

Optica Laser Congress

Session Guide

Disclaimer: This guide is limited to technical program with abstracts and author blocks as of 11 October. For updated and complete information with special events, reference the online schedule or mobile app.

Monday, 12 October

08:30 -- 10:00

Room: Zeta 1

AM1A • UV and EUV Sources

Presider: Yushi Kaneda; Univ of Arizona, College of Opt. Sciences, USA

AM1A.1 • 08:30

High-Photon-Flux BBO/KTA/ZGP Hybrid OPA Enabling Attosecond Spectroscopy at Buried Interfaces, Tsuneto Kanai¹, Andrius Baltuska², Hibiki Tsunekawa^{1,3}, ChengXiang Jin^{1,3}, Toshiki Sugimoto^{1,3}; ¹*Inst. for Molecular Science, Japan*; ²*Technische Universität Wien, Austria*; ³*Graduate Inst. for Advanced Studies, SOKENDAI, Japan*. We demonstrate a BBO/KTA/ZGP hybrid OPA driven by high-power Yb lasers, enabling ultrafast spectroscopy at buried interfaces with intrinsically weak optical signals through high photon flux, broad tunability, intrinsic multi-color synchronization, and passive CEP stabilization.

AM1A.2 • 08:45

Towards a Narrow-Linewidth Tunable Deep-UV Ce³⁺:LiCAF Laser Using Multi-Prism Wavelength Selection, Hendrik Bükler^{3,2}, Eduardo Granados³, Katerina Chrysalidis³, Marc Eichhorn^{1,2}; ¹*Fraunhofer-Institut für Optronik Systemtechnik und Bildauswertung IOSB, Germany*; ²*IRS, Karlsruher Institut für Technologie, Germany*; ³*European Organization for Nuclear Research, Switzerland*. A tunable Ce³⁺:LiCAF deep-ultraviolet (DUV) laser employing up to four intracavity prisms for wavelength selection is demonstrated. Characterization of laser efficiency and tuning performance shows that multi-prism operation can be achieved with moderate losses, providing a route towards narrow-linewidth DUV generation.

AM1A.3 • 09:00

Generation of >30-μJ Lyman-α Radiation via Two-Photon Resonant Four-Wave Mixing With a High-Energy Nd:YAG Ceramic Laser Amplifier, Yu Oishi^{1,2}, Norihito Saito³, Sotaro Kanda^{1,2}, Takayo Ogawa³, Satoshi Wada³, Koichiro Shimomura¹; ¹*KEK, Japan*; ²*J-PARC, Japan*; ³*Riken, Japan*. We demonstrated 30 μJ-level Lyman-α generation through two-photon-resonant four-wave-mixing in krypton gas using 212.556 nm and 820 nm pulses derived from a wavelength-converted, Nd:YAG-ceramic-based pulsed laser amplifier operating at 1062.78 nm.

AM1A.4 • 09:15

Industrial Ultrafast Deep-UV Lasers: The Road to High Average Power With Long Lifetime, Ralf Knappe¹, Markus Luehrmann¹, Louis Mc Donagh¹; ¹*Coherent Kaiserslautern GmbH, Germany*. We investigated and compared the four most common materials for their performance at pulse durations from 10 picoseconds to 400 femtoseconds and provide a summary of their specific advantages and limitations for Deep UV industrial ultrafast lasers.

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AM1A.5 • 09:30 (Invited)

The 2- μ m Laser-Plasma Interaction Regime for High-Brightness EUV Sources, Oscar Versolato^{1,2};

¹*Advanced Research Center for Nanolithography, Netherlands;* ²*Vrije Universiteit Amsterdam Faculteit der Betawetenschappen, Netherlands.* Recent advances in high-energy 2- μ m solid-state lasers have opened a new regime for laser-produced plasmas. This talk presents our studies of laser–plasma interaction in 2- μ m-driven tin plasmas. We reconstruct the complete energy balance, showing that ~70% of the absorbed laser energy is emitted as photons while the ion energy fraction decreases with laser intensity. These results provide a benchmark for optimizing laser coupling and next-generation EUV plasma sources.

08:30 -- 10:00

Room: Zeta 2

HM1C • Attosecond Dynamics & High-Harmonic Spectroscopy of Matter

Presider: Caterina Vozzi; Consiglio Nazionale Delle Ricerche, Italy

HM1C.1 • 08:30 (Invited)

Probing Ultrafast Chemical Dynamics in Liquids with Soft X-ray Spectroscopy, Zhong Yin¹; ¹*Tohoku Univ., Japan.* Following chemical dynamics in real time remains a central goal in physical chemistry. This talk presents recent advances in ultrafast soft X-ray spectroscopy of liquids, combining element-, site-, and orbital-specific sensitivity with tabletop water-window high-harmonic sources. These methods enable direct insight into transient electronic structure, coupled electronic and nuclear motion, solvation dynamics, and solvent–solute interactions in chemically relevant liquid environments.

HM1C.2 • 09:00 (Upgraded to Invited)

1.2 keV High-Order Harmonic Generation for Transition-Metal L-Edge Spectroscopy, Kaito Nishimiya¹, Eiji J. Takahashi¹; ¹*RAP, Riken, Japan.* We demonstrate a coherent high-order harmonic source extending beyond 1 keV using multi-meter free-space focusing of ultrafast mid-infrared pulses. Furthermore, we generate high harmonics supporting attosecond pulses with photon energies up to 900 eV. This platform enables laboratory-based attosecond spectroscopy at transition-metal L-edges.

HM1C.3 • 09:30

Attosecond Time Delay Measurements of Spin-Orbit Split Ionization Channels in Rare Gases, Ann-Kathrin Raab^{1,4}, Nihar R. Behera¹, Richard J. Squibb¹, Andreas Hult Roos¹, Emil Pettersson¹, Brock Grafstrom⁴, Robin Weissenbilder², Leon Petersson³, Alexandra Landsman⁴, Anne L'Huillier², David Busto², Eva Lindroth³, Raimund Feifel¹; ¹*Department of Physics, Goteborgs universitet, Sweden;* ²*Department of Physics, Lunds Universitet, Sweden;* ³*Department of Physics, Stockholms Universitet, Sweden;* ⁴*Department of Physics, The Ohio State Univ., USA.* We perform high-resolution interferometric photoelectron spectroscopy measurements over broad energies ranges, study spin-orbit-split time delays close to threshold in noble gases and point out limitations due to higher-order transitions at high laser intensities.

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HM1C.4 • 09:45

High Harmonic Spectroscopy of Correlated Solids, Barry D. Bruner¹, Jan Maximilian Klingner¹, Lior Faeyrman¹, Shuang Liu^{3,4}, Eran Mishuk², Anna-Eden Kossoy², Yishay Feldman², Ayelet Vilan², Sigal Keshet², Iddo Pinkas², Peng Chen⁴, Ofer Neufeld³, Nirit Dudovich¹; ¹*Department of Physics of Complex Systems, Weizmann Inst. of Science, Israel*; ²*Department of Chemical Research Support, Weizmann Inst. of Science, Israel*; ³*Schulich Faculty of Chemistry, Technion – Israel Inst. of Technology, Israel*; ⁴*Department of Physics, Guangdong Technion – Israel Inst. of Technology (GTIIT), China*. We employ two-color high-harmonic spectroscopy to investigate sub-cycle dynamics in the correlated insulator NiO. Combined with TDDFT and SBE calculations, our measurements uncover the influence of strong electron-electron correlations on ultrafast electronic motion.

08:30 -- 09:00

Room: Beta 1

LM1D • Free Space Communications and Space

Presider: Helena Diez-y-Riega; Optica, UK

LM1D.1 • 08:30

Intensity-Derived Turbulence-State Sensing for Underwater Laser Links, Svetlana Avramov-Zamurovic¹, Kenzie Fleming¹, Erin Kincade¹, Owen O'Malley¹, Peter Judd²; ¹*USA Naval Academy, USA*; ²*US Naval Research Laboratory, USA*. We learn an eight-number descriptor from pupil-plane intensity and validate it by forecasting held-out future images; it reduces error beyond persistence and carries information beyond standard optical observables in water.

LM1D.2 • 08:45

A Real Time Control AO System for SMF Coupling in a FSOC Downlink Channel, Stefano Bonora^{1,2}, Luca Massaro², Riccardo Mincigrucci²; ¹*CNR-Inst. of Photonics and Nanotech, Italy*; ²*Dynamic Optics srl, Italy*. In the context of the European Space Agency (ESA) founded Generic Adaptive Optics Module (GAOM) project, a Woofer-Tweeter AO system with a Real Time Controller for improving SMF coupling efficiency was developed and tested.

08:30 -- 10:00

Room: Beta 2

MM1E • Mid-IR Fiber Lasers

Presider: Irina Sorokina, Norwegian University of Science and Tech, Norway

MM1E.1 • 08:30

38 ns Gain-Switched Fiber Laser at 2.8 μm , Yigit O. Aydin¹, Réal Vallée¹, Martin Bernier¹; ¹*Centre d'Optique, Photonique et Lasers (COPL), Université Laval, Canada*. We demonstrate a cladding-pumped erbium-doped fluoride fiber laser generating 38 ns pulses at 2.8 μm . This represents the first sub-100-ns gain-switched fluoride fiber laser at 2.8 μm , overcoming traditional temporal limits in modulator-free cavity laser architectures.

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MM1E.2 • 08:45

Mid-Infrared Laser Action in Er³⁺ and Dy³⁺ Doped Fluoroindate Glasses, Karel Veselsky¹, Ngoc Quynh Hoa Nguyen¹, Thiphaine Rault², Solenn Cozic², Jean Letourneur², Saad Hatim³, Kirill Ereemeev³, Pierre-Henry Hanzard³, Thomas Godin³, Patrice Camy¹, Alain Braud¹, Ammar Hideur³, Pavel Loiko¹; ¹*Centre de Recherche sur les Ions des Matériaux et la Photonique, France*; ²*Le Verre Fluoré, France*; ³*Complexe de Recherche Interprofessionnel en Aerothermochimie, France*. We demonstrate mid-infrared laser operation of Er³⁺ and Dy³⁺ ions in bulk fluoroindate glass. The Er-glass laser delivered 233 mW at 2.8 μ m with 26% slope efficiency and 2686–2840 nm tunability, while Dy codoping extended emission to 3.4 μ m.

MM1E.3 • 09:00

2.2W Ho:Germanate Fiber Laser Operating Near 2.1 μ m Wavelength, Guy Shafriri¹, Daniel Belker¹, Aviran Halstuch¹, Joris Lousteau², Nadia G. Boetti³, Amiel A. Ishaaya¹; ¹*Ben-Gurion Univ. of the Negev, Israel*; ²*Dipartimento Di Chimica, Politecnico di Milano, Italy*; ³*LINKS Foundation, Italy*. A Ho:Germanate fiber laser pumped at 1931nm delivers watt-level lasing across 2068--2097nm, reaching 2.2W, with 32.1% slope efficiency, and $M^2 \approx 1.72$, representing record power long-wavelength performance for this host material.

MM1E.4 • 09:15

65 W Peak Power Quasi-Continuous Wave All-Fiber Laser at 2885 nm, William Bisson¹, Yigit O. Aydin¹, Maxime Lemieux-Tanguay¹, Souleymane T. Bah¹, Réal Vallée¹, Martin Bernier¹; ¹*Centre d'optique, photonique et lasers (COPL), Université Laval, Canada*. We demonstrate a quasi-continuous wave (QCW) all-fiber laser delivering 65.6 W of output peak power at 2885 nm. The laser cavity operates at a repetition rate of 40 Hz with a 9.4% duty cycle.

10:30 -- 12:30

Room: Alfa

JM2A • Joint Plenary Session I

Presider: Gregory Quarles; Applied Energetics, USA

JM2A.1 • (Plenary)

Ultrafast Light Sources for Attosecond Chemistry, Francesca Calegari¹; ¹*Desy, Germany*. Attosecond science provides powerful tools to probe electron dynamics in matter. Recent advances in few-femtosecond UV sources and attosecond VUV/soft X-ray sources have enabled chemical control through charge-directed reactivity.

JM2A.2 • (Plenary)

Coherent MIR Sources Based on Thin-Film-Lithium-Niobate, Martin M. Fejer¹; ¹*Stanford Univ., USA*. The tight optical confinement available in thin-film lithium niobate (TFLN) waveguides provides strong nonlinear coupling, dispersion engineering for broadband/ultrafast operation and tight radius bends for multi-function integration, enabling a variety of broadly tunable CW and multi-octave supercontinuum sources.

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14:00 -- 16:00

Room: Zeta 1

AM3A • Large Scale Facilities and Oscillator Synchronization

Presider: Jonathan Evans; US Air Force Inst. of Technology, USA

AM3A.1 • 14:00

Femtosecond Synchronization for Dual-Output UV Laser System at the FLASH Free-Electron Laser Facility, David Schwickert¹, Anne-Laure Calendron¹, Areeb Ahmed¹, Skirmantas Alisauskas¹, Giovanni Cirimi¹, Eugenio Ferrari¹, Uwe Grosse-Wortmann¹, Victor Hariton¹, Ingmar Hartl¹, Nhat-Phi Hoang¹, Yujiao Jiang¹, Mehdi Kazemi¹, Nick Kschuev¹, Thorsten Lamb¹, Tino Lang¹, Massimo De Marco¹, Christian Mohr¹, Hamid Rashtabadi¹, Lucas Schaper¹, Maximilian Schuette¹, Angad Swiderski¹, Hamed Tavakol¹, Jiaan Zheng¹, Sebastian Schulz¹, Holger Schlarb¹; ¹*Deutsches Elektronen-Synchrotron, Germany*. The seeding laser at the FLASH facility with two UV output beams is optically synchronized to the FLASH facility. With automated arrival time correction, remaining drifts are expected around 1fs.

AM3A.2 • 14:15

Modular Laser Source Configuration for Tailored Laser Induced Damage Threshold (LIDT)

Measurements of Custom-Made Large Aperture Optics, Viktor Zuba¹, Kai Babb¹, Veselin Aleksandrov¹, Tahir Jamal¹, William Carter¹, Ross Powell¹, Maks Tobiasiewicz¹, Connor Vintiner¹, Dave Pepler¹, Trevor Winstone¹, Helder Crespo¹, Pedro Oliveira¹; ¹*Central Laser Facility, Rutherford Appleton Laboratory, UK*. We present a modular laser configuration for LIDT testing of large optics at wavelengths relevant to PW-class ultrashort-pulse facilities, employing large spot sizes and actively stabilized temporal profiles across all fluence regimes.

AM3A.3 • 14:30

A 100 Hz Repetition Rate Versatile Laser System for Applications, Péter Gaál¹, Tibor Gilinger², Ádám Kovács¹, Máté Karnok¹, Attila P. Kovács³, Levente Vadász¹, Gergely Ádám¹, Botond Bencsik¹, Péter Balázs^{1,4}, Tibor Novák¹, Károly Osvay^{1,3}; ¹*National Laboratory for Cooperative Technologies, Szegedi Tudományegyetem, Hungary*; ²*National Laser-Initiated Transmutation Laboratory, Szegedi Tudományegyetem, Hungary*; ³*Department of Optics and Quantum Electronics, Szegedi Tudományegyetem, Hungary*; ⁴*Department of Image Processing and Computer Graphics, Szegedi Tudományegyetem, Hungary*. A dual-output 100 Hz laser system has been developed, providing 7.1 fs pulses with 0.25 mJ or 40 mJ with 29 fs, for off-line developments of target systems and secondary sources of large-scale systems.

AM3A.4 • 14:45

Scalability of Cryogenic Yb:YLF Systems for Laser Fusion Drivers, Alexey Yakovlev¹, Christian Rentschler¹, Martin Kellert¹, Jingyi Cui¹, Jakob Schauss¹, Mikhail Pergament¹, Franz X. Kaertner^{1,2}; ¹*Center for Free-Electron Laser Science CFEL, Deutsches Elektronen-Synchrotron, Germany*; ²*Center for Ultrafast Imaging and Department of Physics, Universität Hamburg, Germany*. We present a numerical model of cryogenic Yb:YLF multi-pass amplifiers including gain dynamics, thermal effects, and amplified spontaneous emission. The experimentally validated model enables analysis of practical energy scaling strategies for inertial fusion driver development.

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AM3A.5 • 15:00

Development of a 100 TW, 100 Hz Laser for Laser-Driven Radiation and Particle Sources, Cora Braun¹, Mariastefania De Vido¹, Eleanor Asquith¹, Danielle Clarke¹, Luke McHugh¹, Rajeev Pattathil¹, Cristina Hernandez-Gomez¹; ¹*Science & Technology Facilities Council Central Laser Facility, UK*. We report on the design and status of a 3J, 30fs laser at 100Hz repetition rate, OPCPA seeded, and pumped by a DiPOLE-100Hz system to be installed at the Extreme Photonics Applications Centre (EPAC).

AM3A.6 • 15:15

Toward a High-Power Thin-Disk Frequency Comb, Yasmin Kopp¹, Simon Goncharov¹, Johann Gabriel Meyer¹, Oleg Pronin¹; ¹*Helmut Schmidt Univ., Germany*. Carrier-envelope offset frequency stabilization of a Kerr-lens mode-locked thin-disk oscillator (80 MW peak power) is demonstrated, achieving 39 mrad. Frequency-comb stabilization through locking of a single comb tooth to a narrowband CW-laser is also reported.

AM3A.7 • 15:30

Stress-Induced Birefringence Mitigation in the SYLOS Alignment Laser Source for High-Efficiency Attosecond Pulse Generation, Prabhash Prasannan Geetha¹, Sourin Mukhopadhyay¹, Bence Juhász¹, Szabolcs Tóth¹, László Tóth¹, Tamás Somoskői¹, István Dóra¹, Balázs Kovalovszki¹, Dániel Abt¹, Zsolt Divéki¹, János Csontos¹, Adam Borzsonyi¹; ¹*ELI-HU Non-Profit Ltd., Hungary*. This study resolves polarization contrast degradation in the SEA2-driven high-harmonic generation beamline. By mitigating stress-induced birefringence via aperture reduction and wire-grid filtering, we successfully restored contrast above 10000:1, ensuring stable, high-efficiency attosecond XUV pulse generation.

AM3A.8 • 15:45

Withdrawn

14:00 -- 16:00

Room: Epsilon

EM1B • Compact EUV and X-ray FELs for Science and Industry Applications

Presider: Seth Cousin; EUVTech, USA

EM1B.1 • 14:00 (Invited)

Development of Compact X-ray Light Sources for Ultrafast Science, Arvinder S. Sandhu¹; ¹*Arizona State Univ., USA*. Compact X-ray Light Source (CXLS) for generating femtosecond hard x-rays has become operational at the Arizona State Univ.. CXLS is based on the inverse Compact scattering, and provides a bright beam for ultrafast x-ray diffraction studies in proteins and quantum materials. In the second phase, a Compact X-ray Free Electron Laser (CXFEL) is being developed. CXFEL builds on the latest advances in laser technology and electron beam physics to produce a fully coherent room-sized X-ray laser.

EM1B.2 • 14:30 (Invited)

Compact Structure-Wakefield Acceleration: Enabling Attosecond Control of Matter with Next-Generation XFELs, Philippe Regis Guy Piot¹; ¹*Argonne National Laboratory, USA*. X-ray free-electron lasers are poised to break past femtosecond imaging into a new era of attosecond-scale control of

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matter — enabled by tunable, phase-locked, structured X-ray pulses. Structure-wakefield acceleration paired with two-beam acceleration, is ideally suited to compactly produce and control the required electron bunches. This talk discusses three pillars driving this leap: bright electron beams, high-gradient acceleration with precise phase-space control, and tailored X-ray pulses.

EM1B.3 • 15:00 (Invited)

High-Power EUV-FEL Light Source for Future Lithography, Norio Nakamura¹, Yosuke Honda¹, Ryukou Kato¹, Hiroshi Sakai¹, Kimichika Tsuchiya¹, Yasunori Tanimoto¹, Masahiro Yamamoto¹, Miho Shimada¹, Takanori Tanikawa¹, Olga Tanaka¹, Masakazu Kurata¹, Takako Miura¹, Kensei Umemori¹, Takashi Obina¹, Hiroshi Kawata¹; ¹*High Energy Accelerator Research Org, Japan*. We present a high-power EUV-FEL light source based on energy recovery linac (ERL) for future lithography, an example of its design and simulation study and a test ERL machine at KEK and also mention our recent activities for realizing the light source.

EM1B.4 • 15:30 (Invited)

An Accelerated Future, Erik Hosler¹; ¹*OBSIDIA Semiconductors, USA*. Light has always been the pacing technology of the semiconductor industry, and each generation of light source has demanded that its own supply chain be invented alongside it. EUV took two decades and a global consortium of optics, plasma, laser, and materials suppliers to reach high-volume manufacturing. Accelerator-based light sources now face the same inflection, but with a critical difference: the underlying technology already exists. Particle accelerators have been built for a century, yet almost exclusively as one-off scientific instruments, hand-assembled by national laboratories with no production discipline, no second sources, and no cost curve. The task ahead is not invention but industrialization. Delivering light as a utility requires that superconducting RF cavities, cryomodels, electron injectors, undulators, high-power RF systems, and beam transport be manufactured, qualified, and serviced with the same rigor the industry expects of a lithography tool: repeatable yield, statistical reliability, high availability, and predictable cost of ownership. This means standing up serial production where none exists, converting bespoke

laboratory recipes into qualified process flows, establishing multi-vendor supply for critical components, and cultivating a workforce fluent in both accelerator physics and fab operations. It also means siting and integrating utility-scale facilities alongside fabs, with the same attention to safety, uptime, and supply chain security that governs every other input to the leading edge. The industry that scaled EUV holds every capability needed to scale accelerators. The question is whether it will organize itself to do so before the cost of the status quo becomes prohibitive.

14:00 -- 16:00

Room: Zeta 2

HM3C • XUV/Soft X-ray High-Harmonic Sources & Characterization

Presider: Riccardo Piccoli; Univ. of Venice, Italy

HM3C.1 • 14:00 (Invited)

Development and Application of a High-Power SWIR OPCPA to Soft X-ray High-Harmonic Generation, Iain Wilkinson¹; ¹*Helmholtz-Zentrum Berlin, Germany*. A <3-optical-cycle, CEP-stable, 2.1 μm -central-wavelength optical parametric chirped-pulse amplification laser, which outputs 52 W of amplified signal

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power at a repetition rate of 52.6 kHz, and its application to soft X-ray high-harmonic generation will be described.

HM3C.2 • 14:30 (Invited)

Soft X-ray Metrology for Advanced Semiconductor Device Characterization, Seth Brussaard¹, Sietse Van der Post¹, Christina Porter¹; ¹*Invisix Measuring Systems, Netherlands*. AI demand pushes chip manufacturing toward advanced logic (GAA, CFET) and DRAM devices with complex 3D layouts, requiring extremely tight process control. Current metrology including OCD, e-beam, and hard X-ray cannot meet these needs. Broadband soft X-ray scatterometry (5–50 nm), enabled by HHG, operates in the single-scattering regime, reducing parameter cross-correlation and enabling non-destructive inline 3D characterization. Invisix is building a fab-compatible SXR metrology tool for HVM.

HM3C.3 • 15:00

Phase Matching in Extreme Ultraviolet High-Harmonic Generation Driven by Intense Visible Lasers, Martin Gebhardt¹, Maximilian Karst³, Philipp Gierschke², Lucas R. Eisenbach², Mahmoud Abdelaal¹, Themistoklis Sidiropoulos^{1,3}, Robert Klas², Jan Rothhardt^{3,1}, Jens Limpert^{1,2}; ¹*Friedrich-Schiller-Univ. Jena, Germany*; ²*Fraunhofer-Institut für Angewandte Optik und Feinmechanik IOF, Germany*; ³*Helmholtz-Institut Jena, Germany*. We present numerical modelling of extreme ultraviolet high-harmonic generation, driven by intense visible lasers. Our results reproduce record-high photon flux measurements with excellent agreement, and underline the advantages of plasma-core guiding at visible wavelengths.

HM3C.4 • 15:30

Plasma-Driven Multimode Dynamics Sculpting XUV High-Harmonic Emission in a Hollow Waveguide, Anna Ciriolo¹, Valer Tosa², Stavroula Vovla^{1,3}, Kamal Abedin^{1,3}, Michele Devetta¹, Davide Faccialà¹, Rebeca Martinez Vazquez¹, Roberto Osellame¹, Caterina Vozzi¹, Salvatore Stagira^{1,3}; ¹*Istituto di Fotonica e Nanotecnologie Consiglio Nazionale Delle Ricerche, Italy*; ²*National Inst. for R&D of Isotopic and Molecular Technologies, Romania*; ³*Politecnico di Milano, Italy*. We demonstrate high-harmonic generation in a highly ionized plasma within a hollow waveguide, where plasma-driven multimode dynamics produce spatial and temporal interference. This confines emission from multiple localized HHG sources, shaping the XUV into attosecond pulses.

HM3C.5 • 15:45 (Upgraded to Invited)

Towards Quantitative Characterization of Ultrashort Pulse-Shape-Instability Using Multi-Shot SHG FROG, Pedram Abdolghader^{2,1}, Rana Jafari³, Abinash Das³, Bilal Banerjee⁴, Ellen P. Crews³, Rick Trebino³; ¹*Deutsches Elektronen Synchrotron, Germany*; ²*Inst. of Quantum Optics, Leibniz Universität Hannover, Germany*; ³*Georgia Inst. of Technology School of Physics, USA*; ⁴*Department of Statistics and Data Science, Faculty of Science NUS, National Univ. of Singapore, Singapore*. We demonstrate a method for quantitatively characterizing pulse-shape instability in a train of energetic femtosecond laser pulses using second harmonic generation frequency-resolved optical gating (SHG-FROG) technique combined with two-dimensional (2D) Run analysis.

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Room: Beta 1

LM3D • Lasers for Biomedical

Presider: Simas Sobutas; Light Conversion, Ltd., Lithuania

LM3D.1 • 14:00 (Invited)

Higher Harmonic Generation Microscopy: From Instant Pathology to Functional Treatment Response Prediction, Marie L. Groot¹; ¹*Physics, Vrije Universiteit Amsterdam Faculteit der Betawetenschappen, Netherlands.* Label-free higher harmonic generation microscopy enables AI-assisted diagnosis of fresh biopsies within minutes. Longitudinal imaging of living biopsies extends this technology to quantify tumour dynamics and predict patient-specific treatment response for precision oncology.

LM3D.2 • 14:15 (Invited)

Advances in Multiphoton Microscopy for Clinical Imaging, Mihaela Balu^{1,2}; ¹*Beckman Laser Inst., Univ. of California Irvine, USA;* ²*Dermatology and Biomedical Engineering, Univ. of California Irvine, USA.* Multiphoton microscopy enables label-free, high-resolution visualization of tissue morphology, metabolism, and molecular composition. This presentation highlights recent advances in faster, larger-area clinical imaging approaches and their emerging applications in skin diagnosis and longitudinal therapy monitoring.

LM3D.3 • 14:30 (Invited)

LIRIC: From Preclinical Development to Clinical Translation of Laser-Induced Refractive Index Change, Stephanie Joachim¹; ¹*Ruhr Universitat Bochum, Germany.* Preclinical evaluation of Laser-Induced Refractive Index Change (LIRIC), a femtosecond laser technique for refractive correction, demonstrated preserved collagen structure without inflammation, oxidative stress or angiogenesis in porcine corneas, supporting clinical translation of this non-invasive approach.

LM3D.4 • 14:45 (Invited)

Hard Tissue Laser Surgery, Achim Lenenbach¹; ¹*Fraunhofer-Institut für Lasertechnik, Germany.* Hard-tissue surgery often must be performed near critical structures using mechanical instruments, which carries a risk of serious injury. We have developed a laser surgery system for bones to improve precision and safety.

LM3D.5 • 15:00 (Invited)

Development of Compact, Laser-Driven Accelerators for Novel Radiotherapy Modalities with VHEE Beams, Luca Labate¹; ¹*Istituto Nazionale di Ottica (CNR-INO), Italy.* Although the usage of so-called Very High Energy Electron (VHEE) beams (with energy in the range 100-300MeV) to directly irradiate tumors is deserving a rapidly growing attention, due to the potential for a major step forward in dose control, conformation and deposition capabilities, the actual development and deployment of VHEE accelerators for medical usage is hindered by practical issues related to conventional accelerator techniques..

