, Palaiseau, France; [2]Centre de Nanosciences et de Nanotechnologies, CNRS, Palaiseau, France; [3]Dipartimento di Fisica, Università degli Studi di Pavia, Via Bassi 6, Pavia, Italy; [4]Dipartimento di Ingegneria Industriale e dell'Informazione, Università degli Studi di Pavia, Via Adolfo Ferrata 5, Pavia, Italy; [5]Université Côte d'Azur, Institut de Physique de Nice, CNRS UMR 7010, Sophia Antipolis, France

Photonic crystal cavities are introduced as a novel platform for integrated quantum photonics with the demonstration of ultra-efficient generation of time-energy entangled photon pairs with visibility of 97% due to very small confinement volume.

Room 4a ICM

CK-14.6 FRI 15:15

Hybrid III-V on Silicon-On-Insulator two-dimensional photonic crystal nanolaser

F. Manegatti[1], K. Moratis[1], •B. Garbin[1], A. Demarchi[1], G. Beaudoin[1], K. Pantzas[1], I. Sagnes[1], and F. Raineri[1,2]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, 91120 Palaiseau, France; [2]Université Côte d'Azur, Institut de Physique de Nice, CNRS–UMR 7010, Sophia Antipolis, France

We experimentally demonstrate the first electrically-pumped asymmetric two-dimensional photonic crystal nanolaser. Our devices open great prospects for on-chip optical interconnections.

Room 4b ICM

EI-3.5 FRI 15:15

Polarization-driven reversible deformation in a light-responsive amorphous polymer blend

•D. Urban[1], D.R. Hjelme[1], and E. Descrovi[2]; [1]Norwegian University of Science and Technology, Trondheim, Norway; [2]Polytechnic University of Turin, Torino, Italy

Using commercially available constituents, we show the fabrication of polymer materials that can be locally and reversibly stretched by polarized light along arbitrary directions. Planar substrate stretches and more complex 3D actuator deformations are presented.

Room 5 ICM

CC-6.5 FRI 15:15

Comb-Locked Terahertz Spectroscopy of Critically Coupled Ultra-high-Q Whispering-Gallery Mode Resonators

•S. Müller[1,2], T. Puppe[1], Y. Mayzlin[1], R. Wilk[1], B. Schmauss[2], and D. Vogt[3,4]; [1]TOPTICA Photonics AG, Graefelfing, Germany; [2]Institute of Microwaves and Photonics, Friedrich-Alexander University, Erlangen, Germany; [3] Department of Physics, University of Auckland, Auckland, New Zealand; [4]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand

A novel spectrometer is based on tuneable diode lasers phase-locked to an externally shifted frequency comb. We demonstrate precision terahertz spectroscopy of critical coupling in Ultra-high Q whispering-gallery silicon resonator modes.

Room 11 ICM

CI-7.6 FRI 15:15

Dual-chirp Waveforms with Optical Filter-less Photonic Dechirping for Distance and Velocity Measurement in FMCW RADARs

D. Parida, •R. Dhawan, and A. Choudhary; Ultrafast Optical Communications and High-performance Integrated Photonics (UFO-CHIP) group, Department of Electrical Engineering, Indian Institute of Technology (IIT), Delhi, New Delhi, India

We propose an optical filterless dechirping RADAR receiver based on a dual-drive Mach-Zehnder-modulator for distance and velocity estimation. The system is tested for different velocities showing a maximum error of 7.4% for velocity estimation

Room 12a ICM

CE-10.5 FRI 15:15

Erbium doped nanocrystalline and PMMA-based composite materials

•K. Anders[1,2], A. Jusza[1,2], A. Bieniek[1], P. Mergo[3], R. Łyszczek[3], and R. Piramidowicz[1,2]; [1]Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Warsaw, Poland; [2]LightHouse sp. z o.o., Lublin, Poland; [3]Maria Curie-Sklodowska University, Faculty of Chemistry, Lublin, Poland

We present the research results on short wavelength emission properties of the PMMA-based nanocomposites doped with oxide and fluoride nanocrystals activated with erbium ions dedicated to application in polymer fiber lasers and incoherent light sources.

Room 1 ICM

16:00 – 17:30

CM-11: Laser additive manufacturing II

Chair: Johannes Heitz, Johannes Kepler University, Linz, Austria

Room 2 ICM

16:00 – 17:30

CJ-10: 2-micron fiber sources

Chair: Pavel Peterka, Inst. of Photonics and Electronics, Czech Academy of Sciences, Prague, Czech Republic

Room 3 ICM

16:00 – 17:30

EA-9: Optomechanical systems

Chair: Olivier Dulieu, Université Paris-Saclay, France

Room 4a ICM

16:00 – 17:30

CK-15: Micro- and nano-optical cavities

Chair: Stefano Pelli,CNR-IFAC,Sesto Fiorentino,Italy

Room 4b ICM

16:00 – 17:30

EI-4: Ultrafast dynamics in layered materials

Chair: Chiara Trovatello, Columbia University, New York, USA

Room 5 ICM

16:00 – 17:30

CC-7: THz applications

Chair: Jeremy Johnson, Brigham Young University, Provo, UT, USA

Room 11 ICM

16:00 – 17:30

CI-8: Frequency combs and microwave photonics

Chair: Juerg Leuthold, ETH Zurich, Zürich, Switzerland

Room 12a ICM

16:00 – 17:30

CE-11: Fabrication methods

Chair: George Tsibidis, FORTH, Heraklion, Greece

Room 13a ICM

JSIII-5.5 FRI 15:15

Tunable Optoelectronic Neuromorphic Synaptic Link based on Nanoscale Resonant Tunnelling Diode-Photodetector Spiking Neurons

•W. Zhang[1], M. Hejda [1], Q.R.A. Al-Taai [2], B. Romeira [3], J. Figueiredo [4], E. Wasige [2], and A. Hurtado [1]; [1]University of Strathclyde, Glasgow, United Kingdom; [2]University of Glasgow, Glasgow, United Kingdom; [3]International Iberian Nanotechnology Laboratory, Braga, Portugal; [4]Universidade de Lisboa, Lisboa, Portugal

We report an optoelectronic neuromorphic synaptic link built with high-speed nanoscale resonant tunnelling diode-photodetectors (RTD-PDs), which reproduces temporal-coded spike generation and transmissions in biological neurons and synapses.

Room 13b ICM

CD-13.6 FRI 15:15

Enhancing Nonlinear Interferometers for Imaging with Undetected Photons: Seeding and High-Gain

•E. Pearce[1], J. Flórez[1], N.R. Gemmell[1], M. Abire Karzazi[1], Y. Ma[1], G. Bressanini[1], R.A. Battle[1], R.T. Murray[1], M.S. Kim[1], C.C. Phillips[1], R.F. Oulton[1], and A.S. Clark[1,2]; [1]Department of Physics, Blackett Laboratory, Imperial College London, London, United Kingdom; [2]Quantum Engineering Technology Labs, University of Bristol, Bristol, United Kingdom

We present a comprehensive model of an SU(1,1) interferometer for imaging with undetected photons. We confirm experimentally that interference visibility and contrast are enhanced for coherent state seeding and in the high gain regime.

Room 14a ICM

EF-9.6 FRI 15:15

Distorsion of the nonlinear spectrum of solitonic pulses induced by stimulated Raman scattering

•M. Dufour, S. Randoux, F. Copie, and P. Suret; Laboratoire PhLAM, Université de Lille, Villeneuve d'Ascq, France

We look at how the well-known stimulated Raman scattering and soliton fission manifest in the Inverse Scattering Transform spectrum (nonlinear spectrum) using a single shot measurement of both amplitude and phase of the optical signal.

Room 14b ICM

CH-15.5 FRI 15:15

UV-Photodeactivation of Proteins for Inscription of BIO-Gratings

A. Juste-Dolz[1], •M. Delgado-Pinar[2], M. Avellà-Oliver[1,3], E. Fernández[1], J.L. Cruz[2], M.V. Andrés[2], and Á. Maquieira[1,3]; [1]IDM, Universitat Politècnica de València, Universitat de València, Valencia, Spain; [2]LFO-UV, ICMUV, Universitat de València, Valencia, Spain; [3]Chemistry Department, Universitat Politècnica de València, Valencia, Spain

We present the UV-photoinscription of molecular BIO-gratings by deactivating the BSA molecules of a uniform biolayer in a patterned manner. The fabrication is optimized to enhance the diffractive efficiency and topology after incubation of aBSA.

Room 14c ICM

EE-4.6 FRI 15:15

Ultrafast, all-optical, and highly efficient imaging of molecular chirality

•R. Picciuto[1], J. Broughton[1], K. Kowalczyk[1], H. Allegre[1], J.W.G. Tisch[1], J.P. Marangos[1], O. Smirnova[2,3], D. Ayuso[1,2], and M. Matthews[1]; [1]Imperial College London, London, United Kingdom; [2]Max-Born-Institut, Berlin, Germany; [3]Technische Universität Berlin, Berlin, Germany

Towards all-optical method, that relies on purely electric-dipole interactions, to probe chirality on ultrafast timescales. We aim to measure the chiral dipole response, of a liquid microjet, into the far-field using a non-collinear setup.

Room Osterseen ICM

CL-7.6 FRI 15:15

Non-destructive Direct Pericarp Thickness Measurement of Sorghum Kernels with Fiber-based Extended Focus Optical Coherence Microscopy

•A. Fernandez, D. Sen, D. Crozier, B. Henrich, A. Sokolov, M. Scully, W. Rooney, and A. Verhoef; Texas A&M University, College Station, USA

We apply high-resolution Bessel-beam extended focus optical coherence microscopy for non-destructive morphological phenotyping of sorghum seeds. We obtain accurate thickness measurements with a reduced tendency to overestimate the thickness of thin phenotypes.

Room 21 ICM

CF-11.6 FRI 15:15

Hybrid-Amplified THz-Repetition-Frequency Bursts

•V. Stummer[1], M. Schneller[1], T. Flöry[1], E. Kaksis[1], M. Kitzler-Zeiler[1], A. Pugzlys[1,2], and A. Baltuska[1,2]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]Center for Physical Sciences & Technology, Vilnius, Lithuania

We demonstrate hybrid amplification of femtosecond pulse bursts, in which spectral modulations are deliberately suppressed in a chirped-pulse amplifier and then recovered in an optical parametric amplifier, anticipating several exciting resonant multiphoton applications.

Room 22a ICM

EC-3.6 FRI 15:15

Accelerating Poincaré vortices

•A. Brimis[1,3], K.G. Makris[1,3], and D.G. Papazoglou[1,2]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), Heraklion, Greece; [2]Department of Material Science and Technology, University of Crete, Heraklion, Greece; [3]ITCP, Department of Physics, University of Crete, Heraklion, Greece

We theoretically investigate polarization singularities that exhibit radial and angular acceleration upon propagation. By combining two orthogonally polarized states, consisting of a pure and a vortex phase modulated ring-Airy beam, we produce accelerating polarization singularities.

Room 13a ICM

16:00 – 17:30

JSIII-6: Brain-inspired photonic dedvices and computing II

Chair: Bruno Romeira, INL, Braga, Portugal

Room 13b ICM

16:00 – 17:30

CD-14: Quantum applications

Chair: Robert Fickler, Tampere University, Finland

Room 14a ICM

16:00 – 17:15

EF-10: Extreme events and forecasting techniques

Chair: Alejandro Giacomotti, C2N, Université Paris Saclay, France

Room 14b ICM

16:00 – 17:30

CH-16: Environmental optical sensing

Chair: Cristian Focsa,University of Lille,France

Room 14c ICM

16:00 – 17:30

EE-5: Ultrafast manipulation and control

Chair: John Travers,Heriot-Watt University, UK

Room Osterseen ICM

16:00 – 17:30

CL-8: Novel laser sources

Chair: Kenneth Kin-Yip Wong, The University of Hong Kong, Hong Kong

Room 21 ICM

16:00 – 17:30

CF-12: Mid-IR sources

Chair: Eric Cormier, University of Bordeaux, France

NOTES

Room 1 ICM

CM-11.1 FRI (Invited) 16:00

Laser Induced Forward transfer: Digital Additive Manufacturing solution for electronics

•*I. Zergioti; National Technical University of Athens, Greece*

We demonstrate the potential of LIFT as a digital and additive micro-manufacturing tools delivering structures and patterns consisting of advanced nanostructured materials and 2D layered materials. The prospects of this technology within the concept of industrial applicability will be discussed.

Room 2 ICM

CJ-10.1 FRI 16:00

Tm:fiber CPA driven, nonlinear pulse compression delivering mJ-level, sub-two cycle pulses at 2 μm with >100 W average power

•*Z. Wang[1], T. Heuermann[1,2,3], M. Gebhardt[1,2,3,4], M. Lenski[1], P. Gierschke[1,5], R. Klas[1,2,3,5], J. Rothhardt[1,2,3,5], C. Jauregui[1], and J. Limpert[1,2,3,5]; [1]Institute of Applied Physics, Abbe Center of Photonics, University Jena, Germany; [2]Helmholtz-Institute Jena, Germany; [3]GSI, Darmstadt, Germany; [4]Current address: School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [5]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We report on the nonlinear pulse compression of a high-power thulium-fiber laser, delivering mJ-level, sub-two cycle pulses with about 80 GW peak power and 132 W average power at 101 kHz repetition rate.

CJ-10.2 FRI 16:15

Ultrabroadband, highly efficient mid infrared generation driven by a Tm-doped fiber laser system

•*T. Heuermann[1,2,3], Z. Wang[1], M. Lenski[1], and J. Limpert[1,2,3,4]; [1]University, Jena, Germany; [2]Helmholtz Institute Jena, Germany; [3]GSI, Darmstadt, Germany; [4]Fraunhofer Institute for Applied Optics and*

Room 3 ICM

EA-9.1 FRI 16:00

Ultralow Dissipation Mechanical Resonators for Cavity-Free Quantum Control

•*N.J. Engelsen[1,2], A. Arabmoheghi[1,2], M.J. Bereyhi[1,2], A. Beccari[1,2], S.A. Fedorov[1,2], Y. Xia[1,2], G. Huang[1,2], A. Zicoschi[1,2], and T.J. Kippenberg[1,2]; [1]Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]Center for Quantum Science and Engineering, EPFL, Lausanne, Switzerland*

We fabricate mechanical resonators with record quality factors ($Q > 3 \times 10^9$ at room temperature) and show efficient interferometric measurement of their motion. Technical improvements may allow cavity-free cooling close to the ground state without a cavity.

EA-9.2 FRI 16:15

Demonstration of piezo-orbital backaction force in a bulk rare-earth ion-doped crystal

•*A. Louchet-Chauvet[1], P. Verlot[2], J.-P. Poizat[3], and T. Chanelière[3]; [1]Institut Langevin, CNRS, ESPCI, Université PSL, Paris, France; [2]Lumin, CNRS, Université Paris-Saclay, ENS Paris-Saclay, CentraleSupelec, Orsay, France; [3]Institut Néel, CNRS, Grenoble INP, Univ. Grenoble Alpes, Grenoble, France*

We demonstrate a conservative, optomechanical

Room 4a ICM

CK-15.1 FRI 16:00

Bloch Surface Waves in a photo-tunable, anisotropic microcavity

N. Marcucci[1], M.C. Giordano[2], G. Zambito[2], F. Buatier de Mongeot[2], and •E. Descrovi[1]; [1]Politecnico di Torino, Torino, Italy; [2]Università di Genova, Genova, Italy

An anisotropic resonant structure is presented, anisotropy being due to both topography and a light-controlled molecular orientation in the constitutive materials. Two orthogonal surface modes are spectrally detuned by operating on the induced birefringence.

CK-15.2 FRI 16:15

Twenty Million Q-Factor for Suspended Triangular Nanobeam Cavities

•*C. Maynard[1], D. Beggs[1], M. Wale[2], A. Bennett[3], and J. Hadden[3]; [1]School of Physics and Astronomy, Cardiff University, Cardiff, United Kingdom; [2]Department of Electronic and Electrical Engineering, University College London, London, United Kingdom; [3]School of Engineering, Cardiff University, Cardiff, United Kingdom*

Photonic crystal

Room 4b ICM

EI-4.1 FRI (Invited) 16:00

Lightshift of exciton and exciton-polarons in a 2D semiconductor.

•*B. Evrard, T. Uto, M. Kroner, and A. Imamoglu; Institute of Quantum Electronics, ETH Zurich, Zürich, Switzerland*

The lightshift of an exciton can be dominantly driven by interactions with virtual excitations. Interestingly, this effect is dramatically enhanced by polaron dressing of the exciton with free carriers in a doped 2d semiconductor.

