# Optica Laser Congress
# Session Guide

**Disclaimer**: this guide is limited to technical program with abstracts and author blocks as of 17 October. For updated and complete information with special events, reference the online schedule or mobile app.

## Monday, 20 October

**08:30 -- 10:30**
**Room: South Hall 3C**
**AM1A • From 2 µm to Mid-IR Lasers**
*Presider: Martin Bernier; Université Laval, Canada*

**AM1A.1 • 08:30**
**Picosecond Passive Mode-Locking of a Ho:ZBLAN Waveguide Chip Laser at 2042 nm,** Junha Jung[1,2], Dale E. Otten[2], Wenqi Zhang[2], Ju Han Lee[1], David G. Lancaster[2,3]; *[1]Univ. of Seoul, South Korea; [2]Laser Physics and Photonics Devices Laboratory, Univ. of South Australia, Australia; [3]ARC Centre of Excellence in Microcomb Breakthrough Science (COMBS), Australia.* We demonstrate a passively mode-locked Ho:ZBLAN waveguide chip laser at 2042 nm. By using a combination of a SESAM and a ZnSe-plate dispersion compensator within a folded cavity. 3.1-ps pulses were obtained at 448-MHz.

**AM1A.2 • 08:45**
**Thulium Waveguide Laser Operating With a Birefringent Bragg Reflector,** Ji Eun Bae[1], Pavel Loiko[1], Carolina Romero[2], Javier R. Vázquez de Aldana[2], Xavier Mateos[3], Alain Braud[1], Patrice Camy[1]; *[1]CIMAP-CNRS-Université de Caen Normandie, France; [2]Universidad de Salamanca, Spain; [3]Universitat Rovira i Virgili, Spain.* Depressed-cladding channel waveguides with a birefringent Bragg reflector are inscribed in $Tm^{3+}$-doped monoclinic double tungstate crystals by ultrafast-laser inscription. Dual-polarization, narrow-linewidth laser operation is achieved in such waveguides at 1.9 µm.

**AM1A.3 • 09:00**
**Mid-Infrared Soliton Mode-Locked $Er^{3+}$: ZBLAN Fiber Laser Using Graphene Saturable Absorbers,** Saad Hatim[1], Tristan Guezennec[1], Kirill Eremeev[1], Marie Guionie[1], Said Idlahcen[1,2], Pierre-Henry Hanzard[1], Thomas Godin[1], Thibaud Berthelot[2], Solenn Cozic[2], samuel Pouain[2], Ammar Hideur[1]; *[1]CORIA CNRS UMR6614, Université de Rouen Normandie, France; [2]Le Verre Fluoré, France.* We report on a soliton mode-locked Erbium fluoride fiber laser featuring a graphene-based saturable absorber mirror and operating at 3.46 µm wavelength. Sub-picosecond pulses with 14 nm width are generated.

**AM1A.4 • 09:15**
**All-Fiber Short Pulsed DBR Laser at 2.8 µm,** Yigit O. Aydin[2,1], Pascal Paradis[2], Ray Hua[1], Samansa Maneshi[1], R.J.Dwayne Miller[1,3], Darren Kraemer[4], Réal Vallée[2], Martin Bernier[2]; *[1]Department of Chemistry, Univ. of Toronto, Canada; [2]Center for Optics, Photonics and Lasers (COPL), Université Laval, Canada; [3]Department of Physics, Univ. of Toronto, Canada; [4]Light Matter Interaction Inc., Canada.* We demonstrate an all-fiber gain-switched fluoride laser cavity generating 124 ns pulses at 2825 nm. This simple laser is based on core-pumping of a short distributed Bragg reflector cavity and has the potential for shorter pulses with higher output powers.

**AM1A.5 • 09:30**
**Diode-Pumped Mid-Infrared Tm:CALYO Laser Broadly Tunable Across 2.2 – 2.5 µm,** Zeshang Ji[3], Kirill Eremeev[2], Zhongben Pan[3], Pavel Loiko[1], Xiaoxu Yu[3], Hongwei Chu[3], Han Pan[3], Ammar Hideur[2], Patrice Camy[1], Dechun Li[3]; *[1]CIMAP-ENSICAEN, France; [2]CORIA-CNRS-INSA-Université de Rouen Normandie, France; [3]Shandong Univ., China.* A diode-pumped Tm:$CaYAlO_4$ laser operating on the $^3H_4 \rightarrow {}^3H_5$ transition generated 1.10 W at 2.32 µm and its emission wavelength was tuned across 2254–2512 nm for π-polarization. The polarized spectroscopic properties of $Tm^{3+}$ ions were determined.

**AM1A.6 • 09:45**
**Watt-Level Polarization-Maintaining $Er^{3+}$: ZBLAN Fiber Laser Tunable From 3.4 µm to 3.7 µm,** Saad Hatim[1], Tristan Guezennec[1], Kirill Eremeev[1], Marie Guionie[1], Said Idlahcen[1], Pierre-Henry Hanzard[1], Thomas Godin[1], Thibaud Berthelot[2], Solenn Cozic[2], samuel Pouain[2], Ammar Hideur[1]; *[1]CORIA CNRS UMR6614, Université de Rouen Normandie, France; [2]Le Verre Fluoré, France.* We report a polarization maintaining Erbium fiber laser for emissions at 3.4-3.7 µm. A 337 nm tuning range and watt-level output power is demonstrated. The polarization extinction ratio (PER) is higher than 21 dB over the whole tuning range.

**AM1A.7 • 10:00 (Invited)**
**Generation of High Energy Short and Ultrashort Pulses Using Mid-IR Fiber Amplifiers,** Yu Bai[1], Bohan Zhou[1], Weizhi Du[1], Yifan Cui[1], Almantas Galvanauskas[1]; *[1]Univ. of Michigan, USA.* In this talk we review state-of-the-art in mid-IR Er:ZBLAN fiber amplifiers of mJ-energy short (nanosecond) and sub-mJ energy ultrashort (femtosecond) pulses at ~3µm, and discuss core-size scaling for robust single-mode operation in mid-IR.

## 08:30 -- 10:30
## Room: South Hall 3B
## LM1B • Laser-Beam Delivery and Beam Manipulation of High-Power Laser Beams
*Presider: Bryan Germann; Aerotech Inc, USA*

**LM1B.1 • 08:30 (Invited)**
**Industrial 1 kW 10 mJ Ultrafast Laser for Novel Application Regimes,** Dominik Bauer[1], Daniel Grossmann[1], Benjamin Dannecker[1], Michael Scharun[1], Malte Kumkar[1], Marc Sailer[1], Steffen Ruebling[1], Klaus Albers[1]; *[1]TRUMPF Laser SE, Germany.* Ultrafast lasers with tens of millijoules of pulse energy emerge to open new application fields such as generation of EUV or X-ray radiation or large-scale surface processing. A system that delivers 10 mJ of pulse energy at 1 ps pulse length and 100 kHz repetition rate and full flexibility up to 50 MHz and various burst patterns has been realized with M2<1.3 for all configurations. With this system various novel application tests, strategies and regimes have been evaluated and will be presented.

**LM1B.2 • 08:50 (Invited)**
**Ultra-Fast Material Processing with Polygon Mirror Scanners and High-Power Lasers,** Florian Rößler[1], Sascha Kloetzer[1,2], Robby Ebert[2], André Streek[1,2]; *[1]MOEWE Optical Solutions GmbH, Germany; [2]Laser Inst. of Univ. of Applied Science Mittweida, Germany.* Polygon scanners enable the distribution of multi-kilowatt laser radiation with speeds up to 1,000 m/s. In manufacturing, laser processes can be driven towards high throughput in

macro and micro machining without thermal damaging the substrate.

**LM1B.3 • 09:10 (Invited)**
**Innovative All-Reflective Laser Beam Shaping for Laser Microprocessing,** Frederik Wolf[1]; [1]*Midel Photonics GmbH, Germany*. We present an all-reflective laser beam shaping technology using micro-structured mirrors for high-power lasers, enabling efficient, thermally robust beam shaping and maximizing performance in advanced laser micro-processing applications.