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14:00 -- 16:00

Room: Beta 2

MM3E • Mid-IR and THz Sources

Presider: Majid Ebrahim-Zadeh, Radiantis, Spain

MM3E.1 • 14:00 (Invited)

Background-Free Vibrational Spectroscopy Enabled by Mid-Infrared Mode-Locked Lasers, Satoshi Ashihara¹; ¹*Univ. of Tokyo, Japan*. Background-free spectroscopic approaches potentially overcome the sensitivity limits of conventional detector dynamic ranges in capturing molecular fingerprints. This paper presents recent advances in interferometric background-free vibrational spectroscopy enabled by mode-locked Cr:ZnS-based mid-infrared lasers.

MM3E.2 • 14:30

40 mJ Sub-Nanosecond Cr:ZnSe Gain-Switched MOPA at 2.4 μm , Rem Danilin¹, Daniil Danilin¹, Dmitry Martyshkin¹, Vladimir Fedorov¹, Jeremy Pigeon², Sergey B. Mirov¹; ¹*Physics, The Univ. of Alabama at Birmingham College of Arts and Sciences, USA*; ²*Laboratory of Laser Energetics, Univ. of Rochester, USA*. We demonstrate a 2.4 μm gain-switched Cr:ZnSe master oscillator power amplifier system producing 40 mJ, 650 ps pulses at 10 Hz by amplifying a 2.5 mJ sub-ns seed in a two-pass, dual-end-pumped Cr:ZnSe amplifier.

MM3E.3 • 14:45

High-Efficiency Cr:ZnSe Regenerative Amplifier Delivering 85 nm Bandwidth Pulses at 2400 nm, Clemens Anschütz^{1,2}, Joachim Hein^{1,2}, Malte Kaluza^{1,2}; ¹*Friedrich Schiller Univ. Jena, Germany*; ²*Helmholtz-Institut Jena, Germany*. We demonstrate a high-efficiency mid-IR Cr:ZnSe regenerative amplifier requiring only 30 W of diode pump power. Operating under early saturation, the system achieves a gain of 10^5 , delivering 500 μJ pulses capable of supporting 100 fs durations.

MM3E.4 • 15:00

A Compact Dual-Stage Post-Compression Approach to Single-Cycle, 30 μJ Mid-Infrared Pulses at 100 kHz., Rajaram Shrestha¹, Levente Lehotai¹, Roland Nagymihály¹, Katalin Pirisi¹, Adam Borzsonyi¹, Eric Cormier^{1,2}, Balint Kiss¹; ¹*ELI ALPS Research Inst., Hungary*; ²*Laboratoire Photonique Numerique et Nanosciences (LP2N), France*. We demonstrate single-cycle, 11.2 fs mid-IR pulses (30 μJ , 100 kHz) via a two-stage bulk post-compression with outstanding long-term power, pointing, spectral and CEP stability which validated via stable high-harmonics generation in a ZnO crystal.

MM3E.5 • 15:15

146 fs Pulses at 1800 nm via Supercontinuum-Seeded Transient SRS Amplification in Hydrogen, Auguste Grigaravičiene¹, Paulius Mackonis¹, Aleksej Rodin¹, Rugile Pečiulyte¹; ¹*Valstybinis Moksliniu Tyrimu Institutas Fizinio Ir Technologijos Mokslu Centras, Lithuania*. Supercontinuum-seeded transient vibrational stimulated Raman amplification in hydrogen provides an unexplored pathway for generating 146 fs, 0.25 mJ pulses at 1800 nm, eliminating the dispersion-compensation optics inherent to OPCA. Both the supercontinuum and SRS-stage were driven by ~ 1.3 ps pulses at 1030 nm from a hybrid Yb:YAG/Yb:LuAG laser.

MM3E.6 • 15:30

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Stabilization of a Sub-Cycle Mid-Infrared Filamentation Source for Hyperspectral Imaging Utilizing Static Electric Fields, Neil Cabello¹, Shuto Nakamura¹, Tien D. Vu¹, Yue Zhao², Takao Fujii¹; ¹*Toyota Kogyo Daigaku, Japan*; ²*Muroran Kogyo Daigaku, Japan*. Applying a kilovolt static electric field above a two-color plasma channel significantly enhances the intensity and pointing stability of generated sub-cycle mid-infrared pulses. This stabilization directly improves hyperspectral imaging quality.

MM3E.7 • 15:45

A Tunable mid-IR Laser System for Laser-Produced tin Plasma Studies, Edcel John J. Salumbides¹, Xyoisan Danser¹, John Sheil¹, Stefan Witte¹, Oscar Versolato¹; ¹*ARCNL, Netherlands*. We present a tunable mid-infrared laser covering 1.4–4.4 μm , with energies up to 30 mJ for 5-ns pulses. Applied to laser-produced plasma, we study wavelength-dependent EUV conversion, of relevance to advanced semiconductor lithography sources.

16:30 -- 18:30

Room: Zeta 1

AM4A • Visible and NIR Sources

Presider: Arno Klenke; Helmholtzinstitut Jena, Germany

AM4A.1 • 16:30

High-Brightness, Ultra-Coherent VECSEL for Rb-Based Quantum Technologies, Anjana Ganesh¹, Paulo H. Moriya¹, Jennifer E. Hastie¹; ¹*Inst. of Photonics, Department of Physics, Univ. of Strathclyde, UK*. We compare the single-frequency performance of a 780 nm vertical-external-cavity surface-emitting-laser (VECSEL) under top-hat and Gaussian pump profiles with the former yielding an 84 % increase in output-power (880 mW) with a linewidth of 5.92(1) kHz. The Gaussian-system is utilized in Rb-spectroscopy.

AM4A.2 • 16:45

Mode-Locking-Free Generation of 40 ps Pulses at 1064 nm from SBS-Compressor With SRS-Induced Reshaping., Auguste Grigaravičienė¹, Paulius Mackonis¹, Rugile Pečiulytė¹, Aleksej Rodin¹; ¹*Valstybinis Mokslinių Tyrimų Institutas Fizinių Ir Technologijų Mokslų Centras, Lithuania*. A self-seeded SBS-compressor in a collinear configuration based on HT-230 within a phase-conjugated Nd:YAG amplifier, followed by trailing-edge depletion via transient forward SRS in a KGW crystal, achieves ~23 fold compression of ~1 ns incident pulses to 40 ps. DLIP texturing benefits from eliminating mode-locking and regenerative amplification.

AM4A.3 • 17:00

Withdrawn

AM4A.4 • 17:15

Diode-Pumped CW Red Lasing in a Femtosecond-Laser-Written Dy,Tb:LiLuF₄ Waveguide, Davide Baiocco¹, Ignacio Lopez-Quintas^{2,3}, Javier Vázquez de Aldana^{2,3}, Ji Eun Bae⁴, Pavel Loiko⁴, Patrice Camy⁴, Mauro Tonelli¹, Alessandro Tredicucci^{1,5}; ¹*Università Degli Studi di Pisa, Italy*; ²*Unidad de Excelencia en Luz y Materia Estructurada (LUMES), Universidad de Salamanca, Spain*; ³*Grupo de Investigación en Aplicaciones del Láser y Fotónica, Universidad de Salamanca, Spain*; ⁴*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, France*; ⁵*Istituto Nanoscienze, CNR, Italy*. We present the first continuous-wave laser operation of a

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Dysprosium-based red solid-state laser. Employing femtosecond-laser-written waveguides in Dy,Tb:LiLuF₄, an output power of 18 mW was obtained at 661 nm in a compact 19 mm-long cavity.

AM4A.5 • 17:30

Wavelength-Tunable All-Fiber Laser Delivering High-Peak-Power Narrow-Linewidth Picosecond Pulses via Spectral Compression, Leon Vom Kothen^{2,1}, Florent Scol², Simon Boivinet¹, Olivier Vanvincq¹, Géraud Bouwmans¹, Emmanuel Hugonnot²; ¹*Laboratoire de Physique des Lasers Atomes et Molécules, France*; ²*Commissariat à l'énergie atomique et aux énergies alternatives Centre d'études scientifiques et techniques d'Aquitaine, France*. We present a wavelength-tunable all-fiber polarization-maintaining laser source delivering high energy, narrow-linewidth picosecond pulses with single-mode beam output. Peak powers up to 73 kW are achieved at 1032 nm.

AM4A.6 • 17:45

Ten-Watt Red Pr:LiYF₄ Laser With a Periodically Extended Resonator, rémi soulard¹, Jonathan Demaimay¹, Pavel Loiko¹, Patrice Camy¹; ¹*CIMAP, France*. Ultimate power scaling of a blue diode pumped red Pr:LiYF₄ laser is achieved using a periodically extended cavity architecture. The continuous-wave laser delivers 10 W at 639 nm with 31.1% optical efficiency and a near-diffraction-limited beam.

AM4A.7 • 18:00

Diode Pumped Alexandrite Thin-Disk Laser, Kohei Hashimoto¹, Pawel Sikocinski¹, Hanjin Jo¹, Martin Smrz¹; ¹*HILASE Center, Czechia*. We developed a thin-disk pumping chamber for alexandrite crystal. In continuous operation, maximum output power of 9.5W was achieved with 21.5% optical efficiency. We demonstrate thin-disk schemes can also be applied to alexandrite crystal.

AM4A.8 • 18:15

Sub-100 fs mJ-Level Yb:CALYO and Yb:CALYGLO Amplifiers for Application in Ultrafast Spectroscopy, Lyuben Petrov^{1,2}, Dimitar Velkov³, Stephan Shishkov^{1,2}, Lyubomir Stoychev², Anton Trifonov⁴, Ivan Buchvarov^{1,2}; ¹*Sofia Univ. St. Kliment Ohridski, Bulgaria*; ²*Inst. of Solid State Physics, Bulgarian Academy of Sciences, Bulgaria*; ³*John Atanasoff Center for Bio and Nano Photonics, Bulgaria*; ⁴*IBPhotonics Ltd., Bulgaria*. We review net-gain-bandwidth broadening in quasi-three-level Yb:CALYO and Yb:CALYGLO amplifiers, enabling record sub-100 fs, multi-mJ pulses at various repetition rates, overcoming the 180–300 fs duration limit of conventional Yb CPA systems, and outline their applications.

16:30 -- 18:30

Room: Zeta 2

HM4C • Laser Front-End Technology: Diode Pumping, Beam Combining, Compression & Control

Presider: Takao Fuji; Toyota Technological Inst., Japan

HM4C.1 • 16:30 (Invited)

Progress in High Repetition Rate Diode Laser Pumps for High Intensity Laser Systems, Marko Hubner¹, Martin Wilkens¹, Seval Arslan¹, Andrei Luferau¹, Lucas Wittenbecher¹, Johannes Zender¹, Bernd Eppich¹, Dominik Martin¹, Pietro Della Casa¹, Arnim Ginolas¹, Paul Simon Basler¹, Neysha Lobo-Ploch¹, Paul Crump¹; ¹*FBH, Germany*. We present studies into kHz-level repetition-rate scaling of highly-efficient and compact micro-channel free multi-kW 940nm diode-laser stack modules, suitable for pumping high

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intensity laser amplifiers. Results of beam homogenization for uniform pumping are also shown.

HM4C.2 • 17:00

Grating Stretcher Design and Front-end for High Temporal Contrast Petawatt Ultrafast Laser System, Christopher Aleshire², Oscar A. Naranjo-Montoya², Frederik Buckstegge², Prashanth Jhetre², Antonia Schmalz², Andrew Moshova¹, Marco Swantusch¹, Giordano Bodini¹, Giovanni Cornaglia¹, Luis L. Morillo¹, Jan H. Buss¹, Erhard Gaul¹; ¹*Marvel Fusion GmbH, Germany*; ²*Pulsed Light Technologies GmbH, Germany*. A grating pulse stretcher and petawatt ultrafast laser front-end is described. The multi-pass stretcher incorporates a cylindrical offner telescope for high pulse contrast and multilayer dielectric gratings for efficient transmission with high chirp factor.

HM4C.3 • 17:15

Tiled-Aperture Coherent Combining of Two High-Power Femtosecond Laser Pulses Using Quadrature Signals for Interferometric Phase Control, Cecilia Oanca^{1,4}, Ana Dinca^{1,3}, Răzvan Ungureanu¹, Gabriel Cojocaru^{1,2}, Mihai Serbănescu¹, Alexandru Mihalcea^{1,3}, Săndel Simion¹, Răzvan Dabu¹; ¹*Institutul National de Fizica Laserilor Plasmei si Radiatiei, Romania*; ²*Extreme Light Infrastructure Nuclear Physics, Romania*; ³*Universitatea Politehnica din Bucuresti, Romania*; ⁴*Universitatea din Bucuresti Facultatea de Fizica, Romania*. We report tiled-aperture coherent beam combination of two TW-class, 37 femtosecond laser pulses, with 90% combining efficiency. Using quadrature signals for interferometric phase control, we achieved a root-mean-square optical path difference deviation of $1/42$.

HM4C.4 • 17:30

1.4 TW, sub-2-Cycle Pulses From Double-Stage Multi-Pass Cell Compression for Yb-Based kHz Laser-Plasma Acceleration, Victor Koltalo¹, Jaismeen Kaur¹, Louis Daniault¹, Mickael Allemand², Florent Pallas², Antoine Courjaud², Emilien Gontier², Cedric Sire³, Francois Sylla³, Rodrigo Lopez-Martens¹; ¹*Laboratoire d'Optique Appliquée, France*; ²*Amplitude Laser Group, France*; ³*SourceLAB, France*. We present double-stage multi-pass cell compression of a 1 kHz 18 mJ Yb laser, reducing pulse duration from 400 fs to 5 fs. The system delivers 12 mJ pulses with 1.4 TW peak power with overall 67% efficiency.

HM4C.5 • 17:45

Beyond GD and GDD: d-Scan Assessment of Chirped Mirrors for Ultra-Broadband High-Power Laser Systems, Vitor Amorim¹, Miguel Miranda¹, Paulo T. Guerreiro¹, Tiago Gomes¹, Helder Crespo¹, Rosa Romero^{1,2}; ¹*Sphere Ultrafast Photonics SA, Portugal*; ²*DFA, Universidade do Porto Faculdade de Ciencias, Portugal*. Broadband chirped mirrors are key for few-cycle high-power lasers. Small deviations from the

target dispersion can strongly affect compression. We present a d-scan based tool for chirped-mirror characterization, enabling direct batch comparison under realistic conditions and providing a practical quality-control metric for compressor performance

HM4C.6 • 18:00

Wavefront Stabilization in Ultraintense High-Power Lasers via High-Performance Astronomy-Inspired Real-Time Controllers, Stefano Bonora², Lorenzo Uliana¹, Luca Massaro¹, Roberto Francescon¹; ¹*Dynamic Optics S.r.l, Italy*; ²*CNR-IFN, Italy*. We demonstrate high-power laser wavefront stabilization using an astronomy-inspired real-time controller and a 64-actuator deformable mirror. Results show effective atmospheric turbulence correction, achieving a very high stability with a Strehl ratios exceeding

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0.95 with a 100Hz rejection bandwidth.

HM4C.7 • 18:15

Withdrawn

16:30 -- 18:30

Room: Beta 1

JM4D • Joint Special Session: Laser-driven EUV Source and Supporting Materials (EUVXRAY and LAC)

Presider: Franz Kaertner; Deutsches Elektronen-Synchrotron, Germany

JM4D.1 • 16:30

EUV Power Scaling to 1 kW and Beyond, Michael Purvis¹, Randy Meijer¹; ¹ASML San Diego, USA.

Extreme ultraviolet (EUV) lithography depends on high-power, stable laser-produced-plasma sources to deliver the photon flux required for high-volume semiconductor manufacturing. This presentation reviews the technology advances that enabled ASML to scale in-band EUV source power from the 250 W threshold that supported initial high-volume manufacturing to a 1000 W dose-controlled demonstration. The scaling trajectory combined improvements in CO₂ laser power, tin-target and plasma engineering, conversion efficiency, repetition rate, and EUV collection and transmission. A 1 μ m pre-pulse architecture enabled 600 W capability with higher conversion efficiency, while a new drive-laser architecture operating at 100 kHz helped unlock the 1 kW result under customer-relevant slit and exposure patterns. Results of collector stress tests at 1 kW and experiments with 50% higher main-pulse energy, show that 1 kW is a waypoint rather than a fundamental limit and support credible paths toward 1.5–2 kW through a system-level balance of pulse-energy and repetition-rate scaling.

JM4D.2 • 17:15

Dielectric Coatings for the Most Demanding Laser Technologies, Carmen S. Menoni¹; ¹Colorado State Univ., USA. Advances in high power and high energy laser driver technologies rely on advances in the dielectric interference coatings which are used in multiple optical components to direct the laser beams to target. Using examples of most demanding laser driver architectures being developed by the fusion industry, I will describe the demands that are posed on dielectric coatings and the opportunities that exist to advance these materials to the next level.

16:30 -- 18:30

Room: Beta 2

MM4E • Optical Parametric Oscillators & Amplifiers

Presider: Peter Schunemann, Onsemi, USA

MM4E.1 • 16:30 (Invited)

Harnessing Phase Matching and Hybridization for New Functionalities in Mid-IR Frequency

Conversion, Jeffrey Moses¹; ¹Cornell Univ., USA. Tricks of phase matching create new possibilities in mid-infrared frequency conversion. We review adiabatic phase matching for single-cycle pulse generation with designed group-delay dispersion, and second-harmonic generation as an idler-elimination method for efficient parametric amplification.

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MM4E.2 • 17:00 (Upgraded to Invited)

BaGa₂GeSe₆ OPO Pumped at 2.05 μm by a Ho:LLF Laser, Marcin Piotrowski¹, Achille Bogas-Droy¹, Anne Hildenbrand-Dhollande¹, Gerhard Spindler², Valentin Petrov³; ¹*Inst Franco-Allemand Recherches St Louis, France*; ²*Independent Researcher, Germany*; ³*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*. We present the first laser-driven BaGa₂GeSe₆ (BGGSe) optical parametric oscillator, delivering signal and idler radiation between 3.4 and 5.2 μm with an output pulse energy >1.6 mJ at 100 Hz and excellent beam quality ($M_2 < 1.5$).

MM4E.3 • 17:30

High-Power Femtosecond Deep-Infrared Optical Parametric Oscillator Using Asymmetric Ring Cavity at 7 μm , Kiran K. Panigrahi¹, Rameshwar Mondal², Chaitanya Kumar Suddapalli²; ¹*Department of Nuclear and Atomic Physics, Tata Inst. of Fundamental Research, India*; ²*Tata Inst. of Fundamental Research Centre for Interdisciplinary Sciences, India*. We report a femtosecond deep-infrared optical parametric oscillator based on CdSiP₂ in an asymmetric ring cavity, delivering a record average power of ~340 mW at 6945 nm, with an idler bandwidth of 452 nm in 289 fs pulses, corresponding to ~12 cycles.

MM4E.4 • 17:45

High-Energy Electron-Beam Defect Engineering in ZnGeP₂, Daniil Danilin¹, Kevin T. Zawilski², Jani Jesenovc², Vladimir Fedorov¹, Bao Pham¹, Rem Danilin¹, Dmitry Martyshkin¹, Mikhail N. Polyanskiy³, Sergey B. Mirov¹; ¹*Univ. of Alabama at Birmingham, USA*; ²*BAE Systems Electronic Systems, USA*; ³*Accelerator Test Facility, Brookhaven National Laboratory, USA*. Energy-dependent electron irradiation and post-irradiation annealing reduce parasitic near-infrared absorption in ZnGeP₂ by up to tenfold. Depth-resolved measurements reveal stronger, more uniform modification at 8-9 MeV than near 2 MeV, indicating a threshold-like process window.

MM4E.5 • 18:00

ZnGeP₂ and BaGa₄Se₇ OPAs Pumped by Big Aperture Thulium Laser, Jani Jesenovc¹, Anthony Catanese¹, Kevin T. Zawilski¹, Zbynek Hubka², Abhilipsa Barik³, Matthew McCluskey³, Leily Kiani²; ¹*BAE Systems Electronic Systems, USA*; ²*Lawrence Livermore National Laboratory, USA*; ³*Washington State Univ., USA*. Picosecond 1.84 mm and 2.3 mm OPAs generating 10.2 mm light was demonstrated in BaGa₄Se₇ (BGSe) and ZnGeP₂ (ZGP) and compared with modeled results. BGSe photodarkening by light near the band edge was also studied. © 2026 The Author(s)

MM4E.6 • 18:15

Numerical Design Optimization of High-Power ZnGeP₂ OPOs: From Single-Pass to Double-Pass Pumping, Marius Rupp¹, Dominik Lorenz¹, Johannes Eckhardt^{1,2}, Marc Eichhorn^{1,2}, Christelle Kieleck¹; ¹*Fraunhofer-Institut für Optoelektronik Systemtechnik und Bildauswertung IOSB, Germany*; ²*Karlsruher Institut für Technologie, Germany*. We present a validated spatio-temporal model for nanosecond ZGP OPOs, capturing diffraction, walk-off, and back conversion. Validated against >60%-efficient mid-IR experiments, systematic parameter sweeps show a double-pass pump geometry can boost conversion efficiency beyond 75%.

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Tuesday, 13 October

08:30 -- 10:30

Room: Zeta 1

ATu1A • Advanced Solid-State Gain Media: Crystals and Ceramics

Presider: Hiroki Tanaka; Leibniz-Institut für Kristallzüchtung, Germany

ATu1A.1 • 08:30

Green, Yellow, and Red Lasing in Eu:YLF, Sascha Kalusniak¹, Hiroki Tanaka¹, Christian Kraenkel¹; ¹*Leibniz-Institut für Kristallzüchtung, Germany*. We report on room-temperature lasing in Eu:YLF in the green, yellow and red. At 700 nm up to 270 mW of continuous-wave output power are obtained at 23% slope efficiency under 393-nm pumping.

ATu1A.2 • 08:45

Cryogenic Laser Performance and Tunability of Tm,Ho:CLNGG Crystal, Dominika Popelová¹, Karel Veselský¹, Jan Kratochvíl¹, Jan Sulc¹, Helena Jelínková¹, María D. Serrano², Xiumei Han², Carlos Zaldo²; ¹*Department of Laser Physics and Photonics, Ceske vysoke uceni technicke v Praze Fakulta jaderna a fyzikalne inzenyrska, Czechia*; ²*Instituto de Ciencia de Materiales, Consejo Superior de Investigaciones Cientificas, Spain*. Temperature-dependent laser operation of resonantly-pumped Tm,Ho:CLNGG is presented. At 80 K, CW output power of 4.6 W and 150 nm tuning range were achieved, demonstrating efficient operation and preserved broad tuning range under low-temperature conditions.

ATu1A.3 • 09:00

Power Scaling of Blue 495 nm Pr³⁺:BaY₂F₈ Lasers, Ole Hahn¹, Zoe Liestmann¹, Sascha Kalusniak¹, Hiroki Tanaka¹, Christian Kraenkel¹; ¹*Leibniz-Institut für Kristallzüchtung, Germany*. We present cyan-blue quasi-three-level lasers in Pr:BYF with improved slope efficiencies reaching 12% at 10°C under diode pumping and 37% under 2ω-OPSL pumping with a record output power of 314 mW.

ATu1A.4 • 09:15

Growth and Polarized Spectroscopy of Monoclinic Nd³⁺:MgWO₄ Crystals for 1 μm Lasers, Xavier Mateos¹, Abir Douzi¹, Sami Slimi¹, Rosa M. Solé¹, Josep M. Serres¹, Weidong Chen², Uwe Griebner³, Valentin Petrov³; ¹*Universitat Rovira i Virgili, Spain*; ²*Chinese Academy of Sciences Fujian Inst. of Research on the Structure of Matter, China*; ³*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*. We report on first attempts to grow Nd³⁺:MgWO₄ single crystals by the TSSG method using K₂W₂O₇ as a solvent. The polarized spectroscopy relevant for 1-μm laser operation is also presented.

ATu1A.5 • 09:30

Laser Performance of Ho:YAG Ceramics, Single Crystal and Ho:YAG-Al₂O₃ DFC Gain Media, Ayu Konno¹, Tetsuro Yamaoka¹, Takunori Taira^{2,3}, Masaki Tokurakawa^{1,4}; ¹*Inst. for Laser Science, Univ. of Electro-Communications, Japan*; ²*Rikagaku Kenkyujo Harima Campus, Japan*; ³*National Inst. for Fusion Science, Japan*; ⁴*jst Presto, Japan*. We present preliminary results comparing Ho(3 at.):YAG ceramics and single-crystal lasers, and demonstrating a five-layer DFC Ho:YAG-Al₂O₃ laser with 62.7% slope efficiency. The ceramic exhibited weaker red fluorescence, and the DFC shows good bonding quality with estimated

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bonding loss of < 0.84%.

ATu1A.6 • 09:45

Low-Threshold, Broadly Tunable Er:CaF₂ Ceramic Laser, Karel Veselsky¹, Meryem Bakbir¹, Dong Chai², Weiwei Li², Bingchu Mei², Weidong Chen³, Liangbi Su⁴, Oleg Lebedev⁵, Patrice Camy¹, Alain Braud¹, Pavel Loiko¹; ¹*Centre de Recherche sur les Ions les Matériaux et la Photonique, France*; ²*State Key Laboratory of Advanced Technology for Materials Synthesis Processing, China*; ³*Chinese Academy of Sciences Fujian Inst. of Research on the Structure of Matter, China*; ⁴*State Key Laboratory of Functional Crystals and Devices, Shanghai Inst. of Ceramics, Chinese Academy of Sciences, China*; ⁵*Laboratoire de Cristallographie et Sciences des Matériaux, France*. A transparent Er³⁺:CaF₂ ceramic fabricated by vacuum hot pressing enabled continuous-wave laser operation at 2.73 μm, delivering 212 mW with 13% slope efficiency and 26 mW laser threshold, with wavelength tuning over 2685–2817 nm.

ATu1A.7 • 10:00

End-Capped Pr: LiYF₄ Laser Crystals, Tobi N. Ajagbe¹, Jonathan Demaimay¹, Esrom Kifle², Rémi soulard¹, Julien Rouvillain², Thierry Georges², Gurvan Brasse¹, Alain Braud¹, Patrice Camy¹, Pavel Loiko¹; ¹*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS ENSICAEN, Université de Caen Normandie, France*; ²*Oxxius SAS, France*. A diffusion-bonded Pr: LiYF₄|LiYF₄ composite crystal exhibited a clean, stress-free interface with a single-pass loss of 0.05%. Under blue diode pumping, it generated 1.13 W at 639 nm with 40.7% slope efficiency and reduced beam ellipticity.

ATu1A.8 • 10:15

II-SAB DFC Chip for High Energy and High Repetition Rate Tiny Integrated Laser, Florent Cassouret¹, Victor Dodin^{2,1}, Takunori Taira^{1,3}; ¹*Laser Science and Innovation group, Okazaki branch, Kaku Yugo Kagaku Kenkyujo, Japan*; ²*Ecole nationale supérieure de chimie de Paris, France*; ³*Laser-Driven Electron-Acceleration Technology group, Riken SPring-8 Center, Japan*. We demonstrated the performances of DFC chip-based MCL for high repetitions rate operations with up to 39 W and 55 % efficiency in free run at 1 kHz. 1 mJ was also obtained in Q-switch.

08:30 -- 10:30

Room: Zeta 2

JTu1B • Joint: Laser-Driven Plasma Secondary Sources: X-ray, EUV & Relativistic Plasma Optics

Presider: Oscar Versolato

JTu1B.1 • 08:30

Laser-Driven X-ray Sources at ELI Beamlines for Ultrafast Spectroscopy, Diffraction, and Imaging, Jaroslav Nejd^{1,2}; ¹*Department of X-ray Sources and Applications, ELI Beamlines Facility, Extreme Light Infrastructure ERIC, Czechia*; ²*DLPP, FNSPE, Ceske Vysoke Ucení Technické v Praze, Czechia*. Laser-driven betatron, high-order harmonic, and plasma K-alpha sources at ELI Beamlines have been commissioned for user operation, delivering femtosecond X-ray/XUV pulses for ultrafast imaging, spectroscopy, diffraction, and materials studies.

JTu1B.2 • 08:45

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THz Generation in High-Intensity Laser Plasma as an in-Situ Probe of Ultrafast Ionization, Lucie Jurkovicova^{1,2}, David Stok^{1,2}, Caroline Juliano¹, Matyas Stanek^{1,2}, Jaroslav Nejd^{1,2}, Ondrej Hort¹; ¹*ELI Beamlines, Czechia*; ²*Ceske vysoke uceni technicke v Praze, Czechia*. We report on an enhanced photocurrent model of THz generation in laser plasma by higher ionization degrees. This improvement allows for a deeper understanding of the key process of time-dependent ionization as a driving force.

