Advanced Solid-State Photonics (ASSP)

February 13-16 2011, Ceylan Intercontinental Istanbul Hotel, Istanbul, Turkey

ASSP - The world’s premier meeting for discussing new developments in solid-state lasers and associated nonlinear optical devices. Learn more.

We look forward to seeing you in Istanbul!

Istanbul Tour

Agenda of Session Now Available!

- Abstracts (1.3 MB)
- Postdeadline Abstracts (1.6 MB)
- Agenda of Sessions (84 KB)
- Key to Authors and Presiders (109 KB)
- Postdeadline Key to Authors and Presiders (92 KB)

Take advantage of all ASSP has to offer:

- Access to technical sessions
- Tabletop exhibit
- Short courses for professional development
- Renowned experts presenting invited talks
- Poster sessions providing one-on-one discussion time with presenters
- Post Deadline Session reporting critical breakthroughs
- Networking events

The 2010 meeting featured presentations from 22 different countries and a special event in honor of the 25th anniversary of the meeting. View the 2010 Meeting Archive (pdf) containing the final program (PDF)

View the conference program and plan your itinerary for the conference

- Browse speakers and the agenda of sessions
- Browse sessions by type or day.
- Search by author, title, OCIS code and more.
- Plan and print your personal itinerary before coming to the conference

Top 5 Downloaded ASSP Meeting InfoBase Papers:

- Frequency Doubling of Tm-Doped Fiber Lasers for...
- Narrow Linewidth Dual Volume-Bragg-Grating Locked...
- Tunability of Lasers Based on Yb3+-Doped Fluoride...
- High Efficiency 20W Single Frequency PM Fiber...
- Microwatt-Level XUV Frequency Comb via Intracavit...
This event is part of the Lasers, Sources and Related Photonic Devices Congress, allowing attendees to access to all meetings within the Congress for the price of one and to collaborate on topics of mutual interest.

Lasers, Sources and Related Photonic Devices: OSA Optics & Photonics Congress

- Advanced Solid-State Photonics (ASSP)
- Advances in Optical Materials (AIOM)
- Fiber Laser Applications (FILAS)
- High-Intensity Lasers and High-Field Phenomena (HILAS)

Sponsor:

OSA
Advanced Solid-State Photonics (ASSP)

February 13-16 2011, Ceylan Intercontinental Istanbul Hotel, Istanbul, Turkey

Program

Invited Speakers
Tour
Special Events

Schedule at a Glance

Advanced Solid-State Photonics (ASSP): February 13-16, 2011 The Advanced Solid-State Photonics Topical Meeting specializes on novel solid-state sources of coherent radiation operating in different spectral ranges. Now in its 26th year, this meeting remains the world’s premier forum for discussing new developments in solid-state and fiber lasers, ultrashort light sources, amplifier design, laser and nonlinear optical materials, and nonlinear frequency conversion devices. These light sources find an increasingly broad range of applications in spectroscopy, metrology, remote sensing, communications, material processing, astronomy, medicine, and life sciences. This year’s invited presentations will focus on advanced specialty fiber lasers, ceramic laser materials, few-cycle optical parametric amplifiers, high-power femtosecond thin-disk lasers, progress in mid-infrared tunable solid-state lasers, recent advances in quasi phase matching, and ytterbium-doped laser materials.

A number of distinguished invited speakers have been invited to present at the meeting. In addition, the organizers have planned a number of special events to make your meeting experience more enjoyable!

Invited Speakers

The program for Advanced Solid-State Photonics (ASSP) will be held Sunday, February 13 through Wednesday, February 16.

Take advantage of all ASSP has to offer:

- Access to technical sessions
- Tabletop exhibit
- Short courses for professional development
- Renowned experts presenting invited talks
- Poster sessions providing one-on-one discussion time with presenters
- Post Deadline Session reporting critical breakthroughs
- Networking events

Agenda of Sessions

- Abstracts (1.3 MB)
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- Agenda of Sessions (84 KB)
- Key to Authors and Presiders (109 KB)
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Explore the main cultural highlights of Istanbul's opulent past - the elegant Blue Mosque and ancient Hippodrome, the magnificent Hagia Sophia, the grandiose Topkapi Palace and the glittering Grand Bazaar.

These are full-day tours offered during the Laser, Sources and Related Photonic Devices Congress. Admission to the sites, an English speaking guide, and lunch is included in the price.

Seating is limited so reserve your space now!

**Tour at a Glance:**
- Blue Mosque – Hippodrome
- Hagia Sophia
- Topkapi Palace
- Lunch break at a local restaurant
- Topkapi Palace
- Grand Bazaar
- Return to the Hotel

**Two Options:**

**Tuesday, February 15, 2011 • 9:00-15:45**
Tour Price per Person $70 USD
*Detailed Itinerary*

**Friday, February 18, 2011 • 9:00-16:30**
Tour Price per Person $80 USD
*Detailed Itinerary*

To reserve your seat

1. Complete the Reservation Form (be sure to select the day and number of people)
2. Email your completed reservation form to reservation@gazella.com

Any incomplete information will delay or prevent the processing of your reservation. Once your reservation request has been processed Gazella Tours will email you a confirmation.

**Special Events**

**Congress Banquet**
Wednesday, 16 February 2011
18:30 – 21:00
Location: Binbirdirek Cistern

The 1001 Columns Cistern, also called the ‘Philoxenus Cistern’ or ‘Binbirdirek Cistern’ in Turkish, is the oldest known cistern in Istanbul. Thought to have been constructed in 330 AD by the Roman Senator Philoxenus during the reign of the Byzantine Emperor Constantine, its original purpose was to serve the Lavsus Palace. Later it was converted into a silk manufacturing warehouse during Ottoman times until falling into disrepair. Closed for decades, it was restored a few years ago and functions as a cafe and venue for exhibitions, functions and concerts. – mydestinationinfo.com & Lonely Planet

Banquet Speaker:

Optical Fibres: The Untold Story, David Payne, Univ. of Southampton, UK
A global internet of 100 million kilometres and the prospect of megawatt fibre lasers? Personal reflections and untold stories.

D. Payne obtained a PhD in 1976 from the University of Southampton, and is now a professor of photonics and Director of the Optoelectronics Research Centre (ORC). He has published over 600 Conference and Journal papers and is co-inventor on over 20 patents. Over the last forty years, he has made several key contributions in optical fibre communications and laser technology. His work in fibre fabrication in the 1970s resulted in many of the special fibres used today, including the revolutionary erbium-doped fibre amplifier (EDFA) and kilowatt-class fibre lasers for manufacturing and defence. He has received the UK Rank Prize for Optics, the 2001 Mountbatten Medal, the 2004 Kelvin Medal for the application of science to engineering, the 2007 IEEE Photonics Award, the 1991 IEEE/LEOS Tyndall Award, the 1998 Benjamin Franklin Medal for Engineering, and is Laureate of the 2008 Millennium Technology Prize. He is also an Eduard Rhein Laureate and a foreign member of the Norwegian and the Russian Academies of Sciences. He is a Fellow of the Royal Society and of the Royal Academy of Engineering. As an entrepreneur, he founded York Technologies, (now PK Technology Inc.) and SPI Lasers plc (now part of the Trumpf Gruppe).

One conference banquet ticket is included in the Full Technical Fee. Guest tickets may be purchased for US$ 95 per person.
Chairs & Committee Members

The Technical Program Chairs and Committee Members are integral to the success of the meeting. These volunteers dedicate countless hours to planning, including such critical activities as raising funds to support the event, securing invited speakers, reaching out to colleagues to encourage submissions, reviewing papers, and scheduling sessions. On behalf of OSA, its Board, and its entire staff, we extend enormous gratitude to the following members of the Advanced Solid-State Photonics (ASSP) Technical Program Committee.

On this page:

Program Committee

Information for Conference Chairs and Committee Members

Information for Session Chairs/Presiders

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Akira Shirakawa, Univ. of Electro-Communications, Japan
If you are a member of the committee and have any questions or concerns at any point along the way, please refer to the information below or contact your program manager.

Information for Conference Chairs and Committee Members

- View the Calendar of Deadlines for the Meeting
- View the Chairs’ Manual
- View the Call for Papers
- View Fundraising Information
- View Exhibit and Sponsorship Information
- View Author/Presenter Information
- View Peer Review Instructions
- View Scheduling Instructions
- View Student Travel Grant Information
- View Registration Information
- View Housing Information
- View On-site Responsibilities

Information for Session Chairs/Presiders

Presiders are requested to identify themselves at least 20 minutes before the session begins to the audiovisual personnel for a quick review of equipment and procedures.

Guidelines

Remember to introduce yourself as the presider and announce the session. The total amount of time allotted for each paper will be listed in the online program as well as in the conference program book. Generally, invited talks are allowed 25 minutes for presentation and 5 minutes for discussion. Generally, contributed talks are allowed 12 minutes for presentation and 3 minutes for discussion. Generally, tutorials are allotted 45 minutes to 1 hour, with 5 minutes for discussion. A 60-minute mechanical timer will be available for your use. We recommend that the timer is set two minutes prior to the end of the presentation time in order to provide a warning to wrap up the talk and start the discussion period. Notify the authors of this warning system. It is also important to remind the speaker to repeat the questions asked from the audience.

Maintaining the scheduled timing of papers is very important. In cases where the paper is withdrawn or the speaker does not show, use the time for an extended question period for authors of previously presented papers or call a break. PLEASE DO NOT START TALKS EARLIER THAN THEY ARE SCHEDULED. All requests to modify the program schedule should be directed to the program chair.

We encourage you to watch a short podcast featuring Dr. Ben Eggleton (CUDOS, Univ. of Sydney, Australia) giving tips on how to be a great presider. Or download notes from the podcast.

Speaker Check-in Sheet

Once you arrive at your session room, you’ll find a folder at the podium or on the table at the front of the room. This folder will contain a sheet for each session in that room. Please be sure to remove only your session sheet. The check-in sheet will list the talks within your session, the order in which they will be given, and the name of the author giving the presentation. Please be sure to check the box to indicate which speakers presented during the session. Make note of any no-show speakers or replacement speakers. Also, please try to estimate the number of attendees at the session at the start of the session, about halfway into the session, and at the end of the session; note these counts where indicated in the upper right corner.
Leave the completed sheet in the folder in the pocket marked "Completed" and leave the folder on the podium or table for the next session presider. The check-in sheet serves two purposes: 1) to assist you in running an effective session and 2) to help us ensure that the appropriate speakers’ files are archived on OSA Optics InfoBase after the meeting. Only those authors who attend and present are included in the InfoBase, so it's important that you make note of any presenters who are absent.

View a sample check-in sheet.

**IMPORTANT NOTICE:** Due to licensing restrictions, the use of music in presentations, including video presentations, is prohibited. If a speaker uses music during his/her presentation, please inform Meeting Management immediately.
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Withdrawals

AITHB02 AIFB3
AITHB03 AIFB6
AITHB11 HWC13
AITHB13 HFB3
AITHB17

Presider Updates
Kent E. Mattsson, Technical Univ. of Denmark, Denmark, will preside over the session, AITHD, Crystal and Glass Fibers II

Author Block Update
The author block for HWA3 should read: Xiaowei Chen, Aurelien Ricci, Arnaud Malvache, Aurelie Jullien, Rodrigo Lopez-Martens; Lab d’Optique Appliquee, Palaiseau Cedex, France.

Presenter Changes
HWB5 will be presented by Paraskevas Tzallas, IESL, FORTH, Heraklion, Greece.

AMB10, ATuD4, and FWB3 will be presented by Lawrence Shah, CREOL College of Optics and Photonics, Univ. of Central Florida, USA.

HThE3 will be presented by P. D. Mason, STFC Rutherford Appleton Laby, Central Laser Facility, UK

HThC5 will be presented by Rainer Hoerlein, Ultrafast Innovations, Germany

Session Changes
AITHF • AIOM Postdeadline Session ends at 19.15.

Special Events
Please join the HILAS and FILAS chairs for an informal “rump” session to discuss the 2011 inaugural offerings of these two meetings and to brainstorm for how to improve in 2012.

FILAS Rump Session
Wednesday, 16 February 2011
13.00–14.00
Marmara

HILAS Rump Session
Thursday, 17 February 2011
20.00–21.00
Citronelle

Welcome Event
Please join the ASSP Chairs on Sunday at the City Lights Bar within the hotel from 18.00–19.00.

Student Awards
The ASSP Student Award sponsored by Lockheed Martin will be presented following session AWB on Wednesday, 16 February.

The FILAS Student Award sponsored by Multiwave Photonics will be presented during the IPG dinner on Thursday, 17 February.

Additional Support provided by:

Postdeadline Paper Programs
Postdeadline Paper Programs are available at Registration.
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Invited Speakers

Plenary Speaker:

Monday, 14 February 2011

AMA1 • 8:15 a.m., Title to Be Announced, M.M. Fejer, E. L. Ginzton Lab, Stanford Univ., USA

Invited Speakers:

Monday, 14 February 2011

AMD1 • 2:15 p.m., Carrier-Envelope-Phase Stable Few-Optical-Cycle Pulses from Optical Parametric Amplifiers, D. Brida¹, C. Manzoni¹, D. Polli¹, G. Cerullo¹, C. Manzoni², D. Polli², G. Cerullo², ¹Politecnico di Milano, Italy, ²IFN-CNR, Italy

AME1 • 4:30 p.m., Dual Comb Sensing of Passive Samples and Active Light Sources, I.R. Coddington, NIST, USA

ATuA1 • 8:00 a.m, Progress in mid-IR Cr2+ and Fe2+ doped II-VI Materials and Lasers, S. Mirov, Univ. of Alabama at Birmingham, USA

Tuesday, 15 February 2011

ATuC1 • 11:30 a.m., Power-Scaling of Femtosecond Thin Disk Lasers, T. Südmeyer¹, C. Roman Emmanue Baer¹, C. Kränkel¹,², C. Jody Saraceno¹, O. Hubert Heckl¹, M. Golling¹, R. Peters², K. Petermann², G. Huber², U. Keller², ¹Dept. of Physics, Inst. of Quantum Electronics, ETH Zurich, Switzerland, ²Inst. for Laser-Physik, Univ. of Hamburg, Germany

ATuE1 • 4:45 p.m., Anisotropic Laser Ceramics toward Giant Micro-photonics, T. Taira, Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Japan

Joint with FILAS JWA1 • 8:15 a.m., Advanced Specialty Fibers for Applications in Fiber Lasers, L. Dong, IMRA America Inc., USA

Wednesday, 16 February 2011

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Short Courses

Short courses are a wonderful way to enhance your knowledge of the optical field. ASSP selects experts in their fields to provide you with an in-depth look at intriguing topics. The courses are designed to increase your knowledge of a specific subject while offering you the experience of knowledgeable teachers. An added benefit is the availability of continuing education units (CEUs).

CEUs are awarded to each participant who successfully completes the short course. The CEU is a nationally recognized unit of measure for continuing education and training programs that meet established criteria. To earn CEUs, a participant must complete the CEU credit form and course evaluation and return it to the instructor at the end of the course. CEUs will be calculated and certificates will be mailed to participants.

- Tuition for short courses is a separate fee, and advance registration is recommended: the number of seats is limited.
- Short courses will sell out quickly! There will be no waiting list.
- Short course materials are not available for purchase.

Schedule

Sunday, 13 February 2011

8.00–12.00

SC365 • High Field Short Pulse Sources and Extreme Nonlinear Optics
Jens Biegert, ICFO - The Institute of Photonics Sciences, Spain

Course Level
Beginner (no background or minimal training is necessary to understand course material)

Course Description
This course aims to provide an overview over high field and short pulse sources and extreme nonlinear optics. The course will begin with a discussion of the fundamental principles of light matter interaction and develop towards high order harmonic generation (HHG) and attosecond pulse production. We will discuss the challenges and methods to fully characterize light bursts in the XUV to soft-X-Ray spectral range, theoretical limitations and practical issues, as well as application of such light pulses. Part of the course will be devoted to the experimentalist’s needs to realize such sources and apply them in extreme nonlinear optics. Specifically, the course participants will learn the tricks of the trade to realize XUV sources; requirements and operating parameters for drive lasers; target design; vacuum and UHV issues and solutions as well as requirements; electron and ion spectroscopy to characterize XUV pulses; attosecond pulse
Benjamin characterization; XUV optics and arrangements; and an outlook from the state of the art.

Benefits and Learning Objectives
This course should enable you to:

- Understand the basic principles of strong field interaction and its regimes
- Gain insight into the principles of high harmonic generation (HHG)
- Acquire a perspective of extreme nonlinear optics
- Identify the critical issues for experimental realizations
- Learn about the necessary techniques for building and operating a strong field setup
- Gain a perspective of current state of the art and recent developments in the field

Intended Audience
This course is intended for researchers with little or no background as well as for those familiar with the subject area who wish to enhance their understanding and update their knowledge of the emerging developments in the field. The course will benefit researchers in both industry and academia.

Biography
Jens Biegert is a professor at the Institute of Photonic Sciences (ICFO) in Barcelona, Spain. He received his doctorate at the Technical University Munich and the University of New Mexico, U.S.A. before taking employment at ETH Zurich as group leader and moving to ICFO in Barcelona. He worked on a range of different research topics, ranging from UV to IR lasers, OPO’s, OPCPA, generation of few-cycle pulses, filamentation, laser triggered lightning, to atomic, strong field and attosecond physics. He received a DAAD stipend, Marie Curie Fellowship, stipend from the German National Academic Foundation, and the OSA Allen Price in 2004. He has served on the program and advisory committees of several international conferences, as well as guest editor of the Journal of Modern Optics.

14.00–18.00

SC363 • Mid-IR Bulk and Fiber Sources
Marc Eichhorn, French-German Res. Inst. of Saint-Louis (ISL), France

Course Level
Advanced Beginner (basic understanding of topic is necessary to follow course material)

Course Description
The course gives an overview on current and future sources in the mid infrared based on bulk or fiber active media, or on a combination of both.

The course will cover the two main ways of mid-IR generation: Direct emission from solid-state laser media and non-linear conversion like optical-parametric generation, Raman amplification or supercontinuum generation.

In the first part, directly emitting lasers are discussed. The basic steps of finding an appropriate laser medium for mid-IR emission are explained and the currently most important examples based on erbium (∼ 2.9 µm, ∼ 4.6 µm), holmium (∼ 4 µm) and chromium (2-3 µm) are described and discussed. This part will also include thulium and holmium around 2-2.1 µm in their special function
as pump lasers for either chromium or for the different nonlinear media discussed in the second part of the course. This overview of different sources will be accompanied by the necessary background on the properties of the different laser media, which are important for the different laser designs.

In the second part, the different ways of non-linear generation are discussed. This will include ZGP and GaAs optical-parametric oscillators, mid-IR Raman converters based on non-linear fibers with solid or gaseous medium and the generation of broadband supercontinuum in mid-IR fiber media like fluoride or chalcogenide hosts. For these sources, the important material parameters and laser designs will be identified.

At the end, the different sources are summarized, their properties are compared and examples of applications for mid-IR lasers are presented.

Benefits and Learning Objectives
This course should enable participants to:

- Identify appropriate laser media for mid-IR emission from their spectroscopic properties.
- Identify the important processes for laser dynamics of a given laser host.
- Determine geometry and doping of a laser medium.
- Define laser designs in dependence of the type of laser medium.
- Compute basic laser properties and perform estimations on laser behaviour.
- Specify pump sources and pumping designs for direct emitters or non-linear media.
- Define non-linear converter designs in dependence of the type of non-linear medium.
- Compute basic properties of OPOs and perform estimations on laser behaviour.

Intended Audience
Attendees should be familiar with the basics of solid-state lasers (e.g. optical transitions, rate equations, pulsed lasers), optical resonators or optical fibers. The course is suited for Ph.D. students in laser physics or engineering and will also be advantageous for master students with background in lasers, for researchers working on or with mid-IR sources, or for individuals searching for such sources to provide mid-IR photons for their research activities, e.g. in chemistry, biology or medicine.

Instructor Biography
Marc Eichhorn received the Diploma degree in physics from the University of Heidelberg, Germany, in 2003, for his work on high power CO2 lasers and ultra-cold atoms and the Dr. rer. nat. degree from the University of Freiburg, Germany, in 2005, for his research on IR fiber lasers and chalcogenide lasers. In 2009, he performed his habilitation in experimental physics at the University of Hamburg, Germany, on quasi-three-level solid-state lasers. Since 2003 he is with the French-German Research Institute of Saint-Louis (ISL), where he holds the position of head of group DPE (Directed Photonics and quantum Electronics). His research interests are primarily in high power diode-pumped solid-state lasers, heat-capacity lasers, fiber lasers in the near- and mid-infrared as well as mid-infrared nonlinear wavelength conversion.

CANCELLED SC364 • Vertical External Cavity Surface Emitting Lasers
Martin Dawson, Univ. of Strathclyde, UK
Course Description
This Short Course will present a detailed overview of Vertical External Cavity Surface Emitting Lasers (VECSELs) - also known as Semiconductor Disk Lasers or Optically-Pumped Semiconductor Lasers (OPSL's). VECSELs consist of an optically-pumped semiconductor platelet gain medium operated in an external resonator, providing an important new variant in continuous-wave (CW) or quasi-CW laser technology. VECSELs are capable of delivering multi-Watt output powers across a wide (UV to mid-IR) spectral range in very high quality beams, offer broad spectral tuning, have attractive single-frequency and mode-locked characteristics, and are very well suited to intra-cavity nonlinear optics. They are thus rapidly taking their place alongside more conventional doped-dielectric gain media in the expanding armoury of solid-state laser technology.

The Course will be organised in a modular and progressive format. It will begin with an overview of the defining features of VECSELs, saying something of their history and comparing their characteristics to other semiconductor and doped-dielectric lasers. It will then explore the epitaxial semiconductor growth techniques on which the technology is based, introduce the materials systems used and their wavelength coverage in bulk, quantum well and quantum dot format. This will be followed by discussion of the design of VECSELs and their optical characteristics, and their laser performance in various cavity formats. Finally, applications areas of the technology will be covered, and an overview given of areas of application and potential future developments.

Benefits and Learning Objectives:
This course should enable participants to:

- Obtain a firm grasp of the current state-of-the-art in VECSEL technology and guide their way through the relevant literature, of which a comprehensive list will be provided
- Compare the operating characteristics of VECSELs to more familiar semiconductor diode and doped dielectric solid-state lasers
- Gain a basic grounding in relevant semiconductor epitaxial growth techniques and associated materials science
- Comprehend the basic design principles of VECSELs and the selection of appropriate gain media and structures to achieve targeted performance
- Appreciate the cavity design and optical pumping benefits and constraints of VECSEL technology
- Identify cavity geometries suitable for single-frequency, mode-locked and intracavity second harmonic generation
- Determine the broader relevance of VECSELs in nonlinear optics
- Gain an understanding of the applications which VECSELs can serve

Intended Audience
This is a new course representing an area of technology that is emerging very rapidly. The intention is to serve a wide range of interested parties, including: professional researchers specialising in other areas of solid state or semiconductor lasers, industrial or government representatives interested in gaining an overview of this technology and its role and distinctive features, and graduate students wishing either an introduction to the field or a broad overview if they are already involved.

Instructor Biography
Professor Martin Dawson has almost thirty years’ research experience in photonics, gained in academia and industry in both the UK and the United States. He has been at the University of Strathclyde since 1996, where he was a founder member of the Institute of Photonics.
(http://www.photonics.ac.uk) and serves as its Director of Research. He holds fellowships of the IEEE, OSA, Institute of Physics and Royal Society of Edinburgh, and is recognised, amongst a broad range of other contributions, as one of the pioneers of VECSEL technology.
# Lasers, Sources and Related Photonics Devices Optics & Photonics Congress Agenda of Sessions

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<td>8.00–10.00</td>
<td>AIThA • Transparent Ceramics and Laser Crystals II</td>
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<td>HTHA • Particles in Intense Fields</td>
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<td>FThA • Fiber Lasers and their Applications</td>
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<td>AIThD • Crystal and Glass Fibers II</td>
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<tr>
<td>7.30–11.00</td>
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<tr>
<td>8.00–10.00</td>
<td>AIFA • Nonlinear Crystals and Processes III (ends at 9.45)</td>
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<td>HFA • Molecules in a Strong Field</td>
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<td>10.30–12.30</td>
<td>AIFB • Waveguides and Laser Patterning</td>
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<td>HFB • Emerging Techniques</td>
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Key to Shading
- ASSP
- AIOM
- FILAS
- HILAS
- Joint Sessions
Intracavity pumping of a continuous-wave KGW Raman laser within an InGaAs VECSEL is reported. VECSEL tuning resulted in tunable Raman laser emission from 1136-1154.5 nm with total output power up to 120 mW.

**AMA5 • 9.45**

1.6W Continuous-wave Diamond Raman Laser, Walter Lubeigt1, Vasili Sariovi1, Gerald M. Bonner1,2, Jennifer E. Hastie1, Martin D. Dawson1, David Burns1, Alan J. Kemp1; Inst. of Photonics, Univ. of Strathclyde, Glasgow, UK; MQ Photonics, Macquarie Univ., Sydney, NSW, Australia. Low-birefringence, single-crystal, synthetic diamond is used as a Raman medium in a Nd:YVO4 laser. CW output powers of 1.6W at the Raman wavelength were recorded. In quasi-CW operation, on-time output powers of 2.8 W were obtained.

Dolmabahce Foyer, R Floor
10.00–10.30
Coffee Break

**AMB01**

Dispersion compensation schemes for femtosecond Kerr-lens mode-locked CrZnSe lasers, Melania N. Cizmeki1, Huseyin Cankaya1, Adnan Kurt2, Alphan Sennaroglu1; Koc Univ., Istanbul, Turkey; Teknofil, Inc., Istanbul, Turkey. By employing different dispersion compensation schemes, we obtained femtosecond pulses with duration as short as 92 fs and pulse energy as high as 0.45 nJ from a Kerr-lens mode-locked CrZnSe laser operated near 2420 nm.