**LM1B.4 • 09:30 (Invited)**
**Manufactures Optics for Scanners and Free Space Beam Lines,** Jurgen Stollhof[1]; [1]*Sill Optics GmbH, Germany.* Abstract not available.

**LM1B.5 • 09:50**
**Spatial and Temporal Shaping of Femtosecond Pulses for Higher Efficiency in Batteries Manufacturing,** Eric Audouard[1], Marie Fleureau[1], Quentin Mocaer[1], Vincent Rouffiange[1]; [1]*Amplitude, France.* This work presents new results for electrode cutting and structuring by high-power femtosecond laser pulses (100-300 W). The interest of temporal shaping of pulses (bursts of pulses) and spatial shaping (beam splitting for multi-spot processing).

**11:30 -- 12:30**
**Room: South Hall 3C**
**JM2A • Joint Plenary Session I**
*Presider: Gabrielle Thomas; Menlo Systems GmbH, Germany*

**JM2A.1 • 11:30 (Plenary)**
**Solid-State Lasers and Their Applications at the Czech Technical Univ. in Prague,** Helena Jelinkova[1]; [1]*Technical Univ. Prague, Czechia.* An overview of solid-state lasers development for satellites laser ranging, medicine, and research of novel laser-active materials for visible, near- and mid-infrared regions will be given. Developed lasers were also used in nonlinear optics.

**14:00 -- 16:00**
**Room: South Hall 3C**
**AM3A • Thulium and Holmium Doped Lasers**
*Presider: Mark Dubinskii; US Army Research Laboratory, USA*

**AM3A.1 • 14:00**
**Trivalent Thulium: Old Laser Transitions Revisited,** Sascha Kalusniak[1], Moritz Badtke[1], Hiroki Tanaka[1], Christian Kraenkel[1]; [1]*Leibniz-Institut für Kristallzüchtung, Germany.* We review the prospects of higher Stark multiplets of $Tm^{3+}$ as upper laser levels. We introduce the spectroscopic properties of the relevant transitions and review the state of the art of such lasers including our latest results.

**AM3A.2 • 14:15**
**Watt-Level Co-Lasing Operation of a $Tm^{3+}$:$LiYF_4$ Channeled Waveguide Laser at 1.9 and 2.3 µm,** Berke Ayevi[1], Yagiz Morova[1,2], Melih K. Kadioglu[1], Eugenio Damiano[3], Mauro Tonelli[3], Alphan Sennaroglu[4]; *[1]Laser Research Laboratory, Departments of Physics and Electrical-Electronics Engineering, Koç Universitesi, Turkey; [2]Physics Department, Istanbul Technical Univ., Turkey; [3]MEGA Materials, Italy; [4]Koç Univ. Surface Science and Technology Center (KUYTAM), Koc Univ., Turkey.* We report the first watt-level co-lasing operation of a continuous-wave femtosecond laser inscribed $Tm^{3+}$:$LiYF_4$ waveguide laser near 1.9 and 2.3 µm with a combined output power of 1.24 W and power slope efficiency of 43%.

**AM3A.3 • 14:30 (Invited)**
**Broadly Tunable Thulium Lasers at 2.3 µm and 1.9 µm,** Alphan Sennaroglu[1], Yagiz Morova[1,2], Berke Ayevi[1], Faik Derya Ince[1], Eylul Nihan Kamun[1], Melih K. Kadioglu[1], Mevlana Yunus Uludag[1], Berna Morova[2], Eugenio Damiano[3], Mauro Tonelli[3]; *[1]Laser Research Laboratory, Koç Universitesi, Turkey; [2]Istanbul Technical Univ., Turkey; [3]Megamaterials s.r.l and Univ. of Pisa, Italy.* We present our recent experimental results obtained with $Tm^{3+}$-doped lasers at 1.9 µm and 2.3 µm, including continuous-wave and pulsed operation in waveguide as well as bulk geometries, conventional and upconversion pumping, co-lasing, and tunability.

**AM3A.4 • 15:00**
**Spectroscopy and Broadly Tunable Laser Operation of Heavily $Tm^{3+}$-Doped Germanate Glasses,** Simone Normani[1], Pavel Loiko[1], Venkatesan Jambunathan[1], Davide Janner[2], Alain Braud[1], Patrice Camy[1], Nadia G. Boetti[3], Joris Lousteau[4]; *[1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, France; [2]Inst. of Materials Physics and Engineering (DISAT) - Politecnico di Torino, Italy; [3]Fondazione LINKS, Italy; [4]Politecnico di Milano, Italy.* We report on spectroscopy and laser operation of novel $Tm^{3+}$-doped germanate glasses. The continuous-wave bulk Tm-glass laser generated 316 mW at 1.92 µm with a slope efficiency of 35.2% and was tuned across 1854-2032 nm.

**AM3A.5 • 15:15**
**Wavelength Tuning of 253 nm in Czochralski-Grown $Tm^{3+}$:$YScO_3$ Around 2.1 µm,** Sascha Kalusniak[1], Ines Arlt[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We demonstrate continuous-wave 2.1-µm laser operation of $Tm^{3+}$:$YScO_3$ with up to 66% slope efficiency and realize a wavelength tuning range of 253 nm between 1933 nm and 2186 nm.

**AM3A.6 • 15:30**
**Continuous-Wave Generation and Wavelength Tunability of Resonantly Diode Pumped Tm,Ho:GGAG Laser,** Jan Kratochvíl[1], Dominika Popelová[1], Pavel Boháček[2], Jan Sulc[1], Michal Nemec[1], Helena Jelinkova[1], Bohumil Trunda[2], Lubomír Havlák[2], Karel Jurek[3], Martin Nikl[3]; *[1]Czech Technical Univ. in Prague, Faculty of Nuclear Sciences and Physical Engineering, Czechia; [2]Inst. of Physics of the Czech Academy of Sciences, Division of Condensed Matter Physics, Czechia; [3]Inst. of Physics of the Czech Academy of Sciences, Division of Solid State Physics, Czechia.* Resonant diode pumping at 1.7 µm was used to obtain efficient 2.1 µm continuous-wave laser based on the Tm, Ho:GGAG disordered garnet crystal. Output power of 2.45 W, slope efficiency of 33% and wavelength tunability range of 2008–2114 nm were achieved.

**AM3A.7 • 15:45**
**7-Rod-Core Thulium-Doped Fiber for Enhanced Fiber Laser Cooling,** Ivo Barton[1], Jan Aubrecht[1], Bara Svejkarova[1], Jan Pokorny[1], Michal Kamaradek[1], Ondrej Podrazky[1], Ivan Kasik[1], Martin Grábner[1], Pavel Peterka[1]; *[1]Inst. of Photonics and Electroncis of the CAS, Czechia.* Structured-core thulium-doped fibers aimed at lower heat load, shorter wavelength operation, and pedestal-free design were developed. Laser slope efficiency of 52% at 1907 nm was demonstrated in a proof-of-principle experiment.

## 14:00 -- 16:00
## Room: South Hall 3B
## LM3B • Additive Laser-Based Processing: From Large Scale to Micro Nano Material Processing I
*Presider: Ruth Houbertz; ThinkMade Engineering & Consulting, Germany*

**LM3B.1 • 14:00 (Invited)**
**Aligned Additive Microfabrication for Advanced Research and Industrial Manufacturing,** Martin Hermatschweiler[1]; *[1]Nanoscribe GmbH & Co. KG, Germany.* Recent advancements in two-photon polymerization (2PP) enable groundbreaking research and high-throughput industrial manufacturing. Applications span from ultra-precise fusion targets to high-performance optical couplers in optics and photonics.

**LM3B.2 • 14:30 (Invited)**
**OPTIMAL - an Automated Maskless Laser Lithography Platform for First Time Right Mixed Scale Patterning,** Paul Hartmann[1]; *[1]Joanneum Research Forschungsgesellschaft, Austria.* The OPTIMAL platform integrates different laser lithography technologies (Grey scale, TPA, interference), QM-systems and processes with self-learning algorithms to develop novel multiscale micro-and nanostructures for applications like freeform optics, photonics, multifunctional surfaces, lab-on-chip, or AR/VR.