JTu1B.3 • 09:00 (Invited)

Efficiency-Optimized Relativistic Plasma Harmonics for Extreme Fields, Robin Timmis¹; ¹*Univ. of Oxford, UK*. Experimental results have shown that bright high harmonic radiation can be efficiently generated from laser pulses reflected from relativistically oscillating plasma surfaces, offering a realistic pathway towards accessing SF-QED field strengths in vacuum.

JTu1B.4 • 09:30 (Invited)

Highly Stable Relativistic Plasma Mirrors at kHz Repetition Rate on a Liquid Sheet, Stefan Haessler², André Kalouguine², Christian Cabello², Antoine Cavagna², Jaismeen Kaur², Philippe Zeitoun², Chaoneng Wu¹, Lu Li¹, Rodrigo Lopez-Martens²; ¹*Shenzhen Key Laboratory of Ultraintense Laser and Advanced Material Technology, Shenzhen Technology Univ., China*; ²*Laboratoire d'Optique Appliquée, France*. Plasma-mirror HHG sources were long plagued by limited runtimes and stability issues. A liquid-leaf-target now yields few-percent stability and hour-long kHz operation, with characterized wavefront and continuous XUV spectrum, supporting high-intensity isolated attosecond pulses.

JTu1B.5 • 10:00

A Tabletop 1 kHz Plasma X-ray Source for Time-Resolved Diffraction Experiments, Roya Garayeva^{1,2}, Yelyzaveta Pulnova^{1,3}, Iuliia Baranova¹, Borislav Angelov¹, Anna Zymakova¹, Krishna Khakurel¹, Jakob Andreasson¹, Jaroslav Nejd^{1,2}; ¹*ELI Beamlines, Czechia*; ²*Ceske vysoke uceni technicke v Praze, Czechia*; ³*Univerzita Karlova, Czechia*. We present a compact 1 kHz femtosecond laser-plasma X-ray source for time-resolved diffraction. Plasma-generated K α radiation enables ultrafast pump–probe studies with femtosecond synchronization, micrometer source size, and high repetition rate operation.

JTu1B.6 • 10:15

The ELI Beamlines HHG Beamline as a Flexible XUV Source and a Platform for High-Harmonic Spectroscopy, Ondrej Hort¹, Lucie Jurkovičová^{1,3}, Cong Zhao², Xiaozhou Zou², Anne Weber², Matyas Stanek^{1,3}, Daniel van Dyk^{1,3}, David Stok^{1,3}, Benjamin T. Miller², Suzan Canbas², Zakaria Dahbi², Martin Albrecht¹, Ondrej Finke^{1,3}, Alexandr Vendl¹, Annika Grenfell¹, Wojciech Szuba¹, Jan Vabek¹, Margarita Khokhlova², Emilio Pisanty², Eric Constant⁴, Fabrice Catoire⁵, Amelle Zair², Jaroslav Nejd¹; ¹*ELI Beamlines, Czechia*; ²*Attosecond Quantum Physics Laboratory, King's College London, UK*; ³*Ceske vysoke uceni technicke v Praze Fakulta jaderna a fyzikalne inzenyrská, Czechia*; ⁴*Institut Lumiere Matière, France*; ⁵*Centre des Lasers Intenses et Applications, France*. ELI Beamlines' HHG Beamline provides a flexible XUV source for advanced user applications while enabling fundamental studies of HHG itself, including waveform-controlled quantum-path interference in gases and Floquet–Bloch dynamics in solids such as MgO.

Optica Laser Congress

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08:30 -- 10:30

Room: Beta 1

LTu1C • ML/AI for Process Development and Monitoring

Presider: Thomas Grunberger, Austria

LTu1C.1 • 08:30 (Invited)

ML/AI for Process Monitoring, Christoph Franz¹; ¹4D Photonics GmbH, Germany. Abstract not available

LTu1C.2 • 08:54 (Invited)

AI-Assisted Autonomous Trajectory Planning for Vision-Guided Robotic Laser Welding Applications,

Matteo Moscatelli¹, Cristiano Raffaldi², Daniele Colombo², Mara Tanelli¹, Ali Gökhan Demir³;

¹Department of Electronics Information and Bioengineering, Politecnico di Milano, Italy; ²BLM Group, Italy; ³Department of Mechanical Engineering, Politecnico di Milano, Italy. AI-assisted autonomous

trajectory planning enables vision-guided robotic laser welding systems to interpret seam geometry, reconstruct welding paths and autonomously generate executable robot trajectories. By integrating visual perception with learning-based path planning, the approach supports flexible and automated welding, reducing manual programming effort and enhancing adaptability in industrial manufacturing applications.

LTu1C.3 • 09:18 (Invited)

Machine Learning for Excellence in Laser Depaneling of Selected Material, Markus Bohrer¹; ¹Dr. Bohrer Lasertec GmbH, Austria. The recent growing demand for PCBs requires precise depaneling process.

However, standard parameterization is limited due to material inhomogeneity. This research explores the integration of machine learning and optical sensing for real-time depaneling optimization, helping to improve the quality, reliability, and cycle time of PCB depaneling.

LTu1C.4 • 09:42 (Invited)

Physics-Informed AI for Ultrafast Optical Thin-Film Coating Design, Henrik Tuennermann¹; ¹Deutsches Elektronen-Synchrotron, Germany. We develop a physics-informed neural network for inverse design of dispersion-controlled multilayer coatings, enabling rapid generation of high-reflectance stacks with prescribed group-delay dispersion across broad wavelength bands.

LTu1C.5 • 10:06 (Invited)

Deep Learning Enabled Coherent Beam Combination, Fedor Chernikov¹, Yuchen Liu¹, James Grant-Jacob¹, Yunhui Xie¹, William Kerridge-Johns¹, Johan Nilsson¹, Michalis Zervas¹, Ben Mills¹; ¹Univ. of Southampton, UK. Coherent beam combination (CBC) is a power-scaling technique with immense potential for advanced wavefront control. While CBC enables shaping and steering of the combined beam, it requires absolute precision over relative phases. In this work, we employ deep learning-based algorithm to achieve this precise phase control, successfully unlocking dynamic beam shaping, steering, and the creation of structured light.

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08:30 -- 10:30

Room: Beta 2

Room: MTu1D • Integrated Photonics

Presider: Martin Fejer, Stanford University, USA

MTu1D.1 • 08:30 (Invited)

Highly Coherent on-Chip Mid-Infrared Light Sources Based on Ultra-Low-Loss Chalcogenide-Glass Waveguides, Hansuek Lee¹; ¹*Korea Advanced Inst of Science & Tech, Korea (the Republic of).* This talk

presents highly coherent on-chip mid-infrared light sources enabled by ultra-low-loss chalcogenide-glass waveguides with light-guiding geometries defined without etching, minimizing propagation loss and harnessing strong nonlinearities for efficient Brillouin lasing and supercontinuum-based dispersive-wave generation.

MTu1D.2 • 09:00 (Invited)

Frequency up-Conversion of Infrared Radiation in AlGaAs-on-Insulator Nonlocal Metasurface,

Giuseppe Leo¹; ¹*Université Paris Cité, France.* SFG in metasurfaces is drawing increasing interest to reduce the footprint of frequency conversion devices. Here we focus on nonlocal metasurfaces of AlGaAs, owing to its high $\chi^{(2)}$ and mature integrability with other optoelectronic devices. In this III-V semiconductor, we demonstrate efficient SFG in metasurfaces based on Fano resonances. We up-convert SWIR radiation into the silicon absorption band with $1.6 \times 10^{-7} \text{ cm}^2/\text{GW}$ efficiency, two orders of magnitude higher than in Mie-type metasurfaces.

MTu1D.3 • 09:30 (Invited)

Scalable 2D Semiconductors for Next-Generation Mid-Infrared Emitters and Detectors, Naoki

Higashitarumizu¹; ¹*Nanyang Technological Univ., Singapore.* This talk highlights recent advances in mid-infrared optoelectronics based on 2D semiconductors, covering their photophysics and scalable approaches toward next-generation emitters and detectors.

MTu1D.4 • 10:00

Ultrafast Excited-State Dynamics in Emerging Perovskite Semiconductor Systems: Interplay of Lattice Anharmonicity, Defect Passivation, and Interface Engineering, Mousumi Upadhyay Kahaly¹; ¹*Eli-Alps,*

Hungary. Combining advanced ultrafast spectroscopy and first-principles calculations, we reveal how structural dynamics, defects, and interfaces dictate excited-state evolution in emerging perovskite semiconductors, providing microscopic insight for designing future ultrafast photonic and coherent optoelectronic materials.

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11:00 -- 13:00

Room: Zeta 1

ATu2A • Beam-Combined Sources

Presider: M J Daniel Esser; Heriot-Watt Univ., UK

ATu2A.1 • 11:00

Real-Time Piston Phase Measurement of Coherent Beam Combined Lasers Using PISTIL

Interferometry, Cyril Ledent^{1,2}, Robin Balosso¹, Ihsan Fsaifes², Julien Jaeck¹, Cindy Bellanger¹, Jerome Primot¹, Jean Christophe Chanteloup¹; ¹Office Natl d'Etudes Rech Aeronautiques, France; ²Laboratoire pour l'Utilisation des Lasers Intenses, France. We demonstrate real-time piston phase measurement for coherent beam combining architecture using the PISTIL interferometer on a segmented laser wave front.

ATu2A.2 • 11:15

Dynamic Beam Shaping of Femtosecond Pulses with a Multicore-Fiber-Based CPA Laser System, Arno

Klenke^{1,2}, Felix Wanitschke^{1,2}, Mehran Bahri², Yahia Khalil², Cesar Jauregui^{2,3}, Johannes Nold³, Stefan Kuhn³, Nicoletta Haarlammer³, Thomas Schreiber³, Jens Limpert^{2,3}; ¹Helmholtz-Institut Jena, Germany; ²Friedrich-Schiller-Universitat Jena, Germany; ³Fraunhofer-Institut fur Angewandte Optik und Feinmechanik IOF, Germany. We present a femtosecond laser system based on a 49-core, Ytterbium-doped fiber. Phase control of the individual beams enables fast beam-shaping up to the kHz frequency range at 150 W total average power after compression.

ATu2A.3 • 11:30

Ultrafast Filamentation in air at MHz Range Repetition Rate, Corentin Lechevalier¹, Ihsan Fsaifes¹, Jordan Andrieu¹, Leandro Frigerio², Milos Burger², Igor Jovanovic³, Jean Christophe Chanteloup¹; ¹Ecole Polytechnique, France; ²Univ. of Michigan, USA; ³Univ. of California Berkeley, USA. Plasma filaments in air are generated using a versatile coherently combined ultrashort fiber laser, reaching the highest repetition rate of 524 kHz reported to date. Cumulative effects on the filament dynamic are investigated.

ATu2A.4 • 11:45

100mJ-Class Spatially and Temporally Coherently Combined Femtosecond Fiber Laser System,

Christopher Pasquale¹, Yanwen Jing¹, Tayari L. Coleman¹, Bowei Yang¹, Bohan Zhou¹, Michael Garner¹, Alexander Rainville¹, Mathew Whittlesey¹, Qiang Du², Almantas Galvanauskas¹; ¹Univ. of Michigan, USA; ²Lawrence Berkeley National Laboratory, USA. We report power scaling progress with a recently built 12-channel and 81-pulse coherently combined femtosecond fiber laser system targeting >100mJ per pulse. Currently achieved 55mJ is a record for femtosecond fiber lasers to date.

ATu2A.5 • 12:00

Vector Beams Generation With Large Aperture Pixelated Liquid Crystal Cells on a Coherently

Combined Digital Laser, Corentin Lechevalier¹, Achraf Ayeb¹, Jordan Andrieu¹, Claude-Alban Ranély-Vergé-Dépré¹, Gerben Boer², Ihsan Fsaifes¹, Jean Christophe Chanteloup¹; ¹Ecole Polytechnique, France; ²Arcoptix, Switzerland. We demonstrate vector beams generation on a coherently combined digital laser using two large-aperture liquid-crystal SLM. This approach enables arbitrary polarization control across the Poincaré sphere and extends the laser toward complete electric field control.

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ATu2A.6 • 12:15

Reduced-Complexity Femtosecond Diffractive Beam Combination of a Fiber Laser Array, Achraf Ayeb¹, Ihsan Fsaifes¹, Jean Christophe Chanteloup¹, Carson Shollenbarger², Dan Schulz², Don Sipes²; ¹*Ecole Polytechnique, France*; ²*Optical Engines, USA*. We report on femtosecond coherent beam combining of 7 fiber amplifiers using diffractive optics. Power scaling of fiber amplifiers, rather than their number, through CPTEC (Counter-Pumped Tapered Endcap) technology constitutes a promising avenue for developing a less complex and potentially more efficient laser system.

ATu2A.7 • 12:30 (Invited)

Coherent Beam Combining Approaches for High-Power Laser Diodes, Gaelle Lucas-Leclin¹; ¹*LCF, France*. Various architectures for coherent beam combining of diode lasers and amplifiers will be presented. The talk will focus on our latest results with individual tapered amplifiers in different time regimes, from cw to short-pulse operation.

11:00 -- 13:00

Room: Zeta 2

JTu2B • Joint: Laser-Wakefield Acceleration & Compact Particle Accelerators (EUVXRAY and HILAS)

Presider: Luca Labate; Consiglio Nazionale delle Ricerche, Italy

JTu2B.1 • 11:00 (Invited)

Plasma Injector for an X-Ray Synchrotron Lightsource, Andreas R. Maier¹; ¹*Deutsches Elektronen-Synchrotron, Germany*. Abstract is not available

JTu2B.2 • 11:30 (Invited)

Laser-Driven Electron Acceleration to 10 GeV in All-Optical Plasma Waveguides, Jiri Sisma^{1,2}; ¹*The Extreme Light Infrastructure ERIC, ELI Beamlines Facility, Czechia*; ²*Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Czechia*. High-power laser systems are driving rapid progress in laser wake field acceleration (LWFA). This talk will present recent demonstrations of ~10 GeV electron acceleration using plasma waveguides generated by femtosecond Bessel beams with the ALEPH laser at Colorado State Univ., together with 5 GeV acceleration and high-repetition-rate plasma guiding using the L3-HAPLS laser at ELI Beamlines, highlighting the potential of advanced laser technology for compact GeV-class accelerators.

JTu2B.3 • 12:00 (Upgraded to Invited)

Multi-Kilohertz Laser Plasma Acceleration Driven by an Industrial-Grade Yb:YAG Laser, Bonaventura Farace¹, Nikita Khodakovskiy¹, Rob Shalloo¹, Tae Gyu Pak¹, Esmerando Escoto¹, Supriya Rajhans¹, Arthur Schonberg¹, Ingmar Hartl¹, Jens Osterhoff¹, Christoph Heyl^{1,2}, Andreas R. Maier¹, Kristjan Poder¹, Wim Leemans^{1,3}; ¹*Deutsches Elektronen-Synchrotron, Germany*; ²*GSI Helmholtzzentrum für Schwerionenforschung GmbH, Germany*; ³*Universität Hamburg Fachbereich Physik, Germany*. We demonstrate the first laser-plasma accelerator driven by a post-compressed, industrial Yb:YAG laser. The accelerator operates in burst mode at repetition rates up to 6.25 kHz, establishing a scalable route for high-average-flux, compact radiation sources.

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JTu2B.4 • 12:30

Commissioning of the First Electron Beams and Laser-Electron Interaction at the STAR Accelerator, Florent Pallas¹, Jean-Gabriel Brisset¹, Côme Jacob¹, Antoine Courjaud¹, Emilien Gontier¹, Luigi Faillace², David Alesini², Marco Bellaveglia², Simone Bini², Fabio Cardelli², Gaetano Catuscelli², Federico Chiarelli², Thomas De Nardis², Adolfo Esposito², Alessandro Gallo², Andrea Ghigo², Gianluca Luminati², Riccardo Magnanimi², Luigi Pellegrino², Luca Piersanti², Giorgio Scarselletta², Beatrice Serenellini², Angello Stella², Simone Tocci², Alessandro Vannozi², Sandro Vescovi², Alberto Bacci³, Francesco Broggi³, Illya Drebot³, Dario Giannotti³, Francesco Prelz³, Andrea Puppini³, Marcello Rossetti Conti³, Sanae Samsam³, Luca Serafini³, Vittoria Petrillo^{3,4}, Ezio Puppini^{3,5}, Joseph Beltrano⁶, Giovanni Amendola⁶, Riccardo Barberi⁶, Alberto Bravin⁶, Mario Ferraro⁶, Vittorio Ferraro⁶, Vincenzo Formoso⁶, Antonella Nicolino⁶, Antonietta Olivieri⁶, Enrico Tassi⁶, Pasquale Pagliusi⁶, Raffaele Agostino⁶; ¹*Amplitude, France*; ²*Laboratori Nazionali di Frascati, Istituto Nazionale di Fisica Nucleare, Italy*; ³*INFN Milano e LASA, Italy*; ⁴*Università degli Studi di Milano, Italy*; ⁵*Politecnico di Milano, Italy*; ⁶*STAR Research Infrastructure, Università della Calabria, Italy*. We report on the commissioning of the STAR facility, a high brightness secondary source based on a synchronized architecture between a linear accelerator and two diode-pumped lasers allowing stable and precise spatial and temporal overlap.

JTu2B.5 • 12:45

High-Sensitivity Optical Characterization of gas Jets for Laser-Plasma Accelerators, Vojtech Janota^{2,1}, Uddhab Chaulagain², Marcel Lamač², Sebastian Lorenz², Orsolya Morvai^{2,1}, Dominik Čáp^{2,1}, Antonia Morabito², Jaroslav Nejd^{2,1}; ¹*Faculty of Nuclear Sciences and Physical, Ceske Vysoke Ucení Technické v Praze, Czechia*; ²*ELI Beamlines, Czechia*. We present a four-pass interferometry setup that enables precise measurements of gas density of targets for LWFA experiments. Tomographic reconstruction reveals fine features, while optical probing in the acceleration experiments provides experimental validation of plasma density.

11:00 -- 13:00

Room: Beta 1

LTu2C • Laser-Beam Delivery and Beam Manipulation of High-Power Laser Beams

Presider: Titas Gertus; Toolas Cluster, Lithuania

LTu2C.1 • 11:00

Microscale Beam Expanders Fabricated by Multiphoton Polymerization for Miniaturized Optical Manipulation, Austėja Kvedaraite¹, Dimitra Ladika¹, Mangirdas Malinauskas¹, Gordon Zyla¹; ¹*Laser Research Center, Vilniaus Universitetas, Lithuania*. Effective light control within microscale confined apertures remains a fundamental challenge for optical manipulation. We demonstrate 3D-fabricated micro beam expanders that enable beam-shaping applications in compact micro-optical devices with shortened light propagation distances and reduced subsequent beam divergence.

LTu2C.2 • 11:20 (Invited)

Non-Degrading IBS-Coated Optics for High-Power Beam Delivery From UV to NIR, Sabina Kuprėnaitė¹, Simonas Kičas¹; ¹*OPTOMAN, Lithuania*. High-power beam delivery requires optical coatings that preserve performance under prolonged ultrafast irradiation. We present non-degrading IBS-coated optics for UV and NIR applications, demonstrating suppressed color-change damage, stable spectral

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LTu2C.3 • 11:40 (Invited)

Title to be Announced, Andrius Melninkaitis¹; ¹*Vilniaus Universitetas, Lithuania*. Abstract is not available

LTu2C.4 • 12:00 (Invited)

3D Beam Shaping – a New Era of Industrial Processing, Frederik Wolf¹; ¹*Midel Photonics GmbH, Germany*. Industrial processes are increasingly limited not by laser power, but process stability and usable depth of field. Midel Photonics' 3D beam shaping optics control intensity throughout the interaction volume, expanding process windows and boosting throughput.

LTu2C.5 • 12:20 (Invited)

Nanostructured Coatings for High-Power Laser Optics: Waveplates, Polarizers and Diffractive Elements, Lina Grineviciute¹; ¹*Ctr for Physical Sciences & Technology, Lithuania*. Glancing angle deposition provides a versatile approach to fabricating nanostructured coatings, enabling waveplates, 0° angle of incidence polarizers, and enhanced diffractive elements for high-power laser applications

LTu2C.6 • 12:40 (Invited)

How to Choose a Beam Expander for High Power Ultrafast Beams, Deividas Macius¹; ¹*Beamera, Lithuania*. This talk discusses beam expander selection for high-power ultrafast laser applications, focusing on how optical system configurations affect beam quality, laser-induced damage threshold, and temporal pulse characteristics.

11:00 -- 13:00

Room: Beta 2

MTu2D • Novel Phase Matching Techniques

Presider: Jeffrey Moses, Cornell University, USA

MTu2D.1 • 11:00 (Upgraded to Invited)

Telecom-Pumped Mid-Infrared Frequency Comb Generator on Thin-Film Lithium Niobate, Alexander Y. Hwang¹, Ethan Rosenfeld¹, Hubert S. Stokowski¹, Ziyu Wang¹, Martin M. Fejer¹, Amir Safavi-Naeini¹; ¹*Stanford Univ., USA*. We demonstrate a broad mid-infrared comb from an integrated frequency-modulated optical parametric oscillator pumped by a continuous-wave 1550 nm laser. The near-flat-top comb spans 6.35 THz with over 5 mW of power at 3100 nm.

MTu2D.2 • 11:30 (Invited)

New Opportunities in Quasi Phase Matched Nonlinear Interactions, Ady Arie¹; ¹*Tel Aviv Univ., Israel*. We review two recent developments in nonlinear wave mixing: (i) Programmable quasi phase matching, enabling dynamic switching of the nonlinear modulation pattern; (ii) Guiding and splitting of light beams by transversely varying the nonlinear modulation.

MTu2D.3 • 12:00 (Invited)

Advances in Backward Wave Optical Parametric Oscillators: From Scientific Curiosity to Practical Devices, Valdas Pasiskevicius¹; ¹*Kungliga Tekniska Hogskolan, Sweden*. The quest for high-finesse periodic structuring of ferroelectric materials on a nanometric scale led to the development of

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backward-wave optical parametric oscillators, a technology that offers scalable, precisely tunable output with unique phase-selectivity properties.

MTu2D.4 • 12:30 (Invited)

Recent Progress in High-Power Mid-Infrared Fluoride Fiber Lasers From 2.8 to 3.9 μm , Martin Bernier¹;

¹*Université Laval, Canada.* Recent advances in fluoride fiber lasers have enabled efficient mid-infrared emission from 2.8 to 3.9 μm . This talk reviews recent power and energy scaling results, short-pulse developments, key components, architectures and challenges for further progress.

MTu2D.5 • 13:00 (Invited)

Withdrawn

14:30 -- 16:00

Room: Zeta 1

ATu3A • Waveguides, Thin Films, and Integrated Photonics

Presider: Lina Grineviciute; Ctr for Physical Sciences & Technology, Lithuania

ATu3A.1 • 14:30

Broadly Tunable $\text{Tm}^{3+}:\text{LiYF}_4$ Waveguide Laser Operating in the Spectral Ranges of 1677-2029 nm and 2292-2327 nm, Berke Ayevi¹, Melih Kayra Kadioglu¹, Yagiz Morova^{2,3}, Eugenio Damiano⁴, Mauro Tonelli⁴, Alphan Sennaroğlu^{1,3}; ¹*Koc Universitesi Fen Bilimleri ve Muhendislik Enstitusu, Turkey*; ²*Istanbul Teknik Universitesi, Turkey*; ³*Koç Univ. Surface Science and Technology Center (KUYTAM), Turkey*; ⁴*Mega Materials srl and Dipartimento di Fisica dell'Università di Pisa, Italy.* We report, for the first time to our knowledge, a grating tuned, femtosecond laser written $\text{Tm}^{3+}:\text{LiYF}_4$ channeled waveguide laser, capable of generating broadly tunable continuous-wave output over the 1677-2029 nm and 2292-2327 nm wavelength ranges.

ATu3A.2 • 14:45

Site-Selective Spectroscopy of Eu^{3+} -Doped Lu_2O_3 Single-Crystalline Epitaxial Layers, Elizaveta Gangrskaja¹, Sebastian Mai², Hongtao Hu¹, Paul-Antoine Douissard³, Thierry Martin³, Eric Mathieu³, Gurvan Brasse⁴, Patrice Camy⁴, Alessandra Bellissimo¹, Andrius Baltuska^{1,5}, Audrius Pugzlys^{1,5}, Pavel Loiko⁴; ¹*Photonics Inst., Technische Universität Wien, Austria*; ²*Inst. of Theoretical Chemistry, Faculty of Chemistry, Universität Wien, Austria*; ³*ESRF, France*; ⁴*Centre de Recherche Sur Les Ions Les Materiaux et La Photonique, France*; ⁵*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania.* Detailed spectroscopic analysis of Eu^{3+} -doped Lu_2O_3 single-crystalline layers grown by liquid phase epitaxy is reported. Particular attention is devoted to site-selective investigation of C_2 and C_{3i} Eu^{3+} species through the $^5\text{D}_0 \rightarrow ^7\text{F}_1$ magnetic-dipole transition.

ATu3A.3 • 15:00

Fabrication and Lasing of $\text{Ho:KY}(\text{WO}_4)_2$ Waveguides, Ghassen Zin Elabedine^{2,1}, Javier Vázquez de Aldana³, Carolina Romero³, Mathilde Schlotböllner⁴, Rosa Maria Solé², Uwe Griebner¹, Weidong Chen¹, Xavier Mateos², Valentin Petrov¹; ¹*Max Born Inst., Germany*; ²*Universitat Rovira i Virgili, Spain*; ³*Univ. of Salamanca, Spain*; ⁴*ISL, France.* We report on the fabrication of buried and surface circular waveguides, and buried hexagonal waveguides in $\text{Ho:KY}(\text{WO}_4)_2$ monoclinic crystals by femtosecond direct laser

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writing and first laser results under Tm-fiber laser pumping at 1960 nm.

ATu3A.4 • 15:15

Monolithic 2- μ m Waveguide Laser Using a Bragg Cavity, Ji Eun Bae¹, Carolina Romero², Javier Vázquez de Aldana², Xavier Mateos³, Alain Braud¹, Patrice Camy¹, Pavel Loiko¹; ¹*CIMAP-CNRS-Université de Caen Normandie, France*; ²*Universidad de Salamanca, Spain*; ³*Universitat Rovira i Virgili, Spain*. We report a proof-of-concept dual-polarization, narrow-linewidth 2- μ m waveguide laser based on a birefringent Bragg-grating cavity fabricated by ultrafast laser inscription in a thulium-doped optically biaxial crystal.

ATu3A.5 • 15:30 (Invited)

Integrated Free-Space Optics: An All-Glass-Based Design Paradigm for Optical Systems Integration, Yves Bellouard¹; ¹*École Polytechnique Fédérale de Lausanne, Switzerland*. We present a laser-manufacturing platform aiming at implementing integrated free-space optics in miniaturized substrates. We illustrate it with the implementation of miniature femtosecond laser oscillators, ultra-high finesse fiber-Fabry Perot cavities and complex optical sensing platforms.

14:30 -- 16:00

Room: Zeta 2

HTu3C • Terahertz Generation & Strong-Field Light-Matter Interaction

Presider: Barry Bruner; Weizmann Inst. of Science, Israel

HTu3C.1 • 14:30 (Invited)

High Average Power Broadband Terahertz Source, Clara J. Saraceno¹; ¹*Ruhr Universität Bochum Fakultät für Geschichtswissenschaft, Germany*. Ultrafast laser-driven broadband THz sources serve many scientific and industrial fields, yet low average power has limited progress. We will present our watt-level THz sources driven by high-power Yb lasers, remaining scaling challenges, and emerging applications.

HTu3C.2 • 15:00

Terahertz-Field-Driven Berry Phase in Solids, Lior Faeyrman³, Jianing Zhang², Liang-You Peng^{2,4}, Misha Ivanov^{5,6}, Nirit Dudovich³, Riccardo Piccoli¹; ¹*Department of Molecular Sciences and Nanosystems, Univ. of Venice, Italy*; ²*State Key Laboratory for Mesoscopic Physics and Frontiers Science Center for Nano-optoelectronics, Peking Univ., China*; ³*Department of Complex Systems, Weizmann Inst. of Science Faculty of Physics, Israel*; ⁴*Beijing Academy of Quantum Information Sciences, China*; ⁵*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*; ⁶*Department of Physics, Humboldt-Universität zu Berlin, Germany*. We use a strong terahertz field to induce a dynamically controlled geometric phase in a topologically trivial material. We measure this phase using an internal interferometer built from two-color high harmonic generation spectroscopy.