Room 5 ICM

CC-7.1 FRI 16:00

In-vivo skin hydration monitoring using a robust Terahertz handheld laser; clinical opportunities

A. Hernandez-Serrano, •X. Ding, and E. Pickwell-MacPherson; University of Warwick, Coventry , United Kingdom

A non-invasive THz portable laser scanner is utilised to evaluate the hydration dynamics of the dorsal aspect of the forearm of 95 healthy volunteers. Increments in hydration are observed during one minute of test

CC-7.2 FRI 16:15

Substrate-integrated hollow waveguides for terahertz gas sensing

•*D. Theiner[1,2], B. Limbacher[1,2], M. Jaidl[1,2], M. Ertl[1,2], M. Hlavatsch[3], K. Unterrainer[1,2], B. Mizaikoff[3,4], and J. Darmo[1]; [1]TU Wien, Institut für Photonik, Vienna, Austria; [2]TU Wien, Zentrum für Mikro- und Nano-Strukturen, Vienna, Austria; [3]University of Ulm, Institute of Analytical and Bioanalytical Chemistry, Ulm, Germany; [4]Hahn-Schickard, Ulm, Germany*

Room 11 ICM

CI-8.1 FRI 16:00

Tuneable laser locking to Optical Frequency Comb

•*W. Indra[1], Z. Feng[1], J. Vojtěch[2], B. Shi[1], and R. Slavík[1]; [1]Optoelectronics Research Centre, University of Southampton, SOUTHAMPTON, United Kingdom; [2]CESNET a.l.e, Praha, Czech Republic*

Tuneable laser is phase locked to optical frequency comb with per-tone power as low as 1nW (entire comb power of 40μW). The system will allow for up to 25 lasers locked simultaneously to 1mW comb.

CI-8.2 FRI 16:15

80-Gb/s fiber–terahertz system in 300-GHz band using stable optical frequency comb generation

•*P. Tien Dat[1], M. Isao [1], S. Norihiko [1], I. Keizo [1], K. Atsuhi [1,2], Y. Naoktatsu [1], and A. Kouichi [1]; [1]National Institute of Information and Communications Technology (NICT), Tokyo, Japan; [2] Nagoya Institute of Technology, Aichi, Japan*

We demonstrate a simple yet high-speed fiber–terahertz system in 300-GHz band using a single Mach-Zehnder

Room 12a ICM

CE-11.1 FRI (Invited) 16:00

Laser based 3D printing of fused silica glass

•*M. Fokine[1,2], T. Oriekhov[2], and C. Liu[2]; [1]Royal Institute of Technology, Stockholm, Sweden; [2]Nobula3D AB, Stockholm, Sweden*

A bench-top glass 3D printer using non-contact CO2-laser heating of filaments is presented. Printing at temperatures of ~2000 C with a small hot-zone enables true 3D printing of transparent glass without need of support structures.

Room 13a ICM

JSIII-6.1 FRI (Invited) 16:00

Scalable and autonomous photonic neural networks

A. Grabulosa[1], A. Skalli[1], J. Moughames[1], X. Porte[2], J. Lott[3], S. Reitzenstein[3], and •D. Brunner[1]; [1]FEMTO-ST, Université Franche-Comté CNRS UMR 6174, Besancon, France; [2]SUPA Department of Physics, University of Strathclyde, Glasgow, United Kingdom; [3]Institut für Festkörperphysik, Technische Universität Berlin, Germany

Using CMOS compatible 3D photonic integration we implement dense and complex networks which pose a challenge to conventional 2D integration, and based on multimode semiconductor lasers we realize a fully autonomous photonic neural network.

Room 13b ICM

CD-14.1 FRI (Invited) 16:00

Fully On-chip Laser-integrated Quantum Source of Entangled Photon States

•H. Mahmudlu[1,2,3], R. Haldar[1,2,3], R. Johanning[1,2,3], A. Khodadad Kashi[1,2,3], A.v. Rees[4], J. P. Epping[5], K.-J. Boller[4], and M. Kues[1,2,3]; [1]Institute of Photonics, Leibniz University Hannover, Hannover, Germany; [2]Hannover Centre for Optical Technologies, Leibniz University Hannover, Hannover, Germany; [3]Cluster of Excellence PhoenixD, Leibniz University Hannover, Hannover, Germany; [4]University of Twente, Enschede, Netherlands; [5]QuiX, Enschede, Netherlands

We demonstrate the first fully on-chip laser-integrated quantum light source of entangled photon states. The hybrid InP-Si3N4 source creates two- and high-dimensional frequency-bin entangled states at telecom-wavelength and brings the required scalability to photonic quantum processing.

Room 14a ICM

EF-10.1 FRI 16:00

Forecasting extreme events from nonlocal partial information in a spatially extended microcavity laser

V.A. Pammi[1], M.G. Clerc[2], S. Coulibaly[3], and •S. Barbay[1]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Departamento de Física and Millennium Institute for Research in Optics, FCFM, Universidad de Chile, Santiago, Chile; [3]Université de Lille, PhLAM - Physique des Lasers, Atomes et Molécules, Lille, France

We address the model-free forecasting of extreme events from experimental data acquired in a spatiotemporally chaotic microcavity laser. We use transfer entropy to identify precursors enabling useful nonlocal prediction exceeding 7.5 times the Lyapunov time.

EF-10.2 FRI 16:15

Machine Learning analysis of temporal instability peaks under Continuous Wave excitation in optical fiber Modulation Instability

•M. Mabed[1], L. Salmela[2], A.V. Ermoleav[1], C. Finot[3], G. Genty[2], and J.M. Dudley[1]; [1]Université de Franche-Comté, Institut Femto-ST, Besançon, France; [2]Photonics Laboratory, Tampere University, Tampere, Finland; [3]Université de Bourgogne, Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon,

Room 14b ICM

CH-16.1 FRI (Invited) 16:00

Chemical sensing of trace gases and particulate matter with optical cavities

•W. CHEN; Université du Littoral Côte d'Opale, Dunkerque, France

Cavity-enhanced optical sensing of key atmospheric species (trace gases/particles) will be overviewed. Development of novel optical cavity based on prisms as cavity reflectors operating in a broadband of 400-1600 nm will be presented as well.

Room 14c ICM

EE-5.1 FRI 16:00

Coherent Generation and Field-Resolved Detection of Nonlinear $\chi^{(3)}$ Spectral Broadening in the Multi-THz Regime

•C. Schönfeld, A.-C. Heinrich, L. Feuerer, A. Baserga, D. Bossini, and A. Leitenstorfer; Department of Physics and Center for Applied Photonics, Konstanz, Germany

Nonlinear spectral broadening of mid-infrared transients with peak electric fields exceeding 100 MV/cm is demonstrated. Field-resolved analysis by electro-optic sampling directly reveals solitonic self-compression and self-steepening on femtosecond timescales.

EE-5.2 FRI 16:15

Manipulation of single-photon wave packets via Kerr-nonlinear refractive index fronts

•S. Bose[1,2], A.M. Angulo M.[1,2], S. Wijaya[1], O. Melchert[2,3], P. Rübeling[1], R. Halder[1,2], D. Ghosh[4], U. Morgner[2,3], A. Demircan[2,3], I. Babushkin[2,3], and M. Kues[1,2]; [1]Institute of Photonics, University Hannover, Germany; [2]Cluster of Excellence PhoenixD, University Hannover, Germany; [3]Institute of Quantum Optics, University Han-

Room Osterseen ICM

CL-8.1 FRI 16:00

Dual Amplification 850 nm FDML Laser

•M. Klufts[1], S. Lotz[1], M.A. Bashir[1], T. Pfeiffer[2], A. Mlynek[2], W. Wieser[2], A. Chamorovskiy[3], V. Shidlovski[3], A. Podoleanu[4], and R. Huber[1]; [1]Institute of Biomedical Optics, University of Lübeck, Lübeck, Germany; [2]Optores GmbH, Munich, Germany; [3]Superlum Diodes Ltd., Cork, Ireland; [4]School of Physical sciences, university of Kent, Canterbury, United Kingdom

We demonstrate a new cavity design for FDML laser providing dual amplification in one round trip. The laser is sweeping over 20 nm around 850 nm with a repetition rate of 409 kHz.

CL-8.2 FRI 16:15

Ultra-short pulse modulation with electro-optic modulators

•S. Meyer[1], T.F. Kutscher[1], P. Lamminger[1], F. Sommer[1,2], and S. Karpf[1]; [1]Institute of Biomedical Optics, Lübeck, Germany; [2]Leibniz Institute of Virology, Hamburg, Germany

To overcome the limitations of expensive electrical pulse generators, electro-optical modulators (EOM) were operated with a fast edge with an amplitude of two times Vpi, allowing the

Room 21 ICM

CF-12.1 FRI 16:00

Hyper spectral imaging using sub-half-cycle mid-infrared pulses

Y. Zhao[1], S. Kusama[1], Y. Furutani[2], W.-H. Huang[3], C.-W. Luo[3], and •T. Fuji[1]; [1]Toyota Technological Institute, Nagoya, Japan; [2]Nagoya Institute of Technology, Nagoya, Japan; [3]National Yang Ming Chiao Tung University, Hsinchu, Taiwan

We have demonstrated hyper spectral imaging using sub-half-cycle mid-infrared pulses generated through two-color filamentation. Up-conversion of the MIR pulse transmitted through the sample at the image plane significantly improve the performance of the spectral imaging.

CF-12.2 FRI 16:15

Low-noise 2-W Average Power, 112-fs Kerr-lens Mode-locked Ho:CALGO Laser at 2.1 μm

•W. Yao[1], Y. Wang[1], S. Ahmed[1], S. Tomilov[1], M. Hoffmann[1], M.v. Delden[2], T. Musch[2], and C.J. Saraceno[2]; [1]Photonics and Ultrafast Laser Science, Ruhr-Universität Bochum, Bochum, Germany; [2]Institute of Electronic Circuits, Ruhr-Universität Bochum, Bochum, Germany

We report a low-noise, 2-W, 112-fs, Kerr-lens mode-locked Ho:CALGO

NOTES

Room 1 ICM

CM-11.2 FRI 16:30

Multi-Photon Polymerization with Upconversion Nanoparticles for Adaptive Feature-Size 3D Printing

•*Q. Zhang*[1]*, A. Boniface*[1]*, V.K. Parashar*[2]*, and C. Moser*[1]; [1]*Laboratory of Applied Photonics Devices, School of Engineering, Ecole Polytechnique Fédérale de Lausanne, Switzerland*; [2]*Laboratory of Microsystems LMIS2, School of Engineering, Ecole Polytechnique Fédérale de Lausanne, Switzerland*

We investigate the polymerization dynamics of the multi-photon polymerization based on UCNPs and shows how it can be used for adaptive feature-size printing, which is promising for fast high-resolution additive manufacturing.

Room 2 ICM

Precision Engineering, Jena, Germany

We report on the efficient generation of mid-infrared radiation driven by a Tm-doped fiber laser system, reaching 3.6% of conversion efficiency with an output spectrum spanning more than one octave.

CJ-10.3 FRI 16:30

Highly efficient, in-band pumped, thulium-doped fibers in high-power amplifier and mJ Q-switched regime

•*M. Lenski*[1]*, T. Heuermann*[1,2,3]*, M. Gebhardt*[1,2,3,4]*, Z. Wang*[1]*, C. Aleshire*[1]*, C. Gaida*[5]*, C. Jáuregui*[1]*, and J. Limpert*[1,2,3,6]; [1]*Institut of Applied Physics, Abbe Center of Photonics, Schiller-Universität, Jena, Germany*; [2]*Helmholtz-Institute Jena, Germany*; [3]*GSI, Darmstadt, Germany*; [4]*School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom*; [5]*Active Fiber Systems GmbH, Jena, Germany*; [6]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We report on a thulium-doped fiber amplifier and Q-switched laser pumped at 1692 nm. Compared with the traditional 793 nm pumping, the in-band pumping allows for significantly higher efficiency in combination with excellent pulse energy capability.

Room 3 ICM

backaction force in an ensemble of rare-earth ions embedded in a crystal. This ”piezo-orbital backaction” induces a novel kind of ion-ion interaction mediated by strain.

EA-9.3 FRI 16:30

Mechanical squeezing of a nanoparticle levitated in a hybrid RF-optical trap

E. Bonvin, L. Devaud, L. Novotny, and •M. Frimmer; Photonics Laboratory, ETH Zurich, Zurich, Switzerland

We introduce a hybrid RF-optical trap. We show thermal squeezing of the mechanical state of a silica nanoparticle by dropping it from the stiff optical to the less-stiff RF trap in vacuum.

Room 4a ICM

nanobeam cavities (PCNCs) provide convenient and monolithic integration of high-Quality-factor (Q) optical cavities on photonic integrated circuits (PICs). We show how to achieve a nanobeam cavity with Q ~ 20,000,000 through apodization.

CK-15.3 FRI 16:30

Monolithic cavity for optomechanics featuring a bound state in the continuum

•*C. Péralle*[1]*, S. Kini Manjeshwar*[2]*, A. Ciers*[2]*, W. Wieczorek*[2]*, and P. Tassin*[1]; [1]*Department of Physics, Chalmers University of Technology, Gothenburg, Sweden*; [2]*Department of Microtechnologies and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden*

We design and study a monolithic photonic-crystal-based microcavity for optomechanics. Our new design exhibits a bound state in the continuum with a dissipative-loss-limited quality factor of over 10^5 and is amenable to fabrication with nanolithography.

Room 4b ICM

EI-4.2 FRI 16:30

Ultrafast optical nonlinearities of exciton-polaritons in atomically thin MoS2 embedded in planar microcavities

•*A. Genco*[1]*, C. Louca*[2]*, C. Trovatello*[3]*, C. Cruciano*[1]*, S. Randerson*[2]*, P. Claronino*[2]*, R. Jayaprakash*[2]*, K. Watanabe*[4]*, T. Taniguchi*[4]*, D.G. Lidzey*[2]*, A.I. Tartakovskii*[2]*, G. Cerullo*[1,5]*, and S. Dal Conte*[1]; [1]*Dipartimento di Fisica, Politecnico di Milano, Milano, Italy*; [2]*Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom*; [3]*Department of Mechanical Engineering, Columbia University, New York, USA*; [4]*Advanced Materials Laboratory, National Institute for Materials Science, Tsukuba, Japan*; [5]*IFN CNR, Milano, Italy*

Pump-probe microscopy experiments provide demonstration of giant nonlinear responses of exciton-polaritons in atomically thin MoS2 microcavities, on ultrashort times and at low excitation powers, unveiling the great potential of such systems for nonlinear optical applications.

Room 5 ICM

Substrate-integrated hollow waveguides and an opto-electronic THz source enable a highly flexible THz sensing platform, that offers real-time control of the probing THz frequencies, state-of-the-art volume-to-optical path ratios and require small sample gas volumes <2mL.

CC-7.3 FRI 16:30

Terahertz assisted Atom Probe Tomography: Effect of THz properties on ion's behavior

•*M. Karam, L. Rousseau, G. Damarla, J. Houard, and A. Vella; Université de Rouen, Rouen, France*

Terahertz monocycle pulses are amplified by their interaction with needled-shaped sample in order to generate an intense field allowing the emission of surface atoms. We demonstrate the effect of the monocycle shape on their trajectories.

Room 11 ICM

modulator-based optical frequency comb generation. An OFDM signal with a line rate of over 80 Gb/s was successfully transmitted.

CI-8.3 FRI 16:30

Field demonstration of multi-wavelength optical transmission with microresonator frequency combs

•*K. tanikawa*[1]*, S. fujii*[2]*, S. kogure*[1]*, S. tanaka*[1]*, S. tasaka*[1]*, K. wada*[1]*, H. kumazaki*[1]*, S. kawanishi*[1]*, and T. tanabe*[1]; [1]*department of electronics and electrical engineering, faculty of science and technology, Keio university, yokohama, Japan*; [2]*department of physics, faculty of science and technology, Keio university, yokohama, Japan*

we performed field demonstration of multi-wavelength optical transmission with microresonator-based optical frequency combs. We used a 9-km round-trip single-mode optical fiber installed in a metropolitan area and realized low-latency and high-capacity transmission.

Room 12a ICM

CE-11.2 FRI 16:30

High-transparency and heavy-durability 3D micro-optics made via ultrafast laser lithography combined with atomic layer deposition and calcination

K. Galvanauskas[1]*, R. Žvirblis*[1]*, G. Balčas*[1]*, D. Gailevičius*[1]*, D. Astrauskytė*[2]*, L. Grinevičiūtė*[2]*, and •M. Malinauskas*[1]; [1]*VU LRC, Vilnius, Lithuania*; [2]*CPST, Vilnius, Lithuania*

We report on high-transparency and heavy-durability glass-ceramic free-from micro-optics made employing ultrafast laser 3D nano-lithography of hybrid organic-inorganic SZ2080^{TM} combined with atomic layer deposition and high-temperature calcination.