**LM3B.3 • 15:00 (Invited)**
**Simulation-Assisted Adaptive Processing and Closed-Loop Control in Laser Powder Bed Fusion,** Tobias Baranzke[1]; *[1]Aconity3D GmbH, Germany.* Combining thermal simulation with real-time thermal emission measurements enables intelligent process control in the L-PBF process. This method aims to minimise the likelihood of errors occurring and support a proactive approach to quality control.

## 14:00 -- 16:00
## Room: South Hall 3A
## LsM3C • Remote Sensing I
*Presider: Nicolas Riviere; Office Natl d'Etudes Rech Aerospatiales, France*

**LsM3C.1 • 14:00 (Invited)**
**ESA's Aeolus Mission: Unveiling Laser and Spectrometer Performance in the First Wind Lidar in Space,** Benjamin Witschas[1], Oliver Lux[1], Christian Lemmerz[1], Oliver Reitebuch[1], Michael Vaughan[2]; *[1]German Aerospace Center (DLR), Germany; [2]Optical & Lidar Associates*

*OLA, UK.* ESA's Aeolus mission (2018–2023) successfully demonstrated that spaceborne wind lidar significantly improvs numerical weather prediction. This presentation details the laser and spectrometer performance and shares key lessons learned to inform future atmospheric lidar missions.

**LsM3C.2 • 14:30 (Invited)**
**Aeolus Validation With the DLR Airborne Doppler Wind Lidar,** Christian Lemmerz[1], Benjamin Witschas[1], Oliver Lux[1], Stephan Rahm[1], Uwe Marksteiner[1], Andreas Schäfler[1], Thorsten Fehr[2], Oliver Reitebuch[1]; *[1]DLR German Aerospace Center, Germany; [2]ESA, Netherlands.* Airborne campaigns validated wind products of ESA's Aeolus mission. The aircraft featured two Doppler wind lidars, utilizing UV laser-based direct detection, and scanning 2 µm heterodyne detection technologies for atmospheric wind profiles remote sensing.

**LsM3C.3 • 15:00**
**Signal-to-Noise Ratio Increase in Coherent Doppler Wind Lidar Using Increased SBS Threshold, Compression Gradient Fiber Amplifier,** William Patiño-Rosas[1], Anasthase Liméry[1], Laurent Lombard[1]; *[1]DOTA, ONERA, Université Paris Saclay, France.* We previously demonstrated the use of a compression gradient fiber amplifier (CGFA) to achieve high peak power through SBS-mitigation. We present in this work the integration of a CGFA into a coherent Doppler wind lidar (CDWL) system to enhance detection range and improve signal-to-noise ratio and wind estimation precision compared to standard fiber amplifier.

**LsM3C.4 • 15:15 (Invited)**
**Telescope Downtime Recovery Using Nonlinear Wavefront Sensing,** Justin Crepp[1]; *[1]Univ. of Notre Dame, USA.* We study different wavefront sensor technologies in turbulent environments where scintillation and branch points impact sensing performance. Nonlinear reconstructors improve sensitivity and reduce telescope downtime, benefitting a broad range of applications.

**LsM3C.5 • 15:45**
**FMCW LiDAR Using a Monolithically InP Integrated Tunable Laser for CO2 Detection With High Spectral Resolution,** Yu Han[1], Limeng Zhang[1], victor D. Calzadilla[1]; *[1]Eindhoven Hendrik Casimir Inst., Eindhoven Univ. of Technology, Netherlands.* We demonstrated that FMCW LiDAR using an integrated tunable laser and the window-moving approach can profile the CO2 absorption line at 1572.335nm with a 0.9-pm spectral resolution and a 5-µs data acquisition time.

## 16:30 -- 18:30
## Room: South Hall 3C
## AM4A • High Energy/Power 1 µm and Facility-Sized Lasers
*Presider: Tino Eidam; Active Fiber Systems GmbH, Germany*

**AM4A.1 • 16:30**
**300 W, 100 mJ, 427 fs Cryogenic Yb:YLF Laser System ,** Mikhail Pergament[1], Martin Kellert[1], Alexey Yakovlev[1], Jelto Thesinga[1], Franz Kärtner[1,2]; *[1]Center for Free Electron Laser Science, Germany; [2]Center for Ultrafast Imaging and Department of Physics, Universität Hamburg, Germany.* We report on the development of a cryogenic Yb:YLF laser system delivering 100 mJ, 427 fs pulses at 300 W average power. The system comprises three main units, and their

design and performance are discussed.

**AM4A.2 • 17:00**
**a 1 kHz, 0.1 TW Peak Power Yb: CALGO Dual Crystal Regenerative Amplifier,** Jiajun Song[1], Tianze Xu[1], Yujie Peng[1], Yuxin Leng[1]; *[1]Shanghai Inst. of Optics and Fine Mechanics (SIOM), Chinese Academy of Sciences (CAS), China.* We present a Yb: CALGO regenerative amplifier system achieving a peak power of 0.1 TW at 1 kHz repetition rate, representing the highest peak power ever demonstrated from a Yb: CALGO-based regenerative amplifier to date.

**AM4A.3 • 17:15**
**Burst-Mode, Ultra-Short, Tunable UV-VIS Pump-Probe Laser for FLASH Free Electron Laser,** Yujiao Jiang[1], Joleik Nordmann[2], Marcus Seidel[1,3], Oender Akcaalan[1], Ayhan Tajalli[1], Hamid Rashtabadi[1], Terry Mullins[1], Christian Brahms[2], John C. Travers[2], Ingmar Hartl[1], Huseyin Cankaya[1]; *[1]Deutsches Elektronen-Synchrotron DESY, Germany; [2]School of Engineering and Physical Sciences, Heriot-Watt Univ., UK; [3]Helmholtz Inst. Jena, Germany.* We report the generation of resonant dispersive wave emission in burst mode from hollow-core waveguide, producing a tunable spectrum spanning from 242 nm to 440 nm, with pulse energies reaching up to 12.6 µJ at 100 kHz.

**AM4A.4 • 17:30**
**Characterization of Spatio-Spectral Couplings in few- to Single-Cycle Laser Pulses From Visible to mid-Infrared,** Levente Lehotai[1], Bálint Kiss[1], Miguel Miranda[3], Matias Charrut[3], Rajaram Shrestha[1], Jie Meng[1], Paulo-Tiago Guirreiro[3], Rosa Romero[3], Imre Seres[1], Barnabás Gilicze[1], Eric Cormier[1,2], Adam Borzsonyi[1], Roland Nagymihály[1]; *[1]ELI ERIC, ALPS Facility, Hungary; [2]Laboratoire Photonique Numérique et Nanosciences (LP2N), UMR 5298, CNRS-IOGS-Université Bordeaux, France; [3]Sphere Ultrafast Photonics, Portugal.* Spatially resolved Fourier transform spectroscopy was implemented in a versatile setup, where only swapping the detector allows for spatio-spectral characterization of few- to single-cycle pulses from 400 to 4500 nm with an advanced processing method.

**AM4A.5 • 17:45**
**On-Target Performance of the 1 kHz, 15 TW SYLOS 3 System at ELI-ALPS,** Szabolcs Tóth[1], Indranuj Dey[1], Mojtaba Shirozhan[1], Sudipta Mondal[2], Janos Csontos[1], Prabhash P. Geetha[1], László T. Tóth[1], Tamás Somoskoi[1], István Dóra[1], Balázs Kovalovszki[1], Dániel Abt[1], Subhendu Kahaly[1], Adam Borzsonyi[1]; *[1]ELI-ALPS, Hungary; [2]Anubal Fusion Pvt. Ltd., India.* SYLOS3 delivers 8 fs, CEP-stabilized pulses for laser–plasma experiments. A vacuum f-to-2f interferometer ensures <150 mrad CEP noise via active feedback. On-target diagnostics include focal spot and pulse contrast characterization.