HTu3C.3 • 15:15

Ultrafast Ellipsometry of Electron Intervalley Scattering and Hole Dynamics in Amorphous and Crystalline Ge, Antónia Gera¹, Zsolt Tóth³, Zsuzsanna Márton¹, Péter Dombi^{1,4}, Zsuzsanna Pápa¹, Judit Budai^{1,2}; ¹*ELI ALPS, The Extreme Light Infrastructure ERIC, Hungary*; ²*Department of Optics and Quantum Electronics, Szegedi Tudományegyetem, Hungary*; ³*Department of Medical Physics and Informatics,*

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Szegedi Tudományegyetem, Hungary; ⁴Hun-Ren Wigner Fizikai Kutatóközpont, Hungary. Ultrafast ellipsometry reveals that the response of amorphous, semi crystalline and crystalline Ge to sub-20-fs optical excitation is dominated by hole relaxation, advancing the understanding of energy transport in Ge-based optoelectronic devices.

HTu3C.4 • 15:30

Extension of Keldysh-Type Ionization Theory of Atoms: From One-Color to Two-Color Pumping,

Viktorija Tamuliene¹, Ihar Babushkin^{2,3}; ¹*Vilniaus Universitetas, Lithuania*; ²*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*; ³*Leibniz Universität Hannover, Germany.* Conventional Keldysh ionization theory of atom is extended to two-color case for the strong monochromatic fundamental laser field and its second harmonic. For the fields, equal phases and orthogonal polarizations are assumed.

14:30 -- 16:00

Room: Epsilon

JTU3B • Joint: Advanced Laser Wakefield Accelerators and their Potential for FEL (EUVXRAY and HILAS)

Presider: Arvinder Sandhu; Univ. of Arizona, USA

JTU3B.1 • 14:30 (Invited)

Laser-Plasma Accelerators and Their Potential to Drive Compact EUV & X-ray Sources,

Manuel Kirchen¹; ¹*Deutsches Elektronen-Synchrotron, Germany.* Abstract not available

JTU3B.2 • 15:00 (Invited)

Latest Result About Optimized Laser Wakefield Acceleration,

Tomonao Hosokai¹; ¹*Univ. of Osaka, Japan.* By precisely controlling electron injection into the laser wakefield and stabilizing laser and plasma conditions, we produce stable, high-quality ~390-MeV LWFA electron beams and demonstrate approximately 20-fold FEL gain near 40 nm.

14:30 -- 16:00

Room: Beta 1

LTu3D • Surface Modification and Micromachining

Presider: Titas Gertus; Toolas Cluster, Lithuania

LTu3D.1 • 14:30

Ablation of Thin Film High Entropy Alloys,

Eulàlia P. Puig Vilardell^{1,6}, Hsin-Hui Huang^{2,3}, Tomas Katkus², Jitraporn P. Vongsvivut⁵, Andrew Ang³, Yoshiaki Nishijima⁴, Vijayakumar Anand⁶, Darius Gailevicius¹, Saulius Juodkazis^{2,5}; ¹*Laser Research Center, Physics Faculty, Vilniaus universitetas, Lithuania*; ²*Optical Sciences Centre, Swinburne Univ. of Technology, Australia*; ³*Australian Research Council Industrial Transformation Training Centres, Australia*; ⁴*Inst. of Advanced Sciences, Yokohama National Univ., Japan*; ⁵*World Research Hub (WRH), School of Materials and Chemical Technology, Inst. of Science Tokyo, Japan*; ⁶*Tartu Ülikool, Estonia.* Femtosecond laser ablation of 100-nm AuAgCu, AuAg, and AlMg high entropy alloy films is investigated. Optical and morphological analyses reveal composition dependent absorption and ablation thresholds, providing insight into precision laser processing of HEA coatings.

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LTu3D.2 • 14:45

Selective Laser Etching of Single-Mode Fiber Embedded Platforms for Optical Trapping, Lukas Silhan^{1,2};

¹*Ustav Pristrojove Techniky Akademie Ved Ceske Republiky, Czechia;* ²*Department of Physical Engineering, Vysoke Ucení Technické v Brně, Czechia.* We present a fused silica dual-beam optical trapping platform fabricated via selective laser etching. Incorporating micromachined V-grooves for precise fiber alignment, the assembly achieves the lateral displacement required for stable microparticle trapping.

LTu3D.3 • 15:00 (Invited)

Influence of Burst-Mode Parameters When Processing Different Materials with Femtosecond Lasers, Simas Butkus¹; ¹*Light Conversion, Ltd., Lithuania.* Abstract not available.

LTu3D.4 • 15:15

SWIR Ultrafast Laser for Semiconductor Processing, Celia Millon¹, Saeid Shakerinezhad¹, Michael Müller¹, Clara J. Saraceno²; ¹*RayVen, Germany;* ²*ETIT, Ruhr-Universität Bochum, Germany.* 2 µm ultrafast lasers offer strong potential for material processing, enabling in volume modification and backside machining of semiconductors. This work presents an ultrafast laser emitting at 2.1 µm and first material processing results, demonstrating how short-wave infrared sources can translate laboratory capabilities to industrial applications

LTu3D.5 • 15:30 (Invited)

Withdrawn

14:30 -- 16:00

Room: Beta 2

MTu3E • Spectroscopic Sources

Presider: Sergey Mirov, University of Alabama at Birmingham, USA

MTu3E.1 • 14:30 (Invited)

Coherent Free-Form Dual-Comb Spectroscopy: From Gas Plume Sensing to Muscle Health

Investigation, Esther Baumann¹; ¹*National Inst of Standards & Technology, USA.* We present a programmable free form dual-comb spectroscopy platform that breaks free from the traditional preset sampling strategies. This capability enables real-time compressive sensing for reduction in measurement time, real-time apodization to tailor SNR and spectral resolution, and recurrence sampling for fast imaging.

MTu3E.2 • 15:00 (Invited)

Exploring the Limits of Laser Molecular Spectroscopy Sensitivity, Saverio Bartalini^{1,2}, Lacopo Galli^{1,3}, Davide Mazzotti^{1,3}, Maria Giulia Delli Santi¹, Pasquale Maddaloni¹, Pablo Cancio Pastor^{1,3}, Paolo De Natale^{1,3}; ¹*Istituto Nazionale di Ottica Consiglio Nazionale Delle Ricerche, Italy;* ²*ppqSense Srl, Italy;* ³*Lens, Italy.* The main challenge for molecular high sensitivity detection has been for a long time the technology gap to access the mid-infrared spectral range. In the last decade, a combination of Quantum Cascade Laser improvements, ultra-low noise electronics and cavity-enhancement, has allowed the full deployment of Saturated-absorption Cavity Ringdown-SCAR has pushed its sensitivity well below 1 part

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in 10^{-15} for detection of radiocarbon dioxide, $^{14}\text{CO}_2$, a ubiquitous molecule.

MTu3E.3 • 15:30

Preliminary Investigation of Carbon Dioxide and Ammonia Absorption Spectroscopy Using a 2- μm Distributed Bragg Reflector Laser,

Makoto Shimokozono¹, Takahiro Kamimoto², Takahiko Shindo¹, Yoshihiro Deguchi², Fumito Nakajima¹; ¹*NTT, Inc., Japan*; ²*Tokushima Daigaku Rikogakubu Daigakuin Shakai Sangyo Rikogaku Kenkyubu, Japan*. Carbon dioxide and ammonia absorption lines and their concentration, temperature, and pressure dependences were investigated by tunable diode laser absorption spectroscopy using a wavelength-swept distributed Bragg reflector laser operating in the 2- μm wavelength range.

MTu3E.4 • 15:45

Optical Phase Stabilization of a Photomixing-Based Continuous-Wave Terahertz Source Using Interferometric Feedback Control,

Amalina Athira B. Ibrahim¹, Isao Morohashi¹, Kazutoshi Kato², Norihiko Sekine¹; ¹*National Inst of Information & Comm Tech, Japan*; ²*Kyushu Daigaku, Japan*. A photomixing-based continuous-wave terahertz source with interferometric optical phase stabilization is demonstrated. Feedback control suppresses low-frequency optical phase drift, improving phase noise by up to 65.2 dB for stable terahertz wave generation.

16:00 -- 17:30

Room: Zeta Foyer

JTu4A • Joint Poster Session I

JTu4A.1

Large LBO and RTP Crystals for Nonlinear and Electro Optic Applications, Denis Balitski¹, Philippe Villeval¹, Dominique Lupinski¹, Slimane S. Raissi¹; ¹*Cristal Laser SA, France*. Cristal Laser SAS has successfully produced 7 Kg LBO and 1.2 Kg RTP boules with excellent optical quality and high resistance to laser damage. This progress has made it possible to meet the growing demand for large-aperture optics in frequency conversion and electro-optics applications.

JTu4A.2

A Conduction-Cooled, 225-W Cladding Light Stripper Based on 20/400- μm Large-Mode-Area Double Clad Fiber,

Suckwoo Shin², Jihwan Kim², Ju Han Lee^{1,2}; ¹*Univ. of Seoul, Korea (the Republic of)*; ²*Kromanet Inc., Korea (the Republic of)*. A cladding light stripper based on 20/400 μm , large-mode-area double-clad fiber was fabricated for stripping 225-W cladding optical power. A stripping efficiency of ~98.3% was achieved with a conduction-cooled, small aluminum packaging.

JTu4A.3

Carrier Recombination, Mobility and Diffusion Dynamics in MBE-Grown GeSn Layers on Silicon,

Patrik Scajev¹, Algirdas Mekys¹, Kazimieras Nomeika¹, Saulius Miasojedovas¹, Abdul Mannan Majeed¹, Kuo-Chih Lee², Henry Cheng², Guo-En Chang³; ¹*Faculty of Physics, Vilniaus Universitetas, Lithuania*; ²*National Taiwan Univ., Taiwan*; ³*National Yang Ming Chiao Tung Univ., Taiwan*. Carrier recombination, mobility and diffusion coefficient in MBE-grown GeSn layers on silicon were investigated using infrared pump-probe, Hall and laser induced transient grating methods in 80-300 K range. Increasing Sn content in the GeSn layers provided reduction of transport parameters by introducing detrimental structural and point

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defects.

JTu4A.4

Spectroscopy and Mode-Locked Laser Operation of an Yb,Gd:YAlO₃ Crystal, Peixiong Zhang², Zhang-Lang Lin⁵, Huang-Jun Zeng⁵, Kai-Wen Shen⁵, Ge Zhang⁵, Shuaihua Wang⁵, Shaofan Wu⁵, Zhenqiang Chen², Pavel Loiko³, Xavier Mateos⁴, Valentin Petrov¹, Weidong Chen^{5,1}; ¹*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*; ²*Jinan Univ., China*; ³*Universite de Caen Normandie, France*; ⁴*Universitat Rovira i Virgili, Spain*; ⁵*Chinese Academy of Sciences Fujian Inst. of Research on the Structure of Matter, China*. We report on the spectroscopy and SESAM mode-locked laser operation of an Yb,Gd:YAlO₃ crystal. The laser delivered 37 fs pulses at 1055.6 nm with an average output power of 197 mW at ~83 MHz.

JTu4A.5

Nanostructured Thin Film Waveplates with Improved Environmental Stability for High-Power Laser Applications, Darija Astrauskyte¹, Lukas Ramalis¹, Lina Grineviciute¹; ¹*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania*. Nanostructured thin film waveplates offer high resistance to laser radiation but suffer from moisture sensitivity. We demonstrate stabilization of nanostructured waveplates through material selection and atomic layer deposition encapsulation.

JTu4A.6

Optimization of Three-Grid Ion Source Optics for Reduced Defect Formation in Ion-Beam-Sputtered Optical Coatings, Andrej Mankievich¹, Dzmitry Zholudzeu¹, Nadzeya Khinevich¹, Mike Ivanovski¹, Yauhen Khakhlou¹; ¹*I-Photonics UAB, Lithuania*. A three-grid Kaufman ion source was optimized using COMSOL ion-optics simulations to eliminate ion-grid interception. The optimized regime improved IBS Ta₂O₅/SiO₂ coating performance, increasing LIDT to 26.65 J/cm² and reducing absorption losses to ~35 ppm.

JTu4A.7

Nanohardness and Young's Modulus of Hexagonal II-IV Semiconductor Crystals, Ginka Exner², Aleksandar Grigorov², Elizabeth Ivanova², Kentaro Miyata³, Valentin Petrov¹; ¹*Max Born Inst., Germany*; ²*Plovdiv Univ., Bulgaria*; ³*Riken, Japan*. The mechanical properties of oriented plates of hexagonal ZnS, CdS, and CdSe were studied by nanoindentation revealing strong anisotropy of the hardness and weak anisotropy of Young's modulus.

JTu4A.8

Studies, Comprehension and Resolution of Parasitic Oscillations in Laser Amplifier rod, Laura Blanchet^{1,2}, Patrice Camy², Sébastien Montant¹; ¹*Commissariat à l'énergie Atomique et aux énergies alternatives Centre D'études Scientifiques Et Techniques d'Aquitaine, France*; ²*Centre De Recherche Sur Les Ions Les Matériaux Et La Photonique, France*. This article studies parasitic oscillations in laser amplifier rods, a problem limiting amplification performance. Simulation codes were developed to understand and propose solution to avoid this phenomenon, such as frosted faces and faces with angles.

JTu4A.9

Gain Measurements in a Hetero-Assembled Amplifying Medium for the Reduction of Thermal Effects, Laura Blanchet^{1,2}; ¹*Commissariat A L'énergie Atomique Et Aux Energies Alternatives Centre D'études*

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Scientifiques Et Techniques d'Aquitaine, France; ²Centre De Recherche Sur Les Ions Les Matériaux Et La Photonique, France. This study explores optimizing the geometry and pumping of composite rods in high power laser systems to enhance thermal conductivity and uniform spatial gain, aiming to increase the firing rate and improve laser beam quality.

JTU4A.10

Cryogenic Spectroscopy of Yb:CALGO From 4 to 300 K, Jan Sulc¹, Michal Němec¹, Sabina Malecová², Antonín Fajstavr²; ¹Ceske Vysoke Ucení Technické V Praze, Czechia; ²Crytur Spol Sro, Czechia.

Temperature-dependent spectroscopy of Yb:CALGO (4-300 K) reveals that both absorption and emission bandwidths decrease only weakly with cooling. The material thus preserves broadband gain at low temperature, making it highly suitable for cryogenically cooled ultrafast laser amplifiers.

JTU4A.11

Rare-Earth Sesquisulfides as Emerging Low Phonon Energy Hosts for Infrared Solid-State Lasers, Jan Sulc¹, Miroslav Coubal¹, Lubomír Havlák², Vojtěch Vaněček², Petr Golis², Vítězslav Jary², Jan Bárta¹, Martin Fibrich¹; ¹Ceske Vysoke Ucení Technické V Praze, Czechia; ²Akademie Ved Ceske Republiky, Czechia. Rare-Earth Sesquisulfides represent a new class of low phonon energy laser hosts. Raman spectroscopy reveal distinct vibrational regimes within this material family and identify Y₂S₃ and Lu₂S₃ as particularly promising hosts for infrared-active rare-earth ions.

JTU4A.12

Advances in the Growth of Fluoride Single Crystal Materials for Laser Gain Media and Other Applications, Allen Brady¹, Kelvin Chang¹, Andrew Craig¹; ¹Northrop Grumman Synoptics, USA. This presentation examines fluoride-based single crystals for solid state lasers, highlighting rare-earth-doped gain media, magneto-optical isolators, and magnetic refrigeration applications. Emphasis is placed on advances in crystal growth enabling high-performance photonic devices at manufacturing scale.

JTU4A.13

Group-Theoretical Generation of d_{eff}^2 Symmetry in Nonlinear Optical Crystals, Kentaro Miyata¹, Valentin Petrov²; ¹Riken, Japan; ²Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany. We show that the apparent complexity of d_{eff}^2 symmetry in nonlinear optical crystals is generated by a small set of symmetry rules. Laue groups and canonical azimuthal forms jointly determine symmetry enhancement, φ -periods, and the number of unique octants, through group closure.

JTU4A.14

Pulsed Electric Current Bonding of Sapphire and Alumina-Coated YAG, Hiroaki Furuse¹, Hiyori Uehara², Ryo Yasuhara², Takaaki Morita³, Takashi Sekine³, Yoshinori Tamaoki³, Yoshinori Kato³; ¹National Inst. for Materials Science, Japan; ²Kaku Yugo Kagaku Kenkyujo, Japan; ³Hamamatsu Photonics Kabushiki Kaisha, Japan. Pulsed electric current bonding was applied to bond sapphire and YAG crystals coated with alumina films. TEM analysis was conducted to observe the interfacial microstructure and to investigate the structural characteristics of the alumina film.

JTU4A.15

X-Ray Metrology of Rare-Earth-Doped YAG Slab Grown by Horizontal Directed Crystallization Toward 140-mm-Class Apertures, Pablo Westermann¹, Juraj Kajan¹, Tomas Gregor¹; ¹AT Crystals, Slovakia.

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Horizontal directed crystallization enables 140-mm-class rare-earth-doped YAG for slab and disk laser gain media. Coupon-scale Nd:YAG measurements with CT, XRT, XRD/XRR and stress-birefringence define qualification gates for aperture scale-up.

JTu4A.16

Transparent Er³⁺ Doped (Sc,La)₂O₃ Ceramics Fabricated by Spark Plasma Sintering for mid-Infrared Laser Applications, Zehao XU^{1,2}, Hiroaki Furuse¹, Tohru Suzuki^{1,2}; ¹*National Inst. for Materials Science, Japan*; ²*Waseda Daigaku, Japan*. Transparent Er:(Sc,La)₂O₃ ceramics were fabricated using co-precipitated powders followed by spark plasma sintering for mid-infrared laser applications. The emission spectrum became broader with higher La³⁺ concentrations, indicating potential for ultrashort pulse lasers.

JTu4A.17

Passively Q-Switched Laser Operation of Nd:CS-FAP Transparent Ceramics, Kazuya Takimoto¹, Hiroyasu Sone², Hiroaki Furuse¹; ¹*Busshitsu Zairyo Kenkyu Kiko, Japan*; ²*Kitami Kogyo Daigaku, Japan*. Passively Q-switched laser operation was demonstrated in Nd:CS-FAP transparent ceramics using Cr⁴⁺:YAG as a saturable absorber. Peak output power of 0.3 kW was achieved at 62 kHz repetition rate and 2.4 ns pulse width.

JTu4A.18

Self-Consistent Thermal Phase-Mismatch Fields in High-Power Nonlinear Optics, Kentaro Miyata¹, Satoshi Wada¹; ¹*Riken, Japan*. In high-power nonlinear frequency conversion, absorption heats the crystal and makes the phase mismatch spatially varying. We express this feedback as $\Delta k(r,z) = F[\Delta k(r,z)]$, where F combines nonlinear conversion, heat generation, thermal diffusion, and thermo-optic detuning. The model unifies asymmetric tuning, hysteresis, and local phase matching.

JTu4A.19

Spectroscopy of Thulium-Doped Amorphous TeO₂ Films on Silicon for 2- μ m Integrated Lasers, Ji Eun Bae¹, Batoul Hashemi¹, Purviben Shukla², Bruno L. Segat Frare², Jonathan D. B. Bradley², Gurvan Brasse¹, Alain Braud¹, Patrice Camy¹, Pavel Loiko¹; ¹*CIMAP-CNRS-Université de Caen Normandie, France*; ²*McMaster Univ., Canada*. We report optical spectroscopy of Tm³⁺-doped amorphous TeO₂ thin films deposited by reactive radio-frequency magnetron co-sputtering on silicon chips for integrated 2- μ m amplifiers and lasers, showing broad phonon-mediated emission with a 150 nm gain bandwidth.

JTu4A.20

Evaluation of Frequency Accuracy in All-Photonic THz Radar System Based on Optical Combs, Isao Morohashi¹, Norihiko Sekine¹; ¹*Kokuritsu Kenkyu Kaihatsu Hojin Joho Tsushin Kenkyu Kiko, Japan*. In the all-photonic terahertz radar system we proposed, range resolution depends on the accuracy of optical combs used as light source. A modulator-based optical comb source has high accuracy and stability, enabling high-resolution measurements.

JTu4A.21

Calibration of d₃₆(CdSiP₂) by Second-Harmonic Generation of 4 μ m Radiation in Large Samples Relative to ZnGeP₂, Achille Bogas-Droy¹, Marcin Piotrowski¹, Gerhard Spindler¹, Mathilde Schlotböllner¹, Valentin Petrov², Anne Hildenbrand-Dhollande¹; ¹*Inst Franco-Allemand Recherches St Louis, France*; ²*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*. We

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evaluate the nonlinear coefficient d_{36} of CdSiP_2 by type-I second-harmonic generation with nanosecond pulses near $4\ \mu\text{m}$ using the isostructural ZnGeP_2 as a reference and large-size, high-quality and anti-reflection coated samples.

JTu4A.22

Nanohardness and Young's Modulus Studies of Cubic III-v Semiconductors (III: Ga, In; v: P, As, Sb),

Ginka Exner³, Vladimir Tassev², Aleksandar Grigorov³, Shivashankar Vangala², Valentin Petrov¹; ¹*Max Born Inst., Germany*; ²*Air Force Research Laboratory, USA*; ³*Plovdiv Univ., Bulgaria*. Young's modulus and nanohardness of III-V semiconductors GaX and InX , where $X = \text{As, P, Sb}$ are measured and compared for the (100) surface, and for different orientations in GaAs.

JTu4A.23

Two-Millijoule, 1.3-Cycle Pulses at $1.88\ \mu\text{m}$ via Cascaded Focus and Compression,

Gaudenis Janssonas¹, Dominykas Karvelis¹, Koji Asaga², Ming-Shian Tsai², Hsin-Hsian Wang², Arunas Varanavičius¹, Rimantas Budriunas¹, Ming-Chang Chen²; ¹*Laser Research Center, Vilniaus universitetas, Lithuania*; ²*Inst. of Photonics Technologies, National Tsing Hua Univ., Taiwan*. We post-compress $2.1\ \mu\text{m}$, sub-120 fs and 4.4 mJ pulses to 2.02 mJ and 7.88 ± 0.81 fs with three stages of cascaded focus and compression. Relative peak power of 64.6% and horizontal spatial-spectral homogeneity of 95.6% were shown.

JTu4A.24

Optical Response of a Femtosecond Laser Inscribed D-Shaped Waveguide in Ag-Coated Glass,

Merve Yilmaz¹, Beyzanur Karali¹, Mustafa Tosun¹, Hadi Jahangiri², Yagiz Morova¹; ¹*Istanbul Teknik Universitesi, Turkey*; ²*Koc Universitesi, Turkey*. We demonstrated a femtosecond laser inscribed D-shaped waveguide in Ag-coated glass. Polarization-resolved measurements revealed a surface plasmon resonance centered at 720 nm, exhibiting 8% transmission dip and indicating plasmonic coupling at the metal-dielectric interface.

JTu4A.25

Femtosecond Laser Welding of BK7 Glass to Aluminum,

Aviran Halstuch¹, Rami Cohen², Israel Lasker², Amiel A. Ishaaya¹; ¹*Ben-Gurion Univ. of the Negev, Israel*; ²*Elbit Systems Electro-optics Elop Ltd, Israel*. We demonstrate successful welding of BK7 glass to aluminum alloys using an amplified Ti:Sapphire femtosecond laser with pulses of 60-80 μJ at a repetition rate of 1 kHz focused through a 10X objective lens.

JTu4A.26

Crystallographically Aligned Deep-UV Writing of Buried Sapphire Laue Lattices for Angular Beam

Control, Edvinas Aleksandravicius¹, Gabrielius Kontenis¹, Indre Meskelaite¹, Domas Paipulas¹, Vyngantas Mizeikis², Saulius Juodkazis³, Kestutis Staliunas⁴, Darius Gailevicius¹; ¹*Vilniaus Universitetas, Lithuania*; ²*Research Inst. of Electronics, Department of Electronics and Materials Science, Shizuoka Univ., Japan*; ³*Swinburne Univ. of Technology, Australia*; ⁴*Institutio Catalana de Recerca i Estudis Avancats, Spain*. Femtosecond writing at 257 nm enables crack-free volumetric phase lattices in sapphire using crystallographically aligned scans and polarization, yielding millimeter-aperture angular beam-control elements with scalable transmission modulation for robust high-power laser optics.

JTu4A.27

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Polymer Liquid-Infused Films With a Hierarchical Micro- and Nanoscale Texture for Reducing Ice Adhesion, Oleksiy Myronyuk², Denys Baklan², Aleksej Rodin¹; ¹*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania*; ²*Chemical Technology of Composite Materials Departmen, National Technical Univ. of Ukraine "Igor Sikorsky Kyiv Polytechnic Inst.", Ukraine*. Ice

adhesion limits polymer film performance in cold environments. Lubricant-infused replicas obtained from laser-microtextured dies in polyethylene films containing hydrophobic silica exhibited a relative ice adhesion of 0.05–0.09, confirming their anti-icing performance.

JTu4A.28

Withdrawn

JTu4A.29

Prestructure-Mediated Subwavelength Gratings Formation by Single-Pulse Femtosecond Laser Writing on Molybdenum, Md A. Taher¹, Sandip Paul², Debabrata Goswami^{3,4}; ¹*Center for Lasers and Photonics, Indian Inst. of Technology Kanpur, India*; ²*Indian Inst. of Technology Kanpur, India*; ³*Department of Chemistry, Indian Inst. of Technology Kanpur, India*; ⁴*Center for Bits and Atoms, Massachusetts Inst. of Technology, USA*. We demonstrate that a single femtosecond pulse generates laser-induced periodic surface structures (LIPSS) on pre-structured surfaces. An initial pulse creates a surface state that modulates subsequent laser-matter interaction, enabling LIPSS formation beyond the multipulse regime.

JTu4A.30

Generation of NiCuFeMnMo High-Entropy Alloy Nanoparticles by Nanosecond Laser Ablation and Their Photothermal Responses at 1 μ m, Aybuke Metin², Hadi Jahangiri¹, Yagiz Morova²; ¹*Kuytam, Koc Universitesi, Turkey*; ²*Physics Engineering, Istanbul Teknik Universitesi, Turkey*. In this study, NiCuFeMnMo high-entropy alloy nanoparticles were synthesized in water and ethanol via Bessel-beam laser ablation. Their morphology, size distribution, and photothermal performance were systematically investigated, revealing solvent-dependent characteristics and light-to-heat conversion behavior.

JTu4A.31

Femtosecond Laser Texturing Strategies for Lithium Niobate Blackening, Raffaele De Palo¹, Felice A. Sfregola², Stefania Caragnano², Caterina Gaudio³, Francesco Paolo Mezzapesa³, Antonio Ancona², Vincenzo Spangolo¹, Pietro Patimisco², Annalisa Volpe¹; ¹*Politecnico di Bari, Italy*; ²*Universita degli Studi di Bari Aldo Moro, Italy*; ³*Consiglio Nazionale delle Ricerche, Italy*. Blackening is a surface texturing approach aimed at enhancing the optical absorption of transparent materials. In this work, femtosecond laser micromachining was exploited to induce *blackening* of lithium niobate, reducing its transmittance in the 1.5–5.0 μ m wavelength range.

JTu4A.32

Femtosecond Laser Micromachining of Quartz for Multipurpose Functional Surfaces, Annalisa Volpe¹, Raffaele De Palo¹, Isabella Petruzzellis², Francesco Paolo Mezzapesa³, Caterina Gaudio³, Andrea Zifarelli², Vincenzo Spangolo¹, Pietro Patimisco², Antonio Ancona²; ¹*Politecnico di Bari, Italy*; ²*Universita degli Studi di Bari Aldo Moro, Italy*; ³*Consiglio Nazionale delle Ricerche, Italy*. Quartz was employed as a model platform to investigate how fs-laser-induced micro- and Nano-structuring can transform the material from a passive optical substrate into a multifunctional material platform suitable for sensing and photonic applications.

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JTu4A.33

Dynamic Beam Shaping for High-Power Laser Manufacturing, Stefano Bonora^{1,2}, Claudio Moretti², Stefano Binotto², Lorenzo Uliana²; ¹*CNR-Inst. of Photonics and Nanotech, Italy*; ²*Dynamic Optics srl, Italy*. We present an actively cooled adaptive optics module for real-time beam shaping in high-power laser manufacturing. Operating up to 6kW, the system dynamically generates diverse focal geometries with sub-millisecond loop latency.