Room 13a ICM

JSIII-6.2 FRI 16:30

Excitability in a PhC nanolaser with an integrated saturable absorber

M. Delmulle[1,2], •B. Garbin[1], L.M. Massaro[1], A. Bazin[1], I. Sagnes[1], K. Pantzas[1], S. Combrié[2], A. De Rossi[2], and F. Raineri[1,3]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, 91120 Palaiseau, France; [2]Thales Research and Technology, Campus Polytechnique, 1 avenue Augustin Fresnel, 91767 Palaiseau, France; [3]Université Côte d'Azur, Institut de Physique de Nice, CNRS–UMR 7010, Sophia Antipolis, France

We experimentally demonstrate the first all-integrated excitable nanolaser. We achieve on-demand generation of optical pulses in a waveguide with a few femtojoule perturbation levels.

Room 13b ICM

CD-14.2 FRI 16:30

Increasing photon-pairs source brightness based on inhibited-coupling hollow-core fiber

•Y. Asselah[1], A. Reigue[1], A. Chambinaud[1], M. Cordier[3], F. Amrani[1,2], B. Debord[1,2], F. Gérôme[1,2], and F. Benabid[1,2]; [1]GPPMM group, Xlim Research Institute, CNRS UMR 7252, Université de Limoges, Limoges, France; [2]GLOphotonics, Limoges, France; [3]Department of Physics, Humboldt-Universität zu Berlin, Berlin, Germany

We report on the feasibility of Raman-free and GHz-level brightness single photon and photon-pair source based on Xenon-filled hollow-core photonic-crystal fiber with manufacturable fiber parameters.

Room 14a ICM

France

We show that a neural network can predict temporal instability peaks from spectral data in ideal CW modulation instability, and we establish limits on the predictive power of the network with distance.

EF-10.3 FRI 16:30

Identifying extreme localization and rogue waves in fibre optics using data-driven dominant balance

•A.V. Ermolaev[1], M. Mabed[1], C. Finot[2], G. Genty[3], and J.M. Dudley[1]; [1]Université de Franche-Comté, Institut FEMTO-ST, Besançon, France; [2]Université de Bourgogne, Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon, France; [3]Photonics Laboratory, Tampere University, Tampere, Finland

We use data-driven dominant balance to identify different regions of dispersive and nonlinear interactions in a nonlinear Schrödinger equation fibre system. We particularly apply the method to gain new insights into fibre modulation instability dynamics.

Room 14b ICM

CH-16.2 FRI 16:30

Mid-infrared Supercontinuum-based Spectroscopy for Open-path Measurements

•R. Krebbers, K. van Kempen, F.J.M. Harren, A. Khodabakhsh, and S.M. Cristescu; Life Science Trace Detection Laboratory, Institute for Molecules and Materials, Radboud University, Nijmegen, Netherlands

The broadband, spatially coherent beam of supercontinuum sources was used for monitoring greenhouse gases and pollutants over open paths. The detection of emissions in an outdoor environment was achieved, including the effects of air turbulences.

Room 14c ICM

nover, Germany; [4]Fiber Optics and Photonics Division, CSIR-Central Glass and Ceramic Research Institute, Kolkata, India

We demonstrate, experimentally, that Kerr nonlinearity-induced refractive index fronts can be employed efficiently to control the optical manipulation of single broadband photons in a nonlinear photonic crystal fiber

EE-5.3 FRI 16:30

Spectro-temporal Characterization of Tunable Supercontinuum using X-FROG Measurements

•B. Chaves[1], V.T. Hoang[1], V. Couderc[1], B. Little[2], S. Chu[3], D. Moss[4], R. Morandotti[5], and B. Wetzel [1]; [1]XLIM Research Institute, CNRS UMR 7252, University of Limoges, France; [2]QXP Technologies , Xi'an, China; [3]City University of Hong Kong, China; [4]Swinburne University of Technology, Hawthorn, Australia; [5]Institut National de la Recherche Scientifique - Centre Énergie Matériaux Télécommunications, Varennes, Canada

We experimentally demonstrate the spectro-temporal characterization and optimization of broadband signals via asynchronous X-FROG measurements. We show that wave-packets with tailored properties can be obtained by suitable on-chip pulse preparation and controlled nonlinear fiber propagation.

Room Osterseen ICM

generation of on-demand optical pulses of 10 ps.

CL-8.3 FRI 16:30

1190 nm FDML laser: Challenges and Strategies

•M.A. Bashir[1], S. Lotz[1], M. Klufts[1], C. Jirauschek[3], and R. Huber[1,2]; [1]Institut Für Biomedizinische Optik, Lübeck, Germany; [2]Medizinisches Laserzentrum Lübeck GmbH, Lübeck, Germany; [3]Technische Universität München, München, Germany

We demonstrate challenges and strategies for Fourier domain mode locked laser (FDML) centered at 1190 nm with 2x410 kHz sweep repetition rate, a sweeping range of 100 nm and 2.5 mW output power.

Room 21 ICM

laser, representing the highest average power among mode-locked Tm/Ho solid-state lasers in 100-fs scale.

CF-12.3 FRI 16:30

Dual-crystal high power MIR OPCPA source tunable from 2.5 μm to 8 μm

N. Thiré[1], R. Maksimenka[1], A.M. Stingel[2], P. Bering Petersen[2], N. Forget[1], and •Y. Pertot[1]; [1]Fastlite, 165 rue des Cistes, 06600, Antibes, France; [2]Ruhr-Universität Bochum, Physikalische Chemie II, Universitätsstr. 150 -NC 7/72, 44801 Bochum, Germany

We present a dual-crystal MIR OPCPA tunable source at 100 kHz repetition rate. The dual-crystal scheme allows for ~50fs pulses in the 2.5-3.7 μm range, while ~100fs pulses are obtained from 3.5-8 μm.

NOTES

Room 1 ICM

CM-11.3 FRI 16:45

Two-Photon Polymerization of an In-Vivo Multiphoton Imaging Window

•R. Martínez Vázquez[1], A. Nardini[2], M. Marini[3], C. Conci[2], B.S. Kariman[4], M. Bouzin[3], M. Collini[3], G. Chirico[3], M.T. Raimondi[2], R. Osellame[1], and G. Cerullo[4]; [1]National Research Council (CNR), Institute for Photonics and Nanotechnologies, Milan, Italy; [2]Chemistry Department, Materials and Chemical Engineering "Giulio Natta", Politecnico di Milano, Milan, Italy; [3]Physics Departament, Università degli Studi di Milano-Bicocca, Milan, Italy; [4]Physics Department, Politecnico di Milano, Milan, Italy

We present an innovative intravital imaging window, fabricated by 2PP, composed of microlenses and microscaffolds. The fabrication process is optimized and the optical fluorescence imaging properties of the microlenses have been validated in stained cells.

CM-11.4 FRI 17:00

Fabrication and analysis of 3D asymmetric pillar-shaped metamaterial for low terahertz (THz) application

•S. Papamakarios[1,2], O. Tsilipakos[4], A. Kouloukidis[1], S.T. Tzortzakis[1,3], M. Kafesaki[1,3], and M. Farsari[1]; [1]IESL/FORTH, Heraklion, Greece; [2]Department of Physics, University of Crete, Heraklion, Greece; [3]Department of Materials

Room 2 ICM

CJ-10.4 FRI 16:45

Nanosecond-pulsed hybrid thulium-Raman fiber amplifier at 2.1 μm

•A.W. Edvardsen[1,2] and L.G. Holmen[1]; [1]Norwegian Defence Research Establishment (FFI), Kjeller, Norway; [2]Department of Technology Systems, University of Oslo, Kjeller, Norway

We present a hybrid thulium-Raman fiber amplifier at 2.1 μm that delivers 20 ns pulses at 100 kHz with 8.42 W average power, achieving a conversion efficiency of 85% w.r.t. 1.95 μm pump light.

CJ-10.5 FRI 17:00

Single-end-pumped Tm^{3+}:Ho^{3+}-codoped all-fiber laser at 2120 nm

•P. Forster[1,2], D. Panitzek[1], C. Romano[1], D. Lorenz[1,2], J. Schneider[1,2], M. Eichhorn[1,2], and C. Kieleck[1]; [1]Fraunhofer IOSB (Institute of Optronics, System Technologies and Image Exploitation), Ettlingen, Germany; [2]Institute of Control Systems (IRS), Karlsruhe, Germany

We present a Tm^{3+}:Ho^{3+}-codoped all-fiber laser emitting at 2120 nm relying on an FBG-based single oscillator cavity. The fiber laser delivers

Room 3 ICM

EA-9.4 FRI 16:45

Tabletop squeezed light optomechanics with SiN patterned membranes

•P.-E. Jacquet[1], M. Croquette [1], G. Dangoisse [1], S. Chua [2], and P.-F. Cohadon [1]; [1]Laboratoire Kastler Brossel (ENS, Sorbonne Université, CNRS, Collège de France), Paris, France; [2]Centre for Gravitational Physics, The Australian National University, Canberra , Australia

Our project aims at beating the Standard Quantum Limit on a wide frequency range by measuring the mechanical displacement of an ultra-high Q silicon nitride mechanical resonator using a NIR frequency dependent squeezed light source.

EA-9.5 FRI 17:00

Strong Optomechanical Coupling with Bulk Acoustic Waves at Room Temperature

•S. Tarrago Velez, S. Nielsen, U. Hoff, and U. Andersen; Center for Macroscopic Quantum States, Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark

We use an optomechanical system consisting of a bulk crystal in a Fabry-Perot optical cavity. We show how to drive the system in a doubly-resonant way, and use it to demonstrate lasing and strong coupling.

Room 4a ICM

CK-15.4 FRI 16:45

Localization of light and quasi-bound-state in the continuum in photonic moiré microcavities at magic configurations

•C. Saadi[1], H.S. Nguyen[1], S. Cueff[1], L. Ferrier[2], S. Mazauric[3], S. Callard[1], and X. Letartre[1]; [1]Univ Lyon, Ecole Centrale de Lyon, CNRS, INSA Lyon, Univ Claude Bernard Lyon 1, CPE Lyon, CNRS, INL, UMR5270, 69130 Ecully, France; [2]Univ Lyon, INSA Lyon, CNRS, Ecole Centrale de Lyon, Univ Claude Bernard Lyon 1, CPE Lyon, INL, UMR5270, 69621 Villeurbanne, France; [3]Univ Lyon, CPE Lyon, CNRS, INSA Lyon, Ecole Centrale de Lyon, Univ Claude Bernard Lyon 1, INL, UMR5270, 69616 Villeurbanne, France

Our study investigates how light confinement in periodic moiré patterns is preserved in finite-size structures with few supercells. Tight-binding model was used to study moiré microcavities. Potential fabrication methods of these structures are also discussed.

CK-15.5 FRI 17:00

Direct Laser-Written Optomechanical Membranes in Fiber Fabry-Perot Cavities

•L. Tenbrake[1], A. Faßbender[2], S. Hofferberth[1], S. Linden[2], and H. Pfeifer[1]; [1]Institute of Applied Physics, Bonn, Germany; [2]Institute of Physics, Bonn, Germany

We present a novel platform for cavity

Room 4b ICM

EI-4.3 FRI 16:45

Free Charge Carrier and Exciton Contributions to Ultrafast Bandgap Renormalization in Layered Semiconductors

•T. Deckert and D. Brida; University of Luxembourg, Luxembourg, Luxembourg

We observe the ultrafast bandgap renormalization dynamics in layered semiconductors caused by the distinct effect induced either by excitons or free carriers.

EI-4.4 FRI 17:00

Tracking the interlayer formation dynamics in a 2D heterostructure

V. Policht[1], H. Mittenzwey[2], O. Dogadov[1], M. Katzer[2], A. Villa[1], Q. Li[3], B. Kaiser[4], A. Ross[1], F. Scotognella[1], X. Zhu[3], A. Knorr[2], M. Selig[2], G. Cerullo[1], and •S. Dal Conte[1]; [1]Department of Physics, Politecnico di Milano, Milan, Italy; [2]Institut fur Theoretische Physik, Nichtlineare Optik und Quantenelektronik, Technische Universitat Berlin, Berlin, Germany; [3]Department of Chemistry, Columbia University, New York, USA; [4]Zuse-Institut, Berlin, Germany

We use optical pump-probe spectroscopy to measure directly the transient optical response of interlayer excitons in a 2D heterostructure. We attribute the ps build-up time to hot interlayer exciton thermalization process.

Room 5 ICM

CC-7.4 FRI 16:45

Lithium Niobate Based Single-Cycle THz Source with 643 mW of Average Power

•T. Vogel and C.J. Saraceno; Ruhr-University Bochum, Bochum, Germany

We demonstrate power scaling of a THz source based on the tilted-pulse front method in lithium niobate to a record-high average power of 643 mW, obtained at 40 kHz repetition rate.

CC-7.5 FRI 17:00

Improving Terahertz Output with Layered Organic Crystal Structures

•D.J.H. Ludlow, A. Alejandro, P.K. Petersen, K.M. Holland, F. N'diaye, T. Manwaring, D.J. Michaelis, and J.A. Johnson; Brigham Young University, PROVO, USA

We have improved the terahertz (THz) output and damage threshold of yellow organic THz generation crystals by fusing them to sapphire and using liquid crystal as index matching fluid to reduce reflective losses.

Room 11 ICM

CI-8.4 FRI 16:45

High-Gain, Narrow-Band Optical Amplification for Photonic Microwave Applications Using Stably Injection-Locked Semiconductor Lasers

•G.-T. Lu[1], C.-H. Tseng[1], and S.-K. Hwang[1,2]; [1]Department of Photonics, National Cheng Kung University, Tainan, Taiwan; [2]Advanced Optoelectronic Technology Center, National Cheng Kung University, Tainan, Taiwan

A narrow-band high-gain optical amplification scheme based on semiconductor lasers operating at stable locking dynamics is proposed and experimentally demonstrated. Optical signals can be greatly amplified without deterioration with the proposed scheme.

CI-8.5 FRI 17:00

Luminescent Concentrators For Next Generation Microwave Photonics

•J. Sathian[1], L. Lopez[2], S. Long[1], B. Ford[1], H. Torun[1], and F. Balembois[2]; [1]Northumbria University, Newcastle upon Tyne, United Kingdom; [2]Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, Palaiseau, France

Luminescent concentrators attained increased attention in recent years due to their applications in solid-state laser

Room 12a ICM

CE-11.3 FRI 16:45

Shape Correction of Glass Using Femtosecond Lasers

G. Chen and •J. Qiao; Rochester Institute of Technology, Rochester, USA

We demonstrate shape correction using a femtosecond laser. A sinusoidal 5-cycle/mm pattern on a glass substrate was successfully reduced to the sub-nanometer level. This result opens a path for the reduction of detrimental mid-spatial-frequency errors.

CE-11.4 FRI 17:00

High-yield mass produced meta-optics for consumer electronics

•E.G. Carnemolla[1], M. Fissore[1], H. Mohamad[2], L. Dilhan[2], J.E. Callaghan[1,3], E. Cox[1], B. Johnson[1], and J. Downing[1]; [1]STMicroelectronics (R&D) Ltd, Edinburgh, United Kingdom; [2]STMicroelectronics, Grenoble, France; [3]Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom

We demonstrate the capability to mass-produce

Room 13a ICM

JSIII-6.3 FRI 16:45

GHz-Rate Photonic Spiking Neural Network with a Single VCSEL

•*D. Owen-Newns, J. Robertson, M. Hejda, and A. Hurtado; Institute of Photonics, University of Strathclyde, Glasgow, United Kingdom*

A photonic spiking neural network is constructed using a single VCSEL, running at GHz rates (250ps per spiking node). The network is shown to be able to accurately classify a highly complex dataset.

JSIII-6.4 FRI 17:00

Online image recognition with ultrafast spiking microlaser neurons

•*A.H. Masominia, L. Calvet, and S. Barbay; Centre de Nanosciences et de Nanotechnologies, Université Paris-Saclay, CNRS, Palaiseau, France*

We present a novel approach for image recognition using ultrafast photonic spiking neurons, inspired by receptive fields and rank coding classification, eliminating the offline computing step. We illustrate it numerically on a simple task.

Room 13b ICM

CD-14.3 FRI 16:45

experimental demonstration of hyper-entangled pulse modes and frequency bins

•*F. Chiriano, J. Ho, C. Morrison, F. Graffitti, and A. Fedrizzi; Heriot-Watt University , Edinburgh, United Kingdom*

We demonstrate photonic hyper-entanglement of frequency bins and pulse modes via downconversion in a domain-engineered PPKTP crystal. The state is characterised via time-of-flight spectroscopy and two-photon interference.