**AM4A.6 • 18:00**
**Status Update on the Commissioning of a High Energy Ti:Sa Amplifier in the EPAC Facility,** Danielle L. Clarke[1], Paul Mason[1], Robert Heathcote[1], Luke McHugh[1], Thomas B[1], Cristina Hernandez-Gomez[1], John Collier[1]; *[1]STFC Rutherford Appleton Laboratory, UK.* We provide an update on the commissioning status of the high energy titanium-doped sapphire amplifier for a petawatt-level laser in the EPAC facility designed to operate at pulse rates up to 10 Hz.

**AM4A.7 • 18:15**
**Arrival Time Analysis of the Pump-Probe Laser at the SPB/SFX Experiment at the EuXFEL,** David Schwickert[1], Anne-Laure Calendron[1], Jayanath Koliyadu[2], Romain Letrun[2], Tomas Popelar[2], Tokushi Sato[2], Jinxiong Wang[2], Ulrike Wegner[2], Daniel Kane[2], Dimitrios Rompotis[2], Radu-Costin Saraceanu[2], Max Lederer[2], Sebastian Schulz[1], Holger Schlarb[1]; *[1]Deutsches Elektronen-Synchrotron DESY, Germany; [2]European XFEL GmbH, Germany.* The arrival time of the 50 fs pulses of an 800 nm pump-probe laser is measured after transport with respect to a synchronization reference. The measurements show that great care has to be taken to the beamline implementation.

## 16:30 -- 18:30
## Room: South Hall 3B
## LM4B • Additive Laser-Based Processing: From Large Scale to Micro Nano Material Processing II
*Presider: Ruth Houbertz; ThinkMade Engineering & Consulting, Germany*

**LM4B.1 • 16:30 (Invited)**
**Multiphoton Lithography for Biomedical Applications,** Aleksandr Ovsianikov[1]; *[1]Technische Universität Wien, Austria.* The recent breakthroughs on the material and hardware development side provide new opportunities for biomedical applications of high-resolution 3D printing using femtosecond lasers. In this contribution, the recent progress in this area will be discussed.

**LM4B.2 • 17:00 (Invited)**
**Birefringence — Asymmetric Woodpile and Beyond,** Darius Gailevičius[1], Domas Paipulas[1], Maciej Kretkowski[2], Saulius Juodkazis[3,1], Vygantas Mizeikis[2]; *[1]Laser Research Center, Faculty of Physics, Vilnius Univ., Lithuania; [2]Research Inst. of Electronics, Shizuoka Univ., Japan; [3]Optical Sciences Centre, School of Science, Swinburne Univ. of Technology, Australia.* We demonstrate the 3D laser printing of form-birefringent photonic metastructures using mechanically stable 3D photonic crystals. This approach overcomes the instability of 1D gratings, enabling the fabrication of compact, functional Q-plates and phase retarders in polymer.

**LM4B.3 • 17:30 (Invited)**
**3D Micro & Nano Printing With Light,** Maria Farsari[1]; *[1]FORTH/IESL, Greece.* Multiphoton Polymerization is an advanced micro- and nano-fabrication technique revolutionizing diverse fields from integrated photonics to biomedical engineering. It enables precise 3D structure writing in photosensitive materials, facilitating complex optical circuits, photonic crystals, and tissue scaffolds for regenerative medicine.

**16:30 -- 18:30**
**Room: South Hall 3A**
**LsM4C • Free Space Optical Communications I**
*Presider: Miranda van Iersel; New Mexico State Univ., USA*

**LsM4C.1 • 16:30 (Invited)**
**Effects of Adaptive Optics on Performance of Laser Satellite Communications,** Muhsin C. Gökçe[1,2], Rudolf Saathof[3]; *[1]Geoscience and Remote Sensing, Delft Univ. of Technology, Netherlands; [2]Electrical-Electronics Engineering, TED Univ., Turkey; [3]Space Systems Engineering, Delft Univ. of Technology, Netherlands.* We investigate Gaussian beam propagation from the ground to a LEO satellite, analyzing beam footprint, Strehl ratio, scintillation index, and bit-error rate under atmospheric turbulence with adaptive optics (AO) applied at the transmitter.

**LsM4C.2 • 17:00**
**Heterodyne Wavefront Sensor for High-Speed and Low-Light Applications,** Douglas McDonald[1], Raphael Bellossi[1], Andreas Zepp[1], Jürgen Zoz[2], Szymon Gladysz[1]; *[1]Fraunhofer IOSB, Germany; [2]MBDA Deutschland GmbH, Germany.* The heterodyne wavefront sensor works by frequency shifting a reference beam and combining it with the beam that has propagated through the atmosphere. The detection process results in a time-varying intensity pattern containing the phase.

**LsM4C.3 • 17:15**
**Performance of Binary Polarization Shift Keying in a Free-Space Optical Link Under Turbulence,** Jaime A. Anguita[1,2], Carlos Pirela[1,2], Kei B. Sawada[1,2]; *[1]Universidad de los Andes (Chile), Chile; [2]Millennium Inst. for Research in Optics, Chile.* We evaluate the performance of polarization-based modulation at 200 Mb/s over an optical free-space link with emulated turbulence in the lab. Detection uses thresholding from received noisy data without prior knowledge. A 1 km outdoor test is underway to assess system robustness in real conditions. Full results will be presented at the conference.

**LsM4C.4 • 17:30 (Student Paper Finalist)**
**Positional Encoding for Improved Perturbation-Dependent Phase Prediction in Multimode Fiber,** Joshua R. Jandrell[1], Mitchell A. Cox[1]; *[1]Univ. of the Witwatersrand, South Africa.* Traditional neural networks struggle to learn the complex phase shifts with respect to perturbations in multimode fiber. We provide a neural network with positionally encoded frequency features enabling it to learn these complex-valued fluctuations.

**LsM4C.5 • 17:45**
**Efficiency of Thrust Force Generation by Nanosecond Laser-Induced Ablation to Carbon Fiber Reinforced Plastic (CFRP) for Space Debris Control,** Hiroshi Kasuga[1], Tomohiro Tsukihana[1], Hideaki Yamane[1], Katsuhiko Tsuno[1], Yutaka Nagata[1], Noriko Kurose[1], Tatsuya Shinozaki[1], Norihito Saito[1], Takayo Ogawa[1], Satoshi Wada[1]; *[1]RIKEN, Japan.* Laser-induced ablation was used as source of thrust force to control space debris. In comparison with wavelength, higher conversion efficiency into thrust force for CFRP was 266nm in Nd:YAG nanosecond laser after the second irradiation.

## Tuesday, 21 October

**08:30 -- 10:30**
**Room: South Hall 3C**
**ATu1A • Pulse Compression & Coherent Beam Combination**
*Presider: Adam Borzsonyi; ELI-Hu Nonprofit Kft, Hungary*

**ATu1A.1 • 08:30**
**100 kHz, 100 W Yb:CALGO Femtosecond Amplifier,** JiaLiang Zhou[1], Geyang Wang[1], Wenlong Tian[1], Yang Yu[1], Jiangfeng Zhu[1], Zhiyi Wei[2]; *[1]Xidian Univ., China; [2]Inst. of Physics, Chinese Academy of Sciences, China.* This work reported on the demonstration of a high-power Yb:CALGO based two-stage multi-pass amplifier. 46-W seed laser was amplified to 110-W at 100 kHz and its pulse duration after compression was 209-fs.