JTu4A.34

Structural Robustness of Optical Vortex Beams in Simulated Tumor Tissue: a Numerical Study of Topological Charge Effects, Mai A. Badran², Maher Farhoud², Mohamed Sakr², Rania M. Abdelazeem¹; ¹*Niles, Cairo Univ., Egypt*; ²*Physics, Alexandria Univ. Faculty of Science, Egypt*. We numerically show, using COMSOL Multiphysics, that Laguerre-Gaussian vortex beams ($l=0-5$) maintain their phase-singularity structure through simulated tumor tissue despite scattering, underscoring their robustness and potential for deep-tissue OAM-based imaging.

JTu4A.35

Comparative Study of Graphene/GO/rGO Based SPR Sensor for Glucose Detection in Urine, Nitesh Mudgal¹, Shweta Mittal¹, Ankur Saharia², Kamal Kishor Choure³, Manish Tiwari², Ghanshyam Singh⁴; ¹*Poornima College of Engineering Jaipur, India*; ²*Manipal Univ. Jaipur, India*; ³*UPES, India*; ⁴*Malaviya National Inst. of Technology Jaipur, India*. This work reports a Graphene/GO/rGO based SPR sensor for the glucose detection in urine (refractive index range of 1.330–1.335). The proposed structure provides a comparative study, which results in reliable sensitive glucose monitoring.

JTu4A.36

He-Ne Laser-Enabled Multilayer SPR Biosensor for Sensitive Detection of Jurkat Blood Cancer Cells, Nahian Montasir¹, Md. Al Amin I. Utshob¹, Tasnim F. Toha¹, Raonak Karim¹, Tabah M. Momo¹, Maymona B. Juwel¹, Khandakar M. Ishtiaq¹; ¹*Ahsanullah Univ. of Science & Tech, Bangladesh*. A novel efficient SPR biosensor employing He-Ne laser excitation is proposed with an N-FK51A/PbTiO₃/Ag/CeO₂/BP structure for label-free Jurkat blood cancer cell detection. This structure helps to improve the plasmonic effect and sensing ability compared to conventional SPR biosensors.

JTu4A.37

Self-Adaptive Nano Bio-Liquid Intelligence: When Ancient and Modern Knowledge Systems Converge Through Bio-Nano Photonics, AI and Human Intelligence, Subhadra Gade¹, Manga Tayaru GVS¹, Gayatri Gade¹, Priya Garuda¹; ¹*Team QAESS, India*. This work presents a biphotonic framework to investigate a self-adaptive Nano bio-liquid formulation inspired by AIKS. Combining AI, HI, plant bioactive, minerals and structured preparation methods, it explores optical signatures, environmental responsiveness and light-matter interactions, proposing pathways for future interdisciplinary research

JTu4A.38

Robust Transport-of-Intensity Phase Retrieval Using Harmonic-Mean Flux Discretization and Gauss-Newton Refinement, Hammid j. al-Ghezi¹; ¹*Electric Engineering, Univ. of Kufa, Iraq*. The Harmonic-Mean Gauss-Newton Transport of Intensity Equation improves quantitative phase retrieval by combining log-domain Gaussian regularization, harmonic-mean finite-volume flux discretization, sparse Tikhonov-

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stabilized inversion, and LU-reused Gauss-Newton refinement for robust low-light, high-contrast microscopy.

JTu4A.39

Luminescent YAG:Ce³⁺ 3D Micro-Structures via Multi-Photon Laser Lithography, Robertas Virketis¹, Artur Harnik², Greta Merkininkaitė¹, Arturo Susarrey-Arce³, Simas Šakirzanovas¹, Mangirdas Malinauskas²; ¹*Faculty of Chemistry and Geosciences, Vilnius Universitetas, Lithuania*; ²*Laser Research Center, Physics Faculty, Vilnius Universitetas, Lithuania*; ³*Department of Chemical Engineering, Mesoscale Chemical Systems, MESA+ Inst., Universiteit Twente, Netherlands*. We demonstrate fabrication of single-phase crystalline YAG:Ce³⁺ luminescent 3D microstructures via multiphoton laser lithography and controlled annealing, achieving sub-micrometer features (0.48 μm) with 2.4 μm resolution, and Ce³⁺ emission at 558 nm.

JTu4A.40

Withdrawn

JTu4A.41

2.6 W Continuous-Wave Ho³⁺:CaGdAlO₄ Femtosecond-Laser-Written Waveguide Laser, Faik Derya Ince¹, Wendwesen Gebremichael², Sergei Tomilov¹, Anna Suzuki¹, Jie Qiao³, Clara J. Saraceno¹; ¹*Photonics and Ultrafast Laser Science, Ruhr Universität Bochum, Germany*; ²*Aktiwave, USA*; ³*Chester F. Carlson Center for Imaging Science, Rochester Inst. of Technology, USA*. We report on continuous-wave laser operation at 2045 nm from an in-band pumped fs-laser-written Ho³⁺:CaGdAlO₄ waveguide, resulting an output power of 2.6 W, which is the highest reported so far with 2-μm waveguides.

JTu4A.42

Prospects of Terbium-Doped ZBLAN Glasses for Blue and Green Fiber Lasers, Niranjana Prasad¹, Laurine Bodin², Joan Bossé², Alain Braud¹, Ammar Hideur³, Patrice Camy¹, Pavel Loiko¹; ¹*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), Umr 6252 Cea-Cnrs-Ensicaen, Université De Caen Normandie, France*; ²*le Verre Fluoré, France*; ³*coria Umr 6614, Cnrs-Insa-Université De Rouen Normandie, France*. Visible emission properties of 0.5–5 mol% Tb³⁺-doped fluorozirconate (ZBLAN) glasses are investigated, focusing on cross-relaxation-driven competition between blue (⁵D₃) and green (⁵D₄) emissions and evaluating their potential for UV-pumped visible fiber lasers.

JTu4A.43

Superfinishing of Fused Silica Optics Using Shear-Thickening Fluid Polishing, Viresh Kumar¹, Dilbag Singh¹, Vinod Mishra^{1,2}; ¹*CSIR-CSIO, Chandigarh, India*; ²*Academy of Scientific and Innovative Research (AcSIR), India*. Shear-thickening fluid polishing was investigated for ultra-precision finishing of fused silica. Fused silica flat was polished using a starch and cerium oxide slurry, reducing roughness from 2.6nm to 0.19 nm in 60 min, with a defect-free surface and 87 nm profile error.

17:30 -- 19:00

Room: Zeta 1

ATu5A • Mode-Locked Oscillators

Presider: Martin Bernier; Université Laval, Canada

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ATu5A.1 • 17:30

Dissipative Soliton Mode-Locked Oscillator With a Normal Dispersion Double-Clad Tm:ZBLAN Fiber, Nur Atikah Binti Azali¹, Shoi Taguchi¹, Takao Fuji¹; ¹*Toyota Technological Inst., Japan*. We demonstrate dissipative soliton mode-locked operation of a normal dispersion double-clad Tm:ZBLAN fiber laser. The system generates highly chirped pulses with an energy of 6.8 nJ and a duration of 783 fs.

ATu5A.2 • 17:45

Sub-60 fs, 940-1245 nm Tunable Laser Source Based on Kerr-Lens Mode-Locked Yb:CALGO Oscillator, Yutong Zhang¹, Yang Yu¹, Xuan Tian¹, Geyang Wang¹, Han Liu¹, Wenlong Tian¹, Jiangfeng Zhu¹, Zhiyi Wei²; ¹*Xidian Univ., China*; ²*Beijing National Laboratory for Condensed Matter Physics and Inst. of Physics, Chinese Academy of Sciences, China*. We demonstrate a femtosecond laser source tunable from 940-1245 nm based on a 52-fs Kerr-lens mode-locked Yb:CALGO oscillator. Few-cycle pulses above 1200 nm was directly obtained without compression.

ATu5A.3 • 18:00

High Order Spatiotemporal Solitons from a Passively Mode-Locked, High-Power Diode Laser, Eden Gaon¹, Mallachi Meller¹, Idan Parshani¹, Yossi Lev¹, Avi Pe'er¹; ¹*Bar-Ilan Univ., Israel*. We demonstrate self-sustained soliton pulses in high-order spatiotemporal modes from a passively mode-locked diode-laser. A wide-area diode with a reverse-bias formed an effective Kerr-lens, leading to nonlinear mode-locking and soliton dynamics in the laser cavity.

ATu5A.4 • 18:15

SESAM-Modelocked Ho,Y:CaF₂ Laser at 2.1 μ m, Faik Derya Ince¹, Sergei Tomilov¹, Zoe Liestmann², Hiroki Tanaka², Clara J. Saraceno¹, Anna Suzuki¹; ¹*Photonics and Ultrafast Laser Science, Ruhr Universität Bochum, Universitätsstraße 150, 44801, Germany*; ²*Leibniz-Institut für Kristallzüchtung (IKZ), Max-Born-Str. 2, 12489, Germany*. We report on a first demonstration of SESAM modelocking in Ho,Y:CaF₂ bulk laser. The system emits 725 fs pulses at 91.5 MHz repetition rate and at 2105 nm central wavelength, with an average power of 382 mW.

ATu5A.5 • 18:30 (Invited)

Advances in Fiber-Based Dual-Comb Technique for Highly Functional Applications, Kaoru Minoshima¹; ¹*Univ. of Electro-Communications, Japan*. Dual-comb spectroscopy provides powerful tools for direct evaluation of complex and dynamical materials responses to optical waves. Precise and versatile frequency controllability of dual-comb enables highly functional measurements with coherent control of various optical properties.

17:30 -- 19:00

Room: Epsilon

JTU5B • Joint FEL Symposium: X-ray Free-Electron Oscillators s (EUVXRAY and HILAS)

Presider: Francesca Calegari; DESY, Germany

ETu5B.1 • 17:30 (Invited)

Lasing of XFEL the Hard X ray Free Electron Laser Oscillator, Jan Gruenert¹, Patrick Rauer¹, Maurizio Vannoni¹, Wolfgang Freund¹, Massimiliano di Felice¹, Bertram Friedrich¹, Daniele La Civita¹, Mikako

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Makita¹, Naresh Kujala¹, Filippo Sottocorona¹, Suren Karabekyan¹, Theophilos Maltezopoulos¹;

¹*European X-Ray Free-Electron Laser Facility GmbH, Germany*. XFELo demonstrates the world's first hard X-ray laser oscillator with a 66m long diamond crystal resonator at the European XFEL, yielding unprecedentedly coherent, narrow band pulses at 7 keV with an intra bunchtrain repetition rate of 2.2 MHz.

ETu5B.2 • 18:00 (Invited)

Development of Cavity-Based X-ray Sources, Alex Halavanau¹, Zhirong Huang¹, Diling Zhu¹, Jingyi Tang¹;

¹*SLAC National Accelerator Laboratory, USA*. Cavity-based X-ray sources are envisioned as the next generation of X-ray sources. Cavity-based XFEL, or CBXFEL, for instance, can offer an increase of up to two orders of magnitude in X-ray brightness, extending both the reachable photon energies and the number of X-ray photons beyond those of current machines. X-ray cavities also offer excellent longitudinal coherence, a highly sought-after property for XFELs. In this talk, we will review recent progress in the development of CBXFEL concepts.

17:30 -- 18:30

Room: Beta 1

LTu5C • Additive Manufacturing: Macro-Micro-Nano I (followed by a panel)

Presider: Maria Farsari; FORTH/IESL, Greece

LTu5C.1 • 17:30 (Invited)

Beam Shaping in Laser-Based Powder Bed Fusion of Metals, Jonas Grünewald¹; ¹*Professorship of Laser-based Additive Manufacturing, Technische Universität München School of Engineering and Design, Germany*. Beam shaping can be used to tailor additive manufacturing processes. This contribution demonstrates the impact of various beam profiles on resulting process and component properties in laser-based powder bed fusion (PBF-LB/M).

LTu5C.2 • 18:00 (Invited)

Volumetric 3D Printing, Christophe Moser¹; ¹*École Polytechnique Fédérale de Lausanne, Switzerland*.
Abstract not available

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Wednesday, 14 October

08:30 -- 10:00

Room: Zeta 1

AW1A • 2 μm Sources

Presider: Salman Noach; Jerusalem College of Technology, Israel

AW1A.1 • 08:30

Thulium-Based F-CPA with 51W Average Power, 510 μJ Pulse Energy and 164fs Pulse Duration Emitting at 1928nm, Tobias Heuermann¹, Ziyao Wang¹, Christian Kern¹, Evgeny Shestaev¹, Sven Breilkopf¹, Christian Gaida¹, Tino Eidam¹; ¹*Active Fiber Systems GmbH, Germany*. Tm-doped fiber CPA system at 2 μm delivers 51.3 W average power, 513 μJ pulse energy, and 164 fs pulses at 1928 nm. Operating from 50 kHz–2 MHz with near-diffraction-limited beam quality, it provides a stable, high-precision ultrafast source for nonlinear optics, spectroscopy, and high-field experiments.

AW1A.2 • 08:45

Nanosecond-Pulsed Thulium-Raman Hybrid Fiber Amplifier at 2.1 μm , André W. Edvardsen^{1,2}, Lars G. Holmen¹; ¹*Forsvarets Forsknings Institutt, Norway*; ²*Department of Technology Systems, Universitetet i Oslo Det Matematisk-Naturvitenskapelige Fakultet, Norway*. We report a thulium-Raman hybrid pulsed fiber amplifier at 2109 nm, combining Tm amplification and Raman shifting to extend beyond the effective Tm gain window, delivering 157 μJ , 20 ns square pulses at 100 kHz.

AW1A.3 • 09:00

Power Scaling of Tm-Doped Fiber Lasers for High-Efficiency EUV Generation, Christian Gaida¹, Tobias Heuermann¹, Mathias Lenski², Felix Wanitschke^{2,3}, Florian Bontke², Arno Klenke^{2,3}, Cesar Jauregui², Jens Limpert^{2,3}, Tino Eidam¹; ¹*Active Fiber Systems GmbH, Germany*; ²*Friedrich-Schiller-Universitat Jena, Germany*; ³*GSI Helmholtzzentrum for heavy ion research, Germany*. Tm-doped fiber amplifiers operating at 2 μm are a promising alternative to CO₂ lasers for EUV generation. We demonstrate kilowatt-class output powers, pulse energies up to 10 mJ, and first results from Tm-doped multicore fibers, highlighting a scalable and efficient route toward next-generation high-power EUV sources.

AW1A.4 • 09:15

Millijoule Femtosecond Pulses From Tm:YAP CPA Outside the Water Absorption Window, Joris Roman¹, Edgar Kaksis¹, Karolis Viskontas³, Julius Lukosiunas³, Rokas Danilevicius³, Andrejus Michailovas^{3,2}, Andrius Baltuska^{1,2}, Audrius Pugzlys^{1,2}; ¹*Photonics Inst., Technische Universitat Wien, Austria*; ²*Valstybinis moksliniu tyrimu institutas Fiziniu ir technologijos mokslu centras, Lithuania*; ³*Ekspla, Lithuania*. Millijoule femtosecond pulses at the water-absorption-free wavelength of 1.98 μm are generated and characterized. We explain the influence of birefringent etalons in YAP and RTP Pockels, leading to pulse splitting, and the measures to improve amplified pulse fidelity.

AW1A.5 • 09:30 (Invited)

Recent Advances in High-Power 2 - μm Fiber Lasers, Anne Hildenbrand-Dhollande¹, Christophe Louot², Esteban Serrano², Félix Billaud², Sylvain Andraud², Louis Marquillie², Clémence Schmitt², Nicolas Dalloz², Stefano Bigotta²; ¹*Inst Franco Allemand Recherches St Louis, France*; ²*French-German Research Inst. of*

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Saint-Louis, France. This work reports recent advances in high-power 2- μm fiber lasers at ISL. We identify thermal management and component failures as primary bottlenecks, and present mitigation strategies to enable power scaling while preserving beam quality and reliability.

08:30 -- 10:00

Room: Epsilon

JW1B • Joint FEL Symposium: High Repetition Rate Attosecond and Seeded FELs (EUVXRAY and HILAS)

Presider: Franz Kaertner; Deutsches Elektronen-Synchrotron, Germany

JW1B.1 • 08:30 (Invited)

Recent Developments in Attosecond XFELs at the Linac Coherent Light Source, Agostino Marinelli¹;

¹*SLAC National Accelerator Laboratory, USA.* In my talk I will discuss recent advances on attosecond XFEL physics at the LCLS: high repetition rate operation, hard x-ray attosecond pulses and novel pulse shaping methods

JW1B.2 • 09:00 (Invited)

Attosecond Pulses from the EuXFEL, Svitozar Serkez¹; ¹*European XFEL GmbH, Germany.* Abstract not available

JW1B.3 • 09:30 (Invited)

Withdrawn

08:30 -- 10:00

Room: Beta 1

LW1D • Additive Manufacturing: Macro-Micro-Nano II

Presider: Maria Farsari; FORTH/IESL, Greece

LW1D.1 • 08:30 (Invited)

High Performance Microoptics Realized via MPL, Mangirdas Malinauskas¹; ¹*Vilniaus Universitetas, Lithuania.* Multiphoton lithography enables high-performance 3D micro-optics. We review routes to enhance them: atomic-layer-deposition coatings, conversion of printed hybrids into glasses and luminescent ceramics, and photonic architectures—achieving transparency, functionalization, and optical activity at the microscale.

LW1D.2 • 09:00 (Invited)

Bringing 3D Laser Nano Printing to the Speed-of-Light Limit, Sebastian Koch¹, Markus Nyman¹, Josephine Spiegelberg¹, Maryna L. Meretska¹, Carsten Rockstuhl¹, Martin Wegener¹, Paul Somers¹; ¹*Karlsruher Institut für Technologie, Germany.* Extending spatiotemporal shaping of ultrafast laser pulses from 2D projections to fully 3D holographic imaging using single pulses enables 3D laser nanoprinting with peak printing rates limited by the fundamental speed of light.

LW1D.3 • 09:30 (Upgraded to Invited)

3D-Printed Diffractive Beam Shapers for Laser Materials Processing, Leander Siegle¹, Michael Wendt², Dario Mekle^{2,3}, Daniel Flamm², Harald Giessen¹; ¹*4th Physics Inst. and Research Center SCoPE, Universität Stuttgart, Germany*; ²*TRUMPF Laser- und Systemtechnik SE, Germany*; ³*Inst. of Applied Physics, Abbe*

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Center of Photonics, Friedrich-Schiller-Universität Jena, Germany. We report high-power laser materials processing using 3D-printed diffractive axicons fabricated by two-photon polymerization. The optics generate Bessel-like beams for transparent material modification and cutting, enabling rapid fabrication of tailored beam shaping components for industrial ultrafast laser applications.

08:30 -- 10:00

Room: Beta 2

LW1E • Frontiers in Laser Applications I

Presider: Ruth Houbertz; ThinkMade Engineering & Consulting, Germany

LW1E.1 • 08:30

Towards an Engineering Station for Space-Debris Remediation via Laser Momentum Transfer, Jens Rodmann¹, Stefan Scharring¹, Jürgen Kästel¹, Michael Steinbatz², Ivana Novak³, Anton Kürten⁴, Daniel Hampf⁴, Laurent Jolissaint⁵, Audrey Baur⁵, Martin Divoky⁶, Didrik Karlsen⁷, Bente Larsen⁷, Catherine Y. Teisset⁸, Sandro Klingebiel⁸, Doris Grosse⁹, Katja Gruenfeld¹⁰, Andrea Di Mira¹¹, Clemens Heese¹¹, Tim Flohrer¹¹; ¹*German Aerospace Center (DLR), Germany*; ²*ASA Astrosysteme GmbH, Austria*; ³*Cosylab Switzerland GmbH, Switzerland*; ⁴*DiGOS Potsdam GmbH, Germany*; ⁵*School of Engineering and Management Vaud, Switzerland*; ⁶*HiLASE Centre, Czechia*; ⁷*Rheinmetall Nordic AS, Norway*; ⁸*TRUMPF Scientific Lasers GmbH + Co. KG, Germany*; ⁹*ANU Enterprise Pty Ltd, Australia*; ¹⁰*Universität zu Köln, Germany*; ¹¹*European Space Operations Centre, Germany.* We present a high-level overview of the ESA activity "Orbit Maintenance via Laser Momentum Transfer" (OMLET). The project performed a conceptual design study to build an Engineering Station for space-debris remediating using Laser Momentum Transfer.

LW1E.2 • 08:45

Delay-Time Dependence of Energy Coupling in Double-Pulse Femtosecond Laser Ablation of Copper and Aluminum Alloy, Tatsuya Shinozaki¹, Hiroshi Kasuga¹, Hideaki Yamane¹, Tomohiro Tsukihana¹, Yutaka Nagata¹, Norihito Saito¹, Takayo Ogawa¹, Satoshi Wada¹; ¹*Rikagaku Kenkyujo, Japan.* A femtosecond laser pulse was split into two pulses with a controllable delay to investigate delay-dependent ablation dynamics. Copper and aluminum alloy was ablated by the double pulse laser. We investigated dependence on second pulse delay time of removal volume.

LW1E.3 • 09:00

Enhanced Momentum Coupling in Ultrashort-Pulse Laser Ablation of CFRP for Space Debris Control, Hiroshi Kasuga¹, Tomohiro Tsukihana¹, Hideaki Yamane¹, Katsuhiko Tsuno¹, Yutaka Nagata¹, Noriko Kurose¹, Tatsuya Shinozaki¹, Norihito Saito¹, Takayo Ogawa¹, Satoshi Wada¹; ¹*RAP, Rikagaku Kenkyujo, Japan.* Ultrashort-pulse laser ablation of carbon fiber reinforced plastic (CFRP) achieved a momentum coupling coefficient of 60.3 $\mu\text{Ns/J}$, approximately 1.8 times larger than that obtained with nanosecond laser irradiation at the same fluence. The results indicate a more efficient conversion of laser energy into recoil momentum.

LW1E.4 • 09:15

Design of a 10 kJ Partially Coherent Long-Pulse Nd:Glass Laser System for Inertial Confinement Fusion Experiments, Harry King¹, William Carter¹, Tahir Jamal¹, Ross Powell¹, Trevor Winstone¹, Maks Tobiasiewicz¹, Pedro Oliveira¹; ¹*CLF, Rutherford Appleton Laboratory, UK.* We present a partially coherent long-pulse Nd:Glass laser using disk amplifiers and a 4-pass vacuum spatial filter, delivering up

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to 10 kJ across six beamlines. A fiber front end shapes ASE pulses for broadband ICF operation. Wavefront, gain, spectral shaping, adaptive compensation, focal spot smoothing and broadband SHG are discussed.

LW1E.5 • 09:30

Water-Assisted Photothermally Induced Antimicrobial Activity With a 1.9- μm Eye-Safe Thulium Laser, Berke Ayevi⁴, Melih Uygün^{1,2}, Nazlı Ataç¹, Fusun Can^{1,3}, Alphan Sennaroğlu^{4,5}; ¹*Is Bank Center for Infectious Diseases (KUIISCID), Koc Universitesi, Turkey;* ²*Koc Universitesi Saglik Bilimleri Enstitüsü, Turkey;* ³*School of Medicine, Department of Medical Microbiology, Koc Universitesi, Turkey;* ⁴*Physics and Electrical-Electronics Engineering, Koc Universitesi, Turkey;* ⁵*Surface Science and Technology Center (KUYTAM), Koc Universitesi, Turkey.* We demonstrate water-assisted photothermally induced antimicrobial activity with a 1.9- μm Tm³⁺:LiYF₄ laser. Total eradication of *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Staphylococcus epidermidis* was achieved upon 6 minutes of irradiation at 0.89 W/cm², without requiring photosensitizers.

LW1E.6 • 09:45 Postdeadline Submission

Thermal and non-Thermal Femtosecond Laser Induced Modifications in Lithium Niobate, Paweł Karpinski¹; ¹*Politechnika Wroclawska Wydział Chemiczny, Poland.* We investigate the fine morphology of femtosecond laser modifications in lithium niobate across thermal and non-thermal regimes. This approach enables independent engineering of local ferroelectric domains and the refractive index, respectively.

10:30 -- 12:30

Room: Alfa

JW2A • Joint Plenary Session II

Presider: Lahsen Assoufid; Argonne National Laboratory, USA and Jonathan Evans; US Air Force Institute of Technology, USA

JW2A.1 • (Plenary)

Cryogenic Solid-State Lasers, Tso Yee Fan¹; ¹*MIT Lincoln Laboratory, USA.* Cryogenic cooling provides advantages relative to 300 K of better thermo-optic properties and higher efficiency for transitions with a lower level near the ground state. These advantages set a path to high-average-power, diffraction-limited lasers.

JW2A.2 • (Plenary)

Utility Scale Light - Changing the Light Source Paradigm for Semiconductor Manufacturing, Nicholas Kelez¹; ¹*xLight Inc., USA.* From lithography to metrology and inspection, light has been at the core of semiconductor manufacturing for decades. However, most light sources are typically constrained to some form of elemental emission line and tool-based form factor that limits power and tunability. xLight is building utility scale light sources that sit outside the fab and distribute light to a fleet of tools with substantially more power, tunability, and extensibility.

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14:00 -- 16:00

Room: Zeta 1

AW3A • High-Power Glass and Fiber Systems

Presider: Pavel Loiko; CIMAP-ENSICAEN, France

AW3A.1 • 14:00

The Impact of Pair Induced Quenching on Performance of Ho-Doped Silica Fibers, Jan Pokorný^{2,1}, Michal Kamradek¹, Pavel Peterka¹, Masaki Tokurakawa^{2,3}; ¹*IPE Czech Academy of Sciences, Czechia*; ²*Inst. of Laser Science, Denki Tsushin Daigaku, Japan*; ³*JST Presto, Japan*. We simulate the impact of pair-induced quenching on laser performance of Ho-doped silica fibers. We use the latest spectroscopic data and compare the simulations to experiments. The results indicate a generational improvement in fiber manufacturing.

AW3A.2 • 14:15

5- μ m Emission From Pr³⁺-Doped Sulfide Glass Fiber, Mariel Ledesma Molinero², Ngoc Quynh Hoa Nguyen¹, Alain Braud¹, Patrice Camy¹, Pascal Masselin³, Catherine Boussard-Plédel², Pavel Loiko¹, David Le Coq²; ¹*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, France*; ²*Institut des Sciences Chimiques de Rennes, CNRS UMR 6226, Université de Rennes, France*; ³*Laboratoire de Physico Chimie de l'Atmosphère, Université du Littoral Côte d'Opale, France*. Pr³⁺-doped core-cladding sulfide glass fibers were fabricated from the 90[0.8(GeS₂)–0.2(Ga₂S₃)]–10[X] system (X=CdI₂ core, CsCl cladding). The fibers show broadband 4–5.5 μ m emission. Dedicated sulfur purification reduces propagation losses below 10 dB/m.

AW3A.3 • 14:30

LED-Pumped Nd:Glass Master Oscillator Power Amplifier, Lisa Lallemand^{1,2}, Maxime Nourry-Martin², Catherine Le Blanc², Jean-Philippe Blanchot¹, Nicolas Laleu¹, Paul Garin¹, Frédéric Druon², Patrick Georges², François Balembois²; ¹*EFFILUX, France*; ²*Laboratoire Charles Fabry, France*. We present a Nd:glass MOPA that is indirectly LED pumped via Ce:LuAG luminescent concentrators. The oscillator operates in Q-switched regime and delivers up to 26 mJ 80 ns pulses. The amplifier demonstrates a small signal gain of 1.5.

AW3A.4 • 14:45

100 W-Class Kilohertz-Linewidth Single-Frequency Fiber Laser at 922 nm, Yafei Wang¹, Zhiquan Lin², Mengting Guo¹, Shikai Wang¹, Chunlei Yu¹, Lili Hu¹; ¹*Shanghai Inst of Optics and Fine Mech, China*; ²*College of Optoelectronics Technology, Chengdu Univ. of Information Technology, China*. We report a high-power Nd-doped single frequency fiber laser at 922 nm with a record 103 W output power, employing the homemade large mode area 20/125 μ m Nd-doped silica fiber

AW3A.5 • 15:00 (Invited)

Towards Mid-Infrared Fluoride-Glass Lasers With Positive-Index Waveguides, Ori Henderson-Sapir^{1,2}, Dale Otten^{1,3}, David G. Lancaster^{1,3}, David J. Ottaway^{1,2}, Heike Ebendorff-Heidepriem^{1,3}, Toney Teddy Fernandez^{1,3}; ¹*Adelaide Univ., Australia*; ²*Australian Research Council, Centre of Excellence for Gravitational Wave (OzGrav), Australia*; ³*Australian Research Council COMBS Centre of Excellence, Australia*. We report progress towards mid-infrared doped ZBAN glass waveguide lasers based on

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positive index modifications. Glass and waveguide development, supported by numerical and experimental results, demonstrate initial steps towards compact, mid-IR glass waveguide laser sources.