CD-14.4 FRI 17:00

Tailoring photon pair emission characteristics via bi-chromatic excitation of an integrated nonlinear cavity

•*A.M. Angulo M.[1,2], J. Heine[1], J.S.S. Durán Gómez[1], H. Mahmudlu[1], R. Haldar[1,2], C. Klitis[3], M. Sorel[3,4], and M. Kues[1,2]; [1]Institute of Photonics, Leibniz University Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD, Leibniz University Hannover, Hannover, Germany; [3]School of Engineering, University of Glasgow, Glasgow, United*

Room 14a ICM

EF-10.4 FRI 16:45

Modulation Instability Control via Optical Seeding and Machine Learning Optimization

•*L. Sader[1], V.T. Hoang[1], Y. Boussafa[1], R. Haldar[2,3], V. Kermene[1], M. Kues[2,3], and B. Wetzel[1]; [1]XLIM Research Institute, CNRS UMR 7252, University of Limoges, Limoges, France; [2]Institute of Photonics, Leibniz University Hannover, Hannover, Germany; [3]Cluster of Excellence PhoenixD, Leibniz University Hannover, Hannover, Germany*

We experimentally study the control of noise-driven modulation instability during nonlinear fiber propagation. Using weak and coherent optical seeding, we show the optimization of incoherent nonlinear dynamics and spectral correlations through machine learning strategies.

EF-10.5 FRI 17:00

Chaotic dynamics and intense wave formation from multiple soliton collisions and the role of extra dimensions

F. Xin[1,2], •L. Falsi[1], D. Pierangeli[1,3], C. Conti[1,3], F. Fusella[1], G. Perepelitsa[4], Y. Garcia[4], A.J. Agranat[4], and E. DelRe[1,3]; [1]Dipartimento di Fisica, Universita di Roma "La Sapienza", Rome, Italy; [2]College of Physics and Materials Science, Tianjin Normal University, Tianjin, China; [3]ISC-CNR, Universita di Roma "La Sapienza", Rome, Italy;

Room 14b ICM

CH-16.3 FRI 16:45

Fluorinated Graphene Flakes as Overlayer on a Tilted Optical Fiber Bragg Grating for Ammonia Vapor Detection

E. Grantzioti[1,2], K. Bhorkar[3], N. Samartzis[3], S. Pissadakis [1], S. Yannopoulos[3], and •M. Konstantaki[1]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology – Hellas (FORTH), , Heraklion , Greece; [2]Physics Department, University of Crete, Heraklion, Greece; [3]Institute of Chemical Engineering Sciences (ICE-HT), Foundation for Research and Technology-Hellas (FORTH),, Patras , Greece

We report on the cladding and Bragg mode wavelength shift response of an optical fibre tilted Bragg grating with a fluorinated Graphene Flakes overlayer in the presence of Ammonia vapours.

CH-16.4 FRI 17:00

A Hot Extractive Differential Optical Absorption Spectroscopy System for SO2 and NOx Monitoring in Industrial Plants

•*A. Roy, P. Pingale, R. Fernandes, Y. Rajeshirke, and C. Mitra; Forbes Marshall Pvt. Ltd., Pune, India*

We report the design, development and validation of a highly sensitive UV differential optical absorption spectroscopy system for hot extractive measurement of sulphur dioxide (SO2) and oxides of nitrogen (NOx) at industrial stacks.

Room 14c ICM

EE-5.4 FRI 16:45

Spatio-Spectral Vector Fields

•*L. Kopf, R. Barros, and R. Fickler; Tampere University, Photonics Laboratory, Physics Unit, Tampere, Finland*

We present spatio-spectral vector fields, which are light fields with a varying polarization structure in space as well as frequency. The beam only exhibits its vectorial nature when all relevant degrees of freedom are resolved.

EE-5.5 FRI 17:00

Shaping resonant dynamics in condensed matter systems by tailored ultrafast pulses

•*O. Meron[1,2], S. Nehemya[1,2], U. Arieli[1,2], E. Bahar[1,2], M. Ben-Shalom[1], and H. Suchowski[1,2]; [1]Condensed Matter Physics Department, School of Physics and Astronomy, Faculty of Exact Sciences, Tel Aviv University, Tel Aviv, Israel; [2]Center for Light–Matter Interaction, Tel–Aviv University, Tel Aviv, Israel*

We experimentally demonstrate a novel control method for

Room Osterseen ICM

CL-8.4 FRI 16:45

13.4 MHz FDML Laser for Intra-Surgical Optical Coherence Tomography

•*S. Lotz[1], M. Göb[1], W. Draxinger[1], A. Dick[1], and R. Huber[1,2]; [1]Institut für Biomedizinische Optik, Universität zu Lübeck, Lübeck, Germany; [2]Medizinisches Laserzentrum Lübeck GmbH, Lübeck, Germany*

We present a 13.4 MHz Fourier domain locked laser (FDML) sweeping over 113 nm centered at 1300 nm to enable high-resolution video rate intra-surgical optical coherence tomography (OCT).

CL-8.5 FRI 17:00

Ultra-compact widely tunable dual-wavelength fiber-based sources for CARS and SRS imaging

E. Shestaev[1], F. Just[1], O. Herrfurth[1], C. Gaida[1], S. Breitkopf[1], T. Meyer-Zedler[2], J. Popp[2], •T. Eidam[1], and J. Limpert[1]; [1]Active Fiber Systems GmbH, Jena, Germany; [2]Leibniz-Institut für Photonische Technologien Jena e.V, Jena, Germany

We present a compact dual-wavelength source for CARS/SRS covering <630cm^-1 up to 2250cm^-1 with a tuning time of a few seconds

Room 21 ICM

CF-12.4 FRI 16:45

Generation of Tunable MIR/LWIR Femtosecond Pulses by Combination of SRS and DFG

•*J. Roman[1], R. Jutas[1], I. Astrauskas[1], A. Imani[1], P. Carpeggiani[1], P. Polynkin[2], E. Kaksis[1], T. Floery[1], A. Baltuška[1,3], and A. Pugžlys[1,3]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]College of Optical Sciences, The University of Arizona, Tucson, USA; [3]Center for Physical Sciences & Technology, Vilnius, Lithuania*

Microjoule-energy femtosecond pulses tunable between 6 and 10 μm are generated as a CEP-stable seed for a high-energy mid-IR OPCPA. We apply difference-frequency-mixing in LGS crystal between 200-fs 1030-nm laser pulses and their Raman-shifted replicas.

CF-12.5 FRI 17:00

Resolving the mode-locking riddle in quantum cascade lasers

•*G. Steinmeyer and W. Chen; Max-Born-Institut, Berlin, Germany*

Solving the Haus master equation, we deliver a simple explanation for the alleged mode-locking, soliton formation, and frequency comb formation of quantum cascade lasers.

NOTES

Room 1 ICM

Science and Technology, University of Crete, Heraklion, Greece; [4]National Hellenic Research Foundation (N.H.R.F.), Athens, Greece

A state of the art electromagnetic metamaterial design for low THz applications is reported. The metallic fabricated structure was measured and exhibited promising results for transmission filter in specific operating wavelengths.

CM-11.5 FRI 17:15

Efficient Implementation of Spatial Light Modulator (SLM) for Ultra-High Throughput 2-Photon Lithography

•*L. Jonušauskas[1,2], D. Andrijec[1], and K. Stonkus[1]; [1]Vital3D Technologies, Vilnius, Lithuania; [2]Vilnius University, Vilnius, Lithuania*

We present a methodology that allows us to tune 2-Photon Lithography resolution during printing using a spatial light modulator. This allows increasing printing throughput more than 100 times in comparison to the current state-of-the-art systems.

Room 2 ICM

160 W of output with a slope efficiency of 46.6 %.

CJ-10.6 FRI 17:15

Temperature-dependent emission cross-section spectra at 1.8 um of the thulium-doped fibers cooled down to cryogenic temperatures

•*B. Jiříčková[1,2], R. Švejkar[2], M. Grábner[1], C. Jauregui[3], J. Aubrecht[1], O. Schreiber[1,2], and P. Peterka[1]; [1]Institute of Photonics and Electronics, Prague, Czech Republic; [2] Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Prague, Czech Republic; [3] Institute of Applied Physics, Abbe Center of Photonics, Jena, Germany*

Thermal management of thulium-doped fibers is crucial for high-power laser systems as temperature affects spectroscopic properties. We present results of temperature-dependent emission cross-section spectra of thulium-doped silica fibers in the temperature range 77-475 K.

Room 3 ICM

EA-9.6 FRI 17:15

Anharmonic mechanical oscillator implemented with a single trapped ion

•*B. Deng, M. Göb, D. Wang, and K. Singer; Institute of Physics, University of Kassel, Kassel, Germany*

Here, we implement an anharmonic oscillator with a single ion trapped in a funnel-shaped potential, quantitatively characterize its nonlinearity, and discuss its potential application in force sensing.

Room 4a ICM

optomechanical experiments featuring 3D-direct-laser-written mechanical membranes directly integrated into fiber Fabry-Perot cavities. The flexible fabrication enables various applications like fiber-tip-integrated sensing, and multimode mechanical resonator systems.

CK-15.6 FRI 17:15

Experimental realization of extreme light confinement in an InP nanocavity

•*M. Xiong, R. E. Christiansen, F. Schroeder, Y. Yu, L. N. Casses, E. Semenova, K. Yvind, N. Stenger, O. Sigmund, and J. Moerk; NanoPhoton - Center for Nanophotonics, Technical University of Denmark, Kgs. Lyngby, Denmark*

We experimentally demonstrate that light can be concentrated far below the so-called diffraction limit in a III-V semiconductor nanocavity designed by topology optimization. The results open a path towards nanoscale active devices and nonlinear elements.

Room 4b ICM

EI-4.5 FRI 17:15

Ultrafast cooling of hot carriers in magic angle twisted bilayer graphene

•*J.D. Mehew[1], R. Luque Merino[2,3,4], H. Ishizuka[5], A. Block[1], J. Diez Merida[2,3,4], A. Diez Carlon[2,3,4], K. Watanabe[6], T. Taniguchi[7], L.S. Levitov[8], D.K. Efetov[3,4], and K.-J. Tielrooij[1,9]; [1]Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona, Spain; [2]ICFO - Institut de Ciencies Fotoniques, Barcelona, Spain; [3]Fakultat fur Physik, LMU, Munchen, Germany; [4]Munich Center for Quantum Science and Technology (MCQST), Munchen, Germany; [5]Department of Physics, Tokyo Institute of Technology, Japan; [6]Research Center for Functional Materials, National Institute for Material Sciences, Tsukuba, Japan; [7]International Center for Materials Nanoarchitectonics, National Institute for Material Sciences, Tsukuba, Japan; [8]Department of Physics, Massachusetts Institute of Technology, Cambridge, USA; [9]Department of Applied Physics, TU Eindhoven, Netherlands*

We reveal a novel Umklapp scattering mechanism between electrons and phonons in magic angle twisted bilayer graphene that enables ultrafast hot carrier cooling from room temperature down to 5K.

Room 5 ICM

CC-7.6 FRI 17:15

Emission dynamic of ions by monocycle THz pulse

•*J. Houard, G. Darmala, M. Karam, O. Bhorade, and A. Vella; CNRS, Univ Rouen Normandie, INSA Rouen Normandie, Groupe de Physique des Matériaux UMR 6634 F-76000, Rouen, France*

Light ions emission dynamic by TeraHertz monocycle from nanometric needle apex is studied measuring time of flight at sub-ns resolution and pump probe experiments. Multiple timescale effects will be shown

Room 11 ICM

pumping. Here we report the results of a room-temperature microwave MASER pumped by a high-brightness LED-luminescent concentrator.

CI-8.6 FRI 17:15

Highly Reconfigurable Microwave Photonic Bandstop Filters using Ultra-Low Brillouin Gain

K. Girish[1], R. Parihar[2], P. Raj[2], and •A. Choudhary[2]; [1]National Institute of Technology, Tiruchirapalli, India; [2]Indian Institute of Technology Delhi, New Delhi, India

We demonstrate a low-power wideband bandstop microwave photonic filter with bandwidth up to 1 GHz achieved by advanced phase engineering of an analog photonic link and harnessing the phase response of stimulated Brillouin scattering.

Room 12a ICM

optical metasurfaces on a standard 300mm semiconductor process typically used for consumer electronics. Products show high optical performance: transmitted zeroth order lower than 0.2% and fabrication yields of 99%.

CE-11.5 FRI 17:15

Holographically fabricated 2D grating coupler for integrated large beam delivery

•*Q.S. Ahmed, J.W. Field, D.-W. Ko, P. Horak, C. Holmes, C.B.E. Gawith, P.G.R. Smith, P.C. Gow, and J.C. Gates; Optoelectronics Research Centre, University of Southampton, Southampton, SO17 1BJ, UK, Southampton, United Kingdom*

We demonstrate a 2D grating coupler (4.4 mm × 3.9 mm) in doped planar silica using a holographic UV laser inscription technique for out-of-plane free-space coupling of beams.

JSIII-6.5 FRI 17:15

Pulse collision computing with spiking micropillar lattices

L. Soun[1], K. Alfaro-Bittner[2], A. Masominia[1], R. Braive[1,3], K. Pantzas[1], G. Beaudoin[1], I. Sagnes[1], J.-R. Coudevylle[1], M.G. Clerc[4], and •S. Barbay[1]; [1]Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Université Paris-Cité & Institut Universitaire de France, Paris, France; [3]Universidad Rey Juan Carlos, Madrid, Spain; [4]Departamento de Fśica and Millennium Institute for Research in Optics, FCFM, Universidad de Chile, Santiago, Chile

We investigate numerically a lattice of coupled ultrafast photonic microlaser neurons and demonstrate how pulse collisions enable the realization of temporal logical gates, including the non linearly separable XOR gate. Preliminary experimental results are discussed.

Kingdom; [4]Institute of Technologies for Communication,Information and Perception (TeCIP),Sant'Anna School of Advanced Studies, Pisa, Italy

Enabling degenerately and non-degenerately excited SFWM processes by bi-chromatic excitation in a nonlinear cavity, we demonstrate enhanced photon pair generation and control of their spectral structure. This allows time-frequency states manipulation for quantum processing applications.

CD-14.5 FRI 17:15

Squeezed vacuum from a photonic crystal fibre parametric oscillator

•A.O.C. Davis[1], A.I. Flint[2], W.A.M. Smith[1], P.J. Mosley[1], R.H.S. Bannerman[2], K. Harrington[1], C. Parry[1], and P.G.R. Smith[2]; [1]Centre for Photonics and Photonic Materials, University of Bath, Claverton Down, United Kingdom; [2]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

We introduce a novel squeezed light source design, comprising a Bragg-reflector Fabry-Perot resonator in monolithic photonic crystal fibre supporting dual-pump degenerate four-wave mixing. Our work promises all-fibre squeezing for quantum communication and information applications.

[4]The Brojde Center for Innovative Engineering and Computer Science, The Hebrew University, Jerusalem, Israel

Our study of multiple soliton collisions shows that if the dimensionality hosting the collision is larger than that of the nonreciprocal interaction, conditions can be found in which multiple solitons fuse without chaotic behavior.

CH-16.5 FRI 17:15

Development of a Breathalyzer for Ethanol Detection using a Quantum Cascade Laser Array and a Dense Pattern Multipass Cell

•C. Jacquemin[1,2], R. Vallon[1], B. Parvitte[1], G. Maisons[2], M. Carras[2], and V. Zeninari[1]; [1]Groupe de Spectrométrie Moléculaire et Atmosphérique, Reims, France; [2]mirSense, Palaiseau, France

A QCL DFB laser array emitting around 10 μm, driven by dedicated electronics, is coupled to an innovative dense pattern multipass cell to detect gas-phase ethanol.

ultrafast coherent quasi-particle dynamics in 2D semiconductors and plasmonic nanoparticles. We selectively steer resonant nonlinear generation, rearranging the interfering quantum pathways from destructive to constructive interferences.

EE-5.6 FRI 17:15

Mid-Infrared Excitation of Rotational Wave Packets at High-Lying Vibrational States

•H. Tsusaka, I. Morichika, and S. Ashihara; Institute of Industrial Science, The University of Tokyo, Tokyo, Japan

we report on successful demonstration of multi-quantum vibrational excitation in the anti-symmetric stretch (ν_3) of gas-phase CO_2 molecules up to the $\nu_3 = 8$ state and observation of the rotational wave packet in the $\nu_3 = 0$ to 8 states.

over the full range, repetition-rates up to 10MHz and <13cm^-1 bandwidth.

CL-8.6 FRI 17:15

Advanced light source for speckle-free multi-exposure imaging at multi-MHz frame rates

•J. Mur, Ž. Lokar, V. Agrež, J. Petelin, J.J. Kočica, and R. Petkovšek; University of Ljubljana, Faculty of Mechanical Engineering, Ljubljana, Slovenia

Shock wave evolution in water, travelling above the speed of sound (1500 m/s), was imaged using a multi-exposure technique. The advanced light source enables speckle-free camera-synchronized imaging at up to 10 MHz frame rates.

CF-12.6 FRI 17:15

Few-cycle 50 μJ Pulses at 11.2 μm from a Single-stage OPCPA at 1 kHz

M. Bock, P. Fuertjes, and •U. Griebner; Max Born Institute, Berlin, Germany

A single-stage optical parametric chirped pulse amplifier based on GaSe generating idler pulses around 11 μm with 180 fs duration and 50 μJ energy at a 1-kHz repetition rate is presented.