**ATu1A.2 • 08:45**
**Chirped Pulse Amplification of 100 fs Pulses in Yb:CALYGLO at kHz and MHz Repetition Rate,** Dimitar Velkov[1], Jan Bartonicek[5,6], Lyuben Petrov[1,2], Marta Mladenova[1], Anton Trifonov[3], Xiaodong Xu[4], Ivan Buchvarov[1,2]; *[1]Sofia Univ. St. Kliment Ohridski, Bulgaria; [2]John Atanasoff Center for Bio and Nano Photonics (JAC BNP), Bulgaria; [3]IBPhotonics Ltd., Bulgaria; [4]Jiangsu Normal Univ., China; [5]Extreme Light Infrastructure ERIC, Czechia; [6]Department of Physics, Czech Technical Univ., Czechia.* The chirped pulse amplification performance of the Yb:CALYGLO crystal, proposed as an enhanced alternative to Yb:CALYO, is demonstrated at two distinct repetition rates: 1 kHz and 1 MHz.

**ATu1A.3 • 09:00 (Invited)**
**High-Energy, High-Average-Power Amplifiers at kHz Repetition Rate and Their Nonlinear Pulse Compression,** Gaia Barbiero[1], Mikhail Osolodkov[1], Eva Marie Bayer[1], Jessica Meier[1], Abel Hailu Woldegeorgis[1], Jonas Manz[1], Catherine Yuriko Teisset[1], Sandro Klingebiel[1], Thomas Metzger[1]; *[1]TRUMPF Scientific Laser GmbH + Co KG, Germany.* We present the latest advancements in Yb-doped thin-disk amplifiers and nonlinear pulse compression using gas- and bulk-based multipass cells, achieving sub-50 fs pulses at kHz rates and high energy and average power.

**ATu1A.4 • 09:30**
**Approaching kW-Class Two-Cycle Fiber Lasers at ELI ALPS,** Imre Seres[1], Barnabás Gilicze[1], Tamás Bartyik[1], Zsolt Bengery[1], Zsolt Kovács[1], Bernát Vinkó[1], Zoltán Várallyay[1], Péter Jójárt[1], Adam Borzsonyi[1], Evgeny Shestaev[2], Maxim Tschernajew[2], Nico Walther[2], Christian Gaida[2], Sven Breitkopf[2], Tino Eidam[2], Jens Limpert[2], Katalin Varjú[1], Gábor Szabó[1]; *[1]ELI-ALPS, ELI-HU Non-Profit Ltd., Hungary; [2]Active Fiber Systems, Germany.* ELI ALPS provides several hundreds of watts, fiber-based few cycle pulses at 100 kHz repetition rate. HR2 recently reached 4mJ, 6.8fs pulses with excellent beam profile. Beamtime is available through ELI ERIC user calls.

**ATu1A.5 • 09:45**
**Tailoring Coherent Beam Combined Fiber Laser Pulse Trains for Laser-Matter Interaction Applications,** Corentin Lechevalier[1], Ihsan Fsaifes[1], Jordan Andrieu[1], Claude-Alban Ranély-Vergé-Dépré[1], Igor Jovanovic[2], Jean-Christophe Chanteloup[1]; *[1]Ecole Polytechnique,*

*France; [2]Gérard Mourou Center for Ultrafast Optical Science, USA.* We report on a versatile coherently combined ultrashort fiber laser allowing an independent peak and average power adjustment, pulse-on-demand, and repetition rate management, needed for laser-matter interaction applications.

**ATu1A.6 • 10:00**
**Divided Pulse Amplification With Phase Detection Using Second Harmonic Generation,** Haruyuki Miyake[1], Ohki Iguchi[1], Henrik Tünnermann[2], Akira Shirakawa[1]; *[1]The Univ. of Electro-Communications, Japan; [2]Deutsches Elektronen-Synchrotron (DESY), Germany.* Divided pulse amplification with 4 or more division with modulation-free, all optical detection of phase differences between divided pulses using second harmonic generation was experimentally demonstrated for the first time.

**ATu1A.7 • 10:15**
**Watt-Level sub-30-fs Kerr-Lens Mode-Locked Yb Oscillator,** Huang-Jun Zeng[1], Zhang-Lang Lin[1], Ge Zhang[1], Feifei Yuan[1], Zhoubin Lin[1], Pavel Loiko[3], Xavier Mateos[4], Valentin Petrov[2], Weidong Chen[1,2]; *[1]Fujian Inst of Res Structure of Matter, China; [2]Max Born Inst., Germany; [3]Université de Caen, France; [4]Universitat Rovira i Virgili (URV), Spain.* We report on a Kerr-lens mode-locked Yb:$Gd_2SrAl_2O_7$ laser delivering 28 fs soliton pulses at 1079.1 nm, with an average output power of 1.17 W at a repetition rate of ~61.1 MHz.

## 08:30 -- 10:30
## Room: South Hall 3B
## LTu1B • Brittle Materials Processing
*Presider: Stuart McLean; Coherent Corp, USA*

**LTu1B.1 • 08:30 (Invited)**
**Ultra-High-Speed and Precision Laser Processing of Transparent Materials Through Visualization of Ultrafast Light-Matter Interactions,** Yusuke Ito[1]; *[1]Univ. of Tokyo, Japan.* We demonstrate that by irradiating light with controlled spatial and temporal distributions, the optical properties of the material can be dramatically altered for an ultrashort duration, enabling ultrafast and highly precise machining.

**LTu1B.2 • 09:00 (Invited)**
**Innovative USP Micromachining Strategies for Enhancing Lithium Niobate Crystals for Photonic Applications,** Mareike Schäfer[1]; *[1]Inst Oberflächen und Schichtanalytik, Germany.* This work investigates ultrashort-pulse laser micromachining of lithium niobate to enhance surface properties for photonic applications, focusing on laser parameters and hybrid techniques to optimize waveguide performance and photonic device integration.

**LTu1B.3 • 09:30 (Invited)**
**Laser-Based Manufacturing of Optical Components – State of the Art & Challenges,** Astrid Sassmannshausen[1]; *[1]Fraunhofer-Institut für Lasertechnik, Germany.* Selective laser-induced etching, ultrashort-pulse laser ablation and $CO_2$-laser polishing are combined for the fabrication of complex-shaped optical components. High precision can be achieved by pulse duration and wavelength tuning to machine optical glasses and sapphire.

**LTu1B.4 • 10:00 (Invited)**
**Burst Mode of Femtosecond Laser Pulses as an Enabling Factor for High Quality Industrial Processing of Glass and Silicon Carbide,** Michal Nejbauer[1], Natalia Grudzien[1], Bogusz Stepak[1], Rafal Smolin[1], Yuriy Stepanenko[1]; *[1]Fluence Technology, Poland.* MHz burst mode of femtosecond lasers, together with pulse duration tuning, greatly enhances the processing throughput and quality of various materials, such as silicon carbide, and also leads to high-speed glass cleaving with minimized chipping. In this talk, I will present a general explanation behind it and provide some practical examples.

**08:30 -- 10:30**
**Room: South Hall 3A**
**LsTu1C • Remote Sensing II**
*Presider: Romain Ceolato; Office Natl d'Etudes Rech Aerospatiales, France*

**LsTu1C.1 • 08:30 (Invited)**
**FRESH Air: Hyperlocal Urban Pollution Monitoring - Insights and Implications,** Stephen Holler[1]; *[1]Fordham Univ., USA.* Compact and portable laser-based sensor systems permit the widespread, hyperlocal monitoring of the urban landscape, where complex structures result in varied environmental conditions, while socioeconomic factors have led to asymmetric pollution exposure and health outcomes.

**LsTu1C.2 • 09:00 (Invited)**
**From Energy Fields to Palm Trees With Distributed Fiber-Optic Sensing,** Islam Ashry[1], Chun Hong Kang[1], Boon S. Ooi[1]; *[1]King Abdullah Univ of Sci & Technology, Saudi Arabia.* This talk presents distributed fiber-optic sensing technologies for oil wells, pipelines, and palm plantations. We highlight hybrid DAS–DTS systems and AI-enhanced pest detection, demonstrating scalable, real-time monitoring across energy and agricultural environments.

**LsTu1C.3 • 09:30 (Invited)**
**High Speed Ejecta's Holography,** Nazila Black[1]; *[1]Lawrence Livermore National Laboratory, USA.* Abstract not available.