**AMB02**

3D simulations for an OCPA chain including nonlinear refractive index effects, Alexandre Thai1, Christoph Skrobol1,2, Philip K. Bates1, Gunnar Arisholm1, Zsuzsanna Major1,2, Ferenc Krausz1,2, Stefan Karsch1,2, Jens Biegert1,2; ICFO, Castelldefels (Barcelona), Spain; Max-Planck-Institut für Quantenoptik, Garching, Germany; Ludwig-Maximilians-Universität München, Garching, Germany; Forsvarets ForskningsInst.t (Norwegian Defence Res. Establishment), Kjeller, Norway; ICREA-Institucio Catalana de Recerca i Estudis Avançats, Barcelona, Spain. We present 3D OCPA simulations for a PW system with 3.67 J, 4 fs transform limited pulses. We show that including nonlinear refractive index effects, the energy is reduced by ~11% and the Fourier limit increased by ~17.5%.

**AMB03**

High pulse energy, picosecond MgO:PPLN optical parametric oscillator using a single-mode fiber for signal feedback, Florian Kienle1, Peh Siong Teh1, Shafiq-Ul Alam1, Corin B. E. Gavith1, David C. Hanna1, David J. Richardson1, David P. Shepherd2; Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Coeselon Ltd., Romsey, UK. We demonstrate a high-pulse-energy, synchronously-pumped (7.19 MHz), 100 ps, widely tunable MgO:PPLN OPO providing 0.49 μJ
pulses at 1.5μm and 0.19μJ pulses at 3.6μm. A single-mode fiber is employed in the OPO to keep the 42m-long cavity compact.

**AMB04**
Enhanced Mode-hop-free Idler Tuning Range with Frequency Stabilization of a Signal Resonant Optical Parametric Oscillator, Emeline Andries, Abdallah Rihan, Thomas Zanovi, Malo Cadoret, Jean-Jacques Zondy; 1Length section, LNE-CNAM, La Plaine Saint Denis, France. A continuous-wave signal-resonant optical parametric oscillator is frequency stabilized at the kilohertz level to the transmission peak of an external high finesse Fabry-Perot cavity, allowing a widely tunable mode-hop-free operation over 500 GHz.

**AMB05**
Phase Locking Thousands of Laser, Micha Nixon, Eitan Ronen, Moti Fridman, Asher A. Friesem, Nir Davidson; 1Weizmann Inst. of Science, Rehovot, Israel. Experimental realization for phase locking several thousands of lasers arranged in a variety of 2D geometries is presented. Coupling ranges and sign are easily controlled giving rise to a variety of intriguing phase structures.

**AMB06**
Coherent Beam Combining at 1064 nm Employing an Erbium Doped Fiber Amplifier for Phase Control, Henrik Tünnermann, Jörg Neumann, Dietmar Kracht, Peter Wessels; 1Laser Zentrum Hannover e.V., Hannover, Germany; 2Ctr. for Quantum Engineering and Space-Time Res. - QUEST, Hannover, Germany. We investigated the phase shift induced by a pumped erbium fiber on a 1064 nm signal. Our results were applied to demonstrate all fiber coherent beam combining with an erbium phase as a phase actuator.

**AMB07**
All-fiber isolator at multi-watt level operation, Chunte A. Lu, Gerry T. Moore; 1Air Force Res. Lab, Kirtland AFB, NM, USA. We experimentally demonstrated an all-fiber optical isolator at 1064nm with 0.5dB insertion loss and 14dB isolation operating at input power of 8W. This result shows that magnetic quasi-phase matching technique is feasible for multi-watt level.

**AMB08**
Inhibition of stimulated Raman scattering using long period gratings in double clad fiber amplifiers, Dirk Nodop, Cesar Jauregui, Florian Jansen, Jens Limpert, Andreas Tünnermann; 1Inst. of Applied Physics, Univ. of Jena, Jena, Germany. Inhibition of SRS in doubleclad fiber amplifiers using LPGs is reported. Three LPGs couple the Stokes wavelength from core to cladding and double the extractable Raman free output power of a test pulse amplifier.

**AMB09**
Influence of pump noise and modulation in in-fiber amplification of broadband pulses, Kutan Gurel, Ibrailim L. Budunoglu, Cagri Senel, Punya P. Paihani, F. Oemer Ilday; 1Physics Dept., Bilkent Univ., Ankara, Turkey. We investigate experimentally and theoretically the coupling of pump laser modulation and noise fluctuations to the output power of a fiber amplifier for broadband pulse trains using the modulation transfer function approach.

**AMB10**
Monolithic Polarization Maintaining Thulium Fiber Laser using High and Low Reflectivity FBGs, Christina C. Willis, Joshua Bradford, Robert Sims, Lawrence Shab, Martin Richardson, Jens Thomas, Ria Becker, Christian Voigtlander, Andreas Tünnermann; 1CREOL, Univ. of Central Florida, Orlando, FL, USA; 2Inst. of Applied Physics, Friedrich-Schiller-Univ., Jena, Germany; 3Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. A monolithic thulium laser consisting of polarization maintaining single-mode fiber and integrated high and low reflectivity fiber Bragg gratings is demonstrated with an output power of 16 W at a wavelength of 2054 nm.

**AMB11**
Robust Single-Mode High Average Power Very Large Mode Area Fiber Amplifiers, Fabian Stutzki, Florian Jansen, Tino Eidam, Cesar Jauregui, Jens Limpert, Andreas Tünnermann; 1Inst. for Applied Physics, FSU Jena, Jena, Germany; 2Helmholtz-Inst. Jena, Germany; 3Fraunhofer Inst. for Applied Optics and Precision Engineering (IOF), Jena, Germany. Yuferbium-doped Large Pitch Fibers with very large mode area are investigated in a high power fiber amplifier. An average output power of 294W is demonstrated, maintaining robust single-mode operation with a mode field diameter of 62μm.

**AMB12**
0.5 μJ femtosecond pulses from a giant-chirp ytterbium fiber oscillator, Nikolai Chichkov, Christian Hapke, Katharina Hausmann, Thomas Theeg, Dieter Wondt, Uwe Mørgner, Jörg Neumann; 1Laser Development, Laser Zentrum Hannover e.V., Hannover, Germany; 2Ctr. for Quantum-Engineering and Space-Time Res. - QUEST, Hannover, Germany; 3Inst. für Quantenoptik, Leibniz Univ. Hannover, Hannover, Germany. We present a mode-locked ytterbium fiber oscillator with output pulse energies of 537 nJ. The oscillator operates at a repetition rate of 4.3 MHz and the output pulses are compressed to durations of 760 fs.

**AMB13**
All-Fiber Regenerative Amplifier for Nanosecond Optical Pulses at 1053 nm, Ran Xiu, Jonathan Zuegel; 1Lab for Laser Energetics, Univ. of Rochester, Rochester, NY, USA. An all-fiber regenerative amplifier employing amplified spontaneous emission suppression techniques amplifies 2.5-ns, 1053-nm, 180-pJ pulses to 118 nJ, achieving a gain of 28 dB, 23 nm off the gain peak of Ytterbium-doped fiber.

**AMB14**
Chirped-Pulsed Yb 3+:YAG Regenerative Amplifier using a Total-Reflection Active-Mirror, Yasuki Takeuchi, Hiroaki Furuse, Akira Yoshida, Takeya Nakashit, Toshikiyo Kawashima, Hirofumi Kani, Takeshi Norimitsu, Noriaki Miyanaga, Junji Kawana; 1Inst. of Laser Engineering, Osaka Univ., Osaka, Japan; 2Inst. for Laser Technology, Osaka, Japan; 3Hamamatsu Photonics K.K., Shizuoka, Japan. The first
chirped-pulse regenerative amplifier using a total-reflection active-
mirror with a cryogenic Yb:YAG/YAG monolithic composite
 ceramic was demonstrated. 3.6 mJ of output pulse energy was
obtained at 100 Hz repetition rate.

AMB15
Efficient Resonantly Inband Pumped Er:YVO₄ Laser Emitting
around 1.6 μm, Christian Brandt¹, V. N. Matrosov¹, Klaus Petermann¹,
Günter Huber¹, ¹Inst. of Laser-Physics, Univ. of Hamburg, Hamburg,
Germany; ²SOLIX LTD., Minsk, Belarus. Efficient resonantly inband
pumped laser operation around 1.6 μm wavelength is demonstrated in
Er(1 at. %):YVO₄. The maximum slope efficiency obtained is 57.9%.
and the maximum output power was 2.3 W.

AMB16
Broadband, diode-pumped Yb:SiO₂: multicomponent glass laser,
Markus Lueser¹, Fabian Rooser¹, Alinud Reichelt¹, Franziska Kroll¹,
Mathias Siebold¹, Ulrich Schramm¹, Stephan Grimm¹, Johannes Kirchhof¹,
Doris Litzendorf², ¹Res. Ctr. Dresden-Rossendorf, Dresden, Germany;
²IPHT, Jena, Germany. We successfully demonstrated cw
lasing of ytterbium-doped silica multicomponent glass bulk
material. A slope efficiency of 43% and a tuning range from 1010–
1080 nm have been achieved.

AMB17
Generation of an Azimuthally Polarized Laser Beam from an End-
pumped Laser Cavity with a c-cut Nd:YVO₄ Crystal, Kazuhiro
Yamagishi¹, Yuichi Kozawa¹, Shunichi Sato², ¹Inst. of Multidisciplinary
Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. An
azimuthally polarized beam with the output power of 750 mW was
demonstrated by a new generation scheme from an end-pumped c-
cut Nd:YVO₄ crystal using a soft aperture effect of the pump beam.

AMB18
On the potential of 914 nm pumping of Nd:YVO₄ for laser
operation at 1064 nm, Xavier Délézi, François Balemoisohan, Olivier
Masset¹, Patrick Georges¹, ¹Laboratoire Charles Fabry, Palaiseau,
France; ²Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon, France.
1064 nm-Nd:YVO₄ lasers were pumped at 808 nm and 914 nm. The
comparative study shows that 914 nm-pumping is adapted for cw
operation whereas 808 nm-pumping provides higher population
inversion interesting for Q-switched operation.

AMB19
Spectroscopy and Laser Action of the Nd-Doped Mixed
Sesquioxide Lu₂Sc₂O₉, Fabian Reichert¹, Klaus Petermann¹, Günter
Huber¹, Philipp Koopmann¹, Matthias Fechner¹, Christian Brandt¹,
¹Inst. of Laser Physics, Univ. of Hamburg, Hamburg, Germany. Efficient cw laser action of a Nd-doped mixed sesquioxide is shown at 952.7 nm. The
maximum output power and slope efficiency of the quasi three-
level-transition ⁴F₉/₂→⁴I₁₁/₂ are 356 mW and 49 %, respectively.

AMB20
Determination of the thermo-optic coefficient and thermal
cconductivity of ytterbium doped sesquioxides ceramics at
cryogenic temperature, Vanessa Cardinali¹², Emilie Marmois¹, Bruno Le
Garrec¹, Gilbert Bourdet¹; ¹Dept. of Power Lasers, C.E.A., Le Barp,
France; ²LULI, Ecole Polytechnique, Palaiseau Cedex, France. This paper
presents thermo-mechanical measurements of ytterbium doped
sesquioxides of yttrium, scandium and lutetium ceramics at
cryogenic temperature. Measurements are also done on ytterbium
doped CaF₂ and YAG.

AMB21
Negative Thermooptic Coefficients and Athermal Directions in
Pure and Yb-doped Monoclinic KY(WO₄)₂, Pavel A. Loiko¹,
Konstantin V. Yumashev¹, Nikolai V. Kuleshov¹, Anatoly A.
Parolyuk¹; ¹Ctr. for Optical Materials and Technologies, Belarusian
National Technical Univ., Minsk, Belarus; ²Inst. of Inorganic Chemistry,
Siberian Branch of Russian Acad. of Sciences, Novosibirsk, Russian
Federation. Thermo-coefficients were measured in pure and
Yb(20 at. %)-doped monoclinic KY(WO₄)₂; crystal by a beam deviation
method in the visible and near-IR. Athermal propagation directions
were calculated in KY(WO₄)₂: at the wavelength of 1.06 μm.

AMB22
Fabrication of composite Yb:YAG lasers by use of the room-
temperature-bonding technique, Kousuke Takayanagi¹, Kenjiro Hara¹,
Takuya Ishikawa¹, Ken Imura¹, Ichiro Shoji¹; ¹Dept. of Electrical,
Electronic, and Communication Engineering, Chuo Univ., Tokyo, Japan.
We have succeeded in fabricating composite Yb:YAG lasers using the
room-temperature-bonding technique. YAG/Yb:YAG/YAG
showed better slope efficiency than YAG/Yb:YAG, which indicates
the efficient heat removal through the bonded interfaces.

AMB23
Thermal lensing effects of edge-pumped Yb:YAG/YAG thin disk
laser with crisscross edges, Mustafa Yadegari¹², Hamed
Aminpour¹; ¹Physics, Univ. of Guilan, Rasht, Islamic Republic of
Iran; ²Physics, Iranian Ctr. of Laser Science and Technology, Tehran,
Islamic Republic of Iran. Thermal behavior in an edge-pumped
Yb:YAG thin disk laser is presented. Ray tracing method is used to
calculate absorbed power through the disk. Temperature
distribution, stress, displacement in crystal and optical path
differences are calculated.

AMC • Coherent Beam Combining

Bosphorus, P Floor
11.30–12.45
Benoit Boulanger; Univ. de Grenoble, France, Presider

AMC1 • 11.30
120 mJ Pulses from Coherently Coupled Femtosecond Fiber Laser
Systems, Enrico Seise¹², Arno Kleinke, Sven Breitkopf, Marco Plötner¹,
Jens Limpert¹², Andreas Tünnermann¹²; ¹Inst. of Applied Physics,
Friedrich Schiller Univ. Jena, Jena, Germany; ²Helmholtz Inst. Jena, Jena,
Germany. We present the coherent combination of high-energy
ultrashort pulses from two fiber CPA channels. We achieved a combining efficiency of 91% with a compressed pulse duration of 800 fs and 120 μJ pulse energy.

AMC2 • 11.45
Coherent combining of two femtosecond fiber chirped pulse amplifiers, Louis Danzault¹, Marc Hanna¹, Laurent Lombard², Didier Gaulier², Pierre Bourdon³, Frédéric Draun¹, Patrick Georges¹; ¹Laboratoire Charles Fabry de l’Inst. d’Optique, Palaiseau, France;²ONERA, Palaiseau, France. We demonstrate coherent combining of two fiber chirped pulse amplifiers seeded by a common oscillator. A phase stability of λ/20 is obtained using a fiber electro-optic phase modulator, and the recombined pulsewidth is 485 fs.

AMC3 • 12.00
All-Fiber Phase-locked Multi-core Photonic Crystal Fiber Laser, Michio Matsumoto¹, Tetsuya Kobayashi², Akira Shirakawa², Ken-ichi Ueda³; ¹Inst. for laser science, UEC, Chofu, Japan. We propose and demonstrated all-fiber in-phase mode selection in an Yb-doped multi-core photonic crystal fiber laser. A high slope efficiency of 71% and significantly improved beam profile by fill-factor enlargement were achieved.

AMC4 • 12.15
Coherent Combining with Imperfect Beams, Gregory Goodno⁴, Chun-Ching Shih⁴, Joshua Rothenberg⁴; ¹Northrop Grumman Aerospace Systems, Redondo Beach, CA, USA. Coherent combining efficiency losses from spatially and temporally mismatched input fields are quantified in terms of normalized variances of the field parameters. We derive expressions for Gaussian beams relevant for coherent fiber arrays.

AMC5 • 12.30
CEP Stable, High Repetition Rate, Two-cycle Pulses from an OPCPA System with μJ Pulse Energies, Marcel Schultze¹, Thomas Binhammer², Guido Palmer², Moritz Emons², Tino Lang², Uwe Morgner², Jan Hädrich², ¹Inst. of Quantum Optics, Leibniz Univ. Hannover, Hannover, Germany; ²VENTEON Laser Technologies GmbH, Garbsen, Germany; ²Ctr. for Quantum Engineering and Space-Time Res. (QUEST), Hannover, Germany. We present a compact two-stage OPCPA system producing CEP-stabilized pulses with compressed pulse energies of more than 3 μJ and durations of less than 6 fs at high repetition rates between 100 and 500 kHz.

12.45–14.15
Lunch Break (on your own)
leads to 35 fs, 380 μJ (19 W), 5.7 GW pulses.

**AMD6 • 15.45**

*Generation of ultrashort visible and mid-IR pulses via adiabatic frequency conversion*, Barry D. Brusset, Haim Suchorski¹, Ayelet Ganany-Padovicz, Haim Suchorski¹, Irit Juvalier¹, Ady Arie¹, Yaron Silberberg¹; ¹Dept. of Physics of Complex Systems, Weizmann Inst. of Science, Rehovot, Israel; ²Dept. of Physical Electronics, Faculty of Engineering, Tel Aviv Univ., Tel Aviv, Israel; ³Dept. of Electrical and Electronics Engineering, Sami Shamoon College of Engineering, Ashkelon, Israel. A method for efficient, broadband sum and difference frequency generation of ultrashort pulses is demonstrated. Using aperiodically poled nonlinear crystals and a single step nonlinear mixing process, conversion efficiencies up to 50% are reported.

**AME5 • 17.45**

*Lab Demonstration and Characterization of a Green Astro-comb*, Chih-Hao Li², Guoqing Chang², Li-jin Chen², David F. Phillips¹, Franz Kärtner³, Ronald L. Walsworth³; ¹Harvard-Smithsonian Ctr. for Astrophysics, Cambridge, MA, USA; ²MIT, Cambridge, MA, USA. A green astro-comb, generated from a Ti:sapphire laser, broadened by a photonic crystal fiber and filtered by a Fabry-Perot cavity, is demonstrated. We characterized the unwanted mode suppression with a quick and broadband method.

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**AME • Frequency Combs**

*Bosphorus, P Floor*  
16.30–18.00  
Livio Grieben; Max Born Inst., Germany, Presider

**AME1 • 16.30**

*In Invited*  
**Rapid, High Resolution Frequency Comb Measurements**, Ian R. Coddington, Fabrizio R. Giorgetta, Esther Baumann, William C. Swann, Nathan R. Newbury; Optoelectronics Division ($15.00), NIST, Boulder, CO, USA. Frequency combs serve as an extremely high accuracy reference across broad portions of the optical spectrum. Dual frequency combs harness this accuracy and allow for fast and highly flexible measurements of passive and active sources.

**AME2 • 17.00**

*4.4-5.4 μm frequency comb from a subharmonic OP-GaAs OPO pumped by a femtosecond Cr:ZnSe laser*, Konstantin Vodopyanov¹, Evgeni Sorokin¹, Peter Schunemann¹, Irina Sorokin¹; ¹Photonics Inst., TU Vienna, Vienna, Austria; ²Physics Dept., NTNU, Trondheim, Norway. A subharmonic OPO based on LiNdP:OPO with pump from a Cr:ZnSe laser was demonstrated to produce a tunable frequency comb centered at 4.9 μm in the far-infrared with a line spacing of 300 kHz.

**AME3 • 17.15**

*Development and characterization of all-normal dispersion fiber laser for frequency comb generation*, Cagri Senel¹, F. Omer Ilday¹, Oguzhan Kara¹, Ramiz Hamid¹, Cihan Gordan¹; ¹Physics, Bilkent Univ., Ankara, Turkey; ²Physics Engineering, Hacettepe Univ., Ankara, Turkey. Development of an all-normal-dispersion Yb-doped fiber laser-based frequency comb is reported. Repetition-frequency stabilization to the cesium standard, amplitude and phase noise measurements indicate low-noise performance.

**AME4 • 17.30**

*Broadband Phase-Noise Suppression in a Yb-based Optical Frequency Comb*, Dylan C. Yost¹, Arman Cingoz¹, Thomas K. Allison¹, Jun Ye¹, Axel Ruehl¹, Ingmar Hartl¹, Martin E. Fernow¹; ¹IILA- Univ. of Colorado Boulder, Boulder, CO, USA; ²IMRA America Inc., Ann Arbor, MI, USA. We achieve 10dB suppression of phase-noise in a Yb-based frequency comb with 300kHz bandwidth by implementing robust intensity servo. The results are important for precision comb applications including femtosecond enhancement cavities.
• Tuesday, February 15, 2011 •

7.30–18.30
Registration Open

**ATuA • Mid-Infrared Lasers**

**Bosphorus, P Floor**

8.00–10.00
Mark Dubinskii; US Army Res. Lab, USA, Presider

**ATuA1 • 8.00 Invited**

Progress in mid-IR Cr:Fe and Fe:Cr doped II-VI Materials and Lasers, Sergey Mirov1; 2Dept. of Physics, Univ. of Alabama at Birmingham, Birmingham, USA. Recent advances in Cr:Fe and Fe:Cr doped mid-IR polycrystalline, hot-pressed ceramic, waveguides, powders, powders in the liquid suspension and polymer-film, and quantum dot laser materials fabrication and lasing under optical excitation are presented.

**ATuA2 • 8.30**

Broadly tunable high-power continuous-wave Cr: CdS laser, Evgeni Sorokin1, Dmitry Klementov2, Irina Sorokina2, Vladimir Kazloeski2, Yu Korostelin3, A. Landmann3, Yuri Podmar’ koe3, Yan Skaysrykii2, Mikhail Frolov2; 4TU Vienna, Vienna, Austria; 5Physics Dept., NTNU, Trondheim, Norway; 6P.N. Lebedev Physical Inst., Moscow, Russian Federation. We report spectroscopic and laser study of Cr: CdS laser - an attractive material for 3 μm room-temperature operation. 1.8 W of output power, continuously tunable over 1000 nm from 2240 nm to 3285 nm was demonstrated.

**ATuA3 • 8.45**

Femtosecond Tm-Ho codoped double tungstate lasers around 2060 nm, Alexander Lagatski1, Dolores Serrano1, Concepción Cascales1, Carlos Zaldo1, Tom Brown1, Wilson Sibbett1; 2Physics and Astronomy, Univ. of St Andrews, St Andrews, UK; 3Inst. o de Ciencia y Tecnología de Materiales de Madrid, Madrid, Spain. Femtosecond modelocking in Tm:Ho codoped Na3(WO4)2 and K2(WO4)2 lasers is reported. Transform-limited 190-fs pulses are produced at 2060 nm at a repetition frequency of 144 MHz. Output power exceeds 200 mW during femtosecond pulse generation.

**ATuA4 • 9.00**

330 mJ, 2 μm, Single Frequency, Ho:YLF Slab Amplifier, Henchard J. Strauss1, 2, D. Preussler1, O. J. Colletti1, M. J. Esser1, C. Jacob1, C. Bollig1, W. Koen1, K. Nyangaza1; 3National Laser Ctr., CSIR, Pretoria, South Africa. A single-frequency double pass Ho:YLF slab amplifier delivering pulses up to 330 mJ at 2064 nm was demonstrated. It was end-pumped with a Tm:YLF slab laser and seeded with 57 mJ of single frequency pulses.

**ATuA5 • 9.15**

Long Wavelength Laser Operation of Tm:Sc2O3 at 2116 nm and Beyond, Philipp Koopmann1, 2, Samir Lamrini1, Karsten Scholle1, Peter Fuhrberg1, Klaus Petermann1, Günter Huber1; 1Inst. of Laser-Physics, Hamburg, Germany; 2LISA laser products, Katlenburg-Lindau, Germany. We report on the high power laser operation of Tm:Sc2O3 with a slope efficiency of 41 % and an output power of 26 W at 2116 nm. A tunability from 1975 nm to 2168 nm is presented.

**ATuA6 • 9.30**

Generation and Stability Characterization of Fiber-Based Difference Frequency Generation Tuned Through Controlled Soliton Self-Frequency-Shifting, David Winters1, Philip Schlap1, Randy Bartels1; 2Colorado State Univ., Fort Collins, CO, USA. We present a soliton-tuned source of mid-infrared (MIR) ultrafast laser pulses. Characterization of the source stability is presented through measurements of intensity noise and timing jitter of the pulses used for frequency conversion.

**ATuA7 • 9.45**

Yb-fiber MOPA Pumped Optical Parametric Oscillator for Frequency-Swept Broadband Mid-Infrared Spectroscopy, Alissa Silva12, 2Univ. of Bristol, Bristol, UK; 3Ctr. for Nanoscience and Quantum Information, Bristol, UK. A Ytterbium-fiber-pumped continuous wave optical parametric oscillator rapidly tunable in the 2.73-4.02μm region is described. The system is well-suited to applications requiring a high-brightness source for spectroscopy of solid and liquid samples.

Dolmabahce Foyer, R Floor
10.00–10.30
Coffee Break

Dolmabahce Ballroom, R Floor
10.00–16.45
Exhibits Open

**ATuB • ASSP Poster Session I**

Dolmabahce Foyer, R Floor
10.00–11.30

**ATuB01**

Novel Actively Cooled Split-Disk Nd:glass Laser Amplifier for High-Energy Applications with Improved Repetition Rate, Jonathan Zuegel1, Milton J. Shoup1, John H. Kelly1, Curt Frederickson2; 1Univ. of Rochester/Lab for Laser Energetics, Rochester, NY, USA; 2Continuum, Inc., Santa Clara, CA, USA. Design details and laser-performance simulations for a novel water-cooled, split-disk laser-amplifier concept are presented. The amplifier will produce high-energy laser pulses (>500 J) with shot rates faster than one shot per minute.

**ATuB02**

Ultrafast nonlinear refractivity of Lead Lantum Zirconate Titanate Ceramics, Atsushi Sugita1, Yasunawa Kazawa1, Naoki Wakiyi1, Hisao Suzuki1, 2Shizuoka Univ., Hamamatsu, Japan. Here we will report that nonlinear refractivity and its temporal response of Lead Lantum Zirconate Titanate ceramics were almost comparable to those of...
SrTiO$_3$ single crystal, one of the most excellent solid-state optical Kerr materials.

ATuB03
Enhanced Detection of a Longitudinal Electric Field for a Linearly Polarized Gaussian Beam. Yuichi Kozawa$^1$, Shunichi Sato$^1$; $^1$Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. Enhanced detection of a weak longitudinal electric field produced by focused linearly and circularly polarized Gaussian beams through a second harmonic generation process is demonstrated by effectively utilizing a strong transverse electric field.

ATuB04
Spectroscopic properties and 2 μm laser operation of Ho:BaYLuF$_4$ crystal. Yingxin Bai$^1$, Jirong Yu$^1$, Brian Walsh$^2$, Songsheng Chen$^1$, Miugeta Petros$^3$, Norman Barnes$^2$, Upendra Singhi$^4$, Arlete Cassanhoro$^5$, Hans Jessen$^6$; $^1$Science and Systems Applications, Incorporation, Hampton, VA, USA; $^2$NASA Langley Res. Ctr., Hampton, VA, USA; $^3$STC, Hampton, VA, USA; $^4$AC material, Tarpon Springs, FL, USA. A novel 2μm laser crystal, Ho:BaYLuF$_4$, has been grown. Spectra for the transition between 1$^1$I and 1$^1$F of this crystal are measured. Laser operations in both linear and ring cavity configuration are demonstrated.