13:00 – 14:00

CC-P: CC Poster session

CC-P.1 FRI

400 kHz repetition rate THz-TDS with 24 mW of average power driven by a compact industrial Yb-laser

•C. Millon[1], S. Houver[2], and C.J. Saraceno[2]; [1]Ruhr University Bochum, Bochum, Germany; [2]Paris Cite University, Paris, France

We demonstrate a 24 mW average power THz-TDS at 400 kHz repetition rate, driven directly by a commercial fs-laser. We show no thermal effects on the generated THz while varying the repetition rate.

CC-P.2 FRI

Ultrafast carrier dynamics in n-doped Ge driven by strong-field THz pulses

•A. Gupta[1,2], K. Chordiya[1,2], V. Gupta[1], J. Bohus[1], M. Kahaly[1], A. Sharma[1], and J. Fulop[1]; [1]ELI-ALPS, Szeged, Hungary; [2]Institute of Physics, University of Szeged, Szeged, Hungary

A detailed experimental study is presented on strong-field THz driven ultrafast carrier dynamics in n-doped Ge at two different temperatures, by using THz pump—THz probe spectroscopy up to near 0.5 MV/cm field strength.

CC-P.3 FRI

THz Characterization and Generation of Temperature-Controlled Organic Crystal BNA

•S. Mansourzadeh[1], T. Vogel[1], M. Shalaby[2], and C.J. Saraceno[1]; [1]Ruhr-University Bochum, Bochum, Germany; [2]Swiss Terahertz Research-Zurich, Zurich, Switzerland

We present THz generation experiments and temperature-dependent (80K – 300K) refractive index and absorption for BNA for the first time. We show increased THz field strength corresponding to a reduced THz absorption at low temperatures.

CC-P.4 FRI

THz Spectroscopy of Graphene Layers using Guided-Mode Resonance Notch Filter

H.S. Bark[1], M.-W. Park[2], and •T.-I. Jeon[2]; [1]Gwangju Institute of Science and Technology, Gwangju, South Korea; [2]Korea Maritime and Ocean University, Busan, South Korea

We measured sheet conductivity of mono-, bi, and triple-layer graphene using an all-dielectric single-layer guided-mode resonance filter (GMRF) operating in the high-frequency terahertz (THz) region.

CC-P.5 FRI

Demonstration of The Imaging-Free Wedged Nonlinear Echelon Slab Terahertz Pulse Source

•G. Krizsán[1,2,3], G. Polónyi[2,3], T. Kroh[4,5], G. Tóth[1,2], Z. Tibai[1], N.H. Matlis[4], G. Almási[1,2], F.X. Kärtner[4,5], and J. Hebling[1,2,3]; [1]Institute of Physics, University of Pécs, Pécs, Hungary; [2]Szentágothai Research Centre, University of Pécs, Pécs, Hungary; [3]ELKH-PTE High-Field Terahertz Research Group, Pécs, Hungary; [4]Center for Free-Electron Laser Science, DESY, Hamburg, Germany; [5]The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Hamburg, Germany

A novel compact, imaging-free, tilted-pulse-front pumped terahertz (THz) source based on a LiNbO3 slab with a small wedge angle (<8°) and with an echelon microstructure on its input surface has been demonstrated.

CC-P.6 FRI

Jitter Correction for Asynchronous Optical Sampling Terahertz Time-Domain Spectroscopy based on Free-Running Pulsed Lasers

•M. Nakagawa, N. Kanda, T. Otsu, I. Ito, Y. Kobayashi, and R. Matsunaga; The Institute for Solid State Physics, The University of Tokyo, Kashiwa, Japan

We developed a new method of asynchronous optical sampling terahertz time-domain spectroscopy based on a pair of free-running laser oscillators without any feedback control, which is realized by recording and processing jitter information.

CC-P.7 FRI

Terahertz radiation from a large-area photoconductive emitter via high average power Yb-oscillator

•M. Khalili[1], T. Vogel[1], S. Mansourzadeh[1], S. Winnerl[2], and C.J. Saraceno[1]; [1]Photonics and Ultrafast Laser Science, Ruhr Universität Bochum,, Bochum, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Ion Beam Physics and Materials Research, Dresden, Germany

We present first steps of power scaling large area photoconductive emitter for THz generation, excited with 1 W of average optical power by a frequency-doubled, home-built, ultrafast oscillator with 90 MHz repetition rate.

CC-P.8 FRI

High-Power Narrowband THz Generation

•N.K. Green, C. Rader, M.F. Nielson, and J.A. Johnson; Brigham Young University, Provo, USA

Using a Ti:Sapphire laser and BNA bonded to sapphire in tandem with a chirp-and-delay technique, we test the limits of intense narrowband THz generation (0.1 to 5 THz).

CC-P.9 FRI

Possibility of CO_2 Laser Pumped Terahertz Sources

•G. Illés[1], G. Nazymbekov[1], G. Almási[1,2], G. Tóth[1,2], and J. Hebling[1,2,3]; [1]Institute of Physics, University of Pécs, Pécs, Hungary; [2]Szentágothai Research Center, University of Pécs, Pécs, Hungary; [3]ELKH-PTE High-Field THz Research Group, Pécs, Hungary

The possibility of CO_2 laser pumped semiconductor-based THz-source was widely investigated numerically. Due to the long wavelength, high pump intensity can be used while avoiding multiphoton absorption and 1% THz conversion efficiency can be reached.

CC-P.10 FRI

Broadband characterization of 6G microelectronics packaging materials: EN-A1 alkali-free boroaluminasilicate glass substrates

M. Zhai[1,2], •H. Shi[1,2], M. Swaminathan[1], A. Locquet[1,2], and D.S. Citrin[1,2]; [1]Georgia Institute of Technology, Atlanta, USA; [2]Georgia Tech Lorraine, Metz, France

EN-A1 alkali-free boroaluminasilicate glass was characterized by terahertz time-domain spectroscopy. Moderately high dielectric constant, low loss tangent, and excellent CTE indicate that EN-A1 glass is an attractive alternative for 6G heterogeneous microelectronics packaging applications.

CC-P.11 FRI

Terahertz-to-Optical Carrier Conversion Using Optical-Comb-Injection-Locked Dual-Wavelength Laser Light and Electro-Optic Polymer Modulator

Y. Matsumura[1], E. Hase[1], Y. Tokizane[1], N. Kuse[1], J.-i. Fujikata[1], H. Kishikawa[1], M. Haraguchi[1], Y. Okamura[1], T. Kaji[2], A. Otomo[2], A. Kanno[2,3], S. Hisatake[4], and •T. Yasui[1]; [1]Tokushima University, Tokushima, Japan; [2]National Institute of Information and Communications Technology, Koganei, Japan; [3]Nagoya Institute of Technology, Nagoya, Japan; [4]Gifu University, Gifu, Japan

THz-to-optical carrier conversion was demonstrated by a combination of optical-comb-injection-locked dual-wavelength laser light and electro-optic polymer modulator, enabling all-photonic detection of THz wave.

CC-P.12 FRI

Raman-supressed 200-300 kW Multicycle Parametric Source at 5.7 THz

•M.-H. Wu, C.-H. Kuo, Y.-J. Lin, and Y.-C. Huang; Institute of Photonics Technologies/National Tsing Hua University, Hsinchu, Taiwan

We report the generation of 200-kW peak power coherent radiation at 5.7 THz from a KTP difference-frequency generator. The THz radiation consists of ~500 cycles in 83-ps pulse width.

CC-P.13 FRI

Investigation of Terahertz Pulse Generation in Semiconductors Pumped at Long Infrared Wavelengths

•G. Polónyi[1,2], G. Tóth[1,2,3], N. Mbithi[2,3,4], Z. Tibai[1,3], I. Benabdelghani[2,3], L. Nasi[2,3], G. Krizsán[1,2,3], G. Illés[3], and J. Hebling[1,2,3]; [1]ELKH-PTE High Intensity Terahertz Research Group, Pécs, Hungary; [2]Szentágothai Research Centre, Pécs, Hungary; [3]University of Pécs, Pécs, Hungary; [4]Garissa University, Garissa, Kenya

Numerical simulations performed to determine the practical limit on pumping wavelength that is not prosperous to exceed when GaP and GaAs semiconductors are pumped to generate THz pulses without the presence of strong multi-photon absorption.

CC-P.14 FRI

Photo-Carrier Dynamics of MAPbI3 Perovskite Depending on Grain Size Through Time-Resolved Terahertz Spectroscopy

•B. Son[1], D. Kim[4], S.H. Park[4], N.-E. Yu[2,3], and D.-K. Ko[1,3]; [1]Department of Physics and Photon Science, GIST, Gwangju, South Korea; [2]Advanced Photonics Research Institute, GIST, Gwangju, South Korea; [3]Research Center for Photon Science Technology, GIST, Gwangju, South Korea; [4]Department of Physics, Pukyong National University, Busan, South Korea

Carrier Density and optical conductivity of different-sized MAPbI3 perovskites are observed by time-resolved terahertz spectroscopy utilizing 400nm optical pump. The carrier density has 0.3~3x10^18cm-3, which is related to grain size.

CC-P.15 FRI

Acceleration of Electrons from Krypton Gas Plasma Using THz Pulses

•S. Turnár[1,2], B.R. Sarkadi[1], S.W. Jolly[4], J. Hebling[1,2,3], and Z. Tibai[1]; [1]Institute of Physics, University of Pécs, Pécs, Hungary; [2]ELKH-PTE High Field Terahertz Research Group, Pécs, Hungary; [3]Szentágothai Research Centre, University of Pécs, Pécs, Hungary; [4]Service OPERA-Photonique, Université Libre de Bruxelles (ULB), Brussels, Belgium

We have numerically investigated the effect of the ionization on the acceleration results and thereby we could optimize our newly presented table top electron accelerator model using General Particle Tracer and EPOCH (particle-in-cell) code.

CC-P.16 FRI

Nonlinear Transmission of FUS Protein Solution and Water at 0.5 THz

•Q.M. Thai[1], I. Ilyakov[2], M. Raj[1], D. Dornbusch[2], A. Arshad[2], T. de Oliveira[2], M. Jahnel[1,3], J.-C. Deinert[2], A.

Ponomaryov[2], S. Kovalev[2], and E.M. Adams[1,2]; [1]Cluster of Excellence Physics of Life (PoL), TU Dresden, Dresden, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Dresden, Germany; [3]Center for Molecular and Cellular Bioengineering, Biotechnology Center, TU Dresden, Dresden, Germany

Here, the nonlinear transmission of a FUS protein solution and water at 0.5 THz - indicating a perturbed hydrogen bonding network are investigated, along with the THz laser induced heat effect on the experimental results.

13:00 – 14:00

CI-P: CI Poster session

CI-P.1 FRI

Input Ordinal Invariant Neural Network based Eigenvalue Demodulator for On-Off Encoded 4096-ary Multi-Eigenvalue Signal

•D. Hisano, T. Kozuno, K. Mishina, and A. Maruta; Osaka University, Suita, Japan

This paper experimentally demonstrates employing input ordinal invariant neural network on eigenvalue demodulation with 4096-ary (=12 bit/symbol) eigenvalues. We obtained the error-free operation at BER = 3.8×10^{-3} in 50-km fiber transmission.

CI-P.2 FRI

Resonator Design For High-Brightness Luminescent Concentrator Pumped MASERs

•S. long, B. Ford, M. Elsdon, H. Torun, and J. Sathian; Northumbria University, Newcastle, United Kingdom

Designing efficient resonator cavities is crucial for advanced microwave photonics applications. Here we report improved microwave resonator design for a miniaturised and efficient room-temperature MASER pumped by a luminescent concentrator at record luminance and power.

CI-P.3 FRI

Experimental Investigations of Orientation-based Solar Noise in Underwater Optical Wireless Communication System

S.K. Mahapatra, M. Howlader, S.K. Roy, •M. Pradhan, and S.K. Varshney; Indian Institute of Technology, Kharagpur, India

The impact of orientation-based solar noise on the UOWC system has been investigated experimentally. The experimental results show a good agreement with the theoretical predictions.

CI-P.4 FRI

Design, production, and characterization of a Large-Mode Area tubular Inhibited-Coupling Guiding Hollow-Core Fiber with low dispersion

•T. Kühlthau[1], B. Chen[1,2], G. Kleem[1], T. Graf[1], and M. Abdou Ahmed[1]; [1]Institut für Strahlwerkzeuge (IFSW), University of Stuttgart, Pfaffenwaldring 43, 70569 Stuttgart, Germany; [2]Graduate School of Excellence advanced Manufacturing Engineering (GSaME), University of Stuttgart, Nobelstraße 12, 70569 Stuttgart, Germany

A large-core tubular inhibited-coupling-guiding hollow-core photonic-crystal fiber with low dispersion was designed, produced, and characterized. The produced fiber shows losses below 30 dB/km and a dispersion below 1.5 ps/(nm·km) between 900 nm and 1150 nm.

CI-P.5 FRI

Design and Fabrication tolerances Analysis of the Polarization-Maintaining Inhibited-Coupling Guiding Hollow-Core Fibers

•B. Chen[1,2], T. Kühlthau[1], C. Röhrer[1], T. Graf[1], and M. Abdou Ahmed[1]; [1]Institut für Strahlwerkzeuge (IFSW), University of Stuttgart, Pfaffenwaldring 43, 70569 Stuttgart, Germany; [2]Graduate School of Excellence advanced Manufacturing Engineering (GSaME), University of Stuttgart, Nobelstraße 12, 70569 Stuttgart, Germany

Numerical simulations were conducted to analyze the influence of design parameters of tubular inhibited-coupling guiding hollow-core photonic crystal fibers on the bending-induced phase shift. After proposing two polarization-maintaining fiber designs, the fabrication tolerances were investigated.

CI-P.6 FRI

Non-line-of-sight optical communication using 1D Speckle Information

P.S. Badavath, V. Raskatla, •H.J. Pandit, and V. Kumar ; National Institute of Technology Warangal, Warangal, India

One-to-three non-line-of-sight optical communication channels employing Orbital angular momentum-Shift keying (OAM-SK) based on 1D speckle information are established with an average classification accuracy of 79% among all three channels.

CI-P.7 FRI

Gradient Boosting for Nonlinear Equalization in Optical Transmission Systems

•E. Sedov; Aston Institute of Photonic Technologies, Birmingham, United Kingdom

This study demonstrates the use of Gradient Boosting as a tool for nonlinear equalization in optical transmission systems. We show an improvement in Q-factor by 0.65 dB and decrease in BER from 0.051 to 0.039.

CI-P.8 FRI

Restricted Boltzmann Machine Classifier for Nonlinear Compensation in DP-16QAM Single and WDM Coherent Optical Communication Systems

A. Singh, •N. Gautam, B. Lall, and A. Choudhary; Indian Institute of Technology Delhi, Delhi, India

A semi-supervised Restricted Boltzmann Machine and logistic regressor learning technique is proposed for nonlinearity compensation in coherent-optical communication systems. Results show Q-factor improvement of up-to 1dB over linear equalization in single channel and WDM systems.

CI-P.9 FRI

Optimization of Bending Loss for Higher Order Modes of Anti-Resonant Hollow Core Fibers

•. Suchita, A. Kaushalram, and A. Bhardwaj; Department of Instrumentation and Applied Physics, Indian Institute of Science Bangalore, Bengaluru, India

Bending loss is optimized by tuning the design parameter of anti-resonant hollow-core fiber. The optimized loss is < 10-1 dB/turn for fundamental mode and larger for higher order mode at bending radius ≥ 40 cm.

CI-P.10 FRI

An Arbitrary Biased EOM-based Pulse-Picker with Programmable Repetition Rate using FPGA

•J. Dutta[1], K. Singh[2], S. S J[1], and D. Venkitesh[1]; [1]Indian Institute of Technology Madras, Chennai, India; [2]National Institute of Technology Kurukshetra, Kurukshetra, India

We experimentally demonstrate an arbitrarily biased electro-optic Mach-Zehnder modulator-based pulse picker with variable repetition rate (from 50 MHz to 500kHz) by using a fast synchronized FPGA. We report a maximum pulse extinction ratio of 34 dB.

CI-P.11 FRI

Tunable High Precision Signal Processing Based on the Simultaneous Photonic Filtering and Digitizing System

•Y. Sun[1,2], Q. Tan[1], D. Wang[1], D. Liang[1], S. Wang[2,3], J. Gong[1], and G. Wu[2]; [1]China Academy of Space Technology, Xi'an, China; [2]The state Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Institute for Advanced Communication and Data Science, Dept of Electronic Engineering, Shanghai Jiao Tong University, Shanghai, China; [3]Shanghai Huawei Technologies Company, Ltd., Shanghai, China

Precisely processing broadband signals are demanding in the tunable photonic aperiodic filtering and digitizing system. The rules to achieve hundreds of MHz filtering in the system design are presented and verified.