**LsTu1C.4 • 10:00**
**Advances in Aerosol Characterization With Digital Holography,** Matthew J. Berg[1]; *[1]Kansas State Univ., USA.* Digital holography is a powerful technique to image small particles, several micrometers in size, in a contact-free manner. We apply such imaging to characterize aerosol particles, including the determination of particle shape, size, and concentration. Here we will cover recent advances in this field.

**LsTu1C.5 • 10:15**
**High Performance Dual Comb Spectroscopy Based on Low Noise Cr:ZnS Laser Combs Combined With Real-Time Computational Correction,** Mike Mirov[1], Sergey Vasilyev[1], Igor Moskalev[1], Yury Barnakov[1], Andrey Muraviev[2], Dmitrii Konnov[2], Roderik Krebbers[3], Mathieu Walsh[4], Jerome Genest[4], Simona M. Cristescu[3], Konstantin Vodopyanov[2]; *[1]Mid-IR Laser Group, IPG Photonics Corp, USA; [2]MIR, Mid-Infrared Combs Research Group, CREOL, the College of Optics and Photonics, Univ. of Central Florida, USA; [3]Analytical Chemistry & Chemometrics, Radboud Univ., Netherlands; [4]Electrical and Computer Engineering, Université Laval,*

*Canada.* We report on high resolution Dual Comb Spectroscopy based on low noise, high power mode-locked Cr:ZnS combs leveraging real-time computational correction. The achieved performance sets a new benchmark in long wave IR spectroscopy.

**10:30 -- 11:30**
**Room: Congress Hall Foyer 3 Posters**
**JTu2A • Joint Poster Session I**

**JTu2A.1**
**a Cladding Light Stripper Based on 10/125-µm Double Clad PM Fiber With Ultra-low Backscattering,** Jihwan Kim[1], Ju Han Lee[2,1]; *[1]Kromanet Inc., South Korea; [2]Univ. of Seoul, South Korea.* A cladding light stripper based on 10/125µm PM LMA DCF was fabricated. A ~99.2% stripping efficiency was achieved with and a ~0.14% backward scattering for 50-W residual pump power while the PER degradation was only ~0.7 dB.

**JTu2A.2**
**Controlled Growth and Laser Performance Characterization of 4-Inch ZnGeP2 Single Crystals for Mid-Infrared Nonlinear Applications,** Shichao Cheng[1,3], Chongqiang Zhu[1,3], Zuotao Lei[1,3], Baoquan Yao[2], Chunhui Yang[1,3]; *[1]School of Chemistry and Chemical Engineering, Harbin Inst. of Technology, China; [2]National Key Laboratory of Tunable Laser Technology, Harbin Inst. of Technology, China; [3]MIIT Key Laboratory of Critical Materials Technology for New Energy Conversion and Storage, Harbin Inst. of Technology, China.* A 4-inch ZnGeP2 crystal was grown by the Bridgman method to produce a 25×25×30 $mm^3$ device capable of 200 mJ single pulse energy at 200 Hz high repetition rate mid-wave laser operation.

**JTu2A.3**
**Thermo-Mechanical Properties of Hexagonal $Ba_2Ga_8GeS_{16}$,** Michael Susner[2], Ginka Exner[3], Jonathan Goldstein[2], Aleksandar Grigorov[3], Ryan Siebenaller[2,4], Kentaro Miyata[5], Jani Jesenovec[6], Kevin Zawilski[6], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]WPAFB, USA; [3]Plovdiv Univ., Bulgaria; [4]The Ohio State Univ., USA; [5]RIKEN, Japan; [6]BAE Systems, USA.* Linear thermal expansion in the 76-310 K range and nanohardness and Young's modulus at room temperature are measured for the newly developed quaternary nonlinear crystal $Ba_2Ga_8GeS_{16}$ applicable in the mid-IR part of the spectrum.

**JTu2A.4**
**Growth and OPtical PRoperties of $Co^{2+}$:$ZnGa_2O_4$ SIngle CRystal,** Wenxiang Mu[1]; *[1]Shandong Univ., China.* $Co^{2+}$-doped $ZnGa_2O_4$ crystal was grown by vertical gradient freeze (VGF) method. There was a wide absorption band spanning from 1100 to 1700 nm which making it a highly promising material for 1.5 *µ*m passive Q-switching.

**JTu2A.5**
**Spectral and Laser Properties of $Cr^{2+}$ and $Fe^{2+}$ Doped and $Cr^{2+}$,$Fe^{2+}$ Co-Doped Chalcogenide Host Materials,** Adam Riha[1], Helena Jelinkova[1], Maxim E. Doroshenko[2], Nazar O. Kovalenko[3]; *[1]Dept. of Laser Physics and Photonics, Czech Technical Univ. in Prague, Czechia; [2]General Physics Inst., Russian Academy of Sciences, Russian Federation; [3]Inst. for Single Crystals, National Academy of Sciences of Ukraine, Ukraine.* We report review of mid-IR lasing in the range of ~2.1-6.05 µm from $Cr^{2+}$-, $Fe^{2+}$-, and $Cr^{2+}$,$Fe^{2+}$-doped II-VI chalcogenides.

Detailed comparison of the spectroscopic and laser properties of various laser materials enabling efficient mid-IR lasing is presented.

**JTu2A.6**
**Thermal Properties and Structural Analysis of Room Temperature Bonded Cr:LiSAF/Sapphire Chip Stacks,** Florent Cassouret[1], Yoichi Sato[2,1], Takunori Taira[2,1]; *[1]Inst. for Molecular Science, Japan; [2]Laser-Driven Electron-Acceleration Technology group, Riken SPring-8 Center, Japan.* $Cr^{3+}$:$LiSrAlF_6$ crystal was successfully bonded to a high thermal conductivity oxide crystal ($Al_2O_3$) at room temperature, leading to >2.5x improvement of the effective thermal conductivity of the composite. The bonding interface composition is also discussed.

**JTu2A.7**
**Novel Post-Processing Method for Homogenity Enhancement of Solid-State Laser Gain Media,** Jan Kendík[1], Lukáš Beran[1], Karel Nejezchleb[1]; *[1]CRYTUR spol. s.r.o., Czechia.* Internal stress is inevitably induced in the production of a solid-state gain medium. By polarimetry, we show an effective post-processing method of stress reduction and increase in the extinction ratio of the laser component.

**JTu2A.8**
**Exploring Photodarkening in Barium Chalcogenide Nonlinear Crystals,** Julius Lukosiunas[2,1], Robertas Kananavicius[1], Justinas Ceponkus[3], Jani Jesenovec[4], Rokas Danilevicius[1], Andrejus Michailovas[2,1]; *[1]EKSPLA, Lithuania; [2]Center for Physical Sciences and Technology, Lithuania; [3]Vilnius Univ., Lithuania; [4]BAE systems, Inc., USA*. We investigate photodarkening in BGSe and BGGSe crystals in mid-IR OPA under femtosecond 1030 nm pumping to asses crystal quality and its impact on nonlinear performance and transmission in VIS – mid-IR range.

**JTu2A.9**
**Resonantly Pumped Tunable 2 µm Lasers Based on $Tm^{3+}$- and $Ho^{3+}$-Doped $BaF_2$ and $SrF_2$ Crystals,** Michal Nemec[1], Dominika Popelová[1], Jan Sulc[1], Ngoc Q. Nguyen[2], Pavel Loiko[2], Helena Jelinkova[1], Karel Veselsky[1], Abdelmjid Benayad[2], Patrice Camy[2], Alain Braud[2]; *[1]Czech Technical Univ. in Prague, Czechia; [2]Université de Caen, France.* We report on the tunable 2-µm laser operation of singly $Ho^{3+}$-doped and $Tm^{3+}$,$Ho^{3+}$-codoped $BaF_2$ and $SrF_2$ fluorite-type crystals under 1.68-µm or 1.94-µm resonant pumping. The broadest tuning range was achieved with Tm,Ho:$BaF_2$ laser system.