AW3A.6 • 15:30 (Invited)

Progress on High Power Neodymium Phosphate Laser Glass for Fusion Energy Application, Lili Hu¹, Xin Wang¹, Yannan Ma¹, Jingping Yan¹, Lu Deng¹, Yan Sun¹; ¹*Shanghai Inst of Optics & Fine Mech Lib, China*. Following NIF's net gain, laser fusion energy research is hot. Neodymium phosphate glass suffers thermal degradation under high repetition rates. Machine learning, with database from over 200 glasses, predicts and verifies new compositions, expediting development.

14:00 -- 16:00

Room: Epsilon

EW2B • Compact EUV and X-ray Sources and Applications

Presider: Yoshifumi Ueno; Gigaphoton Inc, Japan

EW2B.1 • 14:00 (Invited)

Withdrawn

EW2B.2 • 14:30 (Invited)

EUV Metrology Source Applications and Requirements, Seth L. Cousin¹; ¹*EUVTech, USA*. Abstract not available.

EW2B.3 • 15:00 (Invited)

High-Brightness and Compact LPP-EUV Light Source from Gigaphoton, Yoshifumi Ueno¹; ¹*Gigaphoton Inc, Japan*. Abstract not available.

14:00 -- 16:00

Room: Zeta 2

HW3B • High-Power Laser Front ends: Seeding, OPCPA & Broadband Pulse Synthesis

Presider: Jaroslav Nejd, ELI Beamlines Center, Institute of Physics AS CR, Czechia

HW3B.1 • 14:00 (Upgraded to Invited)

Generation of Tunable Sub-2 fs Resonant Dispersive Wave Pulses from an Ytterbium-Based Laser System, Deepjyoti Satpathy¹, Teodora F. Grigороva¹, Connor J. Clarke¹, Nikoleta Kotsina¹, Christian Brahms¹, John C. Travers¹; ¹*Heriot Watt Univ., UK*. We present a three-stage setup generating ultrafast, wavelength-tunable resonant dispersive wave pulses in the deep ultraviolet from an ytterbium-based laser. We characterize the pulses using in-vacuum transient-grating frequency-resolved optical gating, finding sub-2 femtosecond pulse durations.

HW3B.2 • 14:30

Multi-Millijoule-Level CEP-Stable 2150 nm OPCPA at 1 kHz for Bright and Coherent Soft X-ray Generation, Ugaitz Elu³, Martin Kretschmar³, Marcel Krenz³, Jens Biegert^{1,2}, Martin Wolf³; ¹*Institut de Ciencies Fotoniques, Spain*; ²*Institucio Catalana de Recerca i Estudis Avancats, Spain*; ³*Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany*. We present a self-CEP-stable multi-millijoule 2150 nm OPCPA

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driven by Yb-based thin disk laser that is delivering 7.1 mJ at 1 kHz. This table-top system provides a step forward in attosecond physics and core-level spectroscopy.

HW3B.3 • 14:45

Millijoule Level Seeding of a Petawatt Laser by a Dual Pump OPCPA, Roland Nagymihály¹, Raman Maksimenka², Yoann Pertot², Christina Alexandridi³, David Armier³, Viktor Pajer¹, Levente Lehotai¹, Nóra Csernus-Lukács¹, János Bohus¹, Olivier Roy¹, Franck Falcoz³, Emilien Gontier³, Adam Borzsonyi¹, Mikhail Kalashnikov¹; ¹ELI-ALPS, Hungary; ²Fastlite by Amplitude, France; ³Amplitude, France. We present a mJ level 100 Hz OPCPA seeder with exceptional energy and spectral stability, integrated to a Ti:Sa petawatt laser. The new seeder with a redesigned frontend increased the ASE contrast from 10^{11} close to 10^{14} at the end of the laser, while 19.7 fs temporal duration is achieved with 10 J energy.

HW3B.4 • 15:00

Operational Experience and Performance Evolution of the L3 HAPLS, Jakub Novák¹, Petr Szotkowski¹, Emily Frances S. Link², Leily Kiani², Jan Černý¹, Jitka Sedmidubská¹, Alexandros Sarafis¹, Apostolos Banoutsos¹, Lucia Jarboe¹, Martin Cuhra¹, Bohdana Lopushanska¹, Jan Moučka¹, Jan Šabata¹, Thomas Spinka², Bedrich Rus¹; ¹ELI Beamlines, Czechia; ²Lawrence Livermore National Laboratory, USA. The L3 HAPLS laser at ELI ERIC is a high-repetition-rate petawatt-class user facility delivering up to 20~J, 29~fs pulses (690~TW) with excellent beam quality, contrast, and stability. Continuous upgrades have increased performance and reliability, enabling more than 142,000 user femtosecond shots and delivery of 1.14~MJ to experiments in 2025.

HW3B.5 • 15:15

High-Quality Ultra-Broadband Seed Driven by Raman Shifted Yb Laser for Multipetawatt OPCAs, Chengyong Feng¹, Jake Bromage¹; ¹Univ. of Rochester, USA. By Raman shifting the Yb laser to $\sim 1.1 \mu\text{m}$ in a multipass cell, wavelength-redshifted pulses drive white-light continuum with both high stability and spatio-spectral homogeneity near $1 \mu\text{m}$ suited for seeding DKDP-based multipetawatt OPCAs.

HW3B.6 • 15:30

A Universal, Broadband, High Contrast, and CEP Stable Seeder for High-Power Amplifiers, Raman Maksimenka¹, Simone Bux¹, Christina Alexandridi², Jingfeng Chen², David Armier², Emilien Gontier², Alyona Dotsenko², Nicolas Thire¹, Thomas Pinoteau¹, Franck Falcoz², Yoann Pertot¹; ¹Fastlite by Amplitude, France; ²Amplitude Laser Group, France. We present a universal seeder based on filamentation and parametric amplification from an Ytterbium laser, with versatile central wavelength, bandwidth, CEP, and contrast properties for seeding high power amplifiers based on various technologies

HW3B.7 • 15:45

Efficient OPCPA Frontend for L1 Allegra Laser System, Vojtech Grossmann^{1,2}, Pawan Suthar¹, Petr Strkula¹, Roman Antipenkov¹, Bedrich Rus¹; ¹ELI Beamlines, Czechia; ²Ceske Vysoke Ucení Technické V Praze Fakulta Jaderna A Fyzikalne Inzenyrska, Czechia. We report on an upgraded frontend for L1 Allegra laser at ELI Beamlines, delivering 6 mJ pulses compressible to 12 fs, with a spectrum centered at 830 nm. Cascaded second harmonic generation with 80% conversion efficiency was used for pulse shaping, and idler elimination scheme was used to reach 30% pump-to-signal efficiency.

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14:00 -- 16:00

Room: Beta 1

LW3C • Laser Processing for Next Generation Electronic Devices

Presider: Bogusz Stepak; Fluence Technology sp. z o.o., Poland

LW3C.1 • 14:00 (Invited)

Ultrafast Laser Solutions: Challenges and Trade-Offs in Microelectronic Applications, Daniel Schwab¹;

¹*GFH GmbH, Germany*. Ultrafast laser technology has become a key enabler for advanced microelectronic manufacturing, supporting applications such as wafer dicing, thin-film patterning, via drilling, selective material removal, and precision structuring of increasingly complex device architectures. As component dimensions continue to shrink while performance and reliability requirements increase, manufacturing processes must achieve exceptional precision with minimal thermal impact and high throughput. This presentation provides an overview of the key challenges in drilling applications and discusses how ultrafast laser processing addresses these demands. The talk further examines the critical machinery components that determine overall system performance, including ultrafast laser sources, beam delivery and shaping optics, high-speed scanning systems, precision motion platforms, process monitoring, and automation. Their interaction plays a decisive role in achieving robust and scalable manufacturing solutions. Finally, machining solutions are introduced to illustrate how well-engineered ultrafast laser systems enable reliable, high-precision processing across a broad range of microelectronic applications. Attention is given to the inherent trade-offs between machining quality, productivity, process stability, flexibility, and cost of ownership. Strategies for balancing these competing requirements through optimized machine design and process integration are presented.

LW3C.2 • 14:20 (Invited)

Advanced Laser Processing Solutions to Enable Next-Generation Packaging: GHz-Burst-Mode

Picosecond DUV Microvia Drilling in ABF, Rondepierre Alexandre¹; ¹*Mitsubishi Electric Adv Tech R&D Center, Japan*. We developed laser microvia drilling process (down to 5 micrometers) in ABF™ using the GHz burst-mode with picosecond DUV lasers achieving improved throughput and hole quality, paving the way for next generation packaging.

LW3C.3 • 14:40 (Invited)

From Full-Field to Single-Spot – Laser-Based Processing for Microelectronics, Maurice Clair¹; ¹*3D-*

Micromac AG, Germany. Laser-based manufacturing processes provide precise and thermally efficient alternatives to conventional methods in modern microelectronics. They enable targeted local ablation, annealing, and transfer for failure analysis, power semiconductors, sensors, and microLEDs with high precision and productivity.

LW3C.4 • 15:00 (Invited)

Next Steps in Laser Processing of Glass to Address AI Needs, Inga Janulyte¹, Modestas Vainoris¹;

¹*Workshop of Photonics, Lithuania*. This presentation delivers a technical overview of ultra-fast laser processing capabilities, showcasing the precise fabrication of three essential glass components for AI hardware: fiber alignment arrays for PIC edge coupling, Through-Glass Via (TGV), and 3D laser-inscribed waveguides.

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LW3C.5 • 15:20 (Invited)

Withdrawn

16:00 -- 17:30

Room: Zeta Foyer

JW4A • Joint Poster Session II

JW4A.1

High-Brightness 1.5 μm Pulsed Source Based on Injection-Seeded PPLN-OPG / KTA-OPA for Terahertz-Wave Parametric Wavelength Conversion, Sota Katagiri^{2,1}, Yugo Iwata^{2,1}, Shin Ichiro Hayashi^{1,2}, Seigo Ohno³, Katsuhiko Miyamoto⁷, Yoshiharu Urata⁶, Kouji Nawata⁴, Jun-Ichi Shikata⁵, Takayuki Suzuki², Maki Tachikawa², Norihiko Sekine¹; ¹*Kokuritsu Kenkyu Kaihatsu Hojin Joho Tsushin Kenkyu Kiko, Japan*; ²*Meiji Daigaku Rikogakubu Daigakuin Rikogaku Kenkyuka, Japan*; ³*Tohoku Daigaku Daigakuin Rigaku Kenkyuka Rigakubu, Japan*; ⁴*Tohoku Kogyo Daigaku, Japan*; ⁵*Nihon Daigaku, Japan*; ⁶*PHLUXi Inc., Japan*; ⁷*Chiba Daigaku, Japan*. We demonstrate a high-brightness 1.5 μm pulsed source based on injection-seeded PPLN-OPG and KTA-OPA, which serves as a frequency-stabilized pumping beam for terahertz-wave parametric wavelength conversion. These techniques are highly promising for extending applied research in the terahertz region.

JW4A.2

Compact 206 nm Generation of a 1030 nm Fundamental via a Common Optical Path, Tim Klee¹, Joseph J. Broughton¹, John W. Tisch¹; ¹*Imperial College London, UK*. We present a common-path scheme for ultrafast fifth harmonic generation at 206 nm using cascaded nonlinear conversion in BBO crystals. Simulations predict up to 1.2% conversion efficiency and 141 fs pulses surpassing previously published results.

JW4A.3

Tailoring Figure-9 Er/Yb co-Doped Fiber Laser for Generation of Noise-Like Pulses, Akshay Raj R¹, Dhanush D. B C¹, Masood A. Kadiri¹, Shyamal Mondal¹; ¹*Defence Inst. of Advanced Technology, India*. All-PM Er/Yb co-doped fiber laser generating Noise like Pulses was realized in Figure-of-9 configuration. A non-reciprocal phase shifter was included for the self-starting of modelocking, generating the highest maximum average output power of ~ 243 mW.

JW4A.4

Hybrid Yb:YAG / Yb:LuAG Chirped Pulse Amplifier Reaching 70 dB Gain, Auguste Grigaravičienė¹, Paulius Mackonis¹, Aleksej Rodin¹; ¹*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania*. A hybrid two-stage Yb:YAG/Yb:LuAG chirped-pulse amplifier achieved ~ 70 dB small-signal gain from ~ 1 nJ all-fiber seed. The Yb:YAG quad-pass preamplifier delivered 0.5 mJ pulses at 1030 nm, while the double-pass Yb:LuAG booster provided ~ 1.3 ps, 10 mJ pulses with $M^2=1.07$ after compression. This cost-effective approach eliminates fiber preamplifiers.

JW4A.5

PPLN Waveguide Wavelength Converter for Subterahertz Wave Generation at 300 GHz, Tadashi Kishimoto¹, Shin ichiro Hayashi¹, Norihiko Sekine¹; ¹*Kokuritsu Kenkyu Kaihatsu Hojin Joho Tsushin Kenkyu Kiko, Japan*. We developed a PPLN waveguide device to generate 300 GHz wave converted from the

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telecommunication band. We observed the subterahertz wave with the PPLN and measured the difference frequency generation spectrum at room temperature.

JW4A.6

76 MHz Repetition Rate, 72 W Average Power Femtosecond PCMA-FCPA Yb-Fiber Amplifier, Jokubas Pimpe¹, Vygasdas Jarutis¹, Audrius Dubietis¹, Julius Vengelis¹; ¹*Vilniaus Universitetas, Lithuania*. We demonstrate a stable, 76 MHz Yb-fiber femtosecond amplifiers delivering transform-limited, nearly 1 μ J energy pulses with excellent beam quality. Numerical simulations identify optimal pre-chirp and show that improper input chirp selection degrades pulse compressibility.

JW4A.7

An Update on UPLIFT: an Enhanced Efficiency Laser Driver for Inertial Fusion Energy, Ayman Qureshi¹, Luke McHugh^{1,2}, Jodie Smith¹, Rajan Mistry^{1,3}, Agnieszka Wojtusiak^{1,3}, Robbie Scott¹, Toby Graham^{1,4}, Millie Bentley^{1,5}, Joseph Hampton¹, Richard Chapman¹; ¹*Science & Technology Facilities Council Central Laser Facility, UK*; ²*Inst. of Photonics, Univ. of Strathclyde, UK*; ³*School of Engineering and Physical Sciences, Heriot-Watt Univ., UK*; ⁴*The Univ. of Sheffield, UK*; ⁵*Newcastle Univ., UK*. The UPLIFT project seeks to progress inertial fusion energy development across the UK. We report on the design of a laser driver concept utilizing a novel multi-beam, multi-pass architecture aiming to demonstrate enhanced extraction efficiency.

JW4A.8

Passively Q-Switched Tm³⁺:YAP Laser With Ho³⁺:YLF Saturable Absorber, Johannes Eckhardt^{1,2}, Marius Rupp¹, Marc Eichhorn^{1,2}, Christelle Kieleck¹; ¹*Fraunhofer-Institut für Optronik Systemtechnik und Bildauswertung IOSB, Germany*; ²*Inst. of Control Systems, Karlsruher Institut für Technologie, Germany*. We report a passively Q-switched Tm³⁺:YAP laser using Ho³⁺:YLF as a saturable absorber. An intracavity VBG at 1938.7 nm locked emission to the absorber's high-absorption region. Pulsed pumping at 20 Hz yielded 26 ns pulses with 0.73 mJ and near-diffraction-limited beam quality, though double-pulse behavior was observed."

JW4A.9

Analytical Solutions of Stimulated Brillouin Scattering for Numerical Optimization Beyond Conventional B-Integral Estimation, Yuya Imaeda^{1,2}, Tsubasa Endo¹, Kotaro Nakagawa¹, Yohei Kobayashi¹; ¹*The Inst. for Solid State Physics, The Univ. of Tokyo, Japan*; ²*Central Research Laboratory, Hamamatsu Photonics K.K., Japan*. High-power nanosecond fiber lasers enter strongly nonlinear regimes, where the B-integral alone cannot define viable design windows. We derive analytical SBS solutions with phase modulations that reduce numerical-optimization cost for MW-level laser design.

JW4A.10

Efficient 1.573- μ m Generation From a Monolithic-Cavity KTP Optical Parametric Oscillator Pumped by an LED-Pumped Electro-Optically Q-Switched Laser, YouHan Wen¹, Cang-He Kuo¹, Xuan-Long Ho¹, Chun-Yu Cho², Yen Chieh Huang³; ¹*LEDlas corp., Taiwan*; ²*Department of Electro-Optical Engineering, National United Univ., Taiwan*; ³*Inst. of Photonics Technologies, National Tsing Hua Univ., Taiwan*. We demonstrate 1.573- μ m generation from a coated-cavity KTP optical parametric oscillator pumped by an LED-pumped electro-optically Q-switched 1064-nm laser, delivering 14.06 mJ pulse energy and 33.26% optical-to-optical conversion efficiency.

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JW4A.11

Active, Q-Switched Mode-Locking of a Thulium-Doped Fiber Laser at 1.7 μm , Jeehwan Kim¹, Ju Han Lee¹, Junha Jung¹; ¹*Univ. of Seoul, Korea (the Republic of)*. We demonstrate a 1.7 μm all-fiber Q-switched mode-locked thulium-doped fiber laser using active cavity modulation. Stable QML operation at 1726 nm produced 1.07- μs envelopes containing 248-ps mode-locked pulses with a repetition rate of 118 kHz.

JW4A.12

76 MHz Repetition Rate and High Average Power ANDi PCF Supercontinuum Seeded Femtosecond OPA Tunable in the VIS and NIR, Simona Armalyte², Jokubas Pimpe^{2,1}, Vaida Marciulionyte², Migle Kuliesaitė², Audrius Dubietis², Julius Vengelis²; ¹*Light Conversion UAB, Lithuania*; ²*Vilniaus Universitetas Fizikos fakultetas, Lithuania*. We present a widely tunable femtosecond high repetition rate (>50 MHz) and high average power (>10 W) optical parametric amplifier seeded with supercontinuum generated in an all-normal dispersion photonic crystal fiber.

JW4A.13

Tunable Raman Laser Based on Tm:YLF/KGW Crystals for the SWIR Spectral Range, Aviad Noah¹, Rotem Nahear¹, Neria Suliman¹, Salman Noach¹; ¹*Jerusalem College of Technology, Israel*. A tunable KGW/Tm:YLF Raman laser is presented for the first time. Wide 2190–2310nm tunability is achieved by leveraging the dual polarization-dependent Stokes shifts of KGW. Energy range achieved is 0.7–1.2mJ for high-power SWIR applications.

JW4A.14

Experimental Dual Wavelength Laser Based on Tm:YLF and KGW Raman Crystal, Aviad Noah¹, Rotem Nahear¹, Neria Suliman¹, Salman Noach¹; ¹*Jerusalem College of Technology, Israel*. A simultaneous dual-wavelength KGW/Tm:YLF Raman laser is demonstrated for the first time in the 2 μm region. By balancing the polarization-dependent Raman gains, stable simultaneous outputs at 2208 nm and 2274.5 nm obtained.

JW4A.15

Pulse Energy and Peak Power Scaling in a Q-Switched Yb:YAG/Cr:YAG Compact Laser, Krystof Kadlec¹, Jan Sulc¹, Helena Jelínková¹, Karel Nejezchleb², Radim Kudělka²; ¹*Ceske Vysoke Ucení Technické V Praze Fakulta Jaderna A Fyzikálne Inženýrska, Czechia*; ²*CRYTUR Spol Sro, Czechia*. Pulse energy and peak power in a Q-switched Yb:YAG/Cr:YAG compact laser were enhanced by varying pump beam dimensions. Pulse energy of 0.45 mJ and peak power of 240 kW were achieved in 1.9 ns pulses.

JW4A.16

A Dy:ZBLAN Fiber Laser Tunable From 568.9 to 586.3 nm, Junha Jung¹, Jee Hwan Kim¹, Ju Han Lee¹; ¹*Univ. of Seoul, Korea (the Republic of)*. We demonstrate a wavelength-tunable Dy:Zblan fiber laser with a continuous tuning range from 568.9 to 586.3 nm. A proper thermal management allowed for a maximum output power of 798 mW with a 19% slope efficiency.

JW4A.17 • 16:00

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Advantages of Structuring Fibre Core in Tm-Doped Silica Fibre Lasers, Richard Svejkar^{1,2}, Bára Švejkarová^{1,2}, Martin Grábner¹; ¹*Inst. of Photonics and Electronics of the Czech Academy of Sciences, Czechia*; ²*Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Czechia*.

Structured Tm-doped fibres offer a promising route to high-power 2 μm lasers by preserving efficient cross-relaxation while reducing cladding absorption and thermal loading. Simulations indicate their potential for improved efficiency and sustained practical high-power operation.

JW4A.18

Towards a Ho:YAG Thin-Disk Regenerative Amplifier, Yuya Koshiba¹, Great Chayran¹, Jaroslav Huynh¹, Francesco Zielonka¹, Jirí Muzík¹, Kohei Hashimoto¹, Hanjin Jo¹, Antonín Fajstavr², Sabina Kudělková², Martin Smrz¹, Tomas Mocek¹; ¹*Hilase Centre, Czechia*; ²*CRYTUR Spol Sro, Czechia*. We report preliminary results on a Ho:YAG thin-disk regenerative amplifier, employing an in-house-developed 60-pass pumping head, in-band pumped by a high-power thulium-doped fiber laser, and seeded by a holmium-doped fiber laser (HoFL) system.

JW4A.19

9.46 W, 546 fs Bulk Yb:Y₂O₃ Dual-Ceramic Regenerative Amplifier, Bowen Wu¹, Geyang Wang¹, Wenlong Tian¹, Yang Yu¹, Zhiyi Wei², Jiangfeng Zhu¹; ¹*Xidian Univ., China*; ²*Chinese Academy of Sciences, China*. We presented a bulk Yb:Y₂O₃ dual-ceramic regenerative amplifier that is capable of delivering an output power of 9.46 W and a pulse duration of 546 fs at 10 kHz.

JW4A.20

Continuously Tunable Visible-Wavelength Sub nanosecond Micro laser-Pumped Optical Parametric Amplifier for Raman Spectroscopy, Jonas Banys¹, Ieva Baltrukonyte¹, Marius Navickas¹, Julius Vengelis¹; ¹*Laser Research Center, Vilniaus Universitetas, Lithuania*. We demonstrate a Q-switched microlaser-pumped subnanosecond OPA continuously tunable from 419 to 690 nm. The system employs a 532 nm-pumped multigrating MgO:PPLN OPG as a seed source for a 355 nm-pumped LBO OPA, generating visible pulses with 0.2–0.9 nm spectral bandwidths, μJ -level pulse energies, and conversion efficiencies up to 34%.

JW4A.21

Temporal Shaping of Time-Asymmetric Pulses Using a Resonant Saturable Absorber Mirror for Coherent Raman Spectroscopy, Hibiki Tsunekawa^{1,2}, Tsuneto Kanai¹, Atsunori Sakurai^{1,2}, Toshiaki Sugimoto^{1,2}; ¹*Materials Molecular Science, Inst. for Molecular Science, Japan*; ²*Graduate Inst. for Advanced Studies, Japan*. We demonstrate temporal profile control of time-asymmetric pulses using a resonant saturable absorber mirror. Enhanced pulse asymmetry improves temporal contrast and suppresses pre-pulses, offering a promising probe-pulse shaping technique for coherent Raman spectroscopy.

JW4A.22

DFC Microchip Laser Pumped Ce³⁺:LiCAF Tunable UV Laser, Florent Cassouret¹, Alban Bayard^{2,1}, Takunori Taira^{1,3}; ¹*Laser Science and Innovation group, Okazaki branch, Kaku Yugo Kagaku Kenkyujo, Japan*; ²*Institut d'Optique Graduate School, France*; ³*Laser-Driven Electron-Acceleration Technology group, Riken SPring-8 center, Japan*. We report a compact pump source for a Ce³⁺: LiCAF ultraviolet laser: a gain-aperture microchip system frequency-quadrupled from 1064 to 266 nm, delivering 1.17 mJ,

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605 ps pulses at 100 Hz toward 297 nm operation.

JW4A.23

Modeling High-Power Multimode Tm:YLF Slab Lasers, Ross Tully¹, Duncan P. Hand¹, Ian J. Thomson², M J Daniel Esser¹; ¹*Heriot-Watt Univ., UK*; ²*Leonardo UK, UK*. A time-resolved 3D model was developed to analyze the performance of high-power Tm:YLF slab lasers, combining beam propagation with population dynamics and thermal lensing through the thermo-optic effect and laser crystal end-bulging.

JW4A.24

Silica Core Fiber Bragg Grating Locked 460 nm GaN Laser Diode With Wavelength Offset Between Gain and Grating Peaks, Antoine Congar¹, Florent Starecki², Sylvain Girard², Mathieu Laroche², Julien Rouvillain¹, Thierry Georges¹; ¹*Oxxius, France*; ²*Centre de Recherche sur les Ions les Matériaux et la Photonique, France*. The first frequency locking of a 460 nm GaN laser diode using a silica core Fiber Bragg Grating (FBG) is demonstrated, where a wavelength offset of the FBG provides enhanced spectral stability.

JW4A.25

Air-Cooled Thin-Disk Laser Head for Pumping Thin-Disk Gain Media, Petr Bjorgen¹, Antonín Fajstavr¹, Sabina Malecová¹, Jiri Andrés¹, Matej Zacek², Mykola Brynza², Michal Chyla², Pavel Crha², Martin Smrz²; ¹*CRYTUR, spol. s r. o., Czechia*; ²*HiLase Centre, Inst. of physics ASCR, Czechia*. An air-cooled thin-disk laser head was tested with a pump power exceeding 90 W while maintaining a stable disk temperature. The laser achieved average output powers 35 W in single-mode operation and 55 W in multimode operation.

JW4A.26

The Impact of Thermal Effects on Supercontinuum Generation in YAG Crystal at MHz Pulse Repetition Rates, Vaida Marciulionyte¹, Vytautas Jukna¹, Matas Sutovas¹, Gintaras Tamosauskas¹, Audrius Dubietis¹; ¹*Vilniaus Universitetas, Lithuania*. We study the impact of beam focusing geometry-related heat accumulation on supercontinuum generation in YAG crystal pumped with 210 fs, 1030 nm pulses by varying pulse repetition rate from 200 kHz to 2 MHz.

JW4A.27

Thermal Blooming of Thulium Fiber Pump Sources for Ho³⁺-Doped Laser Systems, Moritz Badtke¹, Marius Rupp¹, Marc Eichhorn^{1,2}, Christelle Kieleck¹; ¹*Fraunhofer-Institut für Optronik Systemtechnik und Bildauswertung IOSB, Germany*; ²*Inst. of Control Systems, Karlsruher Institut für Technologie, Germany*. We characterize thermal blooming of a thulium-fiber pump laser in humid air using a spectral overlap integral as predictor, and quantify its impact on beam quality, pointing stability, and efficiency of a Ho:YAG laser.

JW4A.28

Withdrawn

JW4A.29

High-Energy Single-Frequency TEM₀₀ kHz Nd:YAG Laser With Tunable Picosecond Pulse Duration and Low-Jitter Synchronization, Kaloyan Georgiev^{1,2}, Anton Trifonov³, Dimitar Dimitrov¹, Algis Stalnionis⁴, Ryčard Lebed⁴, Lyubomir Stoychev⁵, Ivan C. Buchvarov^{1,2}; ¹*Sofia Univ. St. Kliment Ohridski, Bulgaria*;

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²R&D, ²John Atanasoff Center for Bio and Nano Photonics, Bulgaria; ³IBPhotonics Ltd., Bulgaria; ⁴QS Lasers UAB, Lithuania; ⁵Inst. of Solid State Physics, Bulgarian Academy of Sciences, Bulgaria. We demonstrate a self-seeded single-frequency Nd:YAG MOPA delivering 32-mJ, TEM₀₀, linearly polarized pulses with tunable 300–500-ps duration at 0.5–1 kHz, sub-54-ps trigger jitter, and ~50% conversion to 16 mJ at 532 nm.