CI-P.12 FRI

Radio-frequency Multiplication without Phase Noise Degradation in an Electro-optic Frequency-shifting Loop

•L. Alliot de Borggraef, V. Carlet, M. Brunel, and H. Guillet de Chatellus; Univ Rennes, CNRS, Institut FOTON - UMR 6082, 35000 Rennes, France

We report a photonic architecture enabling the multiplication of input radio frequencies in the GHz range. In contrast to conventional analog frequency multipliers, the system does not degrade the phase noise of the signal.

CI-P.13 FRI

Multiple Scattering Layers As Physical Unclonable Functions For Optical Wireless Communication

•A. Rates[1], J. Vrehen[2], B.L. Mulder[1], W.L. IJzerman[2,3], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Signify, Eindhoven, Netherlands; [3]Department of Mathematics and Computer Science, Eindhoven University of Technology, Eindhoven, Netherlands

We study the correlation of light speckle between multiple scattering layers. Based on this, we propose an optical wireless communication scheme using scattering media as physical unclonable functions.

CI-P.14 FRI

Coherent combination of low-power optical signals: A case study

J. Paczos[1], •K. Banaszek[1,2], and M. Jarzyna[2]; [1]Faculty of Physics, University of Warsaw, Warsaw, Poland; [2]Centre for Quantum Optical Technologies, CeNT, University of Warsaw, Warsaw, Poland

We analyze theoretically the quantum limit on combining coherently two light beams whose relative phase undergoes Gaussian diffusion. A threshold for the light intensity below which beam combination no longer operates efficiently is given.

13:00 – 14:00

CJ-P: CJ Poster session

CJ-P.1 FRI

Compressive strain gradient for Stimulated Brillouin scattering mitigation in optical fibers

•*A. Liméry, F. Gustave, L. Lombard, A. Durécu, and J. Le Gouët*; *ONERA, Palaiseau, France*

We report on our understanding of the compressive strain gradient effect on the SBS Stokes spectrum, the SBS threshold power and PER modification for single mode Er:Yb doped fiber and PMF passive fiber.

CJ-P.2 FRI

All-solid VLMA Yb-Doped Single-Mode PM Fiber with 10dB/m Absorption for High Power Compact Laser Applications

•*A. Haboucha, L. Provino, T. Guezennec, A. Monteville, D. Landais, and O. Legoffic*; *PHOTONICS BRETAGNE, LANNION, France*

We report the design and manufacturing of a truly single-mode VLMA fiber basis on a simple bend oriented all-solid step index principle, presenting an absorption about 10 dB/m and an optical efficiency up to 70%.

CJ-P.3 FRI

Investigation of wavelength tuning in Er^{3+}: ZBLAN fibre amplifier at 2.79 μm with nanosecond pulses

•*P. Ray[1], A. Yadav[1], S. Cozic[2], F. Joulain[2], U. Hinze[3,4], S. Poulain[2], E. Rafailov[1], and N. Chichkov[1,3,4]*; *[1]Aston Institute of Photonic Technologies, Aston University, Birmingam, United Kingdom*; *[2]Le Verre Fluor'e, Campus KerLann, Bruz, France*; *[3]Institute of Quantum Optics, Leibniz Universit¨at Hannover, Hannover, Germany*; *[4]Laser nanoFab GmbH, Hannover, Germany*

We investigate wavelength tunability in Er^{3+}: ZBLAN fibre amplifier operating in the mid-IR wavelengths centred at 2.79 μm, using nanosecond seed pulses generated from a PPLN-OPO, demonstrating 26 dB gain and over 100 nm tunability.

CJ-P.4 FRI

Characterization of power characteristics of 4-mm ultra-short length laser cavity with a highly doped Yb-Mg co-doped silica fiber

•*Y. Matsui, Y. Koyama, and Y. Fujimoto*; *Chiba Institute of Technology, Narashino, Japan*

The 4-mm ultra-short length laser is fabricated using a high-concentration Yb-Mg co-doped fiber that can suppress the photodarkening effect. The output power of 145 μW is expected at pumping input of about 5 mW.

CJ-P.5 FRI

Influence of Quantum Efficiency and Core Propagation Loss on the Performance of Cladding-pumped Thulium-doped Fibre Lasers

•*M. Buckthorpe and W. Clarkson*; *Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*

A method for determining quantum efficiency and propagation loss in Thulium-doped fibres is presented. Results obtained using different doping profiles indicate that propagation loss presents a major issue for power scaling to the kilowatt regime.

CJ-P.6 FRI

Frequency Comb-based Seed Source for Spectral Beam Combining with Enhanced Brillouin Suppressing Properties

•*S. Arora, S. Pal, L. C.G., and V.R. Supradeepa*; *Indian Institute of Science, Bangalore, India*

We demonstrate frequency comb-based seed source for spectral beam combining with enhanced Brillouin suppressing properties. We experimentally demonstrate 58% Brillouin threshold enhancement by line-shaping the spectrum. We achieve 200GHz apart carriers required for beam combining.

CJ-P.7 FRI

Influence of XPM in All-PM Fiber Oscillators mode-locked using NPE in Linear Self-stabilized Fiber Interferometers

•*Y. Hua[1], M. Edelmann[1,2], F.X. Kärtner [1,2], and I. Hartl[1]*; *[1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; *[2]Department of Physics, Universität Hamburg, Hamburg, Germany*

In this work, we numerically demonstrate that asymmetric phase accumulation via XPM can distort mode-locked steady-states in all-PM fiber laser mode-locked by NPE in linear self-stabilized fiber interferometers.

CJ-P.8 FRI

Experimental Noise Characterization of a Mid-infrared Mode-locked Er:ZBLAN Fiber Laser

•*Y. Shi[1], C.R. Smith[1], C.R. Petersen[1,2], and O. Bang[1,2]*; *[1]DTU Electro, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark*; *[2]NORBLIS ApS, Virumgade 35 D, DK-2830 Virum, Denmark*

We present for the first time characterization of the relative intensity noise in a mid-infrared mode-locked Er:ZBLAN fiber laser. The results provide significant value for noise-sensitive applications, such as supercontinuum generation.

CJ-P.9 FRI

Spectral broadening of low repetition rate pulses in a fibre gain-managed nonlinear amplifier.

•*D. Stoliarov, E. Manuylovich, A. Koviarov, D. Galiakhmetova, and E. Rafailov*; *Aston Institute of Photonic Technologies, College of Engineering and Physical Sciences, Aston University, Birmingham, United Kingdom*

The impact of the modelocked low (1MHz) pulse repetition rate on spectral evolution in gain-managed nonlinear amplifiers based on a large mode area fibre was numerically and experimentally studied.

CJ-P.10 FRI

Robust and low-phase noise all-PM figure-8 mode-locked fiber laser for spaceborne optical frequency comb

•*Y. Takeuchi[1], T. Kurihara[1], T. Yamada[1], S. Endo[1], S. Matsushita[2], A. Suemasa[2], T. Sasaki[2], H. Takiguchi[2], I. Kawano[2], S. Kogure[2], and M. Musha[1]*; *[1]The University of Electro-Communications, Chofu-shi, Japan*; *[2]Japan Aerospace Exploration Agency, Tsukuba, Japan*

We have developed a figure-8 mode-locked laser for a spaceborne photonic microwave generator, and its fceo linewidth is less than 100kHz. The self-starting success rate of our laser is over 90% in space environment tests.

CJ-P.11 FRI

Erbium-doped Lithium Niobate Waveguide Amplifier

•*M. Cai[1], K. Wu[1], D. Zhu[2], J. Long[1], and J. Chen[1]*; *[1]State Key Laboratory of Advanced Optical Communication Systems and Networks, Department of Electronic Engineering, Shanghai Jiao Tong University, Shanghai, China*; *[2]Institute of Materials Research and Engineering, Agency for Science, Technology and Research (A*STAR), Singapore, Singapore*

We demonstrate the Er-doped LNOI waveguide amplifier with 28.73 dB signal enhancement and 19.41 dB net gain at 1531.5 nm, and the signal amplification at the whole C band has been achieved.

CJ-P.12 FRI

Toward Super-continuum Generation in Erbium-doped ZBLAN Fiber with Etched Fiber Bragg Grating in the Mid-Infrared

I. Hendry[1,2,3], B. Dutta Gupta[1,2,3], S. Tang[1,2,3], M. Erkintalo[1,3], and •C. Aguergaray[1,2,3]; *[1]The University of Auckland, Auckland, New Zealand*; *[2]The Photon Factory, Auckland, New Zealand*; *[3]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand*

We report on our work attempting to generate supercontinua in the mid-infrared. We start by detailing our mode-locked source laser constructions and performance. We then state the performance of our amplification and nonlinear amplification steps, used to generate supercontinua.

CJ-P.13 FRI

Fiber laser source for picosecond pulse generation based on Mamyshev filtering

•*V. Agrež, M. Marš, J. Petelin, and R. Petkovšek*; *University of Ljubljana, Faculty of Mechanical Engineering, Ljubljana, Slovenia*

A Laser diode, two-stage Mamyshev filtering, double-pass amplification in first stage and a tunable filter are used to achieve pulses with less than 4 ps duration with no addition pulse compression at the output.

CJ-P.14 FRI

Cascade lasing optimization in Dy-doped ZBLAN fiber lasers for efficient yellow emission

•*M. Federico and F. Poli*; *Department of Engineering and Architecture, University of Parma., Parma, Italy*

A self-developed, matrix-based simulation model using rate equations was applied to examine the influence of mid-infrared cascade lasing around 3 μm on yellow emission of ZBLAN Dy-doped fiber lasers, providing useful guidelines for performance improvement.

CJ-P.15 FRI

Fiber optical parametric oscillator delivering signal pulse tunable in wavelength and pulse duration

•*M. Ghawas[1], O. Zurita-Miranda[1], V. Freysz[2], and E. Freysz[1]*; *[1]Univ. Bordeaux,CNRS, LOMA UMR 5798, Talence 33400, France*; *[2]Alphanov, Institut d'Optique d'Aquitaine, Talence 33400, France*

We designed and built an optical parametric oscillator based on PCF fiber. Pumped by an ytterbium picosecond fiber oscillator, it delivers signal pulses tunable in wavelength and pulse duration. Its performances and capabilities are analyzed.

CJ-P.16 FRI

Replica Symmetry Breaking enabled by Rayleigh scattering in a Random Fiber Laser

•*B. Costa Lima[1], P. Tovar[2], A. Lima Moura[3], and J.P. von der Weid[1]*; *[1]Center for Telecommunications Studies, Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro-RJ, Brasil*; *[2]Department of Physics, University of Ottawa, Ottawa, Canada*; *[3]Programa de Pós-graduação em Física, Instituto de Física, Universidade Federal de Alagoas, Maceió-AL, Brasil*

We report the observation of Replica Symmetry Breaking in a Random Fiber Laser with oscillation sustained by the weak backscattering of light. The conditions were obtained by reducing environmental perturbation on the scattering medium.

CJ-P.17 FRI

Asymmetric gain-guided pulses

S. Turitsyn[1], •A. Bednyakova[2], and E. Podivilov[3]; [1]Aston Institute of Photonic Technologies, Birmingham, United Kingdom; [2]Novosibirsk State University, Novosibirsk, Russia; [3]Institute of Automation and Electrometry, Novosibirsk, Russia

A generic model governing optical pulse propagation in a nonlinear dispersive medium with asymmetric gain is introduced. Our results provide insight into the nature of asymmetric pulses capable to accumulate large nonlinear phase without wave-breaking.

CJ-P.18 FRI

1.2 W average power deep-UV light at 229 nm generated by a frequency-quadrupled Nd-doped fiber laser

K. Le Corre[1,2], R. Florentin[1], A. Barnini[2], T. Robin[2], B. Cadier[2], H. Gilles[1], S. Girard[1], and •M. Laroche[1]; [1]CIMAP, Caen, France; [2]Exail, Lannion, France

We present a frequency quadrupled Nd-doped fiber laser system generating >1W at 229nm. The laser configuration is based on a gain-switched laser diode and Nd-doped PM fiber amplifiers optimized for the laser transition at 900nm.

CJ-P.19 FRI

70W, 1MHz, sub-50fs Yb-doped fiber laser system for high harmonic generation

•S. Malekmohamadi[1,2], M. Pergament[1], Y. Liu[1,2], M. Seidel[3], M. Edelmann[1,2], M. Kellert[1], C.M. Heyl[3,4], and F.X. Kaertner[1,2]; [1]Center for Free-Electron Laser Science CFEL, Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22607 , Hamburg, Germany; [2]Department of Physics, Universität Hamburg, Jungiusstr. 9, 20355 , Hamburg, Germany; [3]Deutsches Elektronen-Synchrotron DESY, Notkestr. 85, 22607 , Hamburg, Germany; [4]Helmholtz Institute Jena, Fröbelstieg 3, 07743 , Jena, Germany

We present the development of a Yb-doped fiber laser system that generates 44 fs laser pulses with a pulse energy of up to 70 μJ at a repetition rate of 1 MHz for high-harmonic generation.

CJ-P.20 FRI

Raman lasing in multimode diode-pumped graded-index fiber with fs-inscribed random structures

A.G. Kuznetsov, A.A. Wolf, •Z. Munkueva, A.V. Dostovalov, and S.A. Babin; Institute of Automation and Electrometry SB RAS, Novosibirsk, Russia

We obtain Raman lasing in multimode diode-pumped GRIN fiber with artificial random structures of Rayleigh type or random array of short FBGs, for which 976-nm Stokes power reaches 28W, beam quality M2~2.1, spectrum is stable.

CJ-P.21 FRI

Spectrally and repetition rate tunable femtosecond fiber laser for two-photon biomedical imaging applications

•D. Stachowiak, J. Bogusławski, and G. Soboń; Laser & Fiber Electronics Group, Wrocław University of Science and Technology, Wrocław, Poland

We present a femtosecond frequency-doubled erbium-doped fiber laser which is spectrally and repetition rate tunable. These features, as well as its compactness, make our source an attractive alternative to commercial and commonly used titanium-sapphire lasers.

CJ-P.22 FRI

Thulium Fibre Lasers for Quantum Applications

•A. Pertoldi[1,2], P. Varming[2], and P. Bowen Montague[2]; [1]Niels Bohr Institute, University of Copenhagen, Blegdamsvej 17, 2100 Copenhagen, Denmark, Copenhagen, Denmark; [2]NKT Photonics, Birkeroed, Denmark

Thulium is a gateway element for fiber lasers to deliver new wavelengths in atomic cooling experiments. Low-noise modular lasers and frequency conversion systems will allow the development of a new generation of compact atomic clocks.

CJ-P.23 FRI

Highly efficient frequency doubling of ultrashort-pulse fiber laser at 1700 nm in PPLN bulk and waveguide crystals

•A. Koviarov, D. Stoliarov, D. Galiakhmetova, and E. Rafailov; Aston Institute of Photonic Technologies, Aston University , Birmingham, United Kingdom

The laser system based on frequency-doubling of 1625-1700 nm radiation was demonstrated. Both waveguide and bulk PPLN crystals were used for SHG. Up to 54 mW/10 MHz was obtained with pulse duration of ~100 fs.

CJ-P.24 FRI

All-Fiber Bandpass Spectral Filter Based on Negative Curvature Hollow-Core Optical Fiber (NC-HCF)

•A. Borodkin, A. Jasim, O. Podrazký, and P. Honzátko; Institute of Photonics and Electronics, The Czech Academy of Sciences, Prague, Czech Republic

Bandpass spectral filter based on a hollow-core fiber compatible with standard single-mode fibers is presented. Insertion loss less than 1 dB and the minimum transmission band of 33 nm at 1 μm are achieved.

CJ-P.25 FRI

Advances in YAG derived optical fibre

•C.M. Harvey and M. Fokine; KTH Royal Institute of Technology, Stockholm, Sweden

We explore the performance of a CO laser-based draw tower for YAG-core silica-clad optical fibre. The minimal hot zone demonstrated a significant reduction in silicon diffusion into the YAG core during fabrication.

13:00 – 14:00

CL-P: CL Poster session

CL-P.1 FRI

Towards the development of a SWIR-LEDs based optoelectronic system for urea monitoring during haemodialytic therapy

•E. Bodo, V. Bello, and S. Merlo; Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Pavia, Italy

We provide the proof of concept of urea concentration detection by means of amplitude measurement, specifically exploiting the urea absorption band around λ = 2.15 μm, that can provide valuable information about dialysis efficiency.