**JTu2A.10**
Withdrawn

**JTu2A.11**
**Rotating Magnetic Flux Generator for Crystalline Orientation Control and Improved Alignment of Grains in Yb:FAP Ceramics,** Yoichi Sato[1,2], Takunori Taira[1,2]; *[1]RIKEN SPring-8 Center, Japan; [2]Inst. for Molecular Science, Japan.* Orientation control in Yb:FAP ceramics was improved from Lotgering factor of 0.02 to 0.99 by eliminating miss-aligned layer. The non-mechanical generator of rotating magnetic flux for slip-casting in the magnetic orientation control was also investigated.

**JTu2A.12**
**Thermal Conductivity of YSAG, YGAG, YAG, and $Y_2O_3$ Ceramics Compared to YAG and Sapphire Single Crystals,** Yoichi Sato[2], Takunori Taira[1,2], Tomohisa Takemasa[3]; *[1]RIKEN SPring-8 Center, Japan; [2]Inst. for Molecular Science, Japan; [3]Konoshima Chemical Co., Japan.* Thermal conductivities ($\kappa$) of Nd:YSAG and Nd:YGAG ceramics were evaluated to 70% of Nd:YAG ceramics. Although $Y_2O_3$ ceramics has higher $\kappa$ than YAG ceramics, it was inferior to YAG single crystal below 273 K.

**JTu2A.13**
**High-Power Stress-Free Er:YAG Laser Rods,** Mirek Martínek[1], Pavel Psota[2]; *[1]CRYTUR spol. s.r.o., Czechia; [2]Centrum TOPTEC - Ústav fyziky plazmatu AV ČR, v.v.i., Czechia.* An 850nm interferometer was constructed to assess Er:YAG rod WFE. Our results, presented alongside active output energy characteristics, confirm minimal thermal lensing and overall high quality of the rods.

**JTu2A.14**
**Mid-Infrared Emission Properties of $Er^{3+}$,$Dy^{3+}$-Codoped Fluoroindate Glasses,** Ngoc Quynh Hoa NGUYEN[1], Pavel Loiko[1], Thiphanie Rault[2], Jean Letourneur[2], Solenn Cozic[2], Saad Hatim[3], Kirill Eremeev[3], Pierre-Henry Hanzard[3], Tristan Guezennec[3], Thomas Godin[3], Patrice Camy[1], Alain Braud[1], Ammar Hideur[3]; *[1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, 6 Boulevard Maréchal Juin, France; [2]Le Verre Fluoré, rue Gabriel Voisin, Campus de Ker-Lann, France; [3]CORIA UMR 6614, CNRS-INSA-Université de Rouen Normandie, France.* $Er^{3+}$,$Dy^{3+}$-codoped fluoroindate ($InF_3$) glasses exhibit a broad mid-infrared emission extending up to 4 μm, efficient $Er^{3+}\rightarrow Dy^{3+}$ energy transfer, and long $^6H_{13/2}$ $Dy^{3+}$ luminescence lifetimes, making them promising for broadly tunable mid-infrared fiber lasers.

**JTu2A.15**
**Stabilization of All-Silica Waveplates via Atomic Layer Deposition,** Darija Astrauskyte[1], Lina Grineviciute[1]; *[1]Center for Physical Sciences and Technology, Lithuania.* Nanostructured coatings can be applied to produce highly laser-resistant waveplates. However, such components are porous and sensitive to humidity. In this work, we present the stabilization of nanostructured waveplates via atomic layer deposition.

**JTu2A.16**
**Fabrication and Laser Operation of Nd-Doped $(Ca_{0.5}Sr_{0.5})_{10}(PO_4)_6F_2$ Transparent Ceramics,** Hiroaki Furuse[1], Sanae Koizumi[1], Kazuya Takimoto[1,2], Hiroyasu Sone[2]; *[1]National Inst. for Materials Science, Japan; [2]Kitami Inst. of Technology, Japan.* Hexagonal Nd-doped $(Ca_{0.5}Sr_{0.5})_{10}(PO_4)_6F_2$ transparent ceramics was fabricated with fine microstructure, and laser operation at 1060.1 nm was achieved. The emission spectral width (FWHM) was approximately 4.5 nm with a center wavelength of 1061 nm.

**JTu2A.17**
**Green Tb:ZBLAN Fiber Laser,** Moritz Badtke[1], Sascha Kalusniak[1], Hiroki Tanaka[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We report on laser oscillation at 542 nm in a Tb:ZBLAN fiber with 6.5 mW output power and 1.2% slope efficiency with respect to the launched pump power at 486 nm.

**JTu2A.18**
**Lasing Behavior of $Yb^{3+}$-Doped Fluorapatite Ceramics,** Kazuya Takimoto[1,2], Hiroyasu Sone[2], Shinki Nakamura[3], Hiroaki Furuse[1]; *[1]National Inst. for Materials Science, Japan; [2]Kitami Inst. of Technology, Japan; [3]Ibaraki Univ., Japan.* A laser efficiency exceeding 20% was achieved for Yb-doped FAP non-cubic ceramic materials under quasi-continuous wave operation at 1 ms and 10 Hz. The beam profiles and temporal waveforms of the laser were studied.

**JTu2A.19**
**Thermo-Optical Characteristics of Yb:CALYGLO for High-Average-Power Ultrafast Laser Applications,** Kaloyan Georgiev[2], Stephan Shishkov[3], Dimitar Velkov[1], Lyuben Petrov[1,4], Anton Trifonov[5], Xiaodong Xu[6], Ivan Buchvarov[1,4]; *[1]Sofia Univ. St. Kliment Ohridski, Bulgaria; [2]ALPHALAS GmbH, Germany; [3]Inst. of Solid State Physics, BAS, Bulgaria; [4]John Atanasoff Center for Bio and Nano Photonics (JAC BNP), Bulgaria; [5]IBPhotonics Ltd., Bulgaria; [6]Jiangsu Normal Univ., China.* Thermal conductivities of 1.3 at.% Yb:CALYGLO were measured using long-wave infrared thermography and finite element analysis, revealing superior performance over Yb:CALYO and comparable behavior to Yb:CALGO for ultrafast laser applications.

**JTu2A.20**
**Temperature-Dependent Spectroscopy of $Pr^{3+}$:$LiYF_4$,** Ole Hahn[1], Sascha Kalusniak[1], Hiroki Tanaka[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We present high-resolution temperature-dependent spectroscopy of $Pr^{3+}$:$LiYF_4$ from cryogenic to elevated temperatures with a focus on the green laser at 523 nm, which originates from higher thermally populated Stark levels.

**JTu2A.21**
**Advanced Czochralski Growth Strategies for Yb-Doped LYSB Crystals Enabling High-Performance NIR Laser Emission,** Madalin Greculeasa[1], Alin Broasca[1], Flavius Voicu[1], Stefania Hau[1], Cristina Gheorghe[1], Gabriela Croitoru[1], Nicolaie Pavel[1], Lucian Gheorghe[1]; *[1]ECS Laboratory, National Inst. for Laser, Plasma and Radiation Physics, Romania.* Nonlinear optical (NLO) and laser crystals with incongruent melting of pure and Yb-doped $La_xY_ySc_{4-x-y}(BO_3)_4$ - LYSB were grown by the Czochralski method for the first time. Their main NLO properties and laser performances are reported.

**JTu2A.22**
**Undoped, Yb- and Nd-Doped LGSB Czochralski-Grown Nonlinear and Laser Crystals,** Lucian Gheorghe[1], Madalin Greculeasa[1], Alin Broasca[1], Flavius Voicu[1], Stefania Hau[1], Cristina Gheorghe[1], Catalina Susala[1], Gabriela Croitoru[1], Nicolaie Pavel[1]; *[1]INFLPR, ECS Laboratory, Romania.* Pure, Yb- and Nd-doped $La_xGd_ySc_{4-x-y}(BO_3)_4$ incongruent melting nonlinear optical and laser crystals were successfully grown by the Czochralski method, for the first time, and their optical properties and laser performances were evaluated.