JW4A.30

High-Harmonic Generation in Solids Directly Driven by MHz High-Power Fibre Laser Pulses, Leah Donnelly¹, Tim Klee¹, Joseph J. Broughton¹, Clement Ferchaud¹, John W. Tisch¹, Mary Matthews¹;

¹Imperial College London, UK. We demonstrate high-harmonic generation in solids driven directly by 420 fs MHz fibre-laser pulses, establishing VUV emission in a previously unexplored regime. We identify MgO as optimal, generating 10⁹ photons/s at 50 W.

JW4A.31

Spatially Coherent Vacuum Ultraviolet From Solid High-Harmonic Generation in MgO, Joseph J. Broughton¹, Oliver Phillips¹, Tim Klee¹, Mary Matthews¹, John W. Tisch¹; ¹Imperial College London, UK. We report novel Young's double-slit measurements showing MgO solid high harmonics retain strong transverse spatial coherence in the vacuum ultraviolet (8.0–20.7 eV), establishing solid high-harmonic generation as a compact coherent short wavelength source.

JW4A.32

Iron (II) Phthalocyanine Thin Film Probed by Time-Resolved Extreme Ultraviolet Reflection Spectroscopy, Chinmoy Biswas¹, Filus Zoltán¹, Grósz Tímea¹, Major Balázs¹; ¹ELI-ALPS, Hungary. Extreme Ultraviolet (XUV) transient reflectance spectroscopy is performed in the energy range of 40 – 70 eV on iron (II) phthalocyanine (Fe-PC) thin films, elucidating the effect of the iron atom M_{2,3}-edge.

JW4A.33

Broadband High-Contrast 950–1050 nm Seed Generation for PW-Class Lasers via Chirped PPLN Difference Frequency Generation, Jack D. Morse¹, Nick Stuart², Mary Matthews¹, Roland Smith¹; ¹Imperial College London, UK; ²Science and Technology Facilities Council, UK. High-contrast, broadband sources are essential for next-generation PW-class lasers to maximise on-target intensity. We present nonlinear difference frequency generation in chirped PPLN as a large-bandwidth (950–1050 nm) seed for PW-class facilities.

JW4A.34

Bidirectional Parametric Wavelength Conversion for Terahertz-Wave Spectroscopic Measurement, Yugo Iwata^{4,5}, Ibuki Yasuda^{4,5}, Shin Ichiro Hayashi^{5,4}, Seigo Ohno¹, Katsuhiko Miyamoto⁷, Yoshiharu Urata⁶, Kouji Nawata³, Jun-Ichi Shikata², Takayuki Suzuki⁴, Maki Tachikawa⁴, Norihiko Sekine⁵; ¹Tohoku Daigaku, Japan; ²Nihon Daigaku, Japan; ³Tohoku Kogyo Daigaku, Japan; ⁴Meiji Daigaku Rikogakubu Daigakuin Rikogaku Kenkyuka, Japan; ⁵Kokuritsu Kenkyu Kaihatsu Hojin Joho Tsushin Kenkyu Kiko, Japan; ⁶PHLUXi Inc., Japan; ⁷Chiba Daigaku, Japan. We demonstrate spectroscopic measurement in the

terahertz region via bidirectional parametric wavelength conversion between infrared and terahertz waves in a nonlinear MgO-doped LiNbO₃ crystal. By employing optical heterodyne detection, the energy, frequency, and phase of the terahertz wave are simultaneously extracted and analyzed.

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JW4A.35

Sensitive Phase Correlation Measurements in a Nonlinear Medium With Femtosecond Dual-Beam Excitation, Sachin Singh¹, Indra P. Singh¹, Debabrata Goswami^{1,2}; ¹*Chemistry, Indian Inst. of Technology Kanpur, India*; ²*Center for Bits and Atoms, Massachusetts Inst. of Technology, USA*. Sensitive phase correlations between reflected and transmitted femtosecond autocorrelation signals reveal position-dependent phase shifts during focusing in a highly nonlinear medium, demonstrating that nonlinear propagation and intensity-dependent refractive-index changes govern ultrafast phase evolution.

JW4A.36

Speckle-Learned Complex Field Reconstruction of Orbital Angular Momentum Fields, Chayanika Sharma¹, Vijay Kumar¹; ¹*NIT Warangal, India*. Speckle-learned reconstruction of complex orbital angular momentum fields is demonstrated using GAN-based transfer learning. The method recovers amplitude and phase profiles from speckle intensity patterns, enabling compact, non-interferometric characterization of OAM fields.

JW4A.37

Closed-Form Modulation-Order Scaling Law for XPM-Based Optical Aggregation, Nidhi Singh¹; ¹*Department of Electronics and Communication Engineering, School of Engineering, Chandigarh Univ., India*. A closed-form modulation-order scaling law for XPM-based optical aggregation is derived and validated. The resulting modulation-order ceiling scales with OSNR, aggregation order, and effective interaction length, providing a compact design rule for all-optical coherent modulation synthesis.

JW4A.38

An Unsupervised Framework for OAM Mode Recognition From Obstructed Speckle Patterns, Ravi Kiran Jadi¹, Vijay Kumar¹; ¹*NIT Warangal, India*. An unsupervised learning framework is proposed for decoding obstructed OAM speckle fields. Using AlexNet feature extraction, t-SNE dimensionality reduction, and K-means clustering, OAM modes are recognised with 99.31% accuracy using only one reference image per mode.

JW4A.39

A High-Power Long-Wave Infrared Laser Platform for Inertial Fusion-Relevant Plasma Studies, Igor Pogorelsky¹, Mikhail N. Polyanskiy¹, William Li¹, Anusorn Lueangaramwong¹; ¹*Brookhaven National Laboratory, USA*. Through favorable wavelength scaling, high-power LWIR lasers can reproduce inertial fusion-relevant plasma conditions with improved diagnostic accessibility. Brookhaven's Accelerator Test Facility enables such studies using a multi-terawatt LWIR laser combined with synchronized optical and accelerator-based diagnostics.

JW4A.40

Quadrature-Signals Processing Software for Optical Path Difference Stabilization in Coherent Beam Combination, Ana Dinca^{1,2}, Cecilia Oanca^{1,3}, Răzvan Ungureanu¹, Gabriel Cojocaru^{1,4}, Mihai Serbănescu¹, Alexandru Mihalcea^{1,5}, Răzvan Dabu¹, Săndel Simion¹; ¹*Center for Advanced Laser Technologies, National Inst. for Laser, Plasma and Radiation Physics, Romania*; ²*Faculty of Electronics, Telecommunications and Information Technology, Universitatea Politehnica din Bucuresti, Romania*; ³*Doctoral School of Physics, Universitatea din Bucuresti Facultatea de Fizica, Romania*; ⁴*Extreme-Light Infrastructure – Nuclear Physics, National Inst. for Nuclear Physics and Engineering – Horia Hulubei, Romania*; ⁵*Doctoral School of Electronics, Telecommunications and Information Technology, Universitatea Politehnica din Bucuresti,*

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Romania. A dedicated software was developed to process quadrature signals and reconstruct optical path variations, enabling real-time phase stabilization of two femtosecond pulses for efficient coherent beam combination with sub-100 nm RMS fluctuations.

JW4A.41

Understanding the Statistics of Backscattering Signal and Transmitted Laser Beam in Turbulent Media, Hannah Ogden¹, Paul Johns¹, Vasanthi Sivaprakasam¹, Svetlana Avramov-Zamurovic²; ¹*US Naval Research Laboratory, USA*; ²*USA Naval Academy, USA*. We aim to understand the statistics of the back scattering signal from a turbulent media and the transmitted laser light. To this end, we have an experimental setup to generate controlled ranges of turbulence and explore the signal relationships as a function of the field of view. Preliminary results will be presented.

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Thursday, 15 October

08:30 -- 10:30

Room: Zeta 1

ATh1A • Materials for Q-switched and Mode-Locked Lasers and Frequency Comb Generation

Presider: Takunori Taira; Institute for Molecular Science, Japan

ATh1A.1 • 08:30

Sub-40-fs SESAM Mode-Locked Yb:SrF₂ Laser, Huang-Jun Zeng⁵, Zhang-Lang Lin⁵, Ge Zhang⁵, Shuaihua Wang⁵, Shaofan Wu⁵, Pavel Loiko², Alain Braud², Patrice Camy², Zhen Zhang³, Liangbi Su³, Xavier Mateos⁴, Valentin Petrov¹, Weidong Chen^{5,1}; ¹A3, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany; ²Universite de Caen Normandie, France; ³Shanghai Inst. of Ceramics Chinese Academy of Sciences, China; ⁴Universitat Rovira i Virgili, Spain; ⁵Chinese Academy of Sciences Fujian Inst. of Research on the Structure of Matter, China. We report on a SESAM mode-locked Yb:SrF₂ laser delivering 33 fs soliton pulses at 1058.1 nm with an average output power of 16 mW and a pulse repetition rate of ~71.9 MHz.

ATh1A.2 • 08:45

Characterization and Mode-Locked Pulse Generation of a Ho:YScO₃ Laser at 2.1 μm, Ayu Konno¹, Jan Pokorny^{1,2}, Christian Kraenkel³, Masaki Tokurakawa^{1,4}; ¹Inst. for Laser Science, Univ. of Electro-communications, Japan; ²Ustav Fotoniky A Elektroniky Akademie Ved Ceske Republiky, Czechia; ³Leibniz-Institut für Kristallzüchtung im Forschungsverbund Berlin eV, Germany; ⁴JST PRESTO, Japan. We characterized a Ho:YScO₃ crystal grown by the Czochralski method by evaluating its CW laser performance with various output-coupler transmittance and tunability, and demonstrated, to the best of our knowledge, the first mode-locked laser operation.

ATh1A.3 • 09:00

Gain-Narrowing Compensation in a High-Power Yb:CaF₂ Laser Amplifier With Tunable Spectral Filters, Martin Beyer^{1,2}, Clemens Anschütz¹, Joachim Hein¹, Malte Kaluza^{1,2}; ¹Friedrich Schiller Univ., Germany; ²Helmholtz-Institut Jena, Germany. We demonstrate gain-narrowing compensation in a Yb:CaF₂ regenerative amplifier. Combining intra-cavity tunable spectral filters and seed pre-compensation using a Dazzler, the system delivers 2mJ pulses with 26nm bandwidth, compressed to 95fs.

ATh1A.4 • 09:15

Sub-50-fs, in-Band Pumped Tm:(Lu,Sc)₂O₃ Ceramic Laser, Zhang-Lang Lin^{1,2}, Weidong Chen^{1,2}, Robert T. Murray³, Wei Jing⁴, Xavier Mateos⁵, Ge Zhang², Uwe Griebner¹, Pavel Loiko⁶, Valentin Petrov¹; ¹Max Born Inst., Germany; ²FJIRSM, Germany; ³Imperial College, UK; ⁴Inst. of Chemical Materials, China; ⁵Universitat Rovira i Virgili, Spain; ⁶CIMAP-ENSICAEN, France. A SESAM and Kerr-lens mode-locked, in-band pumped Tm:(Lu,Sc)₂O₃ ceramic laser delivers soliton pulses as short as 43 fs at 2093 nm with an average output power of 51 mW at ~73 MHz.

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ATh1A.5 • 09:30

Sub-30-fs Kerr-Lens Mode-Locked Yb:SALGO Laser, Huang-Jun Zeng¹, Zhang-Lang Lin¹, Feifei Yuan¹, Ge Zhang¹, Shuaihua Wang¹, Shaofan Wu¹, Zhoubin Lin¹, Zhen Zhang³, Liangbi Su³, Pavel Loiko⁴, Xavier Mateos⁵, Valentin Petrov², Weidong Chen^{1,2}; ¹*Chinese Academy of Sciences Fujian Inst. of Research on the Structure of Matter, China*; ²*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*; ³*Shanghai Inst. of Ceramics Chinese Academy of Sciences, China*; ⁴*Université de Caen Normandie, France*; ⁵*Universitat Rovira i Virgili, Spain*. We report on a diode-pumped Kerr-lens mode-locked Yb:SALGO laser delivering 25 fs soliton pulses at 1084 nm with 62 mW average output power and a pulse repetition rate of ~66 MHz.

ATh1A.6 • 09:45

Efficient Electro-Optical Q-Switched Pr:YLF Laser With a Compact Cavity Design at 640nm, Remi GAROT-JACQUEY¹, Lauren Guillemot¹, rémi soulard¹, Gabriel Mennerat², Thierry Georges³, Patrice Camy¹; ¹*Centre de recherche sur les Ions, les Matériaux et la Photonique, Université Caen Normandie, ENSICAEN, CNRS, CEA, Normandie Univ, CIMAP UMR6252, France*; ²*Université Paris-Saclay, CEA, LIDYL, France*; ³*Oxxius SA, France*. A 640nm efficient electro-optical-Q-switched laser is achieved in a blue diode-pumped Pr:LiYF₄ crystal. A compact plane-parallel cavity design allows the generation of 19.6 μ J pulses with a slope efficiency of 21.2% at 20 kHz.

ATh1A.7 • 10:00 (Invited)

Microcomb Light Sources for Photonic Signal Processing and Terahertz Communications, Takasumi Tanabe¹; ¹*Keio Univ., Japan*. Microcomb light sources offer coherent, broadband, and evenly spaced carriers for parallel signal processing. This talk discusses soliton-comb generation, comb-line stabilization, and their application to optical convolution, dot-product operations, and terahertz communications in integrated platforms.

08:30 -- 09:30

Room: Epsilon

ETh1B • Compact and Table-top Sources for Attosecond and Ultrafast Science

Presider: Bastian Manschwetus; Class 5 Photonics, Germany

ETh1B.1 • 08:30 (Upgraded to Invited)

All-Attosecond Pump-Probe Spectroscopy Based on an Ytterbium Laser, Evaldas Svirplys¹, Julijana Petković¹, Gabriel Emperauger¹, Marc J. Vrakking¹, Bernd Schütte¹; ¹*Max Born Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Germany*. We demonstrate an intense attosecond light source driven by few-cycle pulses centered at 515 nm obtained from an ytterbium laser. An XUV autocorrelation measurement is performed, showing the generation of a short attosecond pulse train.

ETh1B.2 • 09:00 (Invited)

High-Power SWIR and MWIR Lasers Based on Chirped Pulse Amplification, Zenghu Chang¹; ¹*Univ. of Ottawa, Canada*. We have developed multi-mJ, few-cycle lasers centered at 2.5 μ m and 4 μ m. These

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compact infrared sources use Cr:ZnSe and Fe:ZnSe crystals pumped by Ho:YAG and Er:YAG lasers, with compression achieved in gas-filled hollow-core fibers.

08:30 -- 10:30

Room: Zeta 2

HTH1C • Petawatt Facility Commissioning & High-Energy Diode-Pumped Lasers

Presider: Roman Antipenkov; ELI Beamlines Facility ERIC, Czechia

HTH1C.1 • 08:30 (Invited)

Commissioning of L4 ATOM at ELI Beamlines: Generation of 5PW 840J Pulses, Bedrich Rus¹; *the Extreme Light Infrastructure ERIC, Czechia.* Abstract is not available

HTH1C.2 • 09:00 (Invited)

NSF OPAL – a Next-Generation Laser User Facility Reaching for the Brightest Light, Jonathan D. Zuegel¹; ¹*Univ. of Rochester, USA.* The Univ. of Rochester leads an NSF-funded design project for NSF OPAL, a new, world-leading, user facility guided by science community needs identified by the 2022 Multi-Petawatt Physics Prioritization (MP3) workshop. It will provide a large-scale, open-access user facility. The project has completed a conceptual design and will complete preliminary design in early 2027. This talk will overview the frontier science NSF OPAL enables, the status of the design, and plans going forward.

HTH1C.3 • 09:30

Room-Temperature, Helium-Gas-Cooled Yb:YAG Diode-Pumped Solid-State Laser (DPSSL) Delivering 10 J at 10 Hz, Katrin A. Schulz^{2,3}, Klaus Ertel², Bernd Metzger², Markus Graf², Harald Rapp², Wolfgang Schüle², Aleksander Budnicki², Thomas Dekorsy^{1,4}; ¹*Universität Stuttgart, Germany*; ²*Research and Development, TRUMPF Laser GmbH, Germany*; ³*Universität Stuttgart, Germany*; ⁴*Deutsches Zentrum für Luft- und Raumfahrt DLR, Germany.* We demonstrate a room-temperature, diode-pumped, multi-slab Yb:YAG amplifier delivering 20 ns pulses with energies > 10 J at 10 Hz repetition rate. Continuous one-hour operation yielded an optical-to-optical efficiency of 19% with 0.68% energy stability.

HTH1C.4 • 09:45 (Upgraded to Invited)

First 100 J Broadband Incoherent Amplification on LULI2000 Using an SOA-Based Arbitrary Spectro-Temporal Shaper for Fusion, Loïc Meignien¹, Pierre Lebegue¹, Titouan Degrandcourt¹, Jean Christophe Delagnes², Patrick Audebert¹, Marc Hanna¹, Joanna De Sousa¹, Doina Badarau¹, Cyril Rapeneau³; ¹*CNRS, France*; ²*Université de Bordeaux, France*; ³*Ecole Polytechnique, France.* We demonstrate a broadband SOA-based incoherent Nd laser front-end enabling programmable spectro-temporal shaping. The system delivers 100 J amplification on LULI2000 with 4.14 nm bandwidth for laser fusion and mitigation of laser-plasma instabilities.

HTH1C.5 • 10:15 Postdeadline Submission

Wavefront Measurements of kHz RHHG From Liquid-Leaf Plasma Mirrors, André Kalouguine⁴, Christian Cabello⁴, Chaoneng Wu³, David Gauthier², Antoine Cavagna⁴, Maxence Drouin¹, Jaismeen Kaur⁴, Willem Boutu², Philippe Zeitoun⁴, Rodrigo Lopez-Martens⁴, Stefan Haessler⁴, Lu Li³; ¹*Imagine Optic SA, France*; ²*Laboratoire Interactions Dynamique et Lasers, France*; ³*Shenzhen Technology Univ., China*; ⁴*Laboratoire d'Optique Appliquée, France.* We present an analysis of high-NA XUV wavefront measurements of

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relativistic high-order harmonics from a 1kHz liquid-leaf plasma-mirror source. Multiple parametric scans were performed, shedding light on the generation process.

08:30 -- 08:45

Room: Beta 1

LTh1D • Fusion Energy (followed by a panel)

Presider: Franck Leibreich; Thales Group, France

LTh1D.1 • 08:30 (Invited)

Commercializing Laser Fusion with a Novel Optical Enhancement Cavity Laser, Paul Rudy¹; ¹*Blue Laser Fusion Inc, USA*. Blue Laser Fusion is commercializing laser-based fusion with novel optical enhancement cavity laser coupled via direct drive to a high gain DT-based fusion fuel target to generate energy.

LTh1D.2 • 08:35 (Invited)

From First Principles to Scalable Power, Jana Jung¹, Jan H. Buss¹; ¹*Marvel Fusion GmbH, Germany*. Marvel Fusion's laser-driven path to scalable power: DUNAMIS and ATLAS demonstrators, Caelora's supply chain, and projects tackling gratings, coatings, crystals, gain media and diodes, from short-pulse, high-energy, high-rep-rate operation to power-plant scalability, cost, and supply

LTh1D.3 • 08:40 (Invited)

Withdrawn

08:30 -- 10:30

Room: Beta 2

MTh1E • OPCPA Systems

Presider: Mikhail Polyanskiy, Brookhaven National Laboratory, USA

MTh1E.1 • 08:30 (Invited)

Power Scaling of a High Repetition Rate, Passively CEP-Stable, Few-Cycle SWIR OPCPA for Strong-Field Applications, Caroline Juliano¹; ¹*Lunds Universitet, Sweden*. We present the upgrade of a high-repetition-rate, passively CEP-stable, few-cycle SWIR OPCPA, driven by a 500W Yb:YAG thin-disk front-end. The 2 μ m, DFG-seeded system is designed to deliver >200 μ J, targeting water-window high-harmonic generation. Beamline planning and applicability to strong-field science are discussed.

MTh1E.2 • 09:00

Compact 100 mJ Ho:YLF Picosecond Amplifier for 2 μ m High Energy MID-IR Applications, Philipp Merkl², Simon Reuter², Sören Buchenau², Mark J. Prandolini^{2,1}, Martin Bock³, Uwe Griebner³, Robert Riedel²; ¹*Universität Hamburg, Germany*; ²*Class 5 Photonics, Germany*; ³*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*. A compact Ho:YLF amplifier system for MIR OPCPA pumping between 3 – 11 mm is presented. Implementing a mJ-level OPA as a front-end reduces the complexity and optimizes the bifurcation dynamics of the regenerative amplifier, delivering 2.1 ps pulses above 100 mJ at 1 kHz (e-mail: Robert.Riedel@class5photonics.com).

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MTh1E.3 • 09:15

Generation and Full Spectral-Temporal Characterization of Multi-mJ LWIR Pulses, Tobias Zhou³, Rokas Jutas³, Joris Roman³, Ignas Astrauskas³, Pavel Polynkin¹, Edgar Kaksis³, Aref Imani³, Paolo Carpeggiani³, Jonas Kolenda², Tadas Bartulevicius², Kirilas Michailovas², Andrejus Michailovas², Andrius Baltuska³, Audrius Pugzlys³; ¹*The Univ. of Arizona, USA*; ²*Ekspla, Lithuania*; ³*E387, Technische Universitat Wien, Austria*. Hybrid OPCPA system based on non-collinearly multicolor seeded and pumped KTA and ZGP crystals, generating mJ-level LWIR femtosecond pulses is presented. Characterization of the compressed LWIR pulses is performed by THG-FROG measurements.

MTh1E.4 • 09:30

Four Synchronized Laser Pumped CEP-Stable 2.1 μm OPCPA With Broadband 2.5–10 μm Generation, Ignas Balciunas¹, Dainius Kucinskas¹, Dominykas Karvelis¹, Vytenis Girdauskas¹, Valdas Maslinskas¹, Rimantas Budriunas^{1,2}, Tomas Stanislauskas¹; ¹*Light Conversion, Lithuania*; ²*Laser Research Center, Vilnius universitetas, Lithuania*. We demonstrate a CEP-stable OPCPA delivering 1.75 mJ, 23.5 fs pulses at 2.1 μm with 141 mrad CEP stability and tunable 2.5–10 μm mid-infrared generation.

MTh1E.5 • 09:45

Systematic Modeling of Optically Pumped High-Pressure Ultrafast CO₂ CPA Laser Amplifiers, Mikhail N. Polyanskiy¹; ¹*Brookhaven National Laboratory, USA*. We present systematic modeling of optically pumped high-pressure ultrafast CO₂ CPA amplifiers, comparing pump wavelengths and excitation pathways to identify configurations that maximize practically achievable optical-to-optical efficiency for multi-terawatt LWIR systems.

MTh1E.6 • 10:00 (Invited)

Self-Compression of Millijoule Pulses at 5 μm in Different Hollow Waveguides, Martin Bock¹; ¹*Max-Born Institut, Germany*. Here we demonstrate solitonic self-compression of 5- μm laser pulses in an argon-filled uncoated hollow-core fiber. 1.9-mJ pulses at 1 kHz were compressed from 85 fs to 47 fs, yielding 17 GW peak power at 0.88 mJ energy.

11:00 -- 13:00

Room: Zeta 1

ATh2A • Nonlinear Conversion and Compression

Presider: Anne-Laure Calendron; Deutsches Elektronen-Synchrotron, Germany

ATh2A.1 • 11:00 (Invited)

Advanced OPCPA Laser Systems, Ignas Balciunas¹; ¹*Light Conversion, Ltd., Lithuania*. An overview of advanced table-top OPCPA systems through Light Conversion's development and operating experience, highlighting demonstrated performance, temporal contrast and carrier-envelope phase stability, alongside developments toward higher repetition rates and longer wavelengths.

ATh2A.2 • 11:30

High Average Power Bulk Supercontinuum Seeded 76 MHz Femtosecond OPA, Jokubas Pimpe^{1,2}, Simona Armalyte¹, Audrius Dubietis¹, Julius Vengelis¹; ¹*Vilnius Univ. Laser Research Center, Lithuania*; ²*Light Conversion UAB, Lithuania*. We present a 76 MHz repetition rate and high average power femtosecond OPA pumped by a Yb-based femtosecond FCPA laser system and seeded by

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supercontinuum generated in bulk KGW crystal. The reported OPA demonstrates excellent spectral, energy, spatial and temporal characteristics.

ATh2A.3 • 11:45

Counter-Propagating Upconversion in Nanostructured PPKTP, Adrian Vågberg¹, Patrick Mutter², Andrius Zukauskas^{1,2}, Fredrik Laurell¹, Valdas Pasiskevicius¹, Max Widarsson²; ¹*Applied Physics, Kungliga Tekniska Hogskolan, Sweden*; ²*SLF Svenska Laserfabriken AB, Sweden*. Counter-propagating sum-frequency generation was shown in a PPKTP waveguide for the first time, demonstrating large spectral coverage through pump wavelength tuning and showing potential for a low-complexity upconversion spectrometer.

ATh2A.4 • 12:00

Supercontinuum Generation With 400 nJ in a Multipass Cell, Zeyang Hu¹, Kilian Fritsch¹, Oleg Pronin¹; ¹*n2-Photonics GmbH, Germany*. We demonstrate single-stage multipass-cell spectral broadening driven by a 10 MHz oscillator at MW-level peak power, achieving 800–1200 nm bandwidth, >75% transmission, and near-Fourier-limited 8.1 fs pulses for ultrafast nonlinear imaging applications.

ATh2A.5 • 12:15

Zigzag Second Harmonic Generation, Anjali Prabhakaran Sheela¹, Sukeert Sukeert¹, Alfredo D. Sanchez Rossi², Chaitanya Kumar Suddapalli³, Majid Ebrahim-Zadeh⁴; ¹*ICFO-The Inst. of Photonic Sciences, Spain*; ²*FunGlass, Alexander Dubček Univ. of Trenčín, Slovakia*; ³*Tata Inst. of Fundamental Research Hyderabad, India*; ⁴*Radiantis, Spain*. We report a novel technique for second harmonic generation of continuous-wave laser radiation in bulk $\chi^{(2)}$ quasi-phase-matched crystal delivering an unprecedented conversion efficiency of ~50% at an input power of only 2 W.

ATh2A.6 • 12:30

Burst-OPA: Broadband non-Collinear Optical Parametric Amplifier at 2.1 μm Pumped by a GHz Pulse Burst, Aivaras Kazakevicius^{2,1}, Lukas Kamarauskas¹, Andrejus Michailovas^{1,2}; ¹*Ekspla, Lithuania*; ²*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania*. We present experimental realization of a single pulse seed amplification at 2.1 μm in a non-collinear OPA pumped by a single beam pulse burst synthesized in an all-in-fiber active fiber loop of the pump laser.

ATh2A.7 • 12:45

Post-Compression of 50 mJ, 2 ps Pulses Around 2 μm Using Bulk Materials at 1-kHz Repetition Rate, Martin Bock¹, Federico Furch¹, Dennis Ueberschaer¹, Uwe Griebner¹; ¹*Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*. Post-compression of pulses up to 50-mJ energy at 2.05- μm in fluoride plates is presented. High energy 41-mJ pulses with 740-fs duration are achieved and 550-fs pulses containing 15-mJ with high spatio-temporal homogeneity are generated.

11:00 -- 13:00

Room: Epsilon

ETh2B • Laser Driven Particle and X-ray Sources for Industrial Applications

President: Hiroshi Kawata; High Energy Accelerator Research Org, Japan

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ETH2B.1 • 11:00 (Invited)

A Laboratory Setup for Demonstrating the Industry-Readiness of Laser-Driven X-ray Sources in

Analytical and Inspection Applications, Jochen Vieker¹, Klaus Bergmann¹, Johannes M. Ebert¹, Sarah Klein¹, Johanna Schmidt¹, Martin Traub¹, Stephan H. Wissenberg¹, Hans-Dieter Hoffmann¹; ¹*Fraunhofer-Institut für Lasertechnik, Germany*. A laboratory setup to validate the industry readiness of laser driven x ray sources with product level laser sources is shown. Key design aspect is the utilization of laser technology yielding an average power of 1 kW at 10 mJ pulse energy as well as a peak intensity of 1018 W/cm² on a high speed liquid metal target.

ETH2B.2 • 11:30

Laser Plasma Accelerator Based X-ray Sources for Multidisciplinary Applications, Uddhab Chaulagain¹;

¹*ELI Beamlines - Intl Laser Research Ctr, Czechia*. We report recent advances in laser-plasma-accelerator-based X-ray sources at ELI Beamlines, including the commissioned Gammatron beamline, advanced plasma diagnostics, high-flux inverse Compton gamma-ray sources, and novel attosecond X-ray concepts for applications ranging from imaging to high-energy-density plasma science.

ETH2B.3 • 11:45 (Upgraded to Invited)

Laser-Based Particle and X-ray Sources for Advanced Material Analysis, Patrizio Antici¹; ¹*Institut*

National de La Recherche Scientifique, Canada. The advent of high-power ultra-short lasers has opened-up the field of secondary sources generation and applications. In this talk, I will give an overview of the use of secondary sources for advanced spectroscopy, in particular PIXE and XRF, showing different applications such as innovative diagnostics in material science.

ETH2B.4 • 12:15

Neural Network-Accelerated Soft X-ray Scatterometry for Semiconductor Nanostructure

Characterization, Jae-Min Ha¹, Hyomin Ahn¹, Hojun Lee¹, Seungbeom Park¹, Junho Shin¹, Younghoon Shin¹, Jisu Lee¹, Yong Woo Kim¹, Seulki Roh¹, Hyonseok Song¹, Sukjong Bae¹, Sangwoo Bae¹, Wookrae Kim¹, Myungjun Lee¹; ¹*Samsung Electronics Co., Ltd, Korea (the Republic of)*. We developed a soft x-ray scatterometry method for semiconductor nanostructure metrology using an RCWA-trained surrogate forward model. It achieved a 277-fold acceleration in structural parameter extraction, supporting practical model-based scatterometric metrology.

ETH2B.5 • 12:30

K α X-ray Generation From a Debris-Free Cryogenic Argon jet Driven by High-Repetition-Rate

Femtosecond Lasers, Adam A. Merdji-Larue¹, Corentin Lechevalier¹, Sebastian Goede², Bianca Iwan³, Jordan andrieu¹, Olena Turianska¹, Ihsan Fsaifes¹, Madhusudhan Pillegowda¹, Pablo San Miguel Claveria⁴, Milutin Kovacev³, Jean Christophe Chanteloup¹, Marta Fajardo⁴, Philippe Zeitoun¹, Hamed Merdji¹; ¹*Ecole Polytechnique, France*; ²*European X-Ray Free-Electron Laser Facility GmbH, Germany*; ³*Institut für Quantenoptik, Leibniz Universität Hannover, Germany*; ⁴*Universidade de Lisboa Instituto de Plasmas e Fusao Nuclear, Portugal*. We investigate 3 keV, K-alpha X-ray generation from a debris-free cryogenic argon jet irradiated by high-repetition-rate femtosecond lasers. Measurements from 100 kHz to 2 MHz reveal efficient X-ray production and fluxes approaching 10e9 photons/second/steradian at MHz repetition rates.

11:00 -- 13:00

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Room: Zeta 2

HTh2C • High-Power Laser Hardware: Amplifiers, Optics & AI-Driven Facilities

Presider: Nicolas Thiré; Fastlite, France

HTh2C.1 • 11:00

550 mJ, 1 kHz, sub-730 fs for 1030 nm Thin-Disk Amplifier, Jessica Meier¹, Eva M. Bayer¹, Abel H. Woldegeorgis¹, Mikhail Osolodkov¹, Catherine Y. Teisset¹, Sandro Klingebiel¹, Thomas Metzger¹; ¹*TRUMPF Scientific Lasers GmbH Co. KG, Germany*. We present a Dira 500-1 ytterbium-based (Yb) thin-disk laser system. It delivers 550 mJ laser pulses at 1 kHz with sub-730 fs pulse durations and near diffraction-limited beam quality ($M^2 < 1.4$).

HTh2C.2 • 11:15 (Upgraded to Invited)

Next Generation Face-Cooled Laser Heads for Petawatt Ti:Sa Amplifiers Operating at 10 Hz, Roland Nagymihály¹, David Armier², Christina Alexandridi², Viktor Pajer¹, Levente Lehotai¹, Nóra Csernus-Lukács¹, János Bohus¹, Olivier Roy², Franck Falcoz², Adam Borzsonyi¹, Mikhail Kalashnikov¹; ¹*ELI-ALPS, Hungary*; ²*Amplitude, France*. Thermal limitations in high energy Ti:Sa amplifiers beyond 1 Hz put very high demand on the laser heads. Here we present a novel face-cooled arrangement for cooling Ti:Sa in amplifiers operating at up to 10 Hz. Numerical simulations and experimental validation are showing great potential to use such laser heads in future laser systems.

HTh2C.3 • 11:45

Towards AI-Driven High-rep Rate Ultrafast Laser Facilities: Digital Architectures, Adaptive Experiments, Applications and Opportunities, Mousumi Upadhyay Kahaly¹, Davorin Peceli², Zsolt Divéki¹, Subhendu Kahaly¹; ¹*ELI-ALPS, Hungary*; ²*ELI Beamlines, Czechia*. High-repetition-rate femtosecond and attosecond laser facilities produce complex data that exceed traditional analysis. We present a physics-informed machine learning framework and facility-scale digital architecture enabling real-time diagnostics, optimization, and autonomous experimental workflows across high-field science platforms.

HTh2C.4 • 12:00

Versatile Joule-Class OPA as Front-end Laser for Inertial Fusion Research, Gabriel C. Loata¹, Yoann Pertot¹, Franck Falcoz¹, Stéphane Branly¹, Antoine Courjaud¹; ¹*Amplitude, France*. We present a versatile kJ-class laser architecture for inertial confinement fusion, combining a multi-Joule OPA front-end with flash-lamped Nd:glass amplifiers. The system provides flexible temporal and spectral control, enabling broadband long-pulse compression and short-pulse ignition applications.

HTh2C.5 • 12:15 (Invited)

Glass-Engraved Metasurfaces: The Path Toward Birefringent and Antireflective Capabilities for High Power Laser Applications, Nathan Ray¹, Eyal Feigenbaum¹, Issa Tamer¹; ¹*Lawrence Livermore National Laboratory, USA*. We report on several all-glass metasurface fabrication efforts, with emphasis placed on antireflective metasurfaces that are highly resistant to laser damage, in addition to scalable substrate-engraved waveplates at 351 nm wavelength. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-2020979.

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HTh2C.6 • 12:45

Structured-Core Thulium-Doped Fiber for Efficient High-Power Laser Operation at 1907 nm, Bara Svejkarova^{1,2}, Jan Aubrecht¹, Ivo Barton¹, Richard Svejkar¹, Michal Kamradek¹, Petr Varak¹, Ondrej Podrazky¹, Zuzana Zaborska¹, Pavel Peterka¹; ¹*Ustav Fotoniky a Elektroniky Akademie Ved Ceske Republiky, Czechia*; ²*FNSPE, Ceske Vysoke Ucení Technické v Praze, Czechia*. A 7-rod-core thulium-doped fiber was fabricated for efficient high-power laser operation at 1907 nm. The laser output power exceeded 55 W with a slope efficiency of more than 72% relative to the absorbed pump power, showing strong potential for power scaling of 1.9 μm fiber lasers.

11:00 -- 11:30

Room: Beta 1

LTh2D • Global Security and Aerospace (followed by a panel)

Presider: Sandra Biedron; Element Aero, USA

LTh2D.1 • 11:00

Surface Morphology of Micro-Optical 3D Structures Manufactured by Digital Light Processing and Masked Stereolithography, Yuri Gordienko^{1,2}, Ioanna-Angeliki Petsi², Austėja Kvedaraite², Gordon Zyla², Mangirdas Malinauskas²; ¹*NTUU Kyiv Polytechnic Inst., Ukraine*; ²*Laser Research Center, Vilniaus universitetas, Lithuania*. Surface morphology and roughness of micro-optics printed by digital light processing (DLP) and masked stereolithography (MSLA) is considered. DLP produces non-saturating linear roughness from sharp voxel steps, while MSLA saturates by pixel smoothing with multi-scale trade-offs for optical fabrication.

LTh2D.2 • 11:15

High-Peak Power LWIR Lasers for Directed Energy Applications, Igor Pogorelsky¹, Mikhail N. Polyanskiy¹, Marcus Babzien¹, Dismas Choge¹, Sandra G. Biedron^{2,3}; ¹*Brookhaven National Laboratory, USA*; ²*Element Aero, USA*; ³*Cornell Univ. Center for Bright Beams, USA*. By the example of Brookhaven's multi-terawatt-peak-power, picosecond, long-wave IR laser system, we discuss state-of-the-art and ongoing R&D in this technology and its recent experimental applications in directed energy research

14:30 -- 16:30

Room: Zeta 1

ATh3A • Materials for Nonlinear Optics and Frequency Conversion

Presider: Valdas Pasiskevicius; Kungliga Tekniska Hogskolan, Sweden

ATh3A.1 • 14:30

The Effective Nonlinearity of Trigonal BaGa₂GeSe₆ Measured by Second-Harmonic Generation at 4 μm Relative to ZnGeP₂, Marcin Piotrowski¹, Achille Bogas-Droy¹, Mathilde Schlotb  ller¹, Gerhard Spindler², Alexandra Pe  a³, Anne Hildenbrand-Dholland  ¹, Valentin Petrov⁴; ¹*Inst Franco-Allemand Recherches St Louis, France*; ²*Independent Researcher, Germany*; ³*Institut N  el, Universit   Grenoble Alpes Grenoble INP Institut d'Ingenierie et de Management, France*; ⁴*Max-Born-Institut f  r Nichtlineare Optik und Kurzzeitspektroskopie im Forschungsverbund Berlin eV, Germany*. We evaluate the effective nonlinearity of BaGa₂GeSe₆ for type-I second-harmonic generation with nanosecond pulses near 4 μm , a large-size, high-quality and anti-reflection coated sample, and ZnGeP₂ as a reference in the same dynamic

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detection range.

ATH3A.2 • 14:45

Transmission and Refractive Index of the ZnSiP₂ Chalcopyrite Type Nonlinear Optical Crystal, Valentin Petrov¹, Peter Schunemann^{2,3}, Jani Jesenovec³, Kevin T. Zawilski³, John Jackson⁴; ¹*Max Born Inst., Germany*; ²*Northrop Grumman SYNOPTICS, USA*; ³*BAE Systems, USA*; ⁴*METRICON Corporation, USA*. We present unpolarized transmission measurements in the 0.5-18- μ m range and first refractive index measurements at 1.55 μ m of the uniaxial ZnSiP₂ chalcopyrite crystal at room temperature. ZnSiP₂ is optically positive with a birefringence of 0.004.

ATH3A.3 • 15:00

Temperature Tuning of Femtosecond mid-Infrared OPA Utilizing Nonlinear BGSe Crystal, Julius Lukosiunas^{2,1}, Jani Jesenovec³, Mikhail Grishin¹, Andrejus Michailovas^{2,1}; ¹*Ekspla, Lithuania*; ²*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania*; ³*BAE systems, Inc., USA*. We investigate temperature tuning of a femtosecond mid-infrared optical parametric amplifier utilizing a BGSe crystal pumped at 1030 nm to study its influence on phase-matching conditions and generated spectral bandwidth.

ATH3A.4 • 15:15

Nonlinear Absorption in CdGeP₂ Measured at 2050 nm, Valentin Petrov¹, Marcin Piotrowski², Shekhar Guha³, Subhasis Das⁴, Peter Schunemann^{5,6}, Martin Bock¹, Dennis Ueberschaer¹, Kevin T. Zawilski⁵, Jani Jesenovec⁵, Uwe Griebner¹; ¹*Max Born Inst., Germany*; ²*ISL, France*; ³*Air Force Research Laboratory, USA*; ⁴*Burdwan Univ., India*; ⁵*BAE Systems Electronic Systems, USA*; ⁶*Northrop Grumman Synoptics, USA*. We present open aperture z-scan measurements of the three-photon absorption coefficient of CdGeP₂ using 650-fs pulses at 2050 nm. Such data are interesting for THz generation with this highly nonlinear but weakly birefringent chalcopyrite crystal.

ATH3A.5 • 15:30

Improved ZnGeP₂ Absorption and Advances of Mid-IR NLO Crystals, Kevin T. Zawilski¹, Sergey B. Mirov³, Mikhail N. Polyanskiy², Eric Readinger¹, Jani Jesenovec¹; ¹*BAE Systems Electronic Systems, USA*; ²*Brookhaven National Laboratory, USA*; ³*The Univ. of Alabama at Birmingham College of Arts and Sciences, USA*. ZnGeP₂ processed with a new treatment resulted in a reduction in absorption at 2 μ m by up to 5 - 10x. Additionally, we provide an overview of current functional Mid-IR nonlinear optical crystals. © 2026 The Author(s)

ATH3A.6 • 15:45

Spectral Broadening of Femtosecond UV Pulses in a Xenon-Filled Hollow-Core Anti-Resonant Fiber, Raz Amar¹, Pavel Sidorenko¹; ¹*Technion Israel Inst. of Technology, Israel*. We investigate nonlinear spectral broadening of 341 nm femtosecond ultraviolet pulses in a xenon-filled anti-resonant hollow-core fiber. At 2 bar pressure, the spectrum broadens by a factor of 11.7, supporting transform-limited pulses of 11.8 fs.

ATH3A.7 • 16:00 (Invited)

Supercontinuum Generation in Bulk Materials at MHz Pulse Repetition Rates: the Impact on Beam Focusing Geometry and Heat Accumulation, Vytautas Jukna¹, Matas Sutovas¹, Vaida Marciulionyte¹, Gintaras Tamosauskas¹, Audrius Dubietis¹; ¹*Laser Research Center, Vilniaus Universitetas, Lithuania*. We

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investigate thermal effects on filamentation and supercontinuum generation in YAG at repetition rates up to 2 MHz. Experiments and simulations reveal that heat accumulation from nonlinear absorption induces thermal lensing, suppressing infrared spectral broadening for converging beams, whereas diverging beams maintain stable broadband spectra.

14:30 -- 16:30

Room: Epsilon

ETH3B • High Order Harmonic Sources and Beamlines

Presider: Jochen Vieker; Fraunhofer-Institut für Lasertechnik, Germany

ETH3B.1 • 14:30

Bright Coherent Soft X-ray High-Harmonic Source Spanning the Full Water Window at 100 kHz

Repetition Rate, Philipp Gierschke^{1,3}, Themistoklis Sidiropoulos^{2,3}, Martin Gebhardt³, Lucas Eisenbach³, Warunya Röder¹, Maximilian Karst³, Maximilian Benner³, Mathias Lenski³, Robert Klas¹, Jan Rothhardt^{2,3}, Jens Limpert^{1,3}; ¹Fraunhofer IOF, Germany; ²Helmholtz-Inst. Jena, Germany; ³Inst. of Applied Physics, Friedrich-Schiller-Universität Jena, Germany. We demonstrate fiber-laser-driven high-harmonic generation at 100 kHz producing coherent soft X-rays spanning the full water window (284 eV – 543 eV). Record photon flux of 1.2×10^9 ph/s/1% bandwidth at the carbon K-edge (284 eV) enables NEXAFS under single-second exposure.

ETH3B.2 • 14:45

Bright Coherent 13.5-nm Emission from Visible-Light-Driven High-Harmonic Generation, Maximilian Karst¹, Lucas Eisenbach¹, Martin Gebhardt¹, Philipp Gierschke¹, Themistoklis Sidiropoulos¹, Robert Klas¹, Jan Rothhardt¹, Jens Limpert¹; ¹Inst. of Applied Physics (Germany), Germany. We report bright high-harmonic generation in helium driven by intense 516 nm green laser pulses, producing XUV emission extending to 100 eV, individual-harmonic conversion efficiencies reaching 10^{-6} , and record-high microwatt-level output at 13.5 nm wavelength.

ETH3B.3 • 15:00

Efficient 13.5 nm EUV Source Based on High Harmonic Generation, Bastian Manschwetus¹, Aswan Alangattuthodi¹, Andrea Zablah Ticas², Supriya Rajhans², Esmerando Escoto², Malte Sumfleth³, Dominic Laumer³, Slawomir Skruszewicz³, Christoph Heyl^{2,4}, Marek Wieland³, Mark J. Prandolini^{1,3}, Tais Gorkhover³, Markus Drescher³, Robert Riedel¹; ¹Class 5 Photonics, Germany; ²Deutsches Elektronen-Synchrotron, Germany; ³Universität Hamburg Fakultät für Mathematik Informatik und Naturwissenschaften, Germany; ⁴Helmholtz-Institut Jena, Germany. We present recent achievements on our high harmonic generation source. Employing a femtosecond laser with 100 W average power, a powerful coherent beam spanning from 9 nm to 18 nm wavelength was produced.

ETH3B.4 • 15:15

High-Harmonic Generation From a 50-fs Compressed Thin-Disk Oscillator, Moinuddin Kadiwala¹, Yasmin Kopp¹, Simon Goncharov¹, Nazar Kovalenko¹, Oleg Pronin¹; ¹Helmut-Schmidt-Universität, Germany. We present an extreme ultraviolet source based on high-harmonic generation at 14 MHz repetition rate driven by a compressed 150 W output of a thin-disk oscillator. First measurements show that harmonics up to the 39th (26.5 nm) can be generated in Argon. After optimization, this source can

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target the 17th harmonic (60.8 nm) for He+ spectroscopy.

ETH3B.5 • 15:30

Versatile Table-top XUV-Beamlines, Johannes Blöchl¹, Simon Reiger¹, Minjie Zhan¹, Asger Kreiner¹, Verónica Oliver Álvarez de Lara¹, Valentina Shumakova¹, Vladimir Pervak^{1,2}, Alexander Guggenmos¹; ¹*Ultrafast Innovations GmbH, Germany*; ²*Ludwig-Maximilians-Universität München, Germany*. UFI® delivers complete, customizable XUV beamlines integrating post-compression, HHG, and diagnostics modules. We present a compact tabletop system using cascaded hollow-core fiber compression, achieving sub-2-cycle pulses (5.7 fs) at 1030 nm — adaptable to a wide range of ultrafast science applications.

14:30 -- 16:30

Room: Zeta 2

HTH3C • Ultrafast Pulse Compression & Nonlinear Pulse Shaping

Presider: Stefano Bonora; CNR-Inst. of Photonics and Nanotech, Italy

HTH3C.1 • 14:30 (Upgraded to Invited)

Terawatt-Scale Optical Attosecond Pulses and 60 GW-Scale Far-Ultraviolet Pulses Through Extreme Soliton Dynamics, Nikoleta Kotsina¹, Michael Heynck¹, Joleik Nordmann¹, Martin Gebhardt¹, Teodora F. Grigorova¹, Christian Brahms¹, John C. Travers¹; ¹*Heriot-Watt Univ., UK*. We present the extreme soliton (XSOL) beamline, an experimental platform capable of delivering terawatt-scale, sub-femtosecond optical attosecond pulses alongside sub-2 fs deep-and vacuum-ultraviolet radiation with peak powers exceeding 60 GW.

HTH3C.2 • 15:00

High Repetition-Rate, Low-Noise Ultrafast UV Generation via Resonant Dispersive Wave Emission in Gas-Filled Capillaries, Gautier Parize^{2,1}, Giovanni Cichelli¹, Michele Natile², Florent Guichard², Marc Hanna¹, Patrick Georges¹, Nicolas Thire²; ¹*Laboratoire Charles Fabry, France*; ²*Amplitude Laser Group, France*. We demonstrate a ultrafast UV source delivering tunable radiation from 280–500 nm at 100 kHz via dispersive wave emission in gas-filled hollow capillary, producing microjoule pulses, supporting sub-10 fs pulse duration, and low-noise suitable for high-precision spectroscopy applications.

HTH3C.3 • 15:15

Raman-Driven Spectral Broadening in a Molecular Gas-Filled Multi-Pass Cell with Bulk Compression to 15 fs, Lucas R. Eisenbach¹, Maximilian Karst¹, Philipp Gierschke¹, Warunya Röder¹, Martin Gebhardt¹, Maximilian Benner¹, Robert Klas¹, Jan Rothhardt¹, Jens Limpert¹; ¹*Inst. of Applied Physics (Germany), Germany*. We report Raman-dominated nonlinear broadening of millijoule-class pulses from an Yb laser in a N₂O/He-filled multi-pass cell. The interaction shifts the spectrum beyond 1200 nm and enables bulk-only compression to 15 fs.

HTH3C.4 • 15:30

Kilowatt-Average-Power and 10mJ Nonlinear Pulse Compression, Dominik Ertel¹, Ronak N. Shah¹, Jonas Manz^{1,2}, Jessica Meier¹, Catherine Y. Teisset¹, Sandro Klingebiel¹, Thomas Metzger¹; ¹*Trumpf Scientific Laser GmbH + Co KG, Germany*; ²*Photonics and Ultrafast Laser Science, Ruhr-Universität Bochum*,

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Germany. Demonstration of kilowatt-average-power nonlinear pulse compression using a gas-filled Herriott-type multi-pass cell. 10 mJ pulses are compressed from 871 fs to 32.5 fs with over 90%

transmission efficiency, high beam quality, and excellent stability.

HTh3C.5 • 15:45

Tailoring Supercontinuum Generation with Tandem Neural Network–Based Models, Robert K. Holcomb^{1,2}, Chengyong Feng¹, Jake Bromage^{1,2}; ¹*Laboratory for Laser Energetics, Univ. of Rochester, USA*; ²*The Inst. of Optics, Univ. of Rochester, USA*. Supercontinuum generation involves coupled nonlinear dynamics, complicating inverse design. We demonstrate a tandem neural network that predicts experimental parameters for target output, offering insight into optimization capabilities and limitations of nonlinear optical systems.

HTh3C.6 • 16:00

Helium-Enhanced Spectral Broadening in CO₂-Filled Hollow-Core Fiber, Imre Seres¹, Barnabas Gilicze¹, Szabolcs Hack¹, Attila Czirják¹, Péter Jójárt¹, Tamás Bartyik¹, Zsolt Kovács¹, Zsolt Bengery¹, Rajaram Shrestha¹, Levenete Ábrók¹, Adam Borzsonyi¹, Katalin Varjú¹, Gábor Szabó¹, Zoltán Várallyay¹; ¹*ELI-ALPS, Hungary*. We demonstrate enhanced spectral broadening of femtosecond pulses in a hollow-core fiber using CO₂/He mixtures. Helium enables stronger broadening, larger Raman shifts, and higher transmission at reduced CO₂ pressure by improving gas cooling and mitigating repetition-rate-dependent losses.

HTh3C.7 • 16:15

Polarization-Modifying Pulse Compressors, Ryan Semple¹, Dale Smith¹, Turan Erdogan¹; ¹*Plymouth Grating Laboratory, Inc., USA*. When linearly polarized light enters a pulse compressor with out-of-plane geometry, a wavelength-dependent elliptical polarization state result. Approximately linear-to-circular polarization conversion is possible by varying the grating and compressor design.

14:30 -- 16:30

Room: Beta 1

LTh3D • Frontiers in Laser Applications II

Presider: To Be Announced

LTh3D.1 • 14:30

Scaling Laws and Design Limits of 3D-Printed Fiber-Tip Microlenses: Maximum Achievable Focal Length and Optimal Geometry, Jan Kosnic¹, Slawomir Ertman¹; ¹*Physics, Politechnika Warszawska, Poland*. Maximum achievable focal lengths of 2PP-fabricated rod-like fiber-tip microlenses are investigated using ABCD matrix analysis. Scaling relationships linking micro lens length and optimal curvature are identified, establishing practical design limits for fiber-coupled free-space optical systems.

LTh3D.2 • 14:45

Multi-Wavelength Dielectric Reflectors with Equal Intensity-Penetration Depths to Reduce Differential Phase Errors, Zach Tebow¹, John Hunt¹, Merlin Mah¹, Al Ogloza³, James Hadaway², Joseph Talghader¹; ¹*Univ. of Minnesota Twin Cities, USA*; ²*Univ. of Alabama at Huntsville, USA*; ³*ManTech International Corporation, USA*. Measurements of beam offsets upon reflection demonstrate the effectiveness of

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multilayer coating designs to reduce differential phase errors in multi-wavelength AO. The concept is based on creating equal intensity penetration depths for all design wavelengths.

LTh3D.3 • 15:00

Nonlinear Refractive Index Characterization of Novel Optical Glasses, Emilis Bluzas¹, Lakshmi P. Gurunathan², Brandon Chalifoux², Matthew Dabney³, Balys Momgaudis¹; ¹*Vilnius Univ. laser research center, Lithuania*; ²*Arizona State Univ., USA*; ³*Edmund Optics Inc, USA*. In this work a comparative study of nonlinear refractive index measurements for two novel glass samples, designed for high intensity optical applications, are presented. The measurements are done using time-resolved digital holographic imaging and Z-scan technique.

LTh3D.4 • 15:15

High-Fidelity Phase Mask Generation via Refined Gerchberg-Saxton Algorithm for Fourier-Plane Two-Photon Polymerisation, Krystof Kobliha^{1,2}, Petr Hauschwitz¹, Ivan Tarant^{1,2}, Juraj Sladek¹, Milan Matejka³, Vilem Bousek^{1,2}, Martin Prochazka¹, Jan Brajer¹, Tomas Mocek¹; ¹*HiLASE Centre, Inst. of Physics of the Czech Academy of Sciences, Czechia*; ²*Faculty of Nuclear Sciences and Physical Engineering, Ceske vysoke Ucení Technické v Praze, Czechia*; ³*IQS nano s.r.o., Czechia*. To overcome the slow throughput of traditional two-photon polymerisation, spatial beam modulation is used to accelerate micro-printing by employing a camera-in-the-loop refined Gerchberg-Saxton algorithm to generate high-fidelity phase masks.

LTh3D.5 • 15:30

3D Printing of Long Afterglow Phosphorescent SrAl₂O₄:Eu²⁺, Dy³⁺ Microstructures, Artur Harnik³, Robertas Virketis¹, Greta Merkininkaitė¹, Simas Šakirzanovas¹, Elmina Kabouraki², Maria Farsari², Mangirdas Malinauskas³; ¹*Faculty of Chemistry and Geosciences, Vilniaus Universitetas, Lithuania*; ²*Inst. of Electronic Structure and Laser, Idruma Tekhnologias kai Ereunas, Greece*; ³*Laser Research Center, Faculty of Physics, Vilniaus Universitetas, Lithuania*. Limited fabrication of phosphorescent inorganic 3D microstructures remains a challenge. Herein, Eu²⁺, Dy³⁺-doped SrAl₂O₄ microstructures were fabricated via two-photon polymerization followed by calcination, yielding polycrystalline phosphorescent structures with long-afterglow emission and demonstrating feasibility for 3D printing.

LTh3D.6 • 15:45

Multi-Wavelength Atom Probe Tomography, Luis Miaja Avila¹, Benjamin Caplins¹, Jacob Garcia¹, May Martin¹, Christopher Mead¹, Joe Bunton², Ann Chiaramonti¹; ¹*National Inst of Standards & Technology, USA*; ²*CAMECA Instruments Inc, USA*. Atom probe tomography is a powerful materials characterization tool. NIST is experimenting with a variety of pulsed light sources with wavelengths from visible to extreme ultraviolet to optimize sample survivability, background signal, and mass resolving power.

LTh3D.7 • 16:00

Steered Photonic Nanojets for Parallel Laser Nano writing of Arbitrary Patterns, Mania Majumder¹, Niladri Ganguly¹, Catalin Constantinescu¹, David Grojo¹; ¹*Aix Marseille Univ., France*. We introduce a maskless laser-based colloidal lithography method using steered photonic nanojets from a monolayer of 5 μm microspheres. By dynamically optimizing the irradiation conditions, the approach enables the writing of complex patterns with sub-wavelength precision (<500 nm) while achieving massive

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parallelization of the fabrication process.

LTh3D.8 • 16:15

Opportunities and Challenges in Processing Glass Substrates with a Femtosecond Laser, Deividas

Andriukaitis¹, Juozas Dudutis², Migle Mackeviciute², Aleksandras Kondratas²; ¹*Ekspla, Lithuania;*

²*Valstybinis Moksliniu Tyrimu Institutas Fiziniu Ir Technologijos Mokslu Centras, Lithuania.* Femtosecond

lasers enable precision glass machining. This study investigates: Selective Laser Etching (SLE) for through-glass vias, direct ablation for volume milling, and Bessel-beam scribing for separation. We evaluate process reliability, throughput vs. quality trade-offs, and the parameter flexibility necessary for task-specific optimization.