CL-P.2 FRI

Classification of clinically significant prostate cancer using Raman spectroscopy and Support Vector Machine classification

•S.J. van Breugel[1,2,3], I. Low[4], M.L. Christie[4], M.R. Pokorny[4], H.U. Holtkamp[1,3], M.K. Nieuwoudt[1,2,3], M.C. Simpson[1,2,3,5], K. Zargar-Shoshtari[4,6], and C. Aguergaray[2,3,5]; [1]School of Chemical Sciences, University of Auckland, Auckland, New Zealand; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [3]The Photon Factory, University of Auckland, Auckland, New Zealand; [4]Counties Manukau District Health Board, Auckland, New Zealand; [5]Department of Physics, University of Auckland, Auckland, New Zealand; [6]Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand

Raman spectroscopy and support vector machine classification are combined to detect clinically significant prostate cancer on a data set of 152 patients. The reported cohort and classification performance are the highest reported to date.

CL-P.3 FRI

Ex Vivo Breast Cancer Tissue Classification Using Hyperspectral Endoscopy Imaging with Deep Learning

S. Zhang[1], •S. Zeng[2], R.R.Z. Tan[1], W. Liao[1], and M. Olivo[1]; [1]Institute of Materials Research and Engineering (IMRE), Singapore, Singapore; [2]Université de Technologie, Troyes , France

We present a hyperspectral imaging endoscope with an ultrathin imaging fiber for the classification of ductal carcinoma, non-ductal carcinoma, and healthy breast tissues. Deep learning was applied, and an accuracy of 97.89% was achieved.

CL-P.4 FRI

Label-Free Cancer Classification Using Hyperspectral Imaging Microscopy and Machine Learning

S. Zhang[1], •S. Zeng[2], W. Liao[1], R.R.Z. Tan[1], and M. Olivo[1]; [1]Institute of Materials Research and Engineering(IMRE), Singapore, Singapore; [2]Université de Technologie, Troyes , France

Hyperspectral imaging combined with darkfield and phase contrast microscopy was used to image label-free unstained breast tissue slides. Machine learning was applied for cancer classification and an accuracy above 96% was achieved.

CL-P.5 FRI

Holography of biomimetic structures based on butterfly wings for image sensing

•H. Skenderovic, N. Demoli, A. Mardan Dezfouli, D. Abramovic, and M. Rakic; Institute of Physics, ZAGREB, Croatia

An outlook for a compact imaging device with biomimetic focal plane array based on holographic reading and fast numeric reconstruction, operating in a broad spectral range is described.

CL-P.6 FRI

Tissue Structure Information Retrieval from Backscattering Polarization Sensitive Measurements

L. Roth, •A. Stefanov, and M. Frenz; Institute of Applied Physics, University of Bern, Bern, Switzerland

We present a method based on Cloude decomposition to quantify the degree of anisotropy of brain tissue and the orientation of the nerve fibers by polarimetric measurement of the backscattered light.

CL-P.7 FRI

Short Time HRV Assessment Based on a Fiber Optic Sensor

•W. Lyu, Y. Li, S. Chen, Q. Wang, and C. Yu; Photonics Research Institute, Department of Electronic and Information Engineering, The Hong Kong Polytechnic University, Hong Kong, China

A fiber optic sensor-based vital signs mornitoring system can assess short time heart rate variability (HRV). The HRV of subject with cardiovascular disease is significantly different from that of healthy people.

CL-P.8 FRI

A realistic determination of the thermal effects generated in human skin during laser-skin thermal treatment

•J. Toumi; Higher Institute of Laser Research and Applications, Damascus University, Damascus, Syria

We take in-vivo measurements of optical parameters of human skin and couple them to simulation to predict heat distribution in skin during laser-skin treatment. The results are verified with thermal measurements to optimize the treatment.

CL-P.9 FRI

GaSe-based fiber optic sensor for human health monitoring

•C. Odaci[1,2], M.S. Khan[2], M. Grüneberg[2], T. Beduk[2], M. Montagnese[2], A. Roshanghias[2], and U. Aydemir[1]; [1]Bursa Uludag University, Bursa, Turkey; [2]Silicon Austria Labs GmbH, Villach, Austria

We report on a SPR-based fiber optic sensor coated with GaSe material for lactate detection for human health monitoring. The sensor is characterized for change in the refractive index with respect to lactate concentration.

CL-P.10 FRI

Lanthanide Doped Nanoparticles for Reliable and Precise Luminescent Nanothermometry in the Third Biological Window

A.C.C. Soares[1], T.O. Sales[1], E.C. Ximendes[2], D. Jaque[2], and •C. Jacinto[1]; [1]Group of Nano-Photonics and Imaging, Instituto de Física, Universidade Federal de Alagoas, 57072-900, Maceió-AL, Brazil; [2]Nanomaterials for Bioimaging Group (nanoBIG), Departamento de Física de Materiales, Facultad de Ciencias, Universidad Autónoma de Madrid, Madrid 28049, Spain; Nanomaterials for Bioimaging Group (nanoBIG), Instituto Ramón y Cajal de Investigación Sanitaria, Hospital Ramón y Cajal, Madrid, Spain

It was demonstrated how shifting the operation range of luminescent nanothermometers to the third biological window opens the venue to reliable thermal sensing within tissues. This possibility has been experimentally demonstrated by using Yb3+/Er3+/Tm3+:CaF2 nanoparticles.

CL-P.11 FRI

Optical trapping of micro-particles and bacterial cells in a flow-focusing microfluidic device

•A. Esan[1,2], C. Steed[1,2], C. McGoverin[1,2], S. Swift[3], and F. Vanholsbeeck[1,2]; [1]Department of Physics, University of Auckland, Auckland, New Zealand; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin, New Zealand; [3]Department of Molecular Medicine and Pathology, University of Auckland, Auckland, New Zealand

We present the optimal trapping power and hydrodynamic flow conditions for achieving single-cell optical trapping of bacterial cells in a microfluidic device that integrates optical tweezers and incorporates both vertical and horizontal flow-focusing.

CL-P.12 FRI

Brightness-enhanced Light Sources for Medical Imaging

•B. Ford, S. Long, and J. Sathian; Northumbria University, Newcastle, United Kingdom

Luminescent concentrators generate intense light, suitable for medical illumination applications. However, extraction of this light is challenging. We report a simple fibre coupling system allowing significant light extraction alongside long lifetime for ageing technology replacement.

CL-P.13 FRI

Measurement of Immunoglobulin G Based on Infrared-Enhanced Absorption Spectroscopic Biosensing with Graphene

Y.-H. Chen, •Y.-A. Wei, and C.-S. Yang; National Taiwan Normal University, Taipei , Taiwan.

Design structural patterns, replace metal and dielectric materials with graphene to generate surface plasmons, and achieve modulation effects. A molecular fingerprint of mock analyte immunoglobulin G.

CL-P.14 FRI

Image Reconstruction Improvement of Variable Coded Aperture using Deep Learning Method for Gamma and Lensless Imaging Applications

•A. Schwarz[1], A. Shemer[1], E. Danan[2], N.E. Cohen[3], and Y. Danan[1]; [1]Department of Electrical and Electronics Engineering, Azrieli College of Engineering, Jerusalem, Israel; [2]Faculty of Engineering, Bar-Ilan University, Ramat Gan, Israel; [3]School of Software Engineering and Computer Science, Azrieli College of Engineering, Jerusalem, Israel

A combination of deep convolutional encoder-decoder neural network with time multiplexed coded aperture is used for gamma imaging in nuclear medicine and lensless imaging. The method improves sensitivity and SNR while challenging inverse filter limitations.

CL-P.15 FRI

Eight-wavelength Digital Inline Holography and Brightfield Imaging in a single microscope

•S. Dixneuf[1], T. Olivier[2], Z. Sedaghat[1], L. Thibon[1], R. Montvernay[3], E. Degout-Charmette[3], N. Faure[3], C. Kolytcheff[3], C. Fournier[2], C. Védrine[1], Q. Josso[3], and F. Mallard[3]; [1]BIOASTER, Bioassays, Microsystems and Optical Engineering Unit, Lyon, France; [2]Laboratoire Hubert Curien UMR 5516, F-42023, Saint-Etienne, France; [3]bioMérieux SA, Clinical Unit, Marcy l'Etoile, France

We propose a double modality microscope based on (incoherent) Brightfield imaging and 8-wavelength Digital Inline Holographic Microscopy (DIHM) to compare standardization and informativeness in the context of the discrimination of stained microbiological objects.

CL-P.16 FRI

Development of an Optical Projection Tomography (OPT) Setup Operating in the Short-Wave Infrared (SWIR) Region

•S.M. Steinecker, C. Pilger, M. Müller, J.C. Schürstedt, G. Wiebusch, M. Schüttpelz, and T. Huser; Biomolecular Photonics, Bielefeld University, Bielefeld, Germany

An optical projection tomography system that uses short-wave infrared (SWIR) light to image biomedical samples in 3D is reported. Contrast for sample structures is provided by specific absorption or fluorescence in the SWIR spectral range.

CL-P.17 FRI

Impact of pulse modulation for Moses Ho: YAG laser lithotripsy in urinary tract model

•K. Kim[1], Y.-S. Seo[2], and J.B. Eom[1]; [1]Department of Biomedical Science, Dankook University School of Medicine, Cheonan , South Korea; [2]R&D center, Wontech Co. Ltd., Daejeon, South Korea

We compared the efficiency of lithotripsy and bubble characteristics according to pulse modulation for Moses Ho: YAG laser lithotripsy using a high-speed camera in the urinary tract model.

CL-P.18 FRI

Compact Multichannel Imaging System with Wide FOV and 4x Optical Magnification

•C. Katopodis[1], I. Zergioti[1], and D. Papazoglou[2,3]; [1]Department of Physics, National Technical University of Athens, Athens, Greece; [2]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas, Heraklion, Greece; [3]Department of Material Science and Technology, University of Crete, Heraklion, Greece

A novel multichannel imaging system based on commercially available micro-lens arrays and a micro-scanning technique to achieve high resolution and wide field of view (7 x 7mm2) at 4x optical magnification.

CL-P.19 FRI

Exploring Spinal Cord Regeneration in Zebrafish by Using the Plasmid-Carried Fluorescent Carbon Nanodots

•F.-C. Chien, Y.-C. Huang, C.-C. Cheng, Y.-W. Li, W. Chung, and C.-L. Luo; Department of Optics and Photonics, National Central University, Taoyuan 32001, Taiwan

Small-sized plasmid-carried fluorescent carbon nanodot, manifesting low toxicity, good biocompatibility, superior photoluminescence signal, and high efficiency of cell uptake was fabricated to improve the neuron differentiation and spinal cord repair in zebrafish.

13:00 – 14:00

EC-P: EC Poster session

EC-P.1 FRI

Observation of interaction-induced topological doublon states

•J. Beck[1], H. Drüeke[1], M.J. Meschede[1], M. Heinrich[1], F.S. Piccioli[1,2], S. Weidemann[1], D. Bauer[1], and A. Szameit[1]; [1]Institute for physics, University Rostock, Rostock, Germany; [2]INO-CNR BEC Center and Dipartimento di Fisica, Universita' di Trento, Trento, Italy

We present the first observation of propagating topologically protected doublon states in an anomalous Floquet driven 1D array. Using dimensional mapping, the two repulsive interacting particles in 1D were observed in 2D laser-written waveguide lattices.

EC-P.2 FRI

Bimorphic Floquet Topological Insulators for Light

•J. Beck[1], G.G. Pyrialakos[2,3], M. Heinrich[1], L.J. Maczewsky[1], M. Khajavikhan[4], N.V. Kantartzis[3], A. Szameit[1], and D.N. Christodoulides[2]; [1]Institute for physics, Univ. Rostock, Germany; [2]College of Optics & Photonics-CREOL, Univ. of Central Florida, Orlando, USA; [3]Department of Electrical and Computer Engineering, Aristotle Univ. of Thessaloniki, Greece; [4]Ming Hsieh Department of Electrical and Computer Engineering, Univ. of Southern California, Los Angeles, USA

We introduce a novel class of Floquet topological insulators simultaneously hosting Chern-type and anomalous edge states. The driving mechanism is implemented in a chained honeycomb lattice, allowing us to observe its different chiral edge states.

EC-P.3 FRI

Fractal photonic topological insulators for light

•M. Heinrich[1], T. Biesenthal[1], L. Maczewsky[1], Z. Yang[2], M. Kremer[1], M. Segev[3], and A. Szameit[1]; [1]Institut für Physik, Universität Rostock, Rostock, Germany; [2]Department of Physics, Zhejiang University, Zhejiang, China; [3]Physics Department and Solid State Institute, Technion, Haifa, Israel

We present the first experimental observation of a fractal topological insulator for light and demonstrate how the self-similar properties of the Sierpinski gasket systematically enhance wave transport its topologically protected edge states.

EC-P.4 FRI

Physical limits on non-Hermitian topology in passive systems

•H. Schomerus; Lancaster University, Lancaster, United Kingdom

I contrast fundamental limits on physical properties in passive and active non-Hermitian systems. While active systems suffer from noise, passive systems are limited by causality - making many desirable effects difficult to observe.

EC-P.5 FRI

n-Root of the Su-Schrieffer-Heeger Model on a Photonic Ring Resonator Lattice

•D. Viedma[1], A.M. Marques[2], R.G. Dias[2], and V. Ahufinger[1]; [1]Universitat Autònoma de Barcelona, Bellaterra, Spain; [2]University of Aveiro, Aveiro, Portugal

We propose a method to implement any *n*-root of the Su-Schrieffer-Heeger model in a lattice of optical ring resonators, which displays an asymmetric coupling distribution that allows to build non-Hermitian systems.

EC-P.6 FRI

Strong-field valley polarization in inversion symmetric bulk 2H-MoS2

•I. Tyulnev[1], Á. Jiménez-Galán[2], J. Poborska[1], L. Vamos[1], O. Smirnova[2,3], M. Ivanov[2,4,5], and J. Biegert[1,6]; [1]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Barcelona, Spain; [2]Max-Born-Institut, Berlin, Germany; [3]Technische Universität Berlin, Berlin, Germany; [4]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [5]Department of Physics, Imperial College London, London, United Kingdom; [6]ICREA - Institución Catalana de Investigación y Estudios Avanzados, Barcelona, Spain

We demonstrate a novel mechanism of strong-field induced valley control in inversion symmetric MoS2, independent of limitations imposed by resonant valley selection rules.

EC-P.7 FRI

Optical dispersion in waveguides based upon the Pancharatnam-Berry phase

•S.V. Arumugam[1], C.P. Jisha[1], A. Alberucci[1], and S. Nolte[1,2]; [1]Friedrich Schiller University, Institute of Applied Physics, Albert-Einstein-Str. 15, 07745,, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Albert-Einstein-Str. 7, 07745, Jena, Germany

A Pancharatnam-Berry phase (PBP) based waveguide confines light in the absence of a refractive index gradient. We theoretically investigate the dispersion properties and the robustness of the PBP waveguide.

EC-P.8 FRI

Power Eigenchannels of non-Hermitian media

•K. Makris[1,2] and D. Psaltis[3]; [1]ITCP-Physics Department, University of Crete, Heraklion, Greece; [2]Institute of Electronic Structure and Laser (IESL)-FORTH, Heraklion, Greece; [3]Optics Laboratory, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland

We introduce the concept of non-Hermitian eigenchannels based on the singular value decomposition of the associated propagator. Thus we determine the optimal wavefronts that lead to maximal/minimal amplification in any non-Hermitian guided structure.

EC-P.9 FRI

State Tomography of Complex Electromagnetic Pulses

•L. Vignjevic[1], Y. Shen[1], S. Pidishety[1], N. Papasimakis[1], and N. Zheludev[1,2]; [1]Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore, Singapore

We present a new approach to characterising complex transient electromagnetic excitations and experimentally demonstrate it on light pulses of toroidal topology quantifying their space-polarization and space-frequency nonseparability and fidelity with respect to theoretical expectations.

EC-P.10 FRI

Tailoring Intensity Statistics of 3D Speckles

•S. Han[1], N. Bender[2], and H. Cao[1]; [1]Yale University, New Haven, USA; [2]Cornell University, Ithaca, USA

We develop a method for tailoring optical speckle intensity statistics in three dimensions. By wavefront shaping of a laser beam, we generate volumetric speckle fields with target intensity statistics and distinct topologies at multiple planes.

EC-P.11 FRI

Fabrication of symmetric SOI photonic crystal slabs and their topological bandgaps and edge modes

A. Begum[1,2], Y. Yao[1,2], T. Kuroda[1], Y. Takeda[1,2], N. Ikeda[1], Y. Sugimoto[1], T. Mano[1], H. Koyama[1], and •K. Sakoda[1]; [1]National Institute for Materials Science, Tsukuba, Japan; [2]University of Tsukuba, Tsukuba, Japan

We fabricated symmetric SOI photonic crystals with topological bandgaps and edge modes for the lowest-order symmetric TE-like modes by EB lithography and PECVD of a SiO2 capping layer, which we confirmed by angle-resolved reflection spectroscopy.