ATuB05
Yb-free Er-doped 976 nm Pumped Large Mode Area Fiber Amplifier with 67 W of Output Power. Vincent Kohn$^{1,2}$, Dietmar Kracht$^{1,2}$, Jörg Neumann$^{1,2}$, Peter Wessels$^{1,2}$; $^1$Laser Development Dept., Laser Zentrum Hannover e.V., Hannover, Germany; $^2$C.tr. for Quantum-Engineering and Space-Time Res. - QUEST, Hannover, Germany. We demonstrate for the first time the power-scaling of Yb-free Er-doped fiber amplifiers to levels of multiple 10W. The achieved output power of 67W is the highest value ever reported for an Yb-free Er-doped fiber-system.

ATuB06
2.5 mJ, sub-nanosecond pulses from single-crystal fiber amplifier in a kHz MOPA system. Igor Martial$^{1,2}$, Francois Balembois$^1$, Julien Didierjean$^2$, Patrick Georges$^2$; Laboratoire Chimies Fabry de l’Inst. d’Optique, Palaiseau cedex, France; $^2$Fiberlight, Lyon, France. A Master Oscillator Power Amplifier configuration using a Nd:YAG single-crystal fiber to amplify a passively Q-switched microlaser is presented. We achieved the amplification of 80 μJ, sub-nanosecond pulses to the multi-millijoule regime.

ATuB07
Gain switched laser diode based all-fiber ps laser source emitting simultaneously at 8 different wavelengths in the NIR region. Hakam Sayice$^{1,2}$, Sebastian Kanzelmeier$^1$, Katharina Hausmann$^{1,2}$, Thomas Theeg$^1$, Jörg Neumann$^{1,2}$, Dietmar Kracht$^{1,2}$; $^1$Laser Zentrum Hannover e.V., Hannover, Germany; $^2$Quantum Engineering and Space-Time Res. (QUEST), Hannover, Germany. In this contribution we demonstrate a gain switched laser diode based all-fiber ps laser source, capable of emitting pulses simultaneously at 8 different wavelengths in the region between 1.06 μm and 1.59 μm.

ATuB08
Review and evaluation of the nonlinear capabilities of RECOb (RE = Y, Gd) oxyborate crystals for SHG. Pascal Loiseau$^{1,2}$, Takunori Taira$^3$, Gerard Aka$^4$; $^1$CMC, ENSCP, Paris, France; $^2$Laser Res. Ctr., IMS, Okazaki, Japan. NLO oxyborate crystals exhibit some outstanding properties that this work critically reviews. 50% SHG conversion efficiency was obtained at 0.23 and 0.37 MW IR peak power for YCOB (15 mm) and LBO (10 mm) respectively.

ATuB09
All-fiber Yb-doped CW and pulsed laser sources operating near 980 nm. Mathieu Laroche$^1$, Celia Bartolacci$^1$, Gilles Herode$^1$, Girard Sylvain$^1$, Thierry Robin$^1$, Benoît Cadier$^2$; $^1$CIMAP, Caen, France; $^2$XFIBER, Lannion, France. We present a CW/pulsed master oscillator-power amplifier (MOPA) fiber source operating near 980 nm and based on a Yb-doped fiber pumped by a Nd-doped fiber laser at 930 nm. Up to 2.1W was obtained in CW regime with a slope efficiency of 81%.

ATuB10
A 469 nm blue laser to pump Pr$^{3+}$ doped fluoride crystals. Patrice Campy$^1$; $^1$CIMAP, Caen, France. We report CW visible laser operation of Pr$^{3+}$ doped LiLuF$_4$, LiYF$_4$, and KYF$_6$ crystals pumped with a compact, intracavity frequency-doubled diode-pumped Nd:YAG laser at 469.12 nm, thus opening another way for power scaling of Pr-lasers.

ATuB11
Mode-locked all-solid photonic bandgap fiber laser, Ammar Hidouer$^1$, Caroline Lecaplain$^1$, Levammy Rosaloniainia$^1$, Olga Egorova$^1$, Evgeni Dianov$^2$, Sergey Semjonov$^2$, Jérémie Michaud$^2$; $^1$CNRS UMR 6614 CORIA, Saint etienne du Rouvray, France; $^2$Fiber Optics Res. Ctr., Moscow, Russian Federation. We report on a mode-locked Yb-doped solid photonic bandgap fiber operating in the all-normal dispersion regime. The laser delivers 4ps pulses with 21 nJ energy. These pulses are extra-cavity compressed down to 230 fs.

ATuB12
8 W Actively Mode-Locked Ytterbium Doped Fiber Laser Delivering 10 ps pulses at 40 MHz. Pierre Deslandes$^{1,2}$, Damien Sangla$^3$, Julien Saby$^1$, Francois Salin$^1$, Eric Frey$^2$; $^1$Edite Systems, Pessac, France; $^2$Univ. de Bordeaux, CNRS, CPMOH, UMR 5798, Talence, France. We present an actively mode-locked laser based on an ytterbium doped single-mode double-clad photonic crystal fiber of 30-μm core diameter pumped with 13.5-W at 976-nm generating 8-W of average power and 10-ps pulses at 40-MHz.

ATuB13
Analysis of a high-energy, diode-pumped Yb:CaF$_2$: disk laser. Markus Loser$^1$, Mathias Siebold$^1$, Franziska Kroll$^1$, Fabian Roeser$^1$, Joerg Koerner$^1$, Joachim Heint$^1$, Ulrich Schramm$^1$; $^1$Res. Ctr. Dresden-Rossendorf,
Dresden, Germany; 'Inst. of Optics and Quantum Electronics, Jena, Germany. We present gain measurements and a time-resolved thermal lens analysis of a diode-pumped Yb:CaF$_2$ disk laser. A lens power of 0.05dpt and small-signal gain of 5.2 amplifier were achieved at full pump power.

**ATuB14**

Diode-pumped Tm:Lu$_2$O$_3$ thin disk laser, Martin Schollhorn$^1$, Philipp Koopmann$^{2,3}$, Karsten Scholle$^1$, Peter Fuhrberg$^1$, Klaus Petermann$^2$, Günter Huber$^1$; 'ISL, French German Res. Inst., Saint-Louis, France; 'LISA laser products, Katlenburg-Lindau, Germany; 'ILP, Univ. of Hamburg, Hamburg, Germany. We report the first diode-pumped Tm:Lu$_2$O$_3$ laser operation in thin disk design. Average output powers of 1.4 W and slope efficiencies of 32 % with respect to incident pump power were achieved in quasi-CW pumping.

**ATuB15**

Sum Frequency Generation of High Energy, Low Divergence UV pulses, Oystein Farsund$^1$, Gunnar Arisholm$^1$, Gunnar Rustad$^2$; 'FFI (Norwegian Defence Res. Establishment), Kjeller, Norway. A 295 nm nanosecond source with pulse energy exceeding 30 mJ and beam quality ~1 mm•mrad is demonstrated. A 1064 nm laser pumps an OPO whose signal beam is mixed with the laser’s third harmonic in a compact setup.

**ATuB16**

Multi-Watt Average Power Nanosecond Microchip Laser and Power Scalability Estimates, Olek Konoplev$^1$, Aleksey A. Vasil'ev$^2$, Antonios A. Sasi$^2$, Anthony W. Yu$^2$, Steven X. Li$^2$, George B. Shaw$^2$, Mark A. Stephen$^2$, Michael A. Krainak$^1$; 'Space Laser Systems, Lanham, MD, USA; 'NASA GSFC, Greenbelt, MD, USA. We demonstrated up to 2 W average power, CW-pumped, passively-Q-switched, 1.5 ns monolithic microchip laser with single-longitudinal mode-operation. We discuss various design approaches to bring the average power to 10W and beyond.

**ATuB17**

Tm$^{3+}$-doped CW fiber laser based on a highly GeO$_2$-doped dispersion shifted fiber, Vladislav Drozdyrin$^1$, Irina Sorokina$^1$, Vladimir Kalashnikov$^1$, Valery Mashinsky$^1$, L. Ischakov$^1$, Evgeni Dianov$^1$, V. F. Khopin$^1$, A. N. Guryanov$^1$; 'Norwegian Univ. of Science & Technology, Trondheim, Norway; 'Inst. für Photonik, TU Wien, Vienna, Austria; 'Fiber Optics Res. Ctr., Russian Acad. of Sciences, Moscow, Russian Federation; 'Inst. of Chemistry of High-Purity Substances, Russian Acad. of Sciences, Nizhny Novgorod, Russian Federation. All-fiber Tm-laser with 55GeO$_2$-45SiO$_2$ core, pumped at 1560 nm with 37% slope efficiency was demonstrated at 1862 nm. Four-wave mixing owing to a high nonlinearity and shifted to 1.85 µm zero-dispersion-wavelength has been observed.

**ATuB18**

Dysprosium lead thigallate crystal resonantly pumped by Er:YLF laser radiation, Helena Jelinková$^1$, Maxim Doroshchenko$^2$, Michal Jelinek$^2$, Jan Šule$^1$, Tasoltan Basiev$^2$, Valerii V. Badikov$^2$, Dmitrii V. Badikov$^2$; 'Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 'General Physics Inst., Moscow, Russian Federation; 'Kuban State Univ., Krasnodar, Russian Federation. The characteristics of room temperature Dy$^{3+}$:PbGa$_2$S$_5$ resonantly pumped by the 1.74 µm Er:YLF laser radiation was investigated. The stable output energy and slope efficiency obtained at 4.3 µm was 3.1 mJ and 8%, respectively.

**ATuB19**

Tunable erbium fiber laser using a low-cost, all-fiber multimode interference filter, Till Walbaum$^1$, Tim Hellwig$^1$, Martin Schäferling$^1$, Carsten Fallnich$^1$; 'Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. A low-cost tunable all-fiber filter in the telecommunication spectral region, based on multimode interference, is realized. We present a fiber laser with this filter that can be tuned by more than 15nm in operation.

**ATuB20**

Automated characterization of polarization within a passively mode-locked erbium-doped all-fiber laser, Tim Hellwig$^1$, Till Walbaum$^1$, Petra Gross$^1$, Carsten Fallnich$^1$; 'Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. Automated characterization and alignment of fiber lasers based on nonlinear polarization rotation is presented. The obtained mode-locking maps allow reproducible selection of pulses with different characteristics by computerized polarization control.

**ATuB21**

Continuous-wave of Yb:CaGdAlO$_3$ thin disk laser, Sandrine Ricaud$^1$, Bruno Viana$^1$, Philippe Goldner$^1$, Marwan Abdouh-Ahmed$^1$, Birgit Weichelt$^3$, Eric Motta$^3$, Patrick Georges$^2$, Frédéric Draoui$^1$; 'Laboratoire Charles Fabry de l’Inst. d’Optique, Palaiseau, France; 'Laboratoire de Chimie Appliquée de l’École nationale Supérieure de Chimie de Paris, Paris, France; 'Inst. fur Strahlwerkzeuge, Stuttgart, Germany; 'Amplitude Systemes, Pessac, France. We report a continuous-wave Yb:CaGdAlO$_3$ thin disk laser, generating 18W of output power with a slope efficiency of 25% and an optical-to-optical efficiency of 20%.

**ATuB22**

Q-switching of a mode-controlled, diode-side-pumped Nd$^{3+}$:YLiF$_4$ laser at 1053 nm with high efficiency and diffraction limited beam quality, Niklaus Wetter$^1$, Marco A. Ferrari$^1$, Eduardo C. Sousa$^1$, Izilda M. Ranieri$^1$, Sonia L. Baldochi$^1$; 'CLA-IPEN/SP_CNEN, Sao Paulo, Brazil. In this work we present passively Q-switched operation of a Nd$^{3+}$:YLiF$_4$ slab laser that achieves 3.2 mJ per pulse and 500Hz rep rate with diffraction limited beam quality by mode-controlling in a simple, compact cavity.

**ATuB23**

Push contrast ratio to 10$^{10}$ in femtosecond Ti:sapphire amplifier with a non-collinear optical parametric amplifier, Cheng Liu$^1$, Zhaohua Wang$^1$, Weichang Liu$^1$, Qing Zhang$^1$, Zhiyi Wei$^1$; 'Lab of Optical Physics, Inst. of Physics, Beijing, China. We demonstrated a new
scheme to promise high contrast ratio in femtosecond Ti:sapphire amplifier. With a non-collinear optical parametric amplifier, contrast ratio up to \(10^{10}\) was realized within the time scale of hundreds of picoseconds.

**ATuB24**

**Application of Frequency Stabilized Lasers for Precision Length Measurements,** Ramiz Hamid\(^1\), Oğuz Sendagdu\(^2\), Changir Erdogan\(^2\); \(^1\)National Metrology Inst. (UME), Gebze-Kocaeli, Turkey; \(^2\)National Metrology Inst. (UME), Gebze, Turkey; \(^3\)National Metrology Inst. (UME), Gebze, Turkey. We report for the first time, application of pulse-bursts in Yb-doped fiber at repetition rates as low as 200 Hz for applications to accelerators and material processing. Synchronous pulsed pumping allows suppression of ASE generation.

**ATuB25**

**Fiber amplification of pulse bursts at low repetition rates via synchronous pulsed pumping,** Hamit Kalyancioglu\(^1\), F Oemer Ilday\(^1\), Koray Eken\(^1\), Seydi Yaras\(^1\); \(^1\)Bilkent Univ., Ankara, Turkey; \(^2\)Fiberlast Ltd., Ankara, Turkey. We report, for the first time, amplification of pulse-bursts in Yb-doped fiber at repetition rates as low as 200 Hz for applications to accelerators and material processing. Synchronous pulsed pumping allows suppression of ASE generation.

**ATuB26**

**Long-period gratings in photonic crystal fibers and their applications on Ytterbium-doped fiber lasers,** Daniel E. Ceballos-Herrera\(^1\), Alejandro Martinez-Rios\(^1\), Oracio Barbosa-Garcia\(^1\); \(^1\)Universidad Politécnica de Valencia, Valencia, Spain; \(^2\)Centro de Investigaciones en Optica (CIO), Leon, Mexico. We present the resonance splitting of long-period fiber gratings induced mechanically in twisted photonic crystal fibers and their applications on the performance of tunable and switchable multiwavelength double-clad Ytterbium-doped fiber lasers.

**ATuB27**

**Crystalline-orientation dependent laser performance of Yb:YAG microchip lasers,** Jian Ma\(^1\), Jun Dong\(^2\); \(^1\)Dept. of Electronics Engineering, Xiamen Univ., Xiamen, China. Manipulated polarized lasers were achieved in laser-diode pumped Yb:YAG microchip laser by controlling the crystalline-orientations in <111> Yb:YAG crystal. Effect of pump source on laser polarization states of Yb:YAG microchip lasers was addressed.

**ATuB28**

**Lamp-pumped and diode-pumped YAG:Nd\(^3+\) laser systems with gain-grating phase conjugation and interchannel phase locking control by a passive Li:F-Q-switch,** Tsollton T. Basiievi\(^1\), Alexander V. Fedin\(^1\), Andrei V. Gavrilov\(^1\), Sergey N. Smetanin\(^1\), Anatoly S. Borevsky\(^1\), Vyacheslav F. Lebedev\(^1\); \(^1\)Laser Materials and Technology Res. Ctr., A.M. Prokhorov General Physics Inst., Moscow, Russian Federation; \(^2\)Laser Physics, Kurchatov State Technological Acad., Moscow, Russian Federation; \(^3\)Laser Systems LTD, St. Petersburg, Russian Federation. New lamp-pumped and diode-pumped YAG:Nd-laser systems with phase conjugation and interchannel phase locking are studied, in which only one laser channel has a Li:F-Q-switch, but it results in phase-locked oscillation of all the laser system.

**ATuB29**

**Pr:YAlO\(_3\) microchip laser at 662 nm,** Martin Fährich\(^1\), Helena Jelinková\(^1\), Jan Šulc\(^1\), Karel Nejezchleb\(^2\), Václav Škoda\(^2\); \(^1\)Czech Technical Univ. in Prague, FNSPE, Prague, Czech Republic; \(^2\)Crytur Ltd., Turnov, Czech Republic. A continuous-wave Pr:YAlO\(_3\) microchip laser operation at 662 nm is reported. Microchip resonator was formed by dielectric mirrors directly coated on the Pr:YAlO\(_3\) crystal surfaces. As a pumping source, 1-W GaN laser-diode was used.

**ATuC • Ultrafast Oscillators**

**Bosphorus, P Floor**

**11.30–13.00**

James Kafka; Newport Corp., USA, Presider

**ATuC1 • 11.30 Invited**

**Power-Scaling of Femtosecond Thin Disk Lasers,** Thomas Südmeyer\(^1\), Cyrill Roman Emmanuel Baer\(^1\), Christian Kränkel\(^2\), Clara J. Saraceno\(^1\), Oliver H. Heckl\(^1\), Matthias Golling\(^1\), Rigo Peters\(^2\), Klaus Petermann\(^2\), Günter Huber\(^1\), Ursula Keller\(^1\); \(^1\)Dept. of Physics, ETH Zurich, Zurich, Switzerland; \(^2\)Inst. of Laser-Physics, Univ. of Hamburg, Hamburg, Germany. Ultrafast thin disk lasers generate higher average powers (>140W) and pulse energies (>25μJ) than any other ultrafast oscillator technology. In this presentation, we discuss the current state-of-the-art and their potential for further power-scaling.

**ATuC2 • 12.00**

**Energies above 30 μJ and average power beyond 100 W directly from a mode-locked thin-disk oscillator,** Dominik Bauer\(^1\), Farina Schättiger\(^1\), Jochen Kleinbauer\(^1\), Dirk H. Sutter\(^1\), Alexander Killi\(^1\), Thomas Dekorsy\(^1\); \(^1\)Dept. of Physics and Ctr. of Applied Photonics, Univ. of Konstanz, Konstanz, Germany; \(^2\)TRUMPF-Laser GmbH + Co. KG, Schramberg, Germany. We demonstrate pulses containing more than 30 μJ with a pulse length of 1040 fs directly out of a thin-disk laser in ambient atmosphere. The laser was operated at 3.5 MHz repetition rate and 108 W output power.

**ATuC3 • 12.15**

**Energy scalability of mode-locked oscillators: comparative analysis,** Vladimir Kalashnikov\(^1\), Alexander Apolonoski\(^1\); \(^1\)Inst. fuer Photonik, TU Wien, Vienna, Austria; \(^2\)Dept. fuer Physik, Ludwig-Maximilians-Univ. Muenchen, Munich, Germany. A theory of energy scalability of modelocked oscillators is developed. An oscillator is characterized by a two-dimensional master diagram and by a simple scaling rule, which justifies sub-mJ femtosecond pulses feasible directly from an oscillator.
22 Watt Average Power Multi-MW fiber oscillator, Martin Baumgart1, Florian Jansen1, Fabian Stutzki1, Cesar Jauregui1, Jens Limpert1, Andreas Tünnemann1,2; Friedrich-Schiller-Univ., Jena, Germany; 1Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report on the realization of a mode-locked fiber laser emitting 27 W of average power. Pulses are compressed to sub-100 fs (80% compressor efficiency) corresponding to 3.2 MW of peak power.

High-energy chirally-coupled-core Yb-fiber laser with high-dispersion limited beam quality, Hung-Wen Chen1, Tom Sosnowski1, Chi-Hung Liu1, Li-Jin Chen1, Jonathan Birge2, Almantas Galvanauskas3, Franz Kärtner3, Guoqing Chang4; 1Dept. of Electrical Engineering and Computer Science and Res. Lab of Electronics, MIT, Cambridge, MA, USA; 2Arbor Photonics, Inc., Ann Arbor, MI, USA; 3Dept. of Electrical Engineering and Computer Science, the Univ. of Michigan, Ann Arbor, MI, USA. We demonstrate a high-energy femtosecond laser system with two rapidly advancing technologies: 3C LMA fiber to ensure single-mode operation and high-dispersion mirror to enable loss-free pulse compression with the diffraction-limited beam quality.

High-magnetic-energy GRIN fiber laser with high-dispersion limited beam quality, Jansen1, Steffen Hädrich2, Henning Carstens3, Jens Limpert4, Andreas Tünnemann2,1; Inst. of Applied Physics, Friedrich-Schiller-Univ. Jena, Jena, Germany; 1Helmholtz-Inst. Jena, Jena, Germany. We report on an ultrashort pulse fiber CPA system that delivers clean pulses with 2.2 mJ pulse energy, sub 500 fs and 3.8 mJ peak power. The main amplifier of the system is a 108µm core diameter Large Pitch Fiber.

All Thulium Fiber CPA System with 107 fs Pulse Duration and 42 nm Bandwidth, Robert Sims1, Pankaj Kadian1, Lawrence Shah1, Martin Richardson1; 1CREOL/ The College of Optics and Photonics, Orlando, FL, USA. 107 fs pulses were generated in a tunable Raman amplifier with energies up to 8.5 nJ at 70 MHz. Pulses were temporal stretched and amplified to 120 nJ with a spectral width of 42 nm.

High Power Energy Sub-10 ps Pulses from Compressed Passively Q-Switched Laser, Alexander Steinnetz1, Dirk Nodop2, Tino Eidam3, Jens Limpert4, Andreas Tünnemann2,1; Friedrich-Schiller-Univ. Jena, Inst. of Applied Physics, Jena, Germany; 1Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report on nonlinear compression of passively Q-switched microchip-laser pulses. Initial 100-ps pulses are fiber-amplified, thereby SPM-spectrally broadened and compressed to 6-ps with pulse energies of 13-µJ at repetition rates of several 100-kHz.

High-power, broadly tunable, and low-quantum-defect Yb+-doped double tungstate channel waveguide lasers, Dimitri Guskus1, Shannugam Aravazhi1, Kerstin Wörmann1, Markus Pollnau1; 1OMS, Univ. of Twente, Enschede, Netherlands. KGd1-xLux(WO4)2:Yb+ channel waveguides delivered 418 mW of output power at 1023 nm with a slope efficiency of 71%. Grating tuning from 980 nm to 1045 nm and a record- low quantum defect of 0.8% was achieved.

Highly Efficient Distributed Feedback Waveguide Laser in Al:Ox:Yb+ on Silicon, Edward H. Berndhardt1, Kerstin Wörhoff1, René M. de Ridder1, Markus Pollnau1; 1Integrated Optical MicroSystems Group, Univ. of Twente, Enschede, Netherlands. An ytterbium-doped aluminum oxide distributed feedback channel waveguide laser is reported. The laser has a 5 mW threshold and emits 34 mW in single-frequency operation at 1022.2 nm wavelength with a slope efficiency of 67%.
ATuE • Near Infrared Lasers

Bosphorus, P Floor
16.45–18.15
Jennifer Haste; Univ. of Strathclyde, UK, Presider

ATuE1 • 16.45 Invited
Anisotropic Laser Ceramics toward Giant Micro-photonic,
Takunori Taira1; 1Laser Res. Ctr. for Molecular Science, Inst. for Molecular
Science,1 Japan. Transparent laser ceramics have been demonstrated
to offer tremendous processing and design advantages. After
progress review for giant micro-photonic, we’d like to discuss the
next generation of high brightness lasers based on the anisotropic
ceramics.

ATuE2 • 17.15
High Efficiency Nanosecond Pulse Amplification Based on Diode-
Pumped Cryogenic-Cooled Yb:YAG, Joerg Koerner1, Joachim Hein1,
Martin Kahle1, Hartmut Liebetrau1, Malte Kaluza1, Mathias
Siebold2; 1Institute of Optics and Quantum Electronics, Jena,
Germany; 2Forschungszentrum Dresden Rossendorf, Dresden, Germany.
An output energy of 1.1 J of amplified nanosecond pulses was
obtained by utilizing a diode-pumped Yb:YAG laser amplifier with
the crystal cooled to 125 K. We achieved an unrivaled high total
amplifier efficiency of 45 %.

ATuE3 • 17.30
High power Yb:CaF2 laser at cryogenic temperature, Frédéric
Druon1, Sandrine Ricaud1,2, Dimitris N. Papadopoulos3, Patrick Georges3,
Patrice Campy1, Jean-Louis Doualan4, Richard Moncorgé5, Antoine
Courjaud6, Eric Mottay7; 1Laboratoire Charles Fabry de l’Inst. d’Optique,
Palaiseau, France; 2Inst. de la Lumière Extrême, Palaiseau, France; 3Ctr. de
recherche sur les Ions, les Matériaux et la Photonique, Caen,
France; 4Amplitude Systèmes, Pessac, France. A high-power diode-
pumped Yb:CaF2 laser operating at cryogenic temperature is
presented with an extracted output power of 97 W at 1034 nm. We
also demonstrate 992-nm laser operation (1.1 % quantum defect).

ATuE4 • 17.45
6.6 J / 2 Hz Yb:YAG Diode-Pumped Laser Chain Activation, Jean-
Christophe Chanteloup1, Daniel Albach1, Antonio Lucianetti1, Thierry
Nove1, Bernard Vincent1; 1CNRS, Palaiseau, France. With careful
Amplified Spontaneous Emission and thermal management, 6.6
Joules 7 ns pulses were extracted at 2 Hz in four passes from Lucia
active mirror Yb:YAG Diode Pumped Laser amplifier. 15% optical to
optical efficiency was achieved.

ATuE5 • 18.00
Efficient σ-polarized Resonantly-Pumped Er3+:YVO4 Laser at
1593.5 nm, Nikolay Ter-Gabrielyan1, Viktor Fromzel1, Tadeusz
Lukasiewicz2, Witold Ryba-Romanowski2, Mark Dubinskii1; 1US Army
Res. Lab, Adelphi, MD, USA; 2Inst. of Low Temperature and Structure
Res., Wroclaw, Poland; 1Inst. of Electronic Materials Technology and
Structure Res., Warsaw, Poland. Laser operation of a resonantly-
pumped Er3+:YVO4 laser at 1593.5 nm is demonstrated for the first
time. Maximum slope efficiency of ~70% and maximum quasi-CW
power of 59.8 W were achieved with spectrally-narrowed diode
pumping at 1534 nm.

NOTES
• Wednesday, 16 February 2011 •

7.00–18.00
Registration Open

8.00–8.15
FILAS Opening Remarks

8.00–8.15
AIOM Opening Remarks

8.00–8.15
HILAS Opening Remarks

**JWA • Joint ASSP/FILAS Session**

8.15–10.00
Farzin Amzajerdian; NASA Langley Res. Ctr., USA, Presider

8.15–10.00
Peter Moulton; Q-Peak, Inc., USA, Presider

8.15–10.00
Mauro Nisoli; Politecnico di Milano, Italy, Italy.

**JWA1 • 8.15 Invited**

Advanced Specialty Fibers for Applications in Fiber Lasers, Liang Dong; Clemson Univ., USA. Progress in specialty fibers is the foundation to further breakthroughs in fiber lasers. We review our efforts in leakage-channel-fibers, wide band air-core photonic-bandgap-fibers, and SBS simulation in optical fibers by incorporating leaky acoustic modes.

**AIWA • Transparent Ceramics and Laser Crystals I**

8.15–10.00
Fabrication of Transparent Ceramics Using Spark Plasma Sintering, Byungnam Kim; 1National Inst. for Materials Science, Tsukuba, Japan. Transparent Al2O3, MgAl2O4 and ZrO2 ceramics with fine microstructures were fabricated by controlling the heating rate and pressure during spark plasma sintering. The scattering theory for Al2O3 ceramics was evaluated with the measured properties.

**HWA • High-Intensity Fiber and Hollow Waveguide Sources**

8.15–10.00
Technologies for Integrated High Power Ultrashort-Pulse Fiber Lasers, Almantas Galvanauskas; Univ. of Michigan, USA. Abstract not available.

**JWA2 • 8.45**

Mode-Locked Yb-Fiber Laser for Rapid Dual Pulse Scanning Applications, Albert Romann1, Christian Mohr1, Axel Ruehl2, Ingmar Hartl1, Martin E. Fernmann; IMRA America, Inc., Ann Arbor, MI, USA; 1Inst. for Lasers, Life and Biophotonics, Vrije Univ.it Amsterdam, Amsterdam, Netherlands. We demonstrate a mode-locked Yb fiber soliton oscillator for the generation of pulse pairs with rapidly scanning pulse separations at interferometric precision.

**AIWA2 • 8.45**

Development of Submicrometer-Grained Highly Transparent Sesquioxide Ceramics, John Ballato1, Kari Serivasatia; 1Materials Science and Engineering, Clemson Univ., Anderson, SC, USA. This paper discusses rare earth doped transparent sesquioxide ceramics with average grain size of 0.3 μm using a two-step sintering approach followed by hot isostatic pressing as well as properties of these ceramics.

**HWA2 • 8.45**

Fiber Laser Based High Harmonic Generation at High Repetition Rate and Average Power, Manuel Krebs2, Steffen Hädrich2, Jens Limpert2, Andreas Tünnemann2; 1Inst. of Applied Physics, Friedrich-Schiller- Univ. Jena, Jena, Germany; 2Helmholtz-Inst. Jena, Jena, Germany; 3Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. The average power of high harmonics driven by a fiber chirped pulse amplification system is measured to be ~30nW in the 35-50 nm range. We proof that this a promising source for processes requiring high photon flux such as photoemission spectroscopy.

**JWA3 • 9.00**

Sub-5 fs pulses with 12 GW peak power from high repetition rate OPCPA, Jan Rothhardt1,2, Steffen Hädrich1,2, Stefan Demmler1, Christoph Jocher1, Jens Limpert1,2, Andreas Tünnemann1; 1Friedrich-Schiller- Univ. Jena, Jena.

**AIWA3 • 9.00**

Fabrication of Rare-Earth Patterned Laser Ceramics by use of Gradient Magnetic Field, Jun Akiyama1, Takunori Taira1; 1IMS, Okazaki, Japan. New micro-domain orientation controlling and patterning process for

**HWA3 • 9.00**

Highly efficient hollow fiber compression scheme for generating multi-mJ, carrier-envelope phase stable, sub-5fs pulses, Xiaowei Chen1; Laboratoire d’Optique Appliquée, Palaiseau Celex, France. We present a simple technique
anisotropic laser ceramics has been developed. We have successfully obtained Nd:LiF composite structure by imposition of 10T gradient magnetic field during slip casting.

**JWA4 • 9.15**  
**Invited**  
Compact, Highly Coherent Fiber Lasers and Amplifiers for Sensing and Oil and Gas Exploration, Arturo Chavez-Pirson1; 1NP Photonics, Inc., Tucson, AZ, USA. We have developed single frequency fiber lasers based on highly doped erbium/ytterbium phosphate glass fibers, which have extremely narrow linewidths (~500 Hz), low relative intensity noise (~170 dB/Hz), low phase noise, and high power (> 125mW).

**AIWA4 • 9.15**  
Thermally Induced Depolarization in Sesquioxide Crystals of m3 Symmetry Class, Anton G. Vyatkin1, Efim Khazanov1; 1Inst. of Applied Physics of the Russian Acad. of Sciences, Nizhnii Novgorod, Russian Federation. Thermally induced depolarization degree in cubic crystals of classes 23 and m3 as a function of crystal orientation was investigated. Three new specific orientations were defined. The best and the worst orientations were determined.

**AIWA5 • 9.30**  
Ti-doped sapphire single crystals grown by Kyropoulos technique (KT) and characterizations, Abdeljelil Nehari1, Kheirredine Lebhour1, Alain Brenier1, Gérard Panczer1, Jean Godfroy1, Serge Labor1, Hervé Legal2, Gilles Chériaux3, Jean-Paul Chambaret3, Richard Moncorge4; 1Univ. de Lyon 1, LPCML, Lyon, France; 2RSA, Le Rubis SA, Jarrie-Grenoble, France; 3Ecole Polytechnique, LOA-ENSTA, Palaiseau, France; 4CNRS, ILE, Palaiseau, France; 5Univ. de Caen, CIMP, Caen, France. High optical quality (FOM over 100), highly-doped (up to 0.45%Ti) and large size (100 mm diameter) Ti-sapphire (Ti3+-doped AlO3) crystals have been grown by using the Kyropoulos technique. Very encouraging laser results are obtained.

**HWA4 • 9.15**  
Towards few-cycle pulses with relativistic intensities, using pulse compression in planar waveguides, Selcuk Akturk1, Card Arnold1, Bing Zhou1, Shichua Chen1, Arnaud Couairon1, Andre Mysyrowicz2; 2Dept. of Physics, Istanbul Technical Univ., Istanbul, Turkey; 3Laboratoire d’Optique Appliquée, École Nationale Supérieure des Techniques Avancées, Palaiseau, France; 4Ctr. de Physique Théorique, École Polytechnique, Palaiseau, France. We show that planar hollow waveguides can be used to compress pulses to few-cycles, in energy up-scalable manner. Controlling the beam size in the free direction allows stable compression without compromising the spatial mode quality.

**HWA5 • 9.30**  
Pulse Compression of 6mJ, 200-fs Pulses From a cw-Diode-Pumped Single-Stage Yb:CaF3 MOPA in Hollow-Core Fiber, Daniil Kartashov1, Giedrius Andriukaitis1, Dusan Lorenc1, Audrius Pugzlys1, Andrius Baltuska1, Linas Giniunas1, Romualdas Danielius1, Jens Limpert1; 1Photronics Inst. Vienna Univ. of Technology, Vienna, Austria; 2Light Conversion Ltd, Vilnius, Lithuania; 3Inst. of Applied Physics, Friedrich Schiller Univ., Jena, Germany. 200-fs 6mJ pulses from a cw-diode-pumped Yb:CaF3 MOPA are spectrally broadened in an Ar- or Ne-filled hollow-core fiber and recompressed to 20 fs (Ar) and 40 fs (Ne) using a prism pair.
JWA5 • 9.45
All Fibre High repetition rate, High Power Picosecond Laser and UV generation.
Simonette Pierrot, Flavien Liegeois, Julien Saby, Benjamin Cocquelin, Yves Hernandez, Francois Salin, Domenico Giannone; 1Eolite Systems, Pessac, France; 2Multitel, Mons, Belgium. We report on a 93W, 1.1 μJ, 83MHz, 35ps MOPA fibre laser based on an Yb mode-locked fibre oscillator and a rod-type LMA amplifier. This configuration can generate up to 20W at 343nm and we demonstrated over 2W at 257nm.

AIWA6 • 9.45
Influence of point defects on the laser efficiency of Tm-doped sodium double molybdate crystals, M. Rico, X. Han, José Maria Cano-Torres, Dolores Serrano, C. Zaldo; 1Inst. de Ciencia de Materiales de Madrid. CSIC, Madrid, Spain. The Tm3+ laser efficiency of NaGd(MoO4)2 crystals (η=50.8%, Pout=641mW) grown in Na2MoO4/Na2Mo2O7 flux is larger than that obtained in similar Czochralski-grown crystals annealed to eliminate color centers.

HWA6 • 9.45
High energy and efficient cross polarized wave generation for high contrast ultrashort laser sources, Lourdes Patricia Ramirez, Dimitris N. Papadopoulos, Alain Pellegrina, Pascal Monot, Aurelien Ricci, Aurelie Jullien, Xiaowei Chen, Jean-Philippe Rousseau, Rodrigo Lopez-Martens, Patrick Georges, Frederic Druon; 1Inst. d’Optique, Palaiseau, France; 2Inst. de la Lumière Extrême, Palaiseau, France; 3CEA, IRAMIS, Gif-sur-Yvette, France; 4Laboratoire d’Optique Appliquée, Palaiseau, France; 5Thales Optronique SA, Elancourt, France. We present a compact and energy-scalable ultrashort laser setup based on waveguide filtering and cross polarized wave generation. A 650 μJ, 15.5 fs, 10-10 contrast ratio XPW pulse is produced with 3.3 mJ, 25 fs input pulses.
AWA01
Background suppression using a fiber stretcher for optimally chirped CARS microscopy, Petra Gross1, Lisa Kleinschmidt1, Carsten Cleff1, Carsten Fallnich1; 1Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. CARS microscopy is performed using a light source based on a single femtosecond laser oscillator and soliton self-frequency shift in microstructured fiber. A fiber stretcher for optimally chirped pulses results in considerable background suppression.

AWA02
Cryogenic Laser Properties of Er:YAG and Er:Sc2O3 - A Comparison, Larry Merkle1, Nikolay Ter-Gabrielyan1, Viktor Fromzel1; 1Army Res. Lab, Adelphi, MD, USA. At cryogenic temperatures, Er:Sc2O3 offers spectroscopic properties that can make it a more attractive laser material than Er:YAG when a very small quantum defect is desired. We discuss these properties, and representative laser results.

AWA03
Mode-locked tuning of diode-pumped femtosecond Cr:LiSAF and Cr:LiCAF lasers using AlGaAs-based saturable Bragg reflectors, Limit Demirbas1, Gale S. Petrich1, Duo Li1, Jiug Wang1, Sheila Nabavaj1, Jonathan Birge1, Peter Fendel1, Alphan Seneroglu1, Leslie A. Kolodziejski1, Franz Kärthner1, James G. Fujimoto1; 1Dept. of Electrical Engineering and Computer Science and Res. Lab of Electronics, MIT, Cambridge, MA, USA. We obtained femtosecond tuning-ranges of 803-831 nm (28-nm), 828-873 nm (45-nm) and 890-923 nm (33-nm) with Cr:LiSAF, and of 767-817 nm (50-nm) with Cr:LiCAF gain media using AlGaAs-based saturable Bragg reflectors and a birefringent tuning-plate.

AWA04
Er:YAG single-crystal fiber laser in Q-switched operation, Igor Martin1,2, Julien Didierjean1, Patrick Georges1; 1Laboratoire Chalres Fabry de l’Inst. d’Optique, Palaiseau cedex, France; 2Fiber optic, Lyon, France. We describe an efficient Q-switched laser emission from a directly grown Er:YAG single-crystal fiber resonantly pumped by a laser diode in an off-axis configuration. The laser produces 2 ml, 38 ns pulses at 1 kHz.

AWA05
High-power high repetition rate mid-infrared flash-pumped Q-switched Er:YAG laser, Marek Skorczakowski1, Jacek Swiderski1, Wieslaw Pichola1, Jacek Kwatkowksi1, Maria Maciejewska1, Lukasz Galecki1; 1Inst. of Optoelectronics, Military Univ. of Technology, Warsaw, Poland. The mechanically Q-switched 2.94mm Er:YAG laser was developed. The laser operated at 25Hz repetition rate generating pulses of 30 mJ energy and duration below 290ns which corresponds to over 100kW peak power.

AWA06
Conceptual design for sub-100 kW laser system based on total-reflection active-mirror geometry, Hiroaki Furuse1, Junji Kawanaka1, Noriaki Miyamaga1, Haik Chosrawjian1, Masayuki Fujita1, Shinya Ishii1, Kazuo Inasaki1, Kenji Takeshita1, Yasukazu Izawa1; 1Inst. for Laser Technology, Osaka, Japan; 2Inst. of Laser Engineering, Osaka Univ., Osaka, Japan; 3Mitsubishi Heavy Industries, Tokyo, Japan. We propose a new concept for a sub-100-kW laser system based on a cryogenic Yb:YAG multiple total-reflection active-mirror design. By adjusting the thickness and doping concentrations of Yb:YAG layers, we will obtain an ideal source.

AWA07
Transverse Mode Control by a Crossing Pair of Linearly Pumped Regions in a Yb:YAG Ceramic Thin Disk, Koki Shimohira1, Yuichi Kozawa1, Shunichi Sato1; 1Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. We demonstrated that a pair of linearly pumped regions was created in a Yb:YAG ceramic thin disk. This enabled us to readily select Laguerre-Gaussian and Hermite-Gaussian beams of higher transverse mode without mechanical manipulation.

AWA08
A comparison of resonantly pumped Ho:YLF and Ho:LLF lasers in CW and Q-switched operation, Martin Schellhorn1, IsL, French German Res. Inst., Saint-Louis, France. Ho:YLF and Ho:LLF are studied under identical pump conditions. Ho:LLF shows lower threshold and in CW operation higher slope efficiencies. 37 and 38.5 mJ were achieved at 100 Hz with Ho:LLF and Ho:YLF, respectively.

AWA09
Enhancement of Third Harmonic Generation with Double-Layer Structure of Nonlinear Organic Material, Myoungskik Cho1, Hee Joo Choi1; 1Dept. of Physics, Pusan National Univ., Busan, Republic of Korea. We designed and fabricated a double-sided organic film device that could enhance the optical third-harmonic generation (THG) at 420 nm. The possibility of quasi-phase-matching THG is experimentally demonstrated.

AWA10
Femtosecond Microjoule-Class Ytterbium Fiber Lasers, Ammar Hideur1, Caroline Lecaplain1, Bülend Oruç1, Guillaume Machinet1, Johan Boulet1, Eric Cormier1, Martin Baumgarth1, Thomas Schreiber1; 1CNRS UMR 6614 CORIA, Saint etienne du Rouvray, France; 2CNRS-INSMI-Inst. of Materials Science and Nanotechnology, Ankara, Turkey; 3Univ. de Bordeaux -CNRS-CEA CELIA, Bordeaux, France; 4Inst. for Applied Physics, Jena, Germany; 5Fraunhofer Inst. for Applied Optics and Precision Engineering, Jena, Germany. We report the generation of 830 nJ energy from a mode-locked all-normal dispersion fiber laser featuring large
mode-area photonic crystal fibers. After external compression, 550 fs pulses with 1.2 MW peak power are demonstrated.

AWA11
All-fiber design for linearly polarized CW Yb-doped tunable fiber laser, Chu Perng Seah1, Tze Yang Ng1, Rui Fen Wu1; 1DSO National Laboratories, Singapore, Singapore. We report on our results of a stable CW, linearly polarized all-fiber tunable fiber laser. Tunability was achieved from 1052nm to 1080nm, with linewidth of 0.3nm. Output power was tested to 60W.

AWA12
Path Length Sensitivity in Coherent Laser Beam Combining: Comparison between Architectures, James R. Leger1, Bradley Tiffany1, Chenhao W1; 1Electrical and Computer Engineering, Univ. of Minnesota, Minneapolis, MN, USA. The effect of path length errors on coherent beam combining performance is analyzed and measured for several combining architectures. Cavity loss and coherence characteristics are highly dependent on design, and can often be optimized.

AWA13
Laser operation near 2 μm of Tm-doped LiLu2Ba2(MoO4)3 single crystal, M. Rico1, X. Han1, Concepción Cascales2, C. Zaldí1; 1Inst. de Ciencia de Materiales de Madrid, CSIC, Madrid, Spain. Tm-doped LiLu2Ba2(MoO4)3 monoclinic crystals were grown by TSSG-method. Laser operation is shown at λ=1940 nm with 62% of slope efficiency. The disordered crystal structure confers potential applications for mode-locked sub-200 fs laser pulses.

AWA14
Nd:LuVO4 Laser Passively Mode-Locked by χ(2) -Laser Formation in Periodically-Poled Stoichiometric Lithium Tantalate, Hristo Ilić1, Ivan Buchvarov1, Suana Kurimura1, Huan Jin Zhang2, Jiayang Wang3, Junhai Liu4, Valentin Petrov5; 1Physics, Sofia Univ., Sofia, Bulgaria; 2National Lab of Crystal Materials, Jilin, China; 3College of Physics, Qingdao Univ., Qingdao, China; 4Max-Born-Institut für Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany. Stable mode-locking of a Nd:LuVO4 laser by intracavity second harmonic generation in PPMgSLT nonlinear crystal is demonstrated with maximum achieved average power of 1.7 W and pulse durations as short as 3.4 ps.

AWA15
Micromachining with square-shaped 1 ns-long pulses from an all-fiber Yb-doped laser-amplifier system, Kivanc Ozgoren1, Bulent Oktem1, F Oemer Ilday1, Ecce Pasini1, Koray Eken1; 1Material Science and Nanotechnology Graduate Program, Bilkent Univ., Ankara, Turkey; 2Dept. of Physics, Bilkent Univ., Ankara, Turkey; 3FiberLAST, Ltd, Ankara, Turkey. We demonstrate micromachining with 1ns-long pulses from an all-fiber laser. Fiber lasers generating uncompressible long pulses have been ignored as undesired modes, however their robust, low-repetition-rate operation is well suited to micromachining.

AWA16
1.34-μm Nd:YVO4 Laser Mode-Locking by Chi-2 Lensing in Periodically Poled Stoichiometric Lithium Tantalate, Ivan Buchvarov1, Suana Kurimura2, Valentin Petrov3; 1Physics, Sofia Univ., Sofia, Bulgaria; 2National Inst. for Materials Science, Tsukuba, Japan; 3Max-Born-Institut für Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany. Self-starting Chi-2 lens mode-locking of a 1.34-μm Nd:YVO4 laser using second harmonic generation in PPMgSLT is demonstrated. A train of 5.9 ps pulses with ~1 W average output power at 102 MHz is achieved.

AWA17
Compact All-Solid-State Continuous-Wave Single-Frequency UV Source for Laser Cooling of Beryllium Ions, Sergey Vasilyev1, Alexander Neisky1, Ingo Ernsten2, Michael Hansen3, Jianwei Shen4, Stephan Schiller5; 1Inst. für Experimentalphysik, Düsseldorf, Germany. A compact setup for generation, absolute frequency stabilization, and precision tuning of the UV laser radiation at 313 nm was developed and tested. The maximum output power of the source is 100 mW.

AWA18
Femtosecond Nd:glass Lasers Mode-Locked with Carbon Nanotube Saturable Absorber Mirror, Antonio Agenesi1, Alessandro Grebello1, Federico Pirzio1, Giancarlo Reali1, Elena Ugolotti1, Sun Young Cha2, Fabian Rotermund2, Uwe Griebner2, Valentin Petrov3; 1Electronics Dept., Univ. of Pavia, Pavia, Italy; 2Division of Energy Systems Res., Ajou Univ., Suwon, Republic of Korea; 3Max-Born-Institut für Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany. We present femtosecond Nd:glass lasers pumped by single-mode 200-mW diodes, mode-locked by single-walled carbon nanotube saturable absorbers. We obtained sub-150-fs and sub-100-fs stable pulse trains with phosphate and silicate glasses, respectively.

AWA19
Concept and realization of collinearly pumped multiple thin disk active medium, Aidas Aleknačius1, Rokas Smilingis1, Mikhail Grishin1, Andrejus Michailovas1, Kirilas Michailovas1, Jurgis Plipavičius1, Valdas Girdauskas1; 1Inst. of physics, Ctr. for Physical Sciences and Technology, Vilnius, Lithuania; 2Faculty of Chemistry, Vilnius Univ., Vilnius, Lithuania; 3Faculty of Natural Sciences, Vytautas Magnus Univ., Kaunas, Lithuania. Two approaches for multiple thin disk active elements configurations are presented. Preliminary lasing experiments and numerical calculations for temperature distribution inside medium are presented.

AWA20
Improved pulse control by all-optical synchronization of fiber lasers, Till Walbaum1, Petra Gross2, Carsten Fallnich3; 1Inst. of Applied Physics, Univ. of Muenster, Muenster, Germany. We show repetition
frequency stability transfer between mode-locked fiber lasers synchronized by all-optical means and investigate the influences on the locking range, output pulse and a potential carrier envelope offset frequency control.

AWA21
High duty cycle and long pulse operation of Dy:PgGa2S4 laser excited by diode pumped Nd:YAG, Jan Šalč, Helena Jelinková, Maxim E. Doroshenko, Tasoltan T. Basiev, Vyacheslav V. Osiko, Valerii V. Badikov, Dmitrii V. Badikov; 1Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Prague 1, Czech Republic; 2Laser Materials and Technology Res. Ctr., General Physics Inst., Moscow, Russian Federation; 3Kuban State Univ., Krasnodar, Russian Federation. The room temperature operating Dy:PgGa2S4 laser, excited at 1318 nm by diode pumped Nd:YAG was realized and mean power 18.4 mW with slope efficiency 3.8 % was obtained at 4.3 μm (pulse length 10 ms, rep. rate 50 Hz).

AWA22
PbS-Quantum-Dot Saturable Absorber Q-switched Tm:KYW Mini-Laser with 9 ns/40 μJ Pulses, Maxim Gaponenko, Victor Kiselev, Alexander Malyshevich, Konstantin Yunashev, Nikolai Kuleshov, Alexei Onushchenko; 1Ctr. for Optical Materials and Technologies, Belarusian National Technical Univ., Minsk, Belarus; 2Res. and Technological Inst. of Optical Materials Science, St. Petersburg, Russian Federation. A compact Tm:KYW diode-pumped laser with cavity length of 8 mm passively Q-switched with PbS-quantum-dot saturable absorber is demonstrated. The laser produces pulses with duration of 9 ns and energy of 40 μJ.

AWA23
Directly diode pumped mid-IR laser based on PbGa2S4:Dy+ crystal, Maxim E. Doroshenko, Tasoltan T. Basiev, Vyacheslav V. Osiko, Valerii V. Badikov, Dmitrii V. Badikov; 1General Physics Inst. RAS, Moscow, Russian Federation; 2Kuban State Univ., Krasnodar, Russian Federation. Direct diode pumped mid-IR oscillations of PbGa2S4:Dy+ crystal were obtained with slope efficiency up to 1%. “Long” output pulses were obtained and the mechanism of lower laser level depopulation is suggested.

AWA24
2 μm Ho:YAG Thin Disk Laser, Günther Renz, Peter Malnke, Jochen Speiser, Adolf Gesen; 1Inst. of Technical Physics, German Aerospace Ctr., Stuttgart, Germany. A Thulium fiber laser pumped Ho:YAG thin disk laser with 15W (cw) or several mJ (pulsed) operation will be presented. Additionally, a narrow (<0.5nm), tunable (30nm) cw operation near 2.09 μm, will be shown.

AWA25
Optical Parametric Oscillators with Idler Absorption, Gunnar Rustad, Øystein Farsund, Gunnar Arisholm; 1FFI (Norwegian Defence Res. Establishment), Kjeller, Norway. We show by simulations that idler absorption may improve the performance of pulsed high energy OPOs, and obtain high signal conversion efficiency and signal beam quality with idler absorption coefficients above 3 cm⁻¹.

AWA26
Few-cycle pulse characterisation with an acousto-optic pulse shaper, Seth Cousin, Nicolas Forget, Philip K. Bates, Jens Biegert, Alexander Gruen; 1ICFO - the Inst. of Photonic Sciences, Castelldefels (Barcelona), Spain; 2FASTLITE, Ctr. Scientifique d’Orsay, Orsay, France. An acousto-optic pulse shaper has been used to characterise an 8.2 fs pulse generated in a hollow-core fibre. A grism-pair compressor has been used to overcome a dispersion related bandwidth limit of the acousto-optic crystal.

AWA27
Frequency tripling for next generation high energy lasers, Gabriel Mennerat; 1Direction des Applications Militaires, Commissariat à l’Energie Atomique, Le Barp, France. Societal applications of high energy lasers require operating at high repetition rate. Merits of frequency triplers at high-average power are discussed. Performances of LBO are demonstrated by generating 360J of ultraviolet with 80% efficiency.

AWA28
Pulsed, Single-Frequency, Ring Laser With A Holographic Output Coupler, Alex Dergachev; 1Q-Peak, Inc., Bedford, MA, USA. A ring laser with reflective thick holographic grating as an output coupler is demonstrated. Unidirectional, passively Q-switched, 2.05-μm Ho:YLF ring laser provides single-frequency, 100-200-ns-long pulses at kHz rate.

AWA29
High Energy Mode-Locked Fiber Laser at 976nm, Guillaume Machinet, Jerome Lhermitte, Caroline Lecaplaine, Johan Boullet, Ammar Hider, Nicholas Traynor, Eric Cormier, Cecilia, Talence, France; 2Ceria, Rouen, France; 3Alphalas, Talence, France; 4Azur light system, Talence, France. We report on a passively mode-locked fiber laser emitting around 976nm. The laser emits chirped pulses with a duration of 1.02ps and 12nJ at 40.7MHz. External compression leads to pulses as short as 286fs.
<table>
<thead>
<tr>
<th>Bosphorus, P Floor</th>
<th>Anadolu, P Floor</th>
<th>Marmara, P Floor</th>
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<tbody>
<tr>
<td><strong>JWB • Joint ASSP/AIOM Session</strong></td>
<td><strong>FWA • Fiber Lasers and Applications I</strong></td>
<td><strong>HWB • Strong-field Atomic Physics</strong></td>
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<tr>
<td><strong>11.30–13.00</strong></td>
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<td>Kathleen Schaffers; Lawrence Livermore Natl. Lab, USA, Presider</td>
<td>Farzin Amzajerdian; NASA Langley Res. Ctr., USA, Presider</td>
<td>Jens Biegert; ICFO, Spain, Presider</td>
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</table>

**HWB1 • 11.30**
Scaling of Strong-Field Atomic Physics, Lou DiMauro; Ohio State Univ., USA. Abstract not available.

**JWB1 • 11.30**
5 mm Thick Periodically Polled Rb:KTiOPO4 for High Power Optical Frequency Conversion, Andrius Zukauskas; Nicky Thüllmann; Valdas Pasiskevicius; Fredrik Laurell; Carlota Canalias; Laser Physics, KTH (Royal Inst. of Technology), Stockholm, Sweden. A periodically poled bulk Rb-doped KTiOPO4 crystal with 5 mm aperture was fabricated at room temperature. The ferroelectric domain structure is shown to be homogeneous across the whole aperture with a deflection of 11 pm/V.

**JWB2 • 11.45**
Yb-Doped Laser Materials: Advances and Challenges, Günter Huber; Kolja Beil; Thomas Calmann; Susanne T. Fredrich-Thornton; Uwe Kelling; Christian Kränkel; Henning Kühl; Jörg Siebenmorgen; Ulrike Wolters; Klaus Petermann; Inst. for Laser-Physik, Hamburg, Germany. We review the progress in performance of Yb:YAG, Yb:LuAG, and Yb:Lu2O3 for ultra-high power generation. Future challenges are the prevention of losses at high Yb inversion densities, further power scaling of thin disk and crystalline waveguide lasers.

**FWA1 • 11.00**
Title to Be Announced, David Payne, Univ. of Southampton, UK. Abstract not available.

**FWA2 • 11.45**
Fourier Transform Spectrometry Using a Single Cavity Length Modulated Mode-Locked Fiber Laser, Christian Mohr; Albert Romann; Axel Ruch; Ingmar Hartl; Martin E. Fernmann; IMRA America, Inc., Ann Arbor, MI, USA; Inst. for Lasers, Life and Biophotonics, Vrije Univ.;it Amsterdam, Amsterdam, Netherlands. We present a Fourier transform spectrometer based on a single repetition rate modulated mode locked Yb-fiber laser configured as a coherent scanning delay line using an imbalanced Mach-Zehnder interferometer. Effective mirror scan rate is 7.5 m/s.

**FBA3 • 12.00**
Ultrabroadband Er:fiber Lasers for Applications in Nanophotonics and Confocal Microscopy, Alfred Leitenstorfer; Fachbereich Physik, Universität Konstanz, Germany, Constance, Germany. An Er:fiber technology is presented delivering output tunable from visible to infrared, at pulse durations down to 4 fs. Applications in ultrafast quantum optics with solid-state nanostructures and confocal microscopy of live systems are featured.

**HWB2 • 12.00**
Attosecond Depletion of Resonant Auger Decay in Krypton, Aart J. Verhoef; Alexander V. Mitrofanov; Maria Krikunova; Nikolay Kabachnik; Armin Scrinzi; Markus Drescher; Andrius Baltuska; Inst. für Photonik, TU Wien, Wien, Austria; Inst. für Experimentalphysik, Univ. Hamburg, Hamburg, Germany; Computational & Plasma Physics, LMU München, München, Germany. Changes in the spectral width of Auger emission reveal
transient depletion of excited states prepared using attosecond XUV pulses by strong phase-stable few-cycle pulses. Additionally, interference of photoelectrons and Auger electrons is observed.

**HWB3 • 12.15**

Benchmarking attosecond physics with atomic hydrogen, Michael G. Pullen\(^1,2\), William Wallace\(^2\), Dane Laban\(^1,5\), Adam Palmer\(^1,5\), Friedrich Hanne\(^1\), Alexei Grum-Grzhimailo\(^1,5\), Brant Abeles\(^1\), Klaus Bartschat\(^1\), Daniel Weflen\(^1\), Igor Ivanov\(^1\), Anatoli Kheifets\(^1\), Harry Quiney\(^1\), Igor Litevlyuk\(^1,2\), Robert Sang\(^1,5\), Dave Kielinski\(^1,2\), ARC Ctr. of Excellence for Coherent X-Ray Science, Griffith Univ., Nathan, QLD, Australia; Australian Attosecond Science Facility and Ctr. for Quantum Dynamics, Griffith Univ., Nathan, QLD, Australia; Atomic and Electronics Physics Group, Westfälische Wilhelms-Universität, Münster, Germany; Dept. of Physics and Astronomy, Drake Univ., Des Moines, IA, USA; Inst. of Nuclear Physics, Moscow State Univ., Moscow, Russian Federation; Res. School of Physical Sciences, The Australian National Univ., Canberra, ACT, Australia; ARC Ctr. of Excellence for Coherent X-Ray Science, Univ. of Melbourne, Melbourne, VIC, Australia. We have performed the first experiment on the interaction of intense few-cycle laser pulses with atomic hydrogen. Experimental data is compared with an advanced ab initio simulation and agrees quantitatively with simulations at the 10% level.

**FWA4 • 12.30**

High Power Thulium Fiber Lasers, Laurence Shah, R. Andrew Sims, Christina C.C. Willis, Pankaj Kadhwa, Joshua Bradford, Martin Richardson; Univ. of Central Florida, USA. Tm fiber-lasers at 2 µm wavelength are following a similar development path to Yb fiber-lasers. We review recent progress exploiting the unique characteristics of these lasers in the high power, spectral and temporal domains.
Phase-Matching Properties of BaGa$_4$S$_7$ and BaGa$_4$Se$_7$: Wide-Bandgap Nonlinear Crystals for the Mid-Infrared, Valerii V. Badikov$^2$, Dmitrii V. Badikov$^2$, Galina Shevyrdyaeva$^2$, Aleksey Tyazhev$^1$, Georgi Marchev$^1$, Vladimir Panyutin$^1$, Valentyn Petrov$^1$, Albert Kwasniewski$^3$; $^1$A3, Max-Born-Inst., Berlin, Germany; $^2$High Technologies Lab, Kuban State Univ., Krasnodar, Russian Federation; $^3$Inst. for Crystal Growth, Berlin, Germany. Biaxial BaGa$_4$S$_7$ and BaGa$_4$Se$_7$ crystals have been grown by the Bridgman-Stockbarger technique in sufficiently large sizes and with good optical quality to measure the refractive indices and analyze the phase-matching configurations.

On The Challenge Of Attosecond Pulse Metrology, Charalambidis Dimitrios$^{1,2}$, Jan Kruse$^{3,2}$, Paraskevas Tzallas$^3$, Emmanouel Skantzakis$^{1,2}$, George Tsakiris$^3$; $^1$IESL, FORTH, Heraklion, Greece; $^2$Physics Dept, Univ. of Crete, Heraklion, Greece; $^3$MPQ, Garching, Germany. We report a comparative experimental study, showing severe inconsistencies between two main attosecond pulse metrology methodologies, namely the 2nd order IVAC and the RABITT techniques [Phys. Rev. A 82, 021402(R) (2010)] and their derivatives.
<table>
<thead>
<tr>
<th>JWC (Joint ASSP/HILAS Session)</th>
<th>AIWB (Crystal and Glass Fibers I)</th>
<th>FWB (Fiber Laser Frequency Combs)</th>
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<tr>
<td><strong>13.00–14.30</strong></td>
<td><strong>14.30–16.00</strong></td>
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<td><strong>Lunch Break (on your own)</strong></td>
<td><strong>Giulio Cerullo; Politecnico di Milano, Italy, Presider</strong></td>
<td><strong>Richard Moncorgé, Univ. de Caen, France, Presider</strong></td>
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<tr>
<td><strong>14.30–16.00</strong></td>
<td><strong>AIWB1 • 14.30 Invited</strong></td>
<td><strong>FWB1 • 14.30 Invited</strong></td>
</tr>
<tr>
<td><strong>Approaching the Full Octave: Noncollinear Optical Parametric Chirped Pulse Amplification with Two-Color Pumping,</strong></td>
<td><strong>Photo darkening in rare earth doped silica: Model and Experiment, Kent E. Mattsson;¹ DTU Fotonik, Technical Univ. of Denmark, Kgs. Lyngby, Denmark. A model for photo darkening based on chemical bond formation is presented. The formation process, color center spectral response and bleaching is discussed and model predictions is found to hold high power fiber laser operation.</strong></td>
<td><strong>Optics to Microwave Synchronisation at sub-100 Attoseconds Stability Level, Yann Le Coq;¹, Wei Zhang;¹, Zhenyu Xu;¹, Jacques Millo;², Rodolphe Boudot;², Michel Lours;², Pierre-Yves Bourgeois;², Andre Luiten;², Giorgio Santarelli;², LNE-SYRTE - Observatoire de Paris, CNRS, UPMC, Paris, France;² FEMTO-ST Inst., CNRS, ENSMM, Besancon, France;³ Univ. of Western Australia, Crawley, WA, WA, Australia. We will present our results on low phase noise and high stability synchronization of a microwave signal with an optical ultra-stable reference. We apply noise reduction strategies which provide timing stability substantially below 100 attoseconds.</strong></td>
</tr>
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<td><strong>Daniel Herrmann;¹, Christian Homann;¹, Raphael Tautz;¹, Ferenc Krausz;², Eberhard Riedel;¹, Laszlo Veisz;²;¹LS für BioMolekulare Optik, Ludwig-Maximilians-Univ. München, München, Germany;²Max-Planck-Institut für Quantenoptik, Garching, Germany;²LS für Photonik und Optoelektronik, Ludwig-Maximilians-Univ. München, München, Germany;²LS für Laserphysik, Ludwig-Maximilians-Univ. München, Garching, Germany. We amplify ultrabroadband spectra to mJ energies: 575-1050nm by two-color-pumping and 675-1000nm by two-beam-pumping. We demonstrate the compressibility of these spectra and reveal the significance of a parametric phase imprinted on the signal.</strong></td>
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<td><strong>FWB2 • 15.00</strong></td>
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<tr>
<td><strong>JWC2 • 14.45</strong></td>
<td><strong>AIWB2 • 15.00</strong></td>
<td><strong>Phase Locking and Spectral Combining of Fiber Lasers by Volume Bragg Gratings,</strong></td>
</tr>
<tr>
<td><strong>Temporal Contrast Measurements of a Noncollinear Optical Parametric Amplifier Seeded by White-Light Continuum,</strong></td>
<td><strong>Single-mode Low-loss Optical Fibers for Long-wave Infrared Transmission, Shbib Jiang;¹;¹AdValue Photonics, Inc., Tucson, AZ, USA. We report the synthesis of single-mode fibers made of chalcogenide glasses with low-loss in the 5-12 μm range. The resulting single mode fibers exhibited losses of ~6dB/m at 10.6</strong></td>
<td><strong>Vadim Smirnov;¹, Leonid Glebov;², Derrek Drachenberg;², Apurva Jain;², Ivan Dovlantsky;², George Venus;², Christina Spiegelberg;¹;¹OptiGrate, Orlando, FL, USA;²CREOL/ The College of Optics and Photonics, Univ. of Central Florida, Orlando,</strong></td>
</tr>
<tr>
<td><strong>Jake Bromage;¹, Christophe Dorrer;¹, Jonathan Zuegel;¹;¹Lab for Laser Energetics, Univ. of Rochester, Rochester, NY, USA. Temporal cross-correlation measurements of a white-light-seeded noncollinear optical parametric amplifier (NOPA) show that its prepulse contrast exceeds the 105-dB dynamic range of the broadband NOPA-based cross-correlator.</strong></td>
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</table>
μm and 3–4 dB/m in the 6–10 μm range.

AIWB3 • 15.15
-2 μm laser output in short length highly Tm<sup>3+</sup>-doped tungsten tellurite glass double cladding fiber, Kefeng Li<sup>1,2</sup>, Lili Hu<sup>1</sup>, Guang Zhang<sup>1,2</sup>, Damping Chen<sup>1</sup>; 1Shanghai Inst. of Optics and Fine Mechanics, Chinese Acad. of Sciences, Shanghai, China; 2Graduate School of Chinese Acad. of Sciences, Beijing, China. Highly Tm<sup>3+</sup>-doped tungsten tellurite glass double cladding fibers were prepared by using rod-in-tube method. A 306 mW laser output at ~2 μm was demonstrated from a 8.9 cm length of this fiber.

FWB4 • 15.30
Atmospheric Propagation Testing Using Broadband Thulium Fiber Systems, Pankaj Kadwani<sup>1</sup>, Robert Sims<sup>1</sup>, Jeffery Chua<sup>1</sup>, Faleh Alatt<sup>4</sup>, Lawrence Shah<sup>1</sup>, Martin Richardson<sup>1</sup>; 1Towens Laser Insr., CREOL College of Optics and Photonics, The Univ. of Central Florida, Orlando, FL, USA; 2College of Optical Sciences, The Univ. of Arizona, Tucson, AZ, USA; 3Masdar Inst. of Science and Technology, Abu Dhabi, United Arab Emirates. Broadband ultrashort pulse and amplified spontaneous emission thulium fiber systems are utilized for atmospheric propagation testing. These systems enable precise characterization of H2O and CO2 absorption in the 2 μm wavelength regime.

AIWB4 • 15.30
Crystalline Semiconductor Core Optical Fibers, John Ballato<sup>2</sup>, Thomas Hawkins<sup>2</sup>, Paul Foy<sup>1</sup>, Colin McMillen<sup>1</sup>, Roger Stolen<sup>1</sup>, Robert Rice<sup>2</sup>; 1Materials Science and Engineering, Clemson Univ., Anderson, SC, USA; 2Northrop Grumman Space Technology, Redondo Beach, CA, USA. Silicon and germanium core optical fibers are discussed. Losses of 4 dB/m have been achieved at 3 μm and suggest that such semiconductor optical fibers could be of practical value for nonlinear and infrared applications.

FWB3 • 15.15
Scalable High-Energy Sub-Cycle Waveform Synthesis for High-Field Physics, Shu-Wei Huang<sup>1</sup>, Giovanni Circi<sup>1</sup>, Kyung-Han Hong<sup>1</sup>, Jeffrey Moses<sup>2</sup>, Jonathan Birge<sup>1</sup>, Siddharth Bhardwaj<sup>1</sup>, Vasileios-Marios Gkortas<sup>1</sup>, Andrew Benedick<sup>1</sup>, Li-Jin Chen<sup>1</sup>, Enbang Li<sup>1</sup>, Benjamin Egganeti<sup>1</sup>, Giulio Cerullo<sup>1</sup>, Franz Kärtner<sup>1</sup>; 1RLE, MIT, Cambridge, MA, USA; 2CUDOS ARC, Univ. of Sydney, Sydney, NSW, Australia; 3Dipartimento di Fisica, Politecnico di Milano, Milano, Italy. We demonstrate coherent pulse synthesis from two few-cycle phase-stable OPCPAs, enabling scalable, high-energy arbitrary optical waveform generation on sub-cycle time scales, suitable for attosecond control of high-field physics experiments.

FWB3 • 15.30
Invited
High Power Fiber Laser Frequency Combs for XUV Spectroscopy, Axel Raebi<sup>1</sup>, Martin E. Fernaran<sup>1</sup>, Ingmar Hartl<sup>1</sup>, A. Cingöz<sup>2</sup>, Dylan C. Yost<sup>1</sup>, Jun Ye<sup>1</sup>; 1IMRA America Inc, Ann Arbor, MI, USA; 2Department of Physics, JLLA, National Institute of Standards and Technology and University of Colorado, Boulder, CO, USA. A Yb-fiber frequency comb with 120 fs pulse duration, 154 MHz repetition rate, and 80 W average power is used for cavity-enhanced high harmonic generations. Plateau harmonics beyond the microwatt level have been demonstrated.

AIWB5 • 15.45
Mid-IR Multimillijoule 100-fs Chirped-Pulse Parametric Amplifier, Giedrius Andriukaitis<sup>1</sup>, Tadas Balciaunas<sup>1</sup>, Alexey Andrianov<sup>2,3</sup>, Oliver D. Mickle<sup>1</sup>, Igor Diomin<sup>1</sup>, Linas Giniunas<sup>1</sup>, Romas Daniūnas<sup>1</sup>, Andrius Baltuska<sup>1</sup>, Audrius Pugzlys<sup>1</sup>; 1Inst. of photonics, Vienna Univ. of Technology, Vienna, Austria; 2Inst. of Applied Physics, Russian Acad. of Sciences, Nizhny

AIWB5 • 15.45
Spectroscopic investigation of Tm<sup>3+</sup>:TeO<sub>2</sub>-K2O-Nb2O5 glasses at different doping levels for 2 μm laser applications, Adil T. Gorgulu<sup>1</sup>, Huseyin Cankaya<sup>1</sup>, Adrian Kurt<sup>1</sup>, Adolfo Speghini<sup>1</sup>, Marco Bettinelli<sup>2</sup>, Alphan Seynaroglu<sup>1</sup>; 1Kac Univ., Istanbul, Turkey; 2Teknofil, Inc., Istanbul, Turkey; 3Univ. of Verona and INSTM, Verona, Italy. Spectroscopic measurements performed
Bosphorus, P Floor | Anadolu, P Floor | Marmara, P Floor
---|---|---
Novgorod, Russian Federation; "Light Conversion Ltd., Vilnius, Lithuania. We demonstrate a 20-Hz-repetition-rate mid-IR OPCPA based on inverted stretching technique delivering 300-nm FWHM 7.5 mJ pulses centered at 3600 nm. 3-mJ 100-fs pulses obtained after compression are suitable for a variety of high-field applications.

with Tm$^{3+}$:TeO$_2$-K$_2$O-Nb$_2$O$_5$ glass at different concentrations show a high emission cross section (6.22×10$^{-21}$cm$^2$) for the 1860-nm band, making the material potentially important for 2-μm laser development.

**NOTES**

Dolmabahce Foyer, R Floor
16.00–16.30
Coffee Break
### AIWC • Nonlinear Crystals and Processes I

**16.30–18.00**

**AIWC1 • 16.30**
Invited

*Growth of Large GaN Single Crystals, Sylvester Porowski, Izabella Grzegory, Inst. of High Pressure Physics, Polish Acad. of Sciences, Poland.* The state of the art results achieved in bulk GaN crystallization by most relevant techniques are reviewed. A special role of HVPE and ammonothermal methods in development of laser quality quasi-bulk GaN substrates and bulk GaN crystals is emphasized. The High Nitrogen Pressure Solution method is presented in more details.

**AIWC2 • 17.00**
Invited

*Bulk PPKTP by crystal growth, Benoit Boulanger1; 1Univ. Joseph Fourier, Grenoble, France.* We performed the first growth of a 39.86 μm-periodicity PPKTP crystal of good optical quality over a thickness of 800 μm onto a (001) face of a PPKTP substrate previously obtained by electric field poling.

### AWB • Ultrafast Sources II

**16.30–17.45**

**AWB1 • 16.30**

*Diode-Pumped Mode-Locked Yb^{3+}:YCaO(BO3)3 Laser Generating 35 fs Pulses, Uwe Griebner1, Akira Yoshida1, Andreas Schmidt1, Valentin Petrov1, Huajin Zhang1, Jiyang Wang1, Junhai Liu1, Christian Fiebig1, Katrin Paschke1, Götz Erbert1; 1Max Born Inst., Berlin, Germany; 2Inst. of Laser Engineering, Osaka Univ., Osaka, Japan; 3Shandong Univ., Jinan, China; 4Quingdao Univ., Quingdao, China; 5Ferdinand-Braun-Inst., Berlin, Germany.* A mode-locked Yb:Ca4YO(BO3)3 laser delivering pulses as short as 35 fs at 1055 nm is demonstrated. The oscillator is pumped by a two-section distributed Bragg-reflector tapered diode-laser and mode-locked by a semiconductor saturable absorber mirror.

**AWB2 • 16.45**

*Sub-200-fs Pulses at 92 GHz Repetition Rate from a Harmonically Mode-locked Semiconductor Disk Laser, Uwe Griebner1, Peter Klop1, Martin Zorn1, Markus Wegers2; 1Max Born Inst., Berlin, Germany; 2Ferdinand-Braun-Inst., Berlin, Germany.* Ultrashort-pulse semiconductor disk lasers emitting around 1025 nm are presented. Pulse durations of 198 fs at 92 GHz and 107 fs at 5.1 GHz repetition rate were achieved by harmonic and fundamental mode-locking, respectively.

**AWB3 • 17.00**

*High peak power from a mode-locked two-crystal Yb:KYW oscillator with cavity-dumping, Guido Palmer1, Moritz Emoms1, Marcel Schultz1, Uwe Morgen1; 1Leibniz Univ. Hannover, Inst. für Quantenoptik, Hannover, Germany; 2Laser Zentrum Hannover, Hannover, Germany.* We report on a chirped-pulse two-crystal Yb:KYW oscillator with cavity-dumping which generates 12 MW of peak power. Pulse energies of 7 μJ and 416 fs short pulses have been obtained at 1 MHz repetition.

### FWC • Fiber Lasers in LIDAR and Space

**16.30–18.00**

**FWC1 • 16.30**
Invited

*Fiber-Based Coherent Doppler Lidar for Precision Landing on the Moon and Mars, Farzin Amazjerdian1, Larry Petway1, Bruce Barnes1, Glenn Hines1, Diego Pierrottet1, George Lockard2; 1NASA, Hampton, VA, USA; 2Coherent Applications, Inc., Hampton, VA, USA.* A coherent Doppler lidar capable of providing highly accurate vector velocity and altitude data is being developed for enabling precision navigation of landing vehicles to the designated safe landing site.
rate.

AWB4 • 17.15
Octave Spanning Ultra-Broadband Carbon Nanotube Saturable Absorber for Bulk Solid-State Lasers, Sun Young Choi1, Won Bae Cho1, Dong-il Yeom1, Kihong Kim1, Fabian Rotermund1, Ji-Hee Kim1, Ki-Ju Yee2, Andreas Schmidt1, Günter Steinmeyer1, Benjamin Wolter3, Valentin Petrov4, Uwe Griebner5; 1Division of Energy Systems Res., Ajou Univ., Suwon, Republic of Korea; 2Dept. of Physics, Chungnam National Univ., Daejeon, Republic of Korea; 1Max Born Institute Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany. Octave spanning saturable absorber possessing operation bandwidth of ~1000 nm is fabricated on the basis of single-walled carbon nanotubes and applied for mode-locking of different bulk lasers in the 1 and 2 μm spectral range.

AIWC3 • 17.30
Two-dimensional domain engineering in LiNbO3 via a hybrid patterning technique, Michele Manzo1, Fredrik Laurell1, Valdas Pasiskevicius1, Katia Gallo1; 1Laser Physics, Applied Physics, KTH, Stockholm, Sweden. We propose a novel electric field poling technique employing selective proton exchange and resist patterning to fabricate nonlinear photonic crystals in LiNbO3. We demonstrate 2D tetragonal bulk lattices with 8x6.78μm2 periodicity in 0.5mm substrates.

AIWC4 • 17.45
Direct Bonding of Periodically-Poled Lithium Niobate Crystals for Broadly Tunable Quasi-Phase Matching, Myoungsik Cha1; 1Pusan National Univ., Busan, Republic of Korea. We fabricated a 2 mm-thick periodically-poled lithium niobate (PPLN) by direct bonding of two 1 mm-thick PPLNs. A broad spectral range of quasi-phase matched second-harmonic generation was demonstrated by angular tuning.

AWB5 • 17.30
Toward Efficient Femtosecond Solid State Yb Amplifiers Pumped by a 976-nm YDFA, Audrius Pugzlys1, Gedrius Andriukaitis1, Daniel Adam1, Andrius Baltuska2, Guillaume Machinet1, Jerome Lhermitte2, Dominique Descampe1, Eric Cormier1, Ronald Holzwarth3; 1Photonics Inst., Vienna Univ. of Technology, Vienna, Austria; 2Ctr. Lasers Intenses et Applications, Univ. de Bordeaux-CNRS-CEA, Talence, France; 3Menlo Systems Gmbh, Martinsried, Germany. We demonstrate high-gain broadband amplification in Yb:CaF2 crystal pumped with a bright source based on an ultra-large-core PCF-rods. 3-fold single-pass gain was obtained in a 10-mm Yb:CaF2, which significantly outperforms any cw-diode-pumped scheme.

FWC3 • 17.15
Tm:Fiber Laser Resonantly-Pumped Ho:YLF Laser for air/space borne lidar application, Yingxin Bai1, Jirong Yu2, Songsheung Chen1, Mulugeta Petros1, Paul Petzar1, Upendra N. Singh1; 1Science and Systems Applications, Incorporation, Hampton, VA, USA; 2NASA Langley, Hampton, VA, USA; 3Science and Technology Corporation, Hampton, VA, USA. Tm:fiber laser pumped Ho:YLF laser enables efficient operation at high repetition rate. Corresponding injection seeding technique has been developed. Its significant application is a transmitter of air/space borne CO2 differential absorption lidar.

FWC4 • 17.30 Invited
Tm:Fiber Pumped Solid-State Ho:YLF 2-μm Coherent Laser Transmitter for Air and Space-based CO2 Measurements, Upendra Singh1, Yingxin Bai2, Jirong Yu1; 1NASA Langley Res. Ctr., Hampton, VA, USA, 2Science Systems and Applications, Inc., Hampton, VA, USA. Researchers at NASA Langley Research Center has developed an efficient, high repetition rate, Tm:fiber pumped Ho:YLF 2-μm coherent laser transmitter to measure atmospheric CO2 profiles and column concentration from an airborne and space-borne platform.
HWC1
Mapping the Coulomb Potential’s Influence on the Motion of Electronic Wave Packets in Strong Laser Fields, Xinhua Xie1, Stefan Reitner1, Daniil Kartashov3, Emil Persson1, Li Zhang1, Stefanie Gräfe2, Markus Schöffler1,2, Matthias Lezis1, Reinhard Dörner3, Joachim Burgdörfer2, Andrius Baltuska1, Markus Kitzler2; 1Photonics Inst., Vienna Univ. of Technology, Vienna, Austria; 2Inst. for Theoretical Physics, Vienna Univ. of Technology, Vienna, Austria; 3Inst. für Kernphysik, J.W. Goethe Univ., Frankfurt/Main, Germany; 4Max-Planck Inst. for Quantum Optics, Garching, Germany. We manipulate the trajectories of field-ionizing electron waves using two-color laser pulses for controlling the Coulomb potential’s influence on their three-dimensional momentum distributions.

HWC2
Attosecond Ionization Dynamics in Transparent Solids, Alexander V. Mitrofanov1, Aart J. Verheoef1, Evgenii E. Serebryannikov2, Julien Lameau1, Leonid Glebov1, Alexey M. Zhelitkov2, Andrius Baltuska1; 1Photonics Inst., TU Wien, Vienna, Austria; 2International Laser Ctr., Moscow State Univ., Moscow, Russian Federation; 3CREOL, Univ. of Central Florida, Orlando, FL, USA. We observe an optical signature induced by sub-cycle modulation of the free carrier density in several transparent dielectrics, quasi-periodically ionized on an attosecond time scale by electric field peaks of a focused few-cycle laser pulse.

HWC3
Tunable THz generation with a CEP-stable multicolor OPA, Tadas Bاليμas1, Dusan Lorenc1, Misha Ivanov1, Olga Smirnova1, Andrius Pugžlys1, Alexey M. Zhelitkov2, Daniel Dietze1, Jurej Darma1, Karl Unterrainer1, Tim Rathje1, Gerhard G. Paulus1, Andrius Baltuska1; 1Inst. of photonics, Vienna Univ. of Technology, Vienna, Austria; 2Dept. of Physics, Imperial College London, London, UK; 3Max Born Inst., Berlin, Germany; 4Dept. of Physics, M.V. Lomonosov Moscow State Univ., Moscow, Russian Federation; 5Inst. of Optics and Quantum Electronics, Friedrich-Schiller-Univ. Jena, Jena, Germany. THz emission tunability is demonstrated in a plasma driven by a field synthesized with a multicolor CEP stable OPA. Sub-cycle field ionization followed by continuum-continuum electron transitions are responsible for tunable low frequency emission.

HWC4
Using the Classical Ensemble Method in Strong-Field Atomic Physics, Xu Wang1, Joseph H. Eberly1; 1Physics & Astronomy, Univ. of Rochester, Rochester, NY, USA. The classical ensemble method gives a unified picture to strong-field ionization problems. Recently it has been extended to include ellipticity in laser polarization. New effects are predicted for both sequential and nonsequential double ionization.

HWC5
Development of a Novel Large Bandwidth Front-end System for High Peak Power OPCPA Systems, Andrey Lyachenko1, Oleg Chekhlov1, John Collier1, Marco Galimberti2, Cristina Hernandez-Gomez2, Pavel Matousek1, Ian Musgrave1, Ian Ross1, Yunxin Tang2; 1Central Laser Facility, Science and Technology Facilities Council, Didcot, UK. We present the development of a novel large bandwidth front-end that is capable of supporting sub 30fs pulses, with 0.4J of energy at a 2Hz repetition rate that is centered at 910nm.

HWC6
Small-Scale Self-Focusing Suppression at Intense Laser Beams in Mediums with Quadratic and Cubic Nonlinearity, Sergey Mironov1, Efim Khazanov1, Vladimir Lozhkarev1, Vladimir Ginzburg2, Gerard Mourou1; 1Inst. of Applied Physics of RAS, Nizhny Novgorod, Russian Federation; 2Inst. de la Lumière Extrême, Palaiseau, France. Method of small-scale self-focusing suppression at intense laser beams (1-4TW/cm²) was developed and verified in experiments successfully. The theoretical model of plane wave instability in mediums with quadratic and cubic nonlinearity was created.

HWC7
Spatio-Temporal Chirped Amplification for avoiding spectral modifications in ultra-short Petawatt lasers Pulse, Gilles Chériaux1, Christophe Radier1, Fabio Giambraudo1, Christophe Simon-Boisson1, Vincent Moro2; 1LOA, Palaiseau, France; 2TOSA USL, Elancourt, France. Amplification of small bandwidth pulses in a spatio-temporal configuration is demonstrated at 28 J for avoiding spectral shifting in high energy power amplifiers in CPA laser chain. Application to hundreds joules pulses will be discussed.

HWC8
Influence of asymmetry and nodal planes on high-harmonic generation in heteronuclear molecules, Bradley B. Augstein1, Carla Figueira de Morisson Faria1; 1Physics and Astronomy, Univ. College London, London, UK. We investigate the connection between high-harmonic spectra and the geometry of heteronuclear and homonuclear isoelectronic molecules. Two distinct behaviors of the nodal planes are identified, and the physics behind them discussed.

HWC9
Independent Control of Arbitrary Dispersion Order of High Intensity Laser Pulses, Borzsényi Adami4, Peter Jojart1, Mate Kovacs1, Mihály Gorbe1, Karoly Osvay1; 1Optics and Quantum Electronics, Univ. of Szeged, Szeged, Hungary; 2CE Optics, Szeged, Hungary; 3Faculty of Mechanical Engineering and Automation, Kecskemet College, Kecskemet, Hungary. We report on wedge pairs made of different materials, which are capable of tuning exclusively one dispersion coefficient of laser pulses. Contrary to conventional dispersion controlling devices, these wedges can be used with high intensities.
HWC10
Generation of White-Light Supercontinuum with Axially Symmetric Polarization, Shunichi Sato1, Yuichi Kozawa1, Takahiro Nakamura1; 1Inst. of Multidisciplinary Res. for Advanced Materials, Tohoku Univ., Sendai, Japan. The generation of white-light supercontinuum with axially symmetric polarization was demonstrated by transmitting a Ti:sapphire vector beam through water based on the polarization preservation in a white light generation process.

HWC11
Quantum Control of Strong-Field Ladder Climbing in Atomic Sodium, Sangkyung Lee1, Jongseok Lim1, Jaewook Ahn1; 1Dept. of Physics, KAIST, Daejeon, Republic of Korea. We demonstrate quantum control of energy-level ladder climbing in Sodium 4s and 7p states in the strong-field regime, by spectro-temporal ultrafast pulse shaping. Dressed state picture model calculations show good agreements with the experiment.

HWC12
Recent Advancements in Compact Laser Plasma EUV Sources based on a Gas Puff Target, Henryk Fiederowicz1, Andrzej Bartnik1, Roman Jarocki1, Jerzy Kostecki1, Mirosław Szczurek1, Przemysław Wachulak1; 1Inst. of Optoelectronics, Military Univ. of Technology, Warsaw, Poland. In this paper the recent advancements in technology of compact laser plasma EUV sources based on a gas puff target are presented. These sources have been used in nanoimaging and micro- and nanoprocessing polymers.

HWC13
Multiphoton Population of Rydberg States and Strong-Field Interference Stabilization in Low-Frequency Laser Fields, Alexander Popov1, Olga Tikhonova1, Ekaterina Volkova1; 1Inst. of Nuclear Physics, Moscow State Univ., Moscow, Russian Federation. The set of new phenomena corresponding to the strong field regime of atomic photoionization and stabilization in IR laser field is analyzed by direct numerical integration of non-stationary Schroedinger equation for the model atom in a laser field.

HWC14
High Order Harmonic Generation in the Presence of a Resonance, Maria Tudorovskaya1,2, Manfred Lein1; 1Inst. für Theoretische Physik and Ctr. for Quantum Engineering and Space-Time Res. (QUEST), Leibniz Univ. Hannover, Hannover, Germany; 2Inst. für Physik, Univ. Kassel, Kassel, Germany. High-harmonic generation and its time-frequency analysis are studied numerically for a system with a shape resonance. Resonant enhancement occurs for long or short laser pulses. In a gas the resonance remains significant after intensity averaging.

HWC15
Strong-field dynamics of atoms in low-frequency ultrashort laser pulses, Olga Tikhonova1, Alexander Popov1, Ekaterina Volkova1; 1Inst. of Nuclear Physics, Moscow State Univ., Moscow, Russian Federation. New features of ionization dynamics of a Hydrogen atom and rescattering process in strong ultra-short low-frequency laser field are demonstrated.

HWC16
Investigation of Contrast of Astra-Gemini Laser, Yunxin Tang1, Chris Hooker1, Oleg Chekhlov2, Steve Hawkes1, Klaus Ertel1, Rajeev Pattathil1, John Collier1; 1Central Laser Facility, Rutherford Appleton Lab., Oxfordshire, UK. We report an investigation of the temporal contrast of the Astra-Gemini high power laser. Enhanced contrast by nearly an order of magnitude has been achieved by upgrading the commercial front-end to provide cleaner seed pulses.

HWC17
Relativistic birefringence induced by high-intensity laser field in plasma, Gin-yih Tsaur1, 1Mathematics, Tunghai Univ., Taichung, Taiwan. An analytical expression for relativistic birefringence induced by high-intensity laser field in plasma is derived. Its dependence on intensity, wavelength, and density is clearly displayed. The theory is verified by particle-in-cell simulation.

HWC18
Single- and two-color pump-induced high-order harmonic generation in fullerene-containing plasma plumes, Rashid Ganceev1; 1Institute of Electronics, Tashkent, Uzbekistan. The results of systematic studies of single- and two-color pump-induced high-order harmonic generation in fullerene-rich laser-produced plasma under various plasma conditions and laser parameters are presented.

HWC19
Nonlinear refractive index effects in a Petawatt class OPCPA, Alexandre Thai1, Christoph Skrobó1,2, Philip K. Bates1, Gunnar Arisholm1, Zsuzsanna Major1,2,3, Ferenc Krausz1,2,3, Stefan Karsch1,2,3, Jens Biegert1,2, 1CFC, Castelldefels (Barcelona), Spain; 2Max-Planck-Inst. für Quantenoptik, Garching, Germany; 3Ludwig-Maximilians-Univ. München, Garching, Germany; 4Forsvarets ForskningsInstitut (Norwegian Defence Res. Establishment), Kjeller, Norway; 5ICREA-Institucio Catalana de Recerca i Estudis Avançats, Barcelona, Spain. We present 3D OPCPA simulations including nonlinear refractive index for a PW system with 3.67 J, 4 fs transform limited pulses. Those effects reduce the energy by ~11% and increase the Fourier limit by ~17.5%.

HWC20
Low-energy structure of photoelectron spectra in mid-infrared strong laser fields: classical description, Chengpu Liu1, Karen Z Hatsagortsyan1; 1Max Planck Inst. for Nuclear Physics, Heidelberg, Germany. Using a semiclassical model incorporating tunneling and Coulomb field effects, the origin of the unexpected low-energy
structure in above-threshold ionization spectrum, revealed in recent experiments with mid-infrared laser pulses, is clarified.

HWC21
Tracking electron motion at the 1fs temporal scale, Charalambidis Dimitrios1,2, Emmanouel Skantzakis1,2, Paraskevas Tsallis1, Jan Kruse1,2, Faucher Olivier3, George Tsakiris4; 1IESL and Physics Dept, FORTH and Univ. of Crete, Heraklion, Greece; 2Physics Dept, Univ. of Crete, Heraklion, Greece; 3Univ. of Bourgogne, Dijon, France; 4MPQ, Garching, Germany.

We report on ultra-broadband XUV Fourier Transform spectroscopy, implemented through XUV time resolve spectroscopy of an autoionizing electron wave-packet, i.e. a coherent superposition of doubly excited and Auger decaying inner-shell excited states.

18.30–21.00
Joint Conference Banquet

Banquet Speaker
Title to Be Announced, David Payne, Univ. of Southampton, UK.
Abstract not available.
AITHA • Transparent Ceramics and Laser Crystals II

8.00–10.00
Takunori Taika; IMS, Japan, Presider

AITHA1 • 8.00 Invited
Fabrication and characterisation of transparent ceramics with new optical properties, Yvonne Menke; Schott AG, Germany.

In this paper new developments in the fabrication of high refractive index materials with cubic crystal structure as possible matrix material for rare-earth activated compounds are described. Key challenges for the development of such high end materials are presented and related applications in both optical and fluorescence application fields are illustrated.

AITHA2 • 8.30
Thermally Induced Light Scattering in Laser Ceramics with Arbitrary Sized Grains, Anton G. Vyatkin1, Efim Khazanov2; 1Inst. of Applied Physics of the Russian Acad. of Sciences, Nizhny Novgorod, Russian Federation. Thermally induced beam distortions in laser ceramics with arbitrary grain size were investigated. The average scattered power was defined and compared with the corresponding value obtained in the geometrical optics approximation.

AITHA3 • 8.45 Invited
Nd3+ and Yb3+ doped fluoride laser ceramics, Tasoltan T. Basirov1, Maxim E. Doroshenko1, Vasiliy A. Konyshevkin1;1Russian Acad of Sciences, Moscow, Russian Federation. Fluoride laser ceramics of high optical quality doped with Yb3+ and Nd3+ ions was prepared and its optical and laser properties investigated. Different optical centers were observed and efficient laser oscillation were obtained.

Marmara, P Floor

FThA • Fiber Lasers and their Applications

8.00–10.00
Andreas Tünnemann; Friedrich Schiller Univ., Jena, Germany, Presider

FThA1 • 8.00 Keynote
Title to Be Announced, Valentin Gapontsev1; 1IPG Photonics Corp., Oxford, MA, USA. Abstract not available.

FThA2 • 8.45
Mid-IR Fiber Supercontinuum Source for Hyperspectral Image Projector, Brandon Shaw1, Rafael Gattass1, Jas Sanghera1, Ishwar Aggarwal1, Joseph Rice2; 1Naval Res. Lab, Washington, DC, USA; 2National Inst. of Standards and Technology, Gaithersburg, MD, USA. We describe a broadband all fiber mid-IR fiber supercontinuum source for illumination of the Hyperspectral Image Projector (HIP) system currently under development at NIST. The source spectral range is 1.5 μm to 5 μm.

Citronelle, N Floor

HThA • Particles in Intense Fields

8.00–10.00
Gerard Mourou; ENSTA, France, Presider

HThA1 • 8.00 Keynote
Laser Compton Light Sources: From Atomic to Nuclear Photonics, Christopher P. Barty1; 1MS L-470, Lawrence Livermore National Lab, Livermore, CA, USA. Abstract not available.

HThA2 • 8.45 Invited
High Current Electron Beam Produced with Laser Plasma Accelerators, Victor Malka1; 1LOA, CNRS/ENSTA/Polynettechnique, Palaiseau, France. Ultra-high peak current (few kA) and ultra-short duration (few fs) electron beams have been produced using the colliding laser pulses scheme.
FThA3 • 9.00
Experimental Test of a Fiber Laser
Hydrophone Array, Enrico Maccioni1, Nicòlo Beverini1, Stefano Firpi1, Mauro Morganti1, Fabio Stefani1, Cosimo Trono1, Piero Guerrini1, Alain Maguer1; 1Dipartimento di Fisica, Università di Pisa, Largo Pontecorvo 3, Pisa, Italy; 2CNR-Istituto di Fisica Applicata “Nello Carrara”, Polo Scientifico, Sesto Fiorentino (FI), Italy; 3Nato Undersea Res. Ctr., Viale San Bartolomeo, 400, La Spezia, Italy. A fiber laser hydrophone array is described. Acoustic waves produce a strain on the fiber laser with a consequent modulation of the wavelength. The sensitivity is of few mPa/(Hz)^{1/2} in the 0.5-5 kHz frequency band.

AIThA4 • 9.15
Yb:CaF₂ grown by Liquid Phase Epitaxy, Patrice Camy1; 1CIMAP, Caen, France. Ytterbium doped CaF₂ crystalline layers were grown for the first time by using the liquid phase epitaxy technique. Structural and spectroscopic properties show that the obtained layers are very close to the Yb^{3+}-CaF₂ bulk crystals.

FThA4 • 9.15
Fiber Amplifiers of Radially or Azimuthally Polarized Light, Micha Nixori1, Moti Fridman1, Asher A. Friesem1, Nir Davidson1; 1Weizmann Inst. of Science, Rehovot, Israel. A novel configuration for amplifying radial or azimuthal polarized light with fiber amplifier is presented. We obtained 40dB amplification with more than 85% polarization purity and efficient conversion to linear polarization.

AIThA5 • 9.30
Simultaneous Dual-Wavelength Laser Operation in Co-Doped (Ho,Tm):KLu(WO₄)₂ Crystal, Xavier Mateos1, Venkatesan Jambunathan1, Maria Cinta Pujol1, Joan Josep Carvojol1, Magdalena Aguilo1, Francesc Diaz1, Andreas Schmidt1, Uwe Griebner2, Valentin Petrov3; 1Univ. Rovira i Virgili, Tarragona, Spain; 2Max-Born Inst., Berlin, Germany. Simultaneous lasing of Ho^{3+} at 2061 nm and Tm^{3+} at 1937 or 1919 nm is observed in co-doped monoclinic (Ho,Tm):KLu(WO₄)₂: at room temperature with output power and slope efficiency reaching 218 mW and 27%, respectively.

FThA5 • 9.30
Invited
Distributed Feedback Lasers in Phosphate Glass Active Fiber, Axel Schulze1, Peter Hofmann1,2, Li Li1, Nasser Peyghambarian2, Lingyun Xiong1, Albane Laronche1, Jacques Albert1; 1CREOL, College of Optics and Photonics, Univ. of Central Florida, Orlando, FL, USA; 2College of Optical Sciences, Univ. of Arizona, Tucson, AZ, USA; 3Dept. of Electronics, Carleton Univ., Ottawa, ON, Canada. Writing grating structures directly into the highly-doped core of phosphate glass fibers enables the fabrication of distributed feedback lasers. Efficient pump absorption allows for novel cladding pumped distributed feedback fiber lasers.

HThA3 • 9.15
LWFA Experiments at PEARL Facility, Alexander Soloviev1, Konstantin Burdakov1, Vladimir Ginzburg1, Evgeny Katin1, Efim Khazanov1, Alex Kirsanov1, Vladimir Lzakhkarev1, Grigory Luchinin1, Anatoly Mal’shakov1, Mikhail A. Martynov1, Oleg Palashov1, Anatoly K. Potemkin1, Alexander Sergeev1, Andrey Shagin1, Mikhail Starodubtsev1, Ivan Yakovlev1; 1The Inst. of Applied Physics of the Russian Acad. of Sciences, Nizhny Novgorod, Russian Federation. The results of laser wakefield acceleration experimental series carried out at PEARL (Petawatt pArametrical Laser) system are discussed in the paper. The electron beams with energies up to 300 MeV were observed.

HThA4 • 9.30
Highly-Efficient Ion Acceleration in Laser Plasma via Interaction of Intense Laser Pulse with Cluster-Gas Target, Yuji Fukuda1, Motonobu Tampo1, Masaki Kando1, Yukio Hazashi1, Keigo Kawase1, Anatoly Y. Faenov1,2, Tatiana A. Pikuz1,2, Tatsufumi Nakamura1, Hironao Sakaki1, Alexander Pirozhkov1, Takuya Shimomura1, Hiromichi Kiriya1, Masato Kanasaki1,2, Tomoya Yamauchi1, Ryosuke Kodama1, Kiminori Kondo1, Sergei V. Bulanov1,2; 1Kansai Photon Science Inst., Japan Atomic Energy Agency, Kizugawa, Japan; 2Joint Inst. of High Temperatures, Russian Acad. of Sciences, Moscow, Russian Federation; 3Graduate School of Maritime Sciences, Kobe Univ., Hyogo, Japan; 4Graduate School of Engineering, Osaka Univ., Osaka.
Influence of Nd\textsuperscript{3+}-concentration on laser transitions in Nd:YAG, Yoichi Sato\textsuperscript{1}, Takunori Taira\textsuperscript{1}; \textsuperscript{1}Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Okazaki, Japan. We found 30.9\% difference in stimulated emission cross section at 1319 nm between 0.4at.\% and 5.4at.\% Nd:YAG ceramics by fine spectroscopy. It was also revealed that Stark splitting of Nd:YAG depended on Nd\textsuperscript{3+}-concentration and fabrication processes.

Efficient generation of DD fusion by all diode-pumped solid-state laser, Takashi Sekine\textsuperscript{1}, Toshiyuki Kawashima\textsuperscript{1}, Nakahiro Sato\textsuperscript{1}, Masaru Takeda\textsuperscript{1}, Hirofumi Kani\textsuperscript{1}, Yoneoshi Kitagawa\textsuperscript{2}, Yoshitaka Morii\textsuperscript{2}, Ryohki Hanaya\textsuperscript{2}, Shinichiro Okihara\textsuperscript{2}, Kazuhiro Fujita\textsuperscript{1}, Katsuhiro Ishii\textsuperscript{2}, Naoki Nakamura\textsuperscript{1}, Yasushi Miyamoto\textsuperscript{3}, Hirozumi Azuma\textsuperscript{4}, Tomoyoshi Motohiro\textsuperscript{1}, Tatsuru Hiski\textsuperscript{1}; \textsuperscript{1}Development bureau, Hamamatsu Photonics K. K., Shizuoka, Japan; \textsuperscript{2}The Graduate School for the Creation of New Photonics Industries, Shizuoka, Japan; \textsuperscript{3}Advanced Material Engineering Division, TOYOTA Motor Corporation, Shizuoka, Japan; \textsuperscript{4}TOYOTA Central Res. and Development Laboratories, Inc., Aichi, Japan. We have started a new project of inertial fusion driven by all diode-pumped solid-state laser (DPSSL). 105 DD fusion neutron yield from a 500-μm-thick deuterated polystyrene film has preliminarily demonstrated by 10 TW HAMA laser.
AITHB05
Low-Phonon BaF$_2$: Ho$^{3+}$: Tm$^{3+}$ Doped Crystals for 3.5 - 4 μm Lasing, Yuriï V. Orlowskii$^1$, Olim Alimov$^1$, Usoltan T. Basiev$^2$, Laser Materials and Technology Res. Ctr., General Physics Inst., Moscow, Russian Federation. New pumping and sensitization scheme of 3.9 μm laser transition of Ho$^{3+}$ in low-phonon the BaF$_2$:Ho$^{3+}$:Tm$^{3+}$ crystals is studied. Energy transfer from Tm$^{3+}$ to Ho$^{3+}$ and back transfer from Ho$^{3+}$ to Tm$^{3+}$ are analyzed.

AITHB06
Heat Generation and Flow and Thermal Effects on Optical Spectra in Laser Diode Pumped Thulium-doped Vanadate Crystals, Radoslaw Lisiecki$^1$, Piotr Stachowiak$^1$, Andrzej Jezowski$^1$, Piotr Solarz$^1$, Grazyna Dominik-Dzik$^2$, Witold Ryba-Romanowski$^3$, Tadeusz Lukasiewicz$^4$, 1Inst. of Low Temperature and Structure Res., Polish Acad. of Sciences, Wroclaw, Poland; 2Inst. of Electronic Materials Technology, Warsaw, Poland. Optical spectra, excited state relaxation dynamics and thermal conductivity in a wide temperature region for thulium-doped YVO$_4$, GdVO$_3$ and LuVO$_3$ have been measured and analyzed to assess thermal effects in laser-diode-pumped Tm:vanadate lasers.

AITHB07
Thermoluminescent detectors based on YAP:Mn crystals, Yaroslav Zhydachevski$^1$, Andrzej Suchocki$^1,2$, Marek Berkowski$^1$, Inst. of Physics Polish Acad. of Sciences, Warsaw, Poland; Inst. of Physics, Kazimierz Wielki Univ., Bydgoszcz, Poland; 1Lviv Polytechnic National Univ., Lviv, Ukraine. The work presents results of the experimental study of thermoluminescent (TL) properties of the high-temperature TL peak at 570 K observed in YAIo:Mn crystals at low concentrations of manganese ions.

AITHB08
MeV He Ion-Implanted Planar Waveguide in RTP Crystal, Gang Fu$^1$, School of Science, Shandong Jianzhu Univ., Jinan, China. A planar optical waveguide was formed in RbTiOPO$_4$(RTP) crystal by 3-MeV He-ion implantation with a dose of 1.0×10$^{13}$ions/cm$^2$ at room temperature. The annealing process effectively reduced the color centers and the loss of waveguide.

AITHB09
Measurement Of Up Conversion In Er:YAG And Comparison With Laser Performance, Norman Barnets$^1$, Farzin Amajzadian$^1$, Brian Walsh$^1$, Donald Reichte$^1$, George Busch$^1$, William Carrion$^1$, NASA Langley Res. Ctr., Hampton, VA, USA; 1NASA Langley Res. Ctr., Hampton, VA, USA. Up conversion significantly affects Er:YAG lasers. Measurements done here for low Er concentration are significantly smaller than reported high Er results. Results are used to predict laser performance and results are compared with experiment.
AITHB10
Structural Peculiarities, Energy Transfer and the Visible Emission in Gd$_2$SiO$_5$: Single Crystal Doped with Pr$^{3+}$, Sm$^{3+}$ and Dy$^{3+}$, Grazyna Dominik-Dzik$^1$, Witold Ryba-Romanowski$^1$, Radoslaw Lisiecki$^1$, Piotr Solarz$^2$, Boguslaw Macalik$^1$, Marek Berkowski$^1$; $^1$Inst. of Low Temp. and Structure Res. PAS, Wroclaw, Poland; $^2$Inst. of Physics, Polish Acad. of Sciences, Warsaw, Poland. Analysis of optical spectra and luminescence decay curves with reference to host structural peculiarities revealed mechanisms involved in excitation and relaxation processes leading to the visible emission of Pr$^{3+}$, Sm$^{3+}$ and Dy$^{3+}$ in Gd$_2$SiO$_5$ crystals.

AITHB11
Paper Withdrawn

AITHB12
Bistable Switching based on Pseudo Resonant States in Nonlinear Fractal Photonic Crystals, Mohammad Hosain Teimourpour$^1$, Jahanboon1, 2; $^1$Optics and Laser Engineering, Kermanshah Univ. of Technology, Kermanshah, Islamic Republic of Iran. All optical switching based on Kerr bistability in fractal photonic crystal without any defects is investigated. Finite element analysis is used to investigate bistable switching with low threshold (6.12 W/cm$^2$).

AITHB13
Switching dynamics and thickness effect of an intensity modulator based on a novel nematic liquid crystal mixture, Habib Khooshsima$^1$, Babak Olyaeefar$^1$; $^1$Photonics, Res. Inst. for Aplied Physics, Tabriz, Islamic Republic of Iran. In this experimental work, the latest results for the dynamic behavior of a novel nematic liquid crystal mixture are presented. The free relaxation time and viscoelastic coefficient of samples in three different thicknesses are calculated.

AITHB14
Simulation of Transmission Behaviors of Photonic Crystal Structures Etched into an Ion-implanted LN Waveguide, Qing Huang$^1$, Jin-Hua Zhao$^1$, Peng Liu$^1$, Jing Guan$^1$, Xue-Lin Wang$^1$; $^1$School of Physics, Shandong Univ., Jinan, China. The transmission behaviors of one and two-dimensional photonic crystal structures etched into an oxygen-ion-implanted LN waveguide were simulated by FDTD method. The cavity formed in one-dimensional photonic crystal structure works well as a filter.

AITHB15
Photoluminescence, afterglow and color properties in nanocrystalline SrMgAl$_2$SiO$_4$:Eu$^{3+}$, Dy$^{3+}$ phosphor, Hassan Sameie$^1$, Reza Salimi$^1$, Ali A. Sabbagh$^1$, Ali A. Sarabi, Mohammadreza Tahri$^1$, Mohammad A. Mokhtari Farsi$^1$; $^1$Dept. of Polymer Engineering & Color Technology, Amirkabir Univ. of Technology, Tehran, Islamic Republic of Iran; $^2$Color and Polymer Res. Ctr. (CPRC), Amirkabir Univ. of Technology, Tehran, Islamic Republic of Iran. The phase-condition, morphology and optical properties for sol-gel derived phosphor, SrMgAl$_2$SiO$_4$:Eu$^{3+}$, Dy$^{3+}$ were studied. Results showed that although Dy decreases the emission intensity, but can obviously improve the afterglow characteristic.

AITHB16
Site-Selective Spectroscopy of Garnets Doped with Chromium and Praseodymium Ions, Humeyra Orucu$^1$, Ozen Genc$^1$, Baldassare Di Bartolo$^2$, John Collins$^3$; $^1$Physics and Astronomy, Wheaton College, Norton, MA, USA; $^2$Physics, Boston College, Chestnut Hill, MA, USA. In this paper we present various techniques that can be used for site-selective spectroscopic studies and we follow with a study of some garnet crystals doped with chromium and praseodymium ions.

AITHB17
Pb$_5$ Quantum Dots Formation in Glasses Controlled by Ag Nanoclusters, Kai Xu$^1$, Jong Heo$^1$; $^1$Dept. of Materials Science & Engineering, Pohang Univ. of Science and Technology (POSTECH), Pohang, Republic of Korea. Control of the formation of Pb$_5$ quantum dots in glasses was attempted by precipitating Ag nanoclusters. Heat-treatment and ion-exchange processes were used to form Ag nanoclusters. Ag nanoclusters significantly enhanced the formation of quantum dots.

AITHB18
Chemical synthesis, crystal growth and mid-IR Difference Frequency Generation in ZnGeP$_2$ and AgGaS$_2$. Johan Petti$^1$, Antoine Godard$^2$, Myriam Raybaud$^1$, Jean-Michel Melkonian$^3$, Michel Lefebvre$^2$; $^1$DMSC, ONERA, Chatillon, France; $^2$DMPH, ONERA, Palaiseau, France. Chalcopyrite as ZnGeP$_2$ and AgGaS$_2$ are very promising non linear materials for the 3-12 µm laser sources. Their elaboration process is presented before first DFG experiments in the mid-IR.

AITHB19
Integrated chalcogenide waveguide resonators for mid-IR sensing: Leveraging material properties to meet fabrication challenges, Kathleen Richardson$^1$, Nathan Carlie$^1$, J. David Maugraves$^2$, Bogdan Zdyrko$^1$, Igor Luzinov$^1$, Juexun Hu$^1$, Vivek Singh$^2$, Anu Agarwal$^3$, Lionel C. Kimerling$^1$, Antonio Cianciulli$^1$, Francesco Morichetti$^2$, Andrea Melloni$^1$; $^1$Materials Science and Engineering, COMSET, Clemson Univ., Clemson, SC, USA; $^2$Microphotonics Lab, MSE, MIT, Cambridge, MA, USA; $^3$Electronics and Information, Polytechnique Milano, Milano, Italy. Efforts to reduce loss and tailor optical characteristics of planar chalcogenide devices are discussed and results of trimming experiments to correct fabrication errors, presented.
FThB • Short Pulse Fiber Lasers

10.30–12.30
Valentin Gapontsev; IPG Photonics Corp. USA, Presider

FThB1 • 10.30 Invited
Recent Progress on the ALPINE (Advanced Lasers for Photovoltaic INdustrial processing Enhancement) FP7 Integrated Project, Yves Hernandez¹, Anthony Bertrand¹, Stefano Selleri², François Salin¹, Lasse Leick¹, Marc Hueske², Rok Petkovsek⁴, Fabio Ferrario⁴, Norbert Lichtensteiner⁵; ¹Multitel, Mons, Belgium, ²Univ. of Parma, Parma, Italy, ³EOLITE Systems, PESSAC, France, ⁴NKT Photonics, Birkerød, Denmark, ⁵LPKF SolarQuipment GmbH, Garbsen, Germany, ⁶Univ. of Ljubljana, Ljubljana, Slovenia, ⁷Quanta System S.p.A., Solbiate Olona (VA), Italy, ⁸Oclaro Zurich, Zurich, Switzerland. We present the recent advances on the ALPINE project dedicated to developing innovative fibre lasers for scribing thin film CIGS and CdTe solar cells. The project started in September 2009 and involves 15 European partners.

FThB2 • 11.00
High average power femtosecond pulses at 520 nm via second harmonic generation of a fiber chirped pulse amplification system, Željko Eidam¹,2, Steffen Hädrich¹,2, Jan Rothhardt¹,2, Fabian Stutzki¹,2, Florian Jansen¹, Thomas Gottschalli¹, Thomas V. Andersen¹, Jens Limpert¹,2, Andreas Tümmermann¹,2; ¹Inst. of Applied Physics, Friedrich-Schiller-Univ. Jena, Jena, Germany; ²Helmholtz-Inst. Jena, Jena, Germany; ³NKT Photonics, Birkerød, Denmark. We present efficient second harmonic generation of a femtosecond fiber chirped pulse amplification system. At a record average power of 135W and a repetition rate of 5.25MHz we measured a M² value <1.2.

FThB3 • 11.15
High Efficiency Chirped Bragg Gratings for Pulse Stretching and Compression, Vadim Smirnov¹, Eugeniu Rotari², Ion Cohanoshi³, Almantas Galvanauskas³, Leonid Glebov¹; ¹OptiGrate, Orlando, FL, USA; ²EECS Dept., Univ. of Michigan, Ann Arbor, MI, USA; ³CREOL/ The College of optics and Photonics., Univ. of Central Florida, Orlando, FL, USA. This paper report on the advances in the

HThB • Enhanced Higher-Order Harmonic Generation

10.30–12.30
Presider to Be Announced

HThB1 • 10.30 Invited
Generalized Double Optical Gating, a Route to High Power Isolated Attosecond Sources, Zenghu Chang; Kansas State Univ., USA. Abstract not available.

HThB2 • 11.00 Invited
High-Energy Isolated Attosecond Pulses and Applications to Molecular Physics, Francesca Calegari¹, Federico Ferrari¹, Matteo Lucchini¹, Caterina Vozzi¹, Salvatore Stagira¹, Giuseppe Sansone¹, Mauro Nisoli¹; ¹Dept. of Physics, Politecnico di Milano, Milano, Italy. We report on the generation of isolated 155-as pulses with a pulse energy on-target of a few nanojoules, by using 5-fs driving pulses with stable carrier-envelope phase and peak intensity beyond the gas saturation intensity.

HThB3 • 11.15 Invited
High Efficiency Chirped Bragg Gratings for Pulse Stretching and Compression, Vadim Smirnov¹, Eugeniu Rotari², Ion Cohanoshi³, Almantas Galvanauskas³, Leonid Glebov¹; ¹OptiGrate, Orlando, FL, USA; ²EECS Dept., Univ. of Michigan, Ann Arbor, MI, USA; ³CREOL/ The College of optics and Photonics., Univ. of Central Florida, Orlando, FL, USA. This paper report on the advances in the
large-aperture linearly chirped Bragg grating stretcher/compressor, which enables efficient compact and robust chirped pulse amplification systems for high peak and high average power ultrashort pulses.

**FThB4 • 11.30 Invited**

Fiber Lasers, Jian Liu, Peng Wan, Liboey Yang, Farzin Amzajerdian; 1PolarOnyx Inc., Sunnyvale, CA, USA; 2NASA Langley Res. Ctr., Hampton, VA, USA. Pulse shaping technology is present to mitigate pulse narrowing and SBS effects in high energy/power ns fiber lasers and to balance SPM and gain narrowing in high energy/power fs fiber lasers.

**HThB3 • 11.30**

High-Order Harmonics Tunable Enhancement by a DC-Electric Field, Carles Serra1,2, Jens Biegert1,2; 1UPC - Universitat Politècnica de Catalunya, Terrassa, Spain; 2ICFO, Castelldefels (Barcelona), Spain; 3ICREA, Barcelona, Spain. A static electric field periodically distributed in space controls and enhances the yield in high harmonic generation. The method is relatively simple to implement and allows tuning from the extreme-ultraviolet to soft x-ray.

**HThB4 • 11.45**

Angle-frequency analysis of high-order harmonic generation, Philip K. Bates1, Stephan Teichmann1, Seth Cousin1, Alexander Grein1, Jens Biegert1,4, Arnaud Couairon1, Matteo Clerici3, Antonio Lotti3, Daniele Faccio3, Paolo DiTrapani3; 1Attoscience and Ultrafast Optics, ICFO-Inst. de Ciencies Fotoniques, Castelldefels (Barcelona), Spain; 2Ctr. de Physique Theorique, Ecole Polytechnique, Palaiseau, France; 3CNISM & Dept. of Mathematics and Physics, Università dell’Insubria, Como, Italy; 4ICREA, Institucio Catalana de Recerca i Estudis Avancats, Barcelona, Spain. We measure the far-field (angle-wavelength) spectrum of high order harmonics from a semi-infinite gas cell. Individual harmonics exhibit ring structures in space-time, which are attributed to the different quantum paths.

**FThB5 • 12.00 Invited**

Photovoltaics Applications of High Power Green and UV Fiber Lasers, Julien Saby, Benjamin Cocquelin, Francois Salin, Nicolas Falletto, Eolite Systems, Pessac, France. We present industrial laser products delivering 200W at 1030nm, 60W at 515nm and 20W at 343nm with pulse duration down to 10ns and M2<1.3 with a very simple MOPA architecture based on rod-type fiber laser. Photovoltaics applications are then presented on both silicon and thin film wafers.

**HThB5 • 12.00 Invited**

Bright Coherent Ultrafast X-rays from mid-IR Lasers, Tenio Poppinichchev1, Ming-Chang Chen1, Paul Arpin1, Michael Gerrity1, Matteo Seaborg1, Boheng Zhang1, Dimitar Poppinichchev1, Giedrius Andriukaitis1, Tadas Balciunas2, Oliver D. Mücke3, Andrius Pugzlys1, Andrius Baltuska2, Margaret Murnane1, Henry Kapteyn1; 1JILA and Univ. of Colorado at Boulder, Boulder, CO, USA; 2Photons Inst., Vienna Univ. of Technology, Vienna, Austria. We combine the attosecond physics of high harmonic generation with phase-matching in extreme nonlinear optics to demonstrate bright

**AITHC1 • 11.30 Invited**

Sintered Ceramics for Lighting and Computerized Tomography (CT) Scanners, Anant Setlur; GE Global Res., Niskayuna, NY, USA. Abstract not available.

**AITHC2 • 12.00**

Photo-Thermo-Refractive glass - Properties and Applications, Larissa Glebova1, Karina Chamma2, Julien Lumeau3, Leonid Glebov4; 1Univ. of Central Florida, CREOL, Orlando, FL, USA. Mechanisms of photo-thermo-induced refractive index change, advances in glass properties and applications for holographic optical elements, laser beam profilers, volume phase masks, and monolithic solid state lasers are discussed.
coherent upconversion into the X-ray spectral region using longer wavelength mid-IR lasers.

**AITHC3 • 12.15**

Visible to infrared down conversion in rare-earth doped fluorides for luminescent solar converters, Diana Serrano1, Alain Braud2; 2CIMAP-ENSCAEN, Caen, France. KY3F10 and CaF2 fluoride crystals co-doped with Pr3+ and Yb3+ ions are investigated as possible quantum cutting systems to enhance solar cells efficiency. More than 95% Pr3+ to Yb3+ energy transfer efficiencies are obtained.

**AITHC4 • 12.30**

Crystal growth and Spectroscopy of Cerium doped CaSc2O4, Matthias Fechner1, Fabian Reichert1, Klaus Petermann1, Günter Huber1; 1Inst. für Laser-Physik, Hamburg, Germany. Within cerium doped CaSc2O4 single crystals a ligand to metal Ce4+ - Ce3+ charge transfer absorption band is identified. Crystal growth and its influence on the incorporation of different charged Cerium ions are discussed.

**AITHC5 • 12.45**

Effect of Ho3+ in (Tm3+,Yb3+): KLu(WO4)2 nanocrystals for RGB light generation, E. William Barrera Bello1, Maria Cinta Pujol1, Joan Josep Carvajal1, Xavier Mateos1, Magdalena Aguiló1, Francesc Díaz1, Concepción Cascales2; 1Universitat Rovira i Virgili, Tarragona, Spain; 2Inst. of Ciencia de Materiales de Madrid, Madrid, Spain. Nanocrystalline powder of Ho3+,Tm3+,Yb3+:KLu(WO4)2 was synthesized by modified Pechini method. Under 930 nm, RGB emissions were observed. The decay times were studied to describe the luminescence dynamics. The CIE chromaticity was evaluated.

13.00–14.30

Lunch Break (on your own)
Despite its advantages with respect to precision, ultrashort pulse micromachining often suffers from a low processing speed. We will discuss the opportunities for high repetition rate and high average power ultrafast fiber lasers to overcome these problems.

High Power all fiber Picosecond Laser and Application to Photovoltaic Thin Films Scribing, Simonette Pierrot, Benjamin Cocquelin, Julien Saby, Nicolas Falletto, Francois Salin; Eolite Systems, Pessac, France. We demonstrate an all-fiber source producing 30ps pulses with energy up to 30μJ and average power up to 45W. 50% conversion efficiency to the UV and application to CIGS thin film scribing is demonstrated.

Ultra-short pulse fibre laser parameters optimisation for CdTe thin film solar cells processing and fibre laser design, Yves Hernandez; Multitel, Mons, Belgium. We present the results of an optimization study of ultra-short pulse laser scribing of thin film CdTe solar cells. Thereafter, a fibre laser source has been designed and the first results are also included here.
**Influence of Peak Power and ns Pulse Duration on Micromachining, Sami Hendaw**; 1Multiwave Photonics, San Jose, Portugal. Experimental and modeling results are presented for 10 to 200 ns pulsed fiber laser at 1064nm, showing peak power and pulse duration affecting ablation depth and HAZ, and produce high surface oxidation of stainless steel.

**Spatiotemporal Model of Passively Mode-locked Few-cycle Ti:sapphire Lasers: The Role of Plasma Formation, Li-Jin Chen**; Chien-Jen Lai; Franz Kärtner; 1MIT, Cambridge, MA, USA. A spatiotemporal model for Kerr-lens mode-locked few-cycle Ti:sapphire lasers is developed. The ultra-high intensity leads to significant plasma formation in the crystal which dominates the beam propagation in agreement with experimental observation.

**Plasma Defocusing in High Harmonic Generation with Long-Wavelength Driver Pulses, Chien-Jen Lai**; Franz Kärtner; 1EECS, MIT, Cambridge, MA, USA. Plasma defocusing in gas media and its impact on high-order harmonic generation (HHG) is discussed. It confines HHG with long-wavelength driver pulses to short propagation lengths significantly diminishing the HHG yield from high density media.

**Routes towards Single Intense Attosecond Pulses, George Tsakiris**; 1AttoPhysics, Max-Planck Inst. for Quantum Optics, 85748 Garching, Germany. The plasma medium converts laser light into higher harmonics more efficiently than gaseous media without inherent limitation on the laser intensity. This opens the prospect of generating brilliant, single attosecond pulses for applications.

**Chalcogenide Square Registered IR Imaging Bundles, Brandon Shaw**; Dan Gibson; Vinh Nguyen; Rafael Gattass; Jaya Sanghera; Ishwar Aggarwal; Gabrielle Farrar; 1Naval Res. Lab, Washington, DC, USA; 2Univ. Res. Foundation, Greenbelt, MD, USA. We report on development and characterization of square registered infrared imaging bundles fabricated from AsSb fiber. Bundle cross-talk measurements are presented.

**Low loss micro and nano structured single mode crystalline fibers for 5-15 μm, Leonid N. Butvina**; Alexey L. Butvina; Andrey Okhrimchuk; Nail Lichkova; Vladimir Zagorodnov; Evgeni Dianov; 1Fiber optic, FORC RAS, Moscow, Russian Federation; 2High purity materials, IPTM RAS, Chernogolovka, Russian Federation. Low loss multi component photonic micro- and nano-structured metal halides crystalline fibers for 5-15 μm are extruded. Fibers of different type from silver and metal halides are singlemode for 10 μm.

**Theoretical and experimental study of microstructured chalcogenide AsSb fibers for frequency conversion, Claire Alhenc-Gelas**; Pierre Bourdon; Guillaume Canat; Frédéric Druon; Anne Duricu; 1DOTA-SLS, ONERA, Palaiseau, France; 2Laboratoire Charles Fabry de l’Inst. d’Optique, CNRS, Palaiseau, France. The potential of mid-IR frequency conversion in AsSb microstructured fibers is assessed using an effective index method. The dispersion measurement setup used to validate the model on real chalcogenide fibers is also presented.
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Villval2, Coffee AIThE1 • 16.30
Large nonlinear LBO crystals for high power laser chains, Alexandr E. Kokh1, Nadezda Kononova1, Vasiliy Vlezko1, Konstantin Kokh1, Philippe Villoit2; 1Inst. of Geology and Mineralogy, Novosibirsk, Russian Federation; 2Cristal Laser, Nancy, France.
In order to improve the quality and dimensions of LBO crystal we have performed the growth under nonuniform rotating heat field. Currently Ø 65 mm NLO elements for 2nd and 3rd harmonic generation of 1053 nm were produced.

Anadolu, P Floor

16.30–18.00
Peter Schunemann; BAE Systems, Inc., USA, Presider

AIThE • Nonlinear Crystals and Processes II

AIThE1 • 16.30 Invited
Large nonlinear LBO crystals for high power laser chains, Alexandr E. Kokh1, Nadezda Kononova1, Vasiliy Vlezko1, Konstantin Kokh1, Philippe Villoit2; 1Inst. of Geology and Mineralogy, Novosibirsk, Russian Federation; 2Cristal Laser, Nancy, France.
In order to improve the quality and dimensions of LBO crystal we have performed the growth under nonuniform rotating heat field. Currently Ø 65 mm NLO elements for 2nd and 3rd harmonic generation of 1053 nm were produced.

AIThE2 • 17.00
Crystal growth and optical properties of LYSB, Alain Maillard1, Regine Maillard1, Gerard Aka2, Philippe Villoit2; 1Physics, Univ. Metz, Metz, France; 2Cristal Laser, Messein, France; 1CMCP UMR CNRS 7574, Paris, France. Borate crystal LYSB is successfully grown in large dimensions. This non hygroscopic crystal presents large transparency and good non linear optical properties. Diffraction by non homogeneities grating is studied in relation with crystal parameters.

AIThE3 • 17.15
Optical loss mechanisms in magnesium-doped lithium niobate crystals in the 300 to 2950 nm wavelength range, Judith R. Schwesogg1,2, Ashot Markoyan3, Maria Claudia C. Kajiymama1, Matthias Falk1, Dieter H. Jun1, Karsten Buse1, Martin M. Fejor1; 1E. L. Ginzton Lab, Stanford Univ., Stanford, CA, USA; 2Inst. of Physics, Univ. of Bonn, Bonn, Germany; 3Crystal Technology, Inc., Palo Alto, CA, USA. Absorption measurements in 5 mol. % MgO-doped lithium niobate crystals (optical grade) are presented. Measurements reveal that optical losses in these crystals are mainly caused by H, Fe, Cu, Ni, Cr, and Mn impurities.
AITHE4 • 17.30
Second harmonic generation below 400 nm using potassium lithium niobate from laser-heated pedestal growth, Gisele Maxwell1, Dylan Dalton2, Alan B. Petersen1; 1Spectra Physics, Santa Clara, CA, USA; 2Shasta Crystals, Anderson, CA, USA.
Potassium lithium niobate, compositionally adjusted for noncritical phase-matching has been grown using the laser-heated pedestal growth method. Second harmonic generation has been observed in the blue wavelength region down to 385 nm.

AITHE5 • 17.45
Intensity-dependent photorefractivity of Zirconium-doped lithium niobate crystals, Paolo Minzioni1, Giovanni Navai1, Wenbo Yan1, Ilaria Cristiani1, Vittorio Degiorgio1, Nicola Argüolas1, Marco Bazzani1, Maria V. Ciampolillo1, Annamaria Zaltron1, Cinzia Sada1; 1Electronics, Univ. of Pavia and CNISM, Pavia, Italy; 2Physics, Univ. of Padova and CNISM, Padova, Italy. The pump intensity dependence of photorefractive effect in Zr-doped Lithium-Niobate crystals is investigated. Photorefractivity grows linearly with light intensity in the undoped crystal, whereas it saturates when doping concentration exceeds 2mol%.

HTdD4 • 17.30
Multicolor optical parametric synthesizer for high-field science, Stefan Haessler1, Tadas Balciunas3, Gedrius Andriukaitis3, Oliver D. Mücke1, Audrius Pugelys1, Andrius Baltuska1, Richard Squibb2, Leslau Frasiniski2, Jon Marangoz3, John W. Tisch1, Linas Giniūnas1, Romas Damiačius3, Ronald Holzwarth3; 1Inst. of photonics, Vienna Univ. of Technology, Vienna, Austria; 2Dept. of Physics, Imperial Collège London, London, UK; 3Light Conversion Ltd., Vilnius, Lithuania; 4Max-Planck Inst. of Quantum Optics, Garching, Germany; 5Menlo Systems GmbH, Munich, Germany. We discuss promising high-field applications of a CEP-stable parametric wave synthesizer producing three-color phase-locked tunable frequency pulses. The asymmetric waveform reproducibility is confirmed in the measurements of ATI and THz transients.

HTdD5 • 17.45
A simple linear optical measurement of carrier envelope phase shift, Peter Jojart1,2, Borzsonyi Adam1,2, Sebastian Koke1, Mihály Gorbé1,2, Karoly Osuy1; 1Optics and Quantum Electronics, Univ. of Szeged, Szeged, Hungary; 2CE Optics, Szeged, Hungary; 3Max-Born-Inst. für Nichtlineare Optik und Ultrakurzzeitoptik, Berlin, Germany; 4Faculty of Mechanical Engineering and Automation, Kecskemét College, Kecskemét, Hungary. A robust all-linear method based on spectral interferometry for measuring the carrier-envelope offset phase of ultrashort laser pulses is demonstrated. The performance has been proved with cross-calibration with a conventional f-to-2f interferometer.
FThE8
1.9 micron Tm+-doped germanate fiber laser source for Si-processing, Vladislav V. Dvoiryts1, Irina Sorokina2, Oleg Okhotnikov3, Valery Mashinsky4, L. Ischakova4, Evgeni Dianov4, Vladimir Khupin5, A. N. Garganov6; 1FORC, Moscow, Russian Federation; 2Dept. of Physics, NTNU, Trondheim, Norway; 3Tampere Univ. of Technology, Tampere, Finland; 4Inst. of Chemistry of High-Purity Substances, Nizhny Novgorod, Russian Federation. We report development of a novel Tm+-doped fiber laser source at 1.86 μm based on highly nonlinear 55GeO2-45SiO2 dispersion shifted fiber, applicable to 3D-volume microprocessing of Si.

FThE9
Tapered Double Clad Ytterbium Fiber Laser for Material Processing, Jorma Vihinen1, Jyrki Latokartano1, Tero Kumpulainen1, Valery Filippov2, Juho Kerttula3, Yuri Chumaryovskii4, Konstantin Golani5, Oleg Okhotnikov3, 1Tampere Univ. of Technology, Tampere, Finland; 2Inst. of Radio and Electronics of the Russian Acad. of Sciences, Moscow, Russian Federation. A novel tapered fiber laser has been evaluated for laser cutting applications of thin materials. High efficiency, small size and good beam quality of the tapered fiber laser makes it an interesting option for cutting applications.
FThE13
Energy scalability of 2 μm ultrashort pulsed Tm-laser based on germanate dispersion shifted fiber, Vladimir Kalashnikov1, Irina Sorokina1, Vladislav Dvoyrin2,3; 1Inst. fuer Photonik, TU Wien, Vienna, Austria; 2Dept. of Physics, Norwegian Univ. of Science and Technology, Trondheim, Norway; 3Fiber Optics Res. Ctr., Russian Acad. of Sciences, Moscow, Russian Federation. Theoretical investigation of an all-normal-dispersion mode-locked Tm-laser based on dispersion shifted GeO2-doped SiO2-fiber, demonstrates its energy scalability opening a road for material processing applications.

FThE14
Multiwavelength Erbium-Doped Fiber Laser Employing A Dual-Pass Unbalanced In-Line Sagnac Interferometric Comb Filter, Hermann Lin1; 1Dept. of Optoelectronics and Communication Engineering, National Kaohsiung Normal Univ., Kaohsiung, Taiwan. A dual-pass unbalanced in-line Sagnac interferometric comb filter with both schemes of nonlinear polarization rotation and intensity dependent loss has been proposed for multiwavelenght erbium-doped fiber lasers. The lasing SNR is improved to 60dB.

FThE15
Low Repetition Rate High Energy 1.5 μm Fiber Laser, Peng Wan1, Jian Liu1, Lihmei Yang1, Farzin Amzajerdian2; 1PolarOnyx, Inc., San Jose, CA, USA; 2NASA LaRC, Hampton, VA, USA. Ultra low repetition rate high energy ns pulsed fiber laser is realized. 100 μJ pulse energy was obtained at all fiber based 1550 nm laser at Hz level.

FThE16
Intracavity absorption spectroscopy with Er-doped fiber lasers, Peter Fjodorov1, Valeri M. Baev2, Benjamin Löhden1, Svetlana Kuznetsova1, Sergey Cheskis2; 1Physik, Univ. Hamburg, Hamburg, Germany; 2School of Chemistry, Tel-Aviv, Israel. Intracavity absorption spectroscopy with a broadband Er-doped fiber laser is applied to measure the concentration, temperature and chemical reactions of several gases in flames. Maximum sensitivity corresponds to an absorption path length of 2000 km.
HThE • Joule-class High-field Facilities

18.30–20.00
Todd Ditmire; Univ. of Texas at Austin, USA, Presider

HThE1 • 6:30 p.m. Invited
Towards Joule-scale few-cycle pulses - progress and challenges of short-pulse pumped OPCPA, Zsuzsanna Major1,2, Christoph Skrobol1, Izhar Ahmad1, Christoph Wundt1, Sandro Klingebiel1, Sergei A. Trushkin1, Ferenc Krausz1,2; 1Max-Planck-Inst. für Quantenoptik, Garching, Germany; 2Dept. für Physik, Ludwig-Maximilians-Univ. München, Garching, Germany. The Petawatt Field Synthesizer is based on short-pulse-pumped optical parametric amplification for generating few-cycle, Joule-scale pulses. Stabilizing the pump-seed timing to ~100fs allowed for the first OPA experiments, which are reported here.

HThE2 • 7:00 p.m.
The 10PW OPCPA Vulcan Laser Upgrade, Andrey Lyachev1, Oleg Chekhlov1, John Collier1, Rob Clarke1, Marco Galimberti1, Cristina Hernandez-Gomez1, Pavel Matousek1, Ian Musgrave1, David Neely1, Peter Norreys1, Ian Ross1, Yuxin Tang1, Trevor Winstone1, Brian Wyborn1; 1Central Laser Facility, Science and Technology Facilities Council, Didcot, UK. We present progress made in developing the 10PW OPCPA capability for the Vulcan laser to produce pulses with focused intensities > 10^{13}Wcm^{-2}.

HThE3 • 7:15 p.m.
Performance Modelling of a 1 kJ DPSSL System, Klaus Ertel1, Saumyabrata Banerjee1, Cristina Hernandez-Gomez1, Paul D. Mason1, Jonathan Phillips1, John Collier1; 1Central Laser Facility, STFC Rutherford Appleton Lab, Didcot, UK. We present modelling results for a 1 kJ diode-pumped laser system, based on cryogenic gas-cooled multi-slab Yb:YAG amplifiers.

HThE4 • 7:30 p.m.
Cryogenic disk laser with high peak and average power, Ivan B. Mikhin1, Evgeny Perevezerocev1, Anton Vystokin1, Olga Vadimova1, Oleg Palashov1, Efim Khazanov1; 1Dept. of nonlinear and laser optics, Inst. of Applied Physics Russian Acad. of Science, Nizhny Novgorod, Russian Federation. Spectral and thermooptical properties, the stored energy and amplification in Yb:YAG disks are investigated at 77-300K temperature range. The current status of laser system development with 0.5J output energy at 1kHz repetition rate is presented.

HThE5 • 7:45 p.m.
Design and preliminary results for a sub-5-fs, 100 mJ-level, CEP-stabilized laser facility – PhaSTHEUS, Andreas Vaupel1, Nathan Bodnar1, Benjamin Webb1, Michael Hemmer1, Martin Richardson1; CCREOL, The College for Optics and Photonics, Univ. of Central Florida, Orlando, FL, USA. We report on the preliminary results and design of a new laser facility at the Townes Laser Inst. - PhaSTHEUS. This facility is a 5 fs, 100 mJ, CEP-stabilized laser source for highly nonlinear optical experiments.
• Friday, 18 February 2011 •

7.30–11.00
Registration Open

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<thead>
<tr>
<th>Anadolu, P Floor</th>
<th>Citronelle, N Floor</th>
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<tr>
<td><strong>AIFA • Nonlinear Crystals and Processes III</strong></td>
<td><strong>HFA • Molecules in a Strong Field</strong></td>
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<td>8.00–9.45</td>
<td>8.00–10.00</td>
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<td>Benoit Boulanger; Univ. de Grenoble, France, Presider</td>
<td>Takao Fujii; IMS Okazaki, Japan, Presider</td>
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<td><strong>AIFA1 • 8.00 Invited</strong></td>
<td><strong>HFA1 • 8.00 Invited</strong></td>
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<td>CdSiP₂ and OPGaAs: New Nonlinear Crystals for the Mid-Infrared, Peter Schunemann; ¹BAE Systems, Inc., Nashua, NH, USA. Two new materials have emerged with high nonlinear coefficients and thermal conductivities which extend the operating range of ZGP: CdSiP₂ allows for shorter wavelength 1064nm pumping and OPGaAs enables 8-12 micron generation.</td>
<td>Watching Ultrafast Motion: High Harmonic Spectroscopy of Electron Dynamics in Molecules, Olga Smirnova; Max-Born-Inst., Germany. Abstract not available.</td>
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<td><strong>AIFA2 • 8.30 Phase-matching properties and refined Sellmeier equations of the new nonlinear infrared crystal CdSiP₂, Pierre Brand; Benoit Boulanger ¹, Patricia Segonds¹, Vincent Kemlin¹, Peter G. Schunemann², Kevin T. Zawilski², Thomas M. Pollak³, Bertrand Ménart³, Jérôme Debray³, Institut Néel CNRS/UJF, France. ²BAE Systems, USA We directly measured the second harmonic generation and difference frequency generation phase-matching directions of the nonlinear crystals CdSiP₂ until 9.5 μm using the sphere method, from which we refined the Sellmeier equations of the crystal.</strong></td>
<td><strong>HFA2 • 8.30 High-order Harmonics in Fragile Molecules, Caterina Vozzi; Matteo Negro¹, Sandro De Silvestri², Salvatore Stagira³, Ricardo Torres⁴, Leonardo Brugnera⁵, Thomas Siegel⁵, Jon Marangoz⁵, Carlo Altucci⁵, Raffaele Velotta⁵, Fabio Frassetto⁶, Paolo Villorese⁶, Luca Poletto⁶, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; ²Blackett Lab, Imperial College London, London, UK; ³Università di Napoli Federico II, Napoli, Italy; ⁴Università di Padova &amp; IFN-CNR, Padova, Italy. Exploiting an ultrafast IR source, we produced extended harmonic spectra in several molecules with low ionization potentials. These results pave the way to the extension of high harmonic spectroscopy to complex species like biomolecules.</strong></td>
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<td><strong>AIFA3 • 8.45 Optical, Thermal, Electrical, Damage, and Phase-Matching Properties of Lithium Selenoindate, Jean-Jacques Zondy¹, Valentin Petrov², Ludmila Iašenko³, Olivier Bidauld⁴, Joint Lab of Metrology LNE-CNAM, La Plaine Saint Denis, France; ²Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany; ³Inst. of Geology and Mineralogy, SB RAS, Novosibirsk, Russian Federation; ⁴L.C., CNRS - Univ. de Bourgogne, Dijon, France. LiInSe₂, a biaxial nonlinear crystal transparent from 0.54 to 10 μm, is successfully grown in large sizes with good optical quality. We summarize all characteristics and physical properties of LiInSe₂ essential for nonlinear frequency conversion.</strong></td>
<td><strong>HFA3 • 8.45 Near-Threshold High-Order Harmonic Spectroscopy with Aligned Molecules, Hadas Soifer¹, Barry D. Bruner¹, Pierre Botheron¹, Dror Shafiri², Adi Diner¹, Oren Raz¹, Yann Maireesse², Bernard Pons², Nirit Dudovich¹; ¹Dept. of Physics of Complex Systems, Weizmann Inst. of Science, Rehovot, Israel; ²CELIA, Univ. de Bordeaux l-CNRS-CEA, Talence, France. We study HHG close to the ionization threshold and identify two distinct contributions to the emitted harmonic signals. The observed near-threshold emission is shown to occur outside the realm of the standard strong field approximation.</strong></td>
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<td><strong>HFA4 • 9.00 Concerted High-Energy Proton Emission in Laser-Induced Fragmentations of Polyatomic Molecules, Stefan Roithner¹, Xinhua Xie¹, Daniil Kartashov¹, Li Zhang¹, Hua Liang Xu¹, Atsushi Iwasaki², Markus Schöffler³, Reinhard Dörner³, Koaru Yamanouchi³, Andrius Baltuska¹, Markus Kitzler¹; ¹Photonics Inst., Vienna Univ. of Technology, Vienna, Austria; ²Dept. of Chemistry, School of Science, The Univ. of Tokyo, Tokyo, Japan; ³Inst. für Kernphysik, J.W. Goethe Univ., Frankfurt/Main, Frankfurt/Main, Germany. Using multi-particle coincidence detection we are able to show that carbon-hydrogen molecules exposed to moderate laser-intensities can completely disintegrate from high charge states by a concerted emission of all protons with high kinetic energies.</strong></td>
<td><strong>HFA4 • 9.00</strong></td>
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**Registration**

7.30–8.00
8.00–9.45
9.00–10.00
10.00–11.00

**Concert**

8.30–9.30
9.30–10.30
10.30–11.30

**Breaks**

8.00–9.45
9.00–10.00
10.00–11.00

**Coffee Break**

11.00–11.30
11.30–12.00
12.00–13.00

**Lunch Break**

13.00–14.00
14.00–15.00
15.00–16.00

**Invited Talks**

15.00–15.45
15.45–16.30
16.30–17.15

**Poster Session**

17.15–18.00
18.00–18.30
18.30–19.30

**Roundtable Discussions**

19.30–20.30
20.30–21.30
21.30–22.30

**Closing**

22.30–23.30
23.30–00.30
00.30–01.30

**Afterparty**

01.30–02.30
02.30–03.30
03.30–04.30

**End of Day**

04.30–05.30

AIFA • 9.15
Non-resonant pump-induced refractive index changes and non-degenerate two-wave mixing in Nd³⁺ and Yb³⁺ doped laser materials, Rémi Souard¹,², Andrey Zinoviev³, Arnaud Brignon⁴, Jean-Louis Doualan³, Oleg Antipov³, Jean-Pierre Huignard⁴, Richard Moncorge⁵; CIMAP, Univ. de Caen, Caen, France; ²TRT, Thales Res. & Technology, Palaiseau, France; ³Inst. of Applied Physics, RAS, Nizhny-Novgorod, Russian Federation. Modeling and experiments of two-wave mixing and energy-transfer based on accurate measurements of pump-induced refractive index variations were performed. Results indicate that energy transfer exceeding 50% is possible under high pumping conditions.

AIFA • 9.30
Optically-pump induced athermal and non-resonant refractive index changes in Cr-doped materials: still an opened question, Thomas Godin¹, Rémi Moncorge⁵, Jean-Louis Doualan³, Michael Fromager⁵, Kamel Ait-Ameur⁶, Tomaz Catunda¹; ¹Univ. de Caen, CIMAP, Caen, France; ²USP Sao-Carlos, Inst. de Fisica Sao-Carlos, Sao-Carlos, Brazil. More reliable ESA and Z-scan measurements have been performed in Cr:GSGG and ruby. The results indicate that the real origin of the purely dispersive refractive index changes observed in these materials needs to be reconsidered.

3.00–3.30
AIFB • Waveguides and Laser Patterning

AIFB1 • 10.30
Femtosecond Laser Writing of Waveguides in Glass, Luke B. Fletcher¹,², Jonathan J. Winchester³, Neil Troy¹, Richard K. Brown¹, Denise Krolik¹; ¹Univ. of California, Davis, Davis, CA, USA; ²Missouri Univ. of Science & Technology, Rolla, MO, USA. Femtosecond laser writing was used to fabricate waveguides in undoped and rare-earth doped polyphosphate glasses. The influence of glass composition and laser parameters on waveguide properties and structural changes in the glass will be discussed.

HFB5 • 9.15
Invited
Molecular-Alignment-Based Frequency-Resolved Optical Gating, Heping Zeng; East China Normal Univ., Shanghai, China. Abstract not available.

HFA6 • 9.45
Signatures of Continuum-Continuum transitions in High Harmonic Generation, Markus C. Kohler¹,², Christian Ott¹,², Philipp Raith¹,², Robert Heck¹, Iris Schlegel³, Christoph H. Keitel³, Thomas Pfeifer³; ³MPI für Kernphysik, Heidelberg, Germany. High harmonic generation is investigated theoretically in the over-the-barrier ionization regime revealing that emission can be dominated by the interference between two distinct free wave packets of a single electron after ground-state depletion.

10.30–12.30
HFB • Emerging Techniques

HFB1 • 10.30
Invited
Intense terahertz fields: electric and magnetic nonlinearities on the sub-cycle scale, Friederike Junghering¹, Alexander Sell¹, Olaf Schubert¹,², Bernhard Mayer¹, Daniele Brida¹, Marco Marangoni¹, Giulio Cerullo¹, Tobias Kampfrath¹, Martin Wolf¹, Alfred Leitenstorfer¹, Rupert Huber¹;¹Dept. of Physics and Ctr. for Applied Photonics, Univ. of Konstanz, Konstanz, Germany; ²IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; ³Dept. of Physics, Freie Univ. Berlin, Berlin, Germany; ⁴Dept. of Physics, Univ. of Regensburg, Regensburg, Germany. High-intensity single- and few-cycle transients covering the mid and far infrared are generated and electro-optically monitored by a passively CEP-locked laser. These pulses drive strong nonlinearities via electric and magnetic field coupling.
AIFB3 • 11.15
Laser Patterning of Oxyfluoride Glasses Containing Silver
Nanoparticles, Chao Liu1, Jong Ho2; 1Dept. of Materials Science and Engineering, Pohang Univ. of Science and Technology, Pohang, Republic of Korea. Irradiation of glasses containing silver nanoparticles with a continuous-wave laser was used to design the patterned glasses for advanced optical devices. Laser induced heating leads to the size reduction of Ag NPs in the glass.

AIFB4 • 11.30
Highly Efficient Waveguide Lasers in a Femtosecond Laser Inscribed Nd:YVO4 Channel Waveguide, Yang Tan1, Jing Guan1, Feng Chen1, Javier R. Vázquez de Aldana2, G. A. Torchia1, Antonio Benayas1, Daniel Jaque2; 1School of Physics, Shandong Univ., Jinan, China; 2Facultad de Ciencias, Universidad de Salamanca, Salamanca, Spain; 2Centro de Investigaciones Ópticas, CIC-Conicet, La Plata, Argentina; 3Departamento de Física de Materiales, Universitat Autònoma de Madrid, Madrid, Spain. Continuous-wave waveguide laser at 1064 nm was generated from a femtosecond laser inscribed Nd:YVO4 channel waveguide. Single-mode laser oscillations have been observed with a low threshold power 34 mW and a high slope efficiency 65%.

AIFB5 • 11.45
Ultrafast Laser Inscription of Waveguide Structures in Cr2+:ZnSe, Patrick Berry1, John MacDonald1, Ajay Kar2, Kenneth Schepler; 1Air Force Res. Lab, Wright-Patterson AFB, OH, USA; 2Heriot-Watt Univ., Edinburgh, UK. Waveguide structures were fabricated in chromium-doped zinc selenide (Cr2+:ZnSe) using ultrafast laser inscription. To obtain optimal results, the multi-scan fabrication technique was used.

AIFB6 • 12.00
Low Loss Silicon Waveguides Fabricated Using a Hydrogen Silesquioxane Oxidation Mask, Maziar P. Nezhad1, Olesya Bondarenko1, Aleksandar Stimić2, Mercede Khajavikhan1, Yesaliyalu Farinman1; 1UC San Diego, La Jolla, CA, USA. Low-loss silicon waveguides are fabricated without plasma etching via oxidation of e-beam patterned HSOx masks. Oxidation converts HSOx to a glassy compound and defines the waveguides. Losses of 0.8dB/cm and Q-factors of 450,000 were measured.

HFB2 • 11.00
Visualization of Nuclear and Electron Motion by Ultrafast Electron Diffraction, Peter Baum1; 1LMU München, Garching, Germany. Ultrashort packets of single electrons allow to reach femtosecond and attosecond resolutions, when observing atomic and electronic motion within matter in four dimensions.

HFB3 • 11.30
A High-Harmonic Source for Time-Resolved ARPES, Georgi Dukovski1,2; 1CINT, LANL, Los Alamos, NM, USA; 2CMMS, LANL, Los Alamos, NM, USA. We present an apparatus for visible pump/XUV probe time- and angle-resolved photoemission spectroscopy utilizing high-harmonic generation. Wide-range tunability is achieved by using a time-delay compensated monochromator, preserving the XUV pulses.

HFB4 • 11.45
Towards MW Average Powers in Ultrafast High-Repetition-Rate Enhancement Cavities, Jan M. Kaster1,2, Ioachim Puepa1,2, Tino Eidam3, Christoph Jocher1, Ernst Fill1, Jens LimPERT1, Ronald Holzwarth1,2, Birgitta Bernhardt1,2, Thomas Udern1,2, Theodor W. Hünscheid1,2, Andreas Tünnermann1,2, Ferenc Krausz1,2; 1Attosecond and Highfield Physics, Max Planck Inst. for Quantum Optics, Garching, Germany; 2Department of Physics, Ludwig-Maximilians-Univers., München, Germany; 3Inst. of Applied Physics, Friedrich-Schiller-Univers., Jena, Germany. We report on high-power, ultrafast enhancement cavity designs with enlarged laser spots on the mirrors. Together with a novel seeding Yb-fiber based CPA, MW-level intra-cavity average powers with sub-ps pulse durations come into reach.

HFB5 • 12.00
Intracavity high harmonic generation with fs frequency combs, Jason Jones1,2; 1College of Optical Sciences, Univ. of Arizona, Tucson, AZ, USA. We report on a high power Ti:sapphire based frequency comb generating harmonics down to 53nm, with average power up to 77 microwatts at 72 nm. Fundamental limitations due to intracavity plasma dynamics are modeled numerically.
All-telluride channel waveguides for mid-infrared applications, Caroline Vigreux1, Marc Barillot2, Eléonore Barthélémy2, Lionel Bastard3, Jean-Emmanuel Broquin3, Volker Kirschner4, Stéphane Ménard5, Gilles Parent6, Claire Poinsot2, Anie Pradel1, Shaoqian Zhang5, Xianghua Zhang6; 1ICGM, Montpellier, France; 2Thales Alenia Space, Cannes La Bocca, France; 3IMEP-LACH, Grenoble, France; 4ESA, Noordwijk, Netherlands; 5LEMTA, Nancy, France; 6LCV, Rennes, France. In this paper, the different steps of the fabrication of single-mode RIB waveguides for both [6-11]μm and [10-20]μm spectral bands are described and the first results in term of light guiding and modal filtering are presented.

Single-shot Characterization of sub-15fs Pulses with 40dB Dynamic Range, Nicolas Forget1, Antoine Maudet1, Stéphanie Grabielle1,2, Christian Cornaggia2, Olivier Gobert1, Thomas Okshenhorder1; 1Fastlite, Orsay, France; 2IRAMIS, Service Photons Atomes & Molécules, CEA, Gif-sur-Yvette, France; 2Lab for Attosecond Physics, Max Planck Inst. of Quantum Optics, Garching, Germany. We present an extended version of the self-referenced spectral interferometry technique. Sub-15fs pulses are characterized by SRSI and feedback experiments demonstrate a measurement dynamic range >40dB.
Advanced Solid-State Photonics (ASSP)
Postdeadline Paper Abstracts

• Monday, 14 February 2011 •

AMF • ASSP Postdeadline Session

Bosphorus, P Floor
8:00 p.m.–9:00 p.m.
Gregory Goodno, Northrop Grumman Aerospace Systems, USA, Presider

AMF1 • 8:00 p.m.
New Visible SrF2:Pr+ Ceramic Laser at 639 nm, M.E. Doroshenko, T.T. Basiev, V.A. Konyushkin, E.V. Konyushkin, G. Huber, F. Reichert, N. Hansen, M. Fechner; 1General Physics Institute, RAS, Russian Federation, 2Inst. of Laser-Physics, Univer. of Hamburg, Germany. For the first time to our knowledge SrF2:Pr+ fluoride ceramics was developed and visible 639 nm wavelength oscillations were obtained in diode pumped CW mode with slope efficiency above 9%.

AMF2 • 8:15 p.m.
Multi-kW Er3+-YAG Solid-State Heat-Capacity Laser, M. Eichhorn, ISL, Saint Louis, France. A resonantly-diode-pumped Er3+-YAG laser in heat-capacity mode is presented, reaching up to 4.65 kW of output power at 51.4 % incident slope efficiency and integrated output energy over 435 J in sub-second operation time.

AMF3 • 8:30 p.m.
High power narrow-band ASE as source for beam combining applications, O. Schmidt, C. Wirth, S. Rhein, M. Rekas, A. Kliner, T. Schreiber, R. Eberhardt, A. Tünnemann, Fraunhofer IOF Jena, Germany. We report on fiber generated and amplified 697W of 12pm narrow-band ASE at 1μm wavelength. This emission is ideal for beam combining setups where SBS is one of the primary limiting nonlinear effects.

AMF4 • 8:45 p.m.
High-power quasi-two-level laser with Yb:CaF: at 77 K emitting at 993 nm, S. Ricaud, F. Balambois, P. Georges, F. Druon, D.N. Papadopoulos, A. Pellegrina, P. Camy, J. Doualan, R. Moncorgé, S. Ricaud, A. Courjaud; 1LCEF IO, France, 2Inst. de la Lumière Extrême, France, 3Ctr. de recherche sur les Ions, les Matériaux et la Photonique, France; 4Amplitude Systèmes, France. Laser operation at 992.7 nm under 981-nm diode-pumping is demonstrated with Yb:CaF: operating at 77 K leading to a extremely-low quantum-defects of 1.2 % with 33W average power with an optical-efficiency of 35 %.

Advances in Optical Materials (AIOM) Postdeadline Paper Abstracts

• Thursday, 17 February 2011 •

AIThF • AIOM Postdeadline Session

Anadolu, P Floor
6:30 p.m.–7:15 p.m.
Peter Moulton, Q-Peak, Inc., USA, Presider

AIThF1 • 6:30 p.m.
85%-efficient, Resonantly Pumped, Er3+-doped Orthovanadate Laser, N. Ter-Gabrielyan, V. Fromzel, M. Dubinskii, T. Lukasiewicz, W. Ryba-Romanowski; 1US Army Res. Lab., USA, 2Inst. of Electronic Materials Technology, Poland, 3Inst. of Low Temperature and Structure Research, Poland. Nearly quantum defect-limited laser operation of a resonantly-pumped Er3+:YVO4 at 1593.5 nm is demonstrated. Achieved slope efficiency of ~85% is, to the best of our knowledge, the highest efficiency ever reported for crystalline Er-doped laser.

AIThF2 • 6:45 p.m.
Femtosecond-Laser Written Highly Doped Yb(15%):YAG Ceramic Waveguide Laser, T. Calmano, J. Siebenmorgen, A. Paschke, S.T. Frederich-Thornton1, K. Petermann, G. Huber, H. Yagi; 1Inst. of Laser-Physics, Univ. of Hamburg, Hamburg, Germany, 2Takuma Works, Komoshima Chemical Co. Ltd., Kouda, Japan. Using a femtosecond laser waveguides were written in Yb(15%):YAG ceramics. Laser oscillation at two outcoupling transmissions was demonstrated. Due to nonlinear losses a higher slope efficiency was observed for the lower outcoupling transmission.

AIThF3 • 7:00 p.m.
Few-layer Graphene as Saturable Absorber for Q-Switched Laser at Sub-MHz Repetition Rate, Q. Wang, Z. Wei, J. Lin, Y. Zhang, L. Guo, Z. Zhang, Lab of Optical Physics, Inst. of Physics, Beijing, China. Quasi-monolayer graphene grown on silicon carbide was used to Q-Switch a compact Nd:YVO4 laser. Stable nanosecond laser pulses was obtained at high repetition rate up to 850 kHz with pulse energy to 680 nJ.
### Key to Authors and Presiders
*(Bold denotes Presider or Presenting Author)*

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Lasers, Sources and Related Photonic Devices

OSA Optics & Photonics Congress 2011

Update Sheet

Withdrawals
AITHB02 AIFB3
AITHB03 AIFB6
AITHB11 HWC13
AITHB13 HFB3
AITHB17

Presider Updates
Kent E. Mattsson, Technical Univ. of Denmark, Denmark, will preside over the session, AITHD, Crystal and Glass Fibers II

Author Block Update
The author block for HWA3 should read: Xiaowei Chen, Aurelien Ricci, Arnaud Malvache, Aurelie Jullien, Rodrigo Lopez-Martens; Lab d’Optique Appliquee, Palaiseau Cedex, France.

Presenter Changes
HWB5 will be presented by Paraskevas Tzallas, IESL, FORTH, Heraklion, Greece.

AMB10, ATuD4, and FWB3 will be presented by Lawrence Shah, CREOL College of Optics and Photonics, Univ. of Central Florida, USA.

HThE3 will be presented by P. D. Mason, STFC Rutherford Appleton Laby, Central Laser Facility, UK

HThC5 will be presented by Rainer Hoerlein, Ultrafast Innovations, Germany

Session Changes
AITHF • AION Postdeadline Session ends at 19.15.

Special Events
Please join the HILAS and FILAS chairs for an informal “rump” session to discuss the 2011 inaugural offerings of these two meetings and to brainstorm for how to improve in 2012.

FILAS Rump Session
Wednesday, 16 February 2011
13.00–14.00
Marmara

HILAS Rump Session
Thursday, 17 February 2011
20.00–21.00
Citronelle

Welcome Event
Please join the ASSP Chairs on Sunday at the City Lights Bar within the hotel from 18.00–19.00.

Student Awards
The ASSP Student Award sponsored by Lockheed Martin will be presented following session AWB on Wednesday, 16 February.

The FILAS Student Award sponsored by Multiwave Photonics will be presented during the IPG dinner on Thursday, 17 February.

Additional Support provided by:

Postdeadline Paper Programs

Postdeadline Paper Programs are available at Registration.