**JTu2A.23**
**Automated Detection of Surface Defects on Laser Elements,** Lukas Beran[1], Ondrej Hradecky[2,1], Karel Nejezchleb[1]; *[1]Crytur spol r.o., Czechia; [2]Technical Univ. of Liberec, Czechia.* This study proposes a cost-effective, high-throughput method for detecting surface defects on polished laser rods. By integrating digital microscopy with machine learning,

it offers a practical alternative to conventional quality control systems.

**JTu2A.24**
**Ca3(Ta, Ga)5O12:Pr3+ Single Crystal: a Promising new Laser Material in the Visible Domain,** Cristina Gheorghe[1], Stefania Hau[1], Alin Broasca[1], Madalin Greculeasa[1], Flavius Voicu[1], Monica Enculescu[2], Lucian Gheorghe[1]; *[1]Natl Inst Lasers Plasma & Radiation Phys, Romania; [2]National Inst. of Materials Physics, Romania.* $Ca_3(Ta, Ga)_5O_{12}:Pr^{3+}$ single crystal was successfully grown by the Czochralski method, for the first time. Based on the optical properties, the crystal may have high potential for obtaining efficient laser emission in the blue domain.

**JTu2A.25**
**Multipass Cells for few-Cycle Pulses for Scientific Applications,** Christian Grebing[1], Maxim Tschernajew[1], Florian Karl[1], Hongru Hao[1], Hugo Gerisch[1], Stefano Wunderlich[1], Nico Walther[1], Christian Gaida[1], Tino Eidam[1]; *[1]Active Fiber Systems GmbH, Germany.* The efficient generation of high-power few-cycle pulses in single- and double-stage noble gas-filled multipass cells is discussed. High-power compression results for various pulse energies achieved in the 1µm wavelength range are reviewed.

**JTu2A.26**
**Excellent Sensing Capabilities of the Multimodal Optical Temperature Sensor Based on Er3+ ion Emission in the CdF2: Er, Y Crystal,** Stefania Hau[1], Hani Boubekri[4], Madjid DIAF[3], Reda Fartas[2], Cristina Gheorghe[1], Alin Broasca[1]; *[1]National Inst. for Laser, Plasma, and Radiation Physics, Romania; [2]08 May 1945 Univ., Algeria; [3]Laser Physics, Optical Spectroscopy and Optoelectronics Laboratory, Badji Mokhtar Annaba Univ., Algeria; [4]Higher Normal School of Technological Education, Algeria.* Single crystals of CdF2: 1 % Er, x% Y (x = 10, 20) were grown by the Bridgman technique. Multimodal optical temperature sensing studies demonstrate their high potential in low-temperature sensing applications.

**JTu2A.27**
**100 µJ Energy Level, Picosecond Difference Frequency Generation in Wavelength-Tunable or Discrete-Wavelength Setup in a Range From 5 to 13 µm,** Michal Jelínek[1], Milan Frank[1], Václav Kubeček[1], Ondrej Novák[2], Jaroslav Huynh[2], Michal Chyla[2], Martin Smrz[2], Tomas Mocek[2]; *[1]Ceske Vysoke Uceni Technicke v Praze, Czechia; [2]HiLASE Centre, FZU, Czechia.* Picosecond difference frequency generation in $AgGaS_2$, $BaGa_4Se_7$, $LiGaSe_2$, or $LiGaS_2$ crystals with various lengths is presented in wavelength-tunable or narrowband, discrete-wavelength setup in a 5-13 µm range.

**JTu2A.28**
**Temperature-Dependent Spectroscopy and Laser Cooling Potential of $Tm^{3+}$-Doped Fluoride Crystals,** Zoe Liestmann[1], Sascha Kalusniak[1], Christian Kraenkel[1], Hiroki Tanaka[1]; *[1]Leibniz-Institut für Kristallzüchtung (IKZ), Germany.* We investigated the potential of $Tm^{3+}$-doped $LiYF_4$, $BaY_2F_8$, and $KY_3F_{10}$ crystals for solid-state laser cooling based on temperature-dependent spectroscopic properties. $Tm^{3+}:LiYF_4$ exhibits the highest cooling figure of merit, showing its promise for 2-µm optical cryocoolers.

**JTu2A.29**
Withdrawn

**JTu2A.30**
**Temporal Contrast Enhancement by Self-Phase Modulation in a Multi-Pass Cell With Excellent Beam Quality and Pointing Stability,** Jiajun Song[1], Yinfei Liu[1], Yujie Peng[1], Yuxin Leng[1]; *[1]Shanghai Inst of Optics and Fine Mech, China.* We demonstrate temporal contrast enhancement through self-phase modulation and subsequent spectral filtering in a gas-filled multi-pass cell. The filtered pulse exhibits a temporal contrast enhancement of over two orders of magnitude, surpassing 10^9.

**JTu2A.31**
**Superhydrophobic and Self-Cleaning Aluminium Surfaces via Affordable Nanosecond Fibre Laser and Vacuum Treatment,** Krystof Kobliha[1,2], Petr Hauschwitz[1], Radka Bičištová[1], Martin Prochazka[1], Jan Brajer[1], Tomas Mocek[1]; *[1]HiLase, Czechia; [2]CVUT FJFI, Czechia.* The fabrication of superhydrophobic and self-cleaning surfaces is usually made by complex and relatively expensive methods. However, the same properties were induced on an aluminium sample using an affordable nanosecond laser combined with vacuum processing.

**JTu2A.32**
**Numerical Simulations of in-Band Clad-Pumped Thulium-Doped Fiber Laser at 820 nm,** Martin Grabner[1], Vincent A. Gomes[1], Pavel Honzatko[1], Pavel Peterka[1]; *[1]Inst. of Photonics and Electronics, Czechia.* Thulium-doped fiber laser (TDFL) operating at 820 nm and clad-pumped with 790 nm is simulated using a comprehensive numerical model. Performance of two laser setups with 4-4% and 100-4% reflection are compared.

**JTu2A.33**
**Thermal Expansion Studies of the Nonlinear Chalcopyrite Crystal $CdGeP_2$,** Michael Susner[2], Peter Schunemann[3], Kevin Zawilski[4], Jani Jesenovec[4], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]AFRL, USA; [3]Onsemi, USA; [4]BAE Systems, USA.* Thermal expansion in the 12-820 K range is measured by X-ray diffraction of powdered $CdGeP_2$ crystals, applicable for THz-generation from near-IR laser sources. The results indicate strong anisotropy with negligible compression along the optical axis.

**JTu2A.34**
**Two-Photon Absorption Studies of Ge at 2.05 µm,** Subhasis Das[1,3], Marcin Piotrowski[2], Martin Bock[1], Dennis Ueberschaer[1], Uwe Griebner[1], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]ISL, France; [3]Burdwan Univ., India.* Two-photon absorption (TPA) measurements are performed on Ge using an open aperture z-scan setup and 2.05 µm, 0.57 ps pulses from a Ho:YLF regenerative amplifier. The derived TPA coefficient amounts to (30 ± 12) cm/GW.

**JTu2A.35**
**Liquid-Phase Epitaxial Growth of $Tm^{3+}$ and $Yb^{3+}$ Doped $MgWO_4$ Layers,** Ghassen Z. Elabedine[1], Rosa M. Solé[1], Magdalena Aguiló[1], Francesc Díaz[1], Weidong Chen[2], Valentin Petrov[3], Xavier Mateos[1]; *[1]Universitat Rovira i Virgili, Spain; [2]State Key Laboratory of Functional Crystals and Devices, Fujian Inst. of Research on the Structure of Matter, Chinese Academy of Sciences, China; [3]Max Born Inst., Germany.* We report the first liquid phase epitaxy growth of $Tm^{3+}$ and $Yb^{3+}$ doped $MgWO_4$ layers on (010) oriented $MgWO_4$ substrates. The resulting

epitaxial films reach thicknesses of 300 μm thick, are crack-free, and exhibit high crystalline quality.

**JTu2A.36**
**Temperature-Tuning Characteristics of Noncritically Phase-Matched $AgGa_{1-x}in_xSe_2$,** Kiyoshi