EC-P.12 FRI

Experimental observation of optical Hilbert's Hotel in vector beam

•A. Ghosh[1], S. Kumar[1,2], C. Kaushik[1,2], A. Shiri[3], G. Gbur[3], S. Sharma[4], and G.K. Samanta[1]; [1]Physical Research Laboratory, Ahmedabad, India; [2]Indian Institute of Technology Gandhinagar, Ahmedabad, India; [3]Department of Physics and Optical Science, University of North Carolina Charlotte, Charlotte, USA; [4]Dynotech Instruments Pvt Ltd, New Delhi, India

We report on the simple experimental implementation of Hilbert's hotel using a fractional vector beam generated by illuminating the spiral phase-plate of integer topological charge for a designed wavelength by supercontinuum laser of tunable wavelength.

EC-P.13 FRI

Airy – like beam with nonhomogeneous polarization structure and bimeronic lattice

•J. Berškys and S. Orlov; State research institute Center for Physical Sciences and Technology, Vilnius, Lithuania

Airy beam with a nonhomogeneous polarization structure is introduced and properties, including its Fourier spectrum and possible ways of generation, are examined. Also, the bimeronic lattice in the domain of the normal to the polarization ellipse is observed.

EC-P.14 FRI

Identifying Topology of Photonic Lattices with Machine and Deep Learning

•L. Smirnov[1], E. Smolina[1], D. Leykam[2], and D. Smirnova[3,4]; [1]Nizhny Novgorod State University, Nizhny Novgorod, Russia; [2]National University of Singapore, Singapore, Singapore; [3]Australian National University, Canberra, Australia; [4]RIKEN, Wako-shi, Japan

We show how the machine learning can be applied to classify topological phases in photonic lattices. We design a neural network determining topology from the output intensity distribution in dimerized waveguide arrays with leaky channels.

EC-P.15 FRI

Near-normal incidence photonic spin Hall effect for material characterization

•J.J. Panda, G. Rajalakshmi, and T.N. Narayanan; Tata Institute of Fundamental Research, Hyderabad, India

We demonstrate the ability to characterize optical properties of dielectric materials using the photonic spin Hall effect (PHE) in near-normal incidence configuration. This approach provides significant advantages over the conventional PHE measurement technique.

13:00 – 14:00

EI-P: EI poster session

EI-P.1 FRI

Miniaturized Spectrometer with Bias-Configurable Two-Dimensional Semiconductor/Metal Schottky Junction

•X. Cui, F. Nigmatulin, M. Du, A.C. Liapis, H.H. Yoon, and Z. Sun; QTF Centre of Excellence, Department of Electronics and Nanoengineering, Aalto University, Espoo, Finland

The computational reconstruction algorithm has opened a new pathway for spectrometer miniaturization via optoelectronics. Based on this algorithm, we demonstrate a miniaturized spectrometer with a bias-configurable Schottky junction.

Hall B0

EI-P.2 FRI

The initial time-delay response of reflectivity changes in photoexcited two-dimensional layered semiconductor 2H – MoTe$_2$

•*T. Fukuda[1], P. Fons[2], K. Makino[3], Y. Saito[3], K. Ueno[4], J. Afalla[1], and M. Hase[1]; [1] University of Tsukuba, Tsukuba, Japan; [2] Keio University, Yokohama, Japan; [3] National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan; [4] Saitama University, Saitama, Japan*

Ultrafast reflectivity changes $\Delta R/R$ of two-dimensional layered semiconductor $2H-MoTe_2$ have been investigated by pump-probe spectroscopy. Fluence-wavelength-dependence measurements revealed that the photoexcited electron-hole plasma dramatically modified the $\Delta R/R$ spectra in early time delay within 1 ps.

EI-P.3 FRI

Microscopic Z-Scan for Measuring Nonlinear Absorption of Mechanically Exfoliated Transition Metal Dichalcogenide Monolayers

•*T. Possmayer[1], L. Sortino[1], S.A. Maier[2,3,1], and L.d.S. Menezes[1,4]; [1] Nano-Institut München, Fakultät für Physik, Ludwig-Maximilans-Universität München, 80539 München, Germany; [2] School of Physics and Astronomy, Monash University, Clayton, Victoria 3800, Australia; [3] Department of Physics, Imperial College London, London SW7 2AZ, United Kingdom; [4] Departamento de Física, Universidade Federal de Pernambuco, 50670-901 Recife-PE, Brazil*

We demonstrate a microscopic Z-scan setup capable of characterizing mechanically exfoliated monolayers with sizes below 10 μm. This is used to measure the nonlinear absorption of common transition metal dichalcogenides around the exciton resonances.

EI-P.4 FRI

Identification of non-uniform strain in WS2 monolayers using P-SHG

•*G. Kourmoulakis[1,2], S. Psilodimitrakopoulos[1], G. Maragkakis[1,3], L. Mouchliadis[1], A. Michail[4,5], J. Christodoulides[6], M. Tripathy[7], J. Parthenios[5], K. Papagelis[5,8], E. Stratakis[1,3], and G. Kioseoglou[1,2]; [1] FORTH/IESL, Heraklion, Greece; [2] Dept. of Materials Science and Technology, Univ. of Crete , Heraklion, Greece; [3] Dept. of Physics, Univ. of Crete , Heraklion, Greece; [4] Dept. of Physics, Univ. of Patra, Patra, Greece; [5] FORTH/ICE-HT, Patra, Greece; [6] Naval Research Laboratory, Washington, USA; [7] Dept. of Physics and Astronomy, Univ. of Sussex, Brighton, United Kingdom; [8] School of Physics, Dept. of Solid-State Physics, Aristotle Univ. of Thessaloniki, Greece*

The locally deformed armchair orientation of a strained monolayer WS2 is imaged with optical means using Polarization Resolved Second Harmonic Generation. A characteristic cross-shaped pattern is proven to be the fingerprint of strain.

EI-P.5 FRI

S-SNOM Imaging of Stacking Order in Few-Layer Graphene

•*D. Beitner[1,2,3], S. Amitay[3], S. Sallah Atri[3], S. Richter [1,2], H. Suchowski [2,3], and M. Ben Shalom[2,3]; [1] Department of Materials Science and Engineering Faculty of Engineering Tel Aviv University, Tel Aviv, Israel; [2] University Centre for Nanoscience and Nanotechnology Tel Aviv University, Tel Aviv, Israel; [3] School of Physics and Astronomy, Faculty of Exact Sciences, Tel Aviv University,, Tel Aviv, Israel*

Tetralayer graphene has three unique stacking configurations. Using single wavelength Near Field Scanning Microscopy, we demonstrate the ability to detect all three possible stacking configurations. By an analytical model, we can quantitively extract dielectric parameters.

EI-P.6 FRI

Second-order nonlinearity of excitons in hBN-encapsulated monolayer transition metal dichalcogenides

•*S. Takahashi[1], S. Kusaba[1], K. Watanabe[2], T. Taniguchi[3], K. Yanagi[4], and K. Tanaka[1,5]; [1] Department of Physics, Kyoto University, Kyoto, Japan; [2] Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Japan; [3] International Center for Materials Nanoarchitectonics, National Institute for Materials Science, Tsukuba, Japan; [4] Department of Physics, Tokyo Metropolitan University, Tokyo, Japan; [5] Institute for Integrated Cell-Material Sciences, Kyoto, Japan*

P-series excitons besides s-series were observed by sum frequency generation spectroscopy in monolayer transition metal dichalcogenides. New insights into nonlinear optical responses were obtained from energy level structures and polarization dependences.

13:00 – 14:00

JSIII-P: JSIII Poster session

JSIII-P.1 FRI

A 3-layer injection-locked multimode semiconductor laser neural network

•*E. Robertson[1,3], A. Skalli[2], R. Lance[2], X. Porte[2], J. Wolters[1,3], and D. Brunner[2]; [1] Institut für Optische Sensorsysteme, Deutsches Zentrum für Luft und Raumfahrt, Berlin, Germany; [2] Institut FEMTO-ST, Université Franche-Comté, Besancon, France; [3] Institut für Optik und Atomare Phyik, Technische Universität Berlin, Berlin, Germany*

We present a deep photonic network created by cascading three mutually coupled large vertical cavity surface emitting lasers, demonstrate their locking to an external injection laser, and investigate their spectral and spatial response.

JSIII-P.2 FRI

3D Polymer Interconnects for Neuromorphic Photonics Technologies

A. Andrishak, T.L. Alves, R.M.R. Adão, C. Maibohm, B. Romeira, and •J.B. Nieder; INL-International Iberian Nanotechnology Laboratory, Ultrafast Bio- and Nanophotonics Group, Braga, Portugal

Free standing and crossing 3D optical interconnects spanning several hundreds of micrometers were successfully fabricated using two photon polymerisation (TPP) - based laser direct writing in polymer on glass and on-chip for neuromorphic computational networks.

JSIII-P.3 FRI

Study of the C-band dynamical response of an injection locked LA-EEL for fully integrated telecommunication data processing

•*R. Lance[1], A. Skalli[1], X. Porte[2], and D. Brunner[1]; [1] Université Bourgogne Franche-Comté, FEMTO-ST, Optics Department, Besançon, France; [2] Institute of Photonics, Department of Physics, University of Strathclyde, Glasgow, United Kingdom*

Fully parallel high bandwidth photonic reservoir implemented using injection locking effect in highly multimodal semiconductor laser. Spatial projection and imaging on a digital micromirror device provides reading and allow hardware integration of programmable output weights.

JSIII-P.4 FRI

Visualizing and Understanding Optoelectronic Neural Networks via the Orbital Angular Momentum of Light

•*H. Wang[1], J. Hu[2], Z. Zhan[1], X. Fu[1], and Q. Liu[1]; [1] Tsinghua University, Department of Precision Instrument, Beijing, China; [2] Laboratoire Kastler Brossel, Collège de France, Paris, France*

We propose a hardware-algorithm-united model interpretation method for optoelectronic neural networks when measuring orbital angular momentum of light to understand the feature-extraction mechanisms of optical layers and to improve the detection efficiency up to 25-fold.

JSIII-P.5 FRI

Improving the performance of photonic delay-based reservoir computing by phase modulating the input signal

•*I. Bauwens[1], K. Harkhoe[1], P. Bienstman[2], G. Verschaffelt[1], and G. Van der Sande[1]; [1] Applied Physics Research Group, Vrije Universiteit Brussel, Brussels, Belgium; [2] Photonics Research Group, Department of Information Technology, Ghent University-IMEC, Ghent, Belgium*

Based on numerical studies of a delay-based reservoir computing system with semiconductor lasers, we are able to improve the performance of such systems by modulating the phase, rather than the amplitude of the injected signal.

JSIII-P.6 FRI

Metasurface Light Encoders Enable Real-Time Hyperspectral Imaging and Video Understanding

•*M. Makarenko, A. Burguete-Lopez, Q. Wang, F. Getman, S. Giancola, B. Ghanem, and A. Fratalocchi; King Abdullah University of Science and Technology, Thuwal, Saudi Arabia*

In this work, we present a recently developed Hyplex™ platform, a hyperspectral imaging concept that addresses the high cost and slow acquisition of current state-of-the-art hyperspectral imaging systems by using universal metasurface hardware encoders.

JSIII-P.7 FRI

Influence of absorber carrier lifetimes on the excitability regime of an integrated two-section InP laser neuron

•*L. Puts, D. Lenstra, K. Williams, and W. Yao; Eindhoven University of Technology, Eindhoven, Netherlands*

The Yamada model is used to investigate the effects of saturable absorber carrier lifetimes on the excitability operation regime of an integrated InP laser neuron. A short lifetime results in a large excitability window.

JSIII-P.8 FRI

Photonic delay-based reservoir computers as deep neural network preprocessors

•*I. Bauwens[1], G. Van der Sande[1], P. Bienstman[2], and G. Verschaffelt[1]; [1] Applied Physics Research Group, Vrije Universiteit Brussel, Brussels, Belgium; [2] Photonics Research Group, Department of Information Technology, Ghent University-IMEC, Ghent, Belgium*

Based on numerical studies we show that the reservoir from a photonic reservoir computing system can be efficiently used to preprocess data that is inputted to a deep neural network, leading to improved computational performance.

Hall B0

JSIII-P.9 FRI

Stability analysis of photonic Ising machines

•*J. Lamers, G. Verschaffelt, and G. Van der Sande*; *Applied Physics Research Group, Vrije Universiteit Brussel, Brussels, Belgium*

Photonic Ising machines are promising candidates to efficiently solve NP-hard optimization problems. However, they don't always find the optimal solution. We perform a stability analysis to predict regions in parameter space with higher success rate.

JSIII-P.10 FRI

High-resolution consistency analysis for performance evaluation of photonic time-delay reservoir computers

•*l. oliverio*[1,2], *d. rontani*[1,2], *and m. sciamanna*[1,2]; [1]*Chaire Photonique, LMOPS, Metz, France*; [2]*CentraleSupélec, Université de Lorraine, Metz, France*

We theoretically analyze the dynamical consistency of a time-delayed laser-based reservoir computer. Our high-resolution mapping unveils unexplored parameter regions with high consistency and good computing performances, hence revisiting earlier claims.

JSIII-P.11 FRI

Implementation of an optoacoustic activation function based on stimulated Brillouin scattering

•*S. Becker*[1,2], *J. Storp*[1], *and B. Stiller*[1,2]; [1]*Max Planck Institute for the Science of Light, Erlangen, Germany*; [2]*Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany*

We present an in-fiber optoacoustic activation function based on stimulated Brillouin scattering. We demonstrate its optically controllable input-output behavior and frequency selectiveness, filling a gap in the landscape of optical activation functions.

JSIII-P.12 FRI

Machine learning empowers large-scale optical sensors for ultrasensitive detection

•*N. Li, Q. Wang, Z. He, A. Burguete-Lopez, F. Xiang, and A. Fratalocchi*; *King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia*

We report a platform technology for sensing based on suitable engineered artificial intelligence nanophotonics hardware that can measure glucose concentration in real time as low as 10^{-20} mol/L.

JSIII-P.13 FRI

Integrated photonic modulators using dispersion engineered phase change metasurfaces

•*Y. Cui, J. Davis, and B. Gholipour*; *University of Alberta, Electrical and Computer Engineering, Edmonton, Canada*

We show that dispersion engineered subwavelength nanostructured phase-change/oxide composite waveguide-integrated metasurfaces enable engineered insertion losses and modulation contrasts without altering circuit architecture or phase-change material composition with active region footprints as small as 14.2um.

JSIII-P.14 FRI

Taming Optical Computing Architectures: from extreme learning machines to diffractive neural networks

•*N. Silva, D. Silva, F. Moreira, and T. Ferreira*; *INESC TEC, Centre for Applied Photonics, Porto, Portugal*

In this communication, by deploying experimental setups and associated digital twins, we extensively explore the capabilities of distinct optical computing architectures, aiming at understanding their specific capabilities and better mapping their potential toward real-world applications.

JSIII-P.15 FRI

Pulse Generation and Memory in Opto-Electronic Neurons with Time-Delayed Feedback

•*J. Mayer Martins*[1], *S.V. Gurevich*[1], *and J. Javaloyes*[2]; [1]*Institute for Theoretical Physics, University of Münster, Wilhelm-Klemm-Str. 9 and Center for Nonlinear Science (CeNoS), University of Münster, Corrensstrasse 2, 48149 Münster, Germany*; [2]*Departament de Física and IAC-3, Universitat de les Illes Balears, C/ Valldemossa km 7.5, 07122 Mallorca, Spain*

In a neuromorphic circuit composed of a nano resonant tunneling diode and a nano laser diode coupled through time-delayed feedback, solitons serving as memory emerge from sustained periodic pulses.

JSIII-P.16 FRI

Experimental investigation of refractory time of optically induced spiking in resonant tunnelling diode photodiodes

J. Lourenço[1], *Q. Al-Taai*[2], *E. Wasige*[2], *and* •*J. Figueiredo*[1]; [1]*Centra-Ciências and Departamento de Física, Faculdade de Ciências da Universidade de Lisboa, Lisboa, Portugal*; [2]*High Frequency Electronics Group, University of Glasgow, Glasgow, United Kingdom*

Due to their nonlinearity and excitability, receiver circuits based on resonant tunneling diode photodetectors (RTD-PDs) show promise as neuron like optically triggered spike firing elements to process information through the timing of the spikes.

JSIII-P.17 FRI

Deep Reservoir Computing Based on Frequency Multiplexing

•*A. Lupo, M. Zajnulina, and S. Massar*; *Laboratoire d'Information Quantique, Université libre de Bruxelles, Bruxelles, Belgium*

Deep Reservoir Computing outperforms traditional RC. We experimentally test a deep-RC that concatenates two photonic reservoirs. It exploits frequency-domain interference to process information encoded in frequency combs. It achieves a two-orders-of-magnitude improvement on channel-equalization task.

NOTES

Authors' Index

The index entries consist of the following data: *<session key>.<paper in the session> <day>* (p*<page>*). Presenting authors are marked by •.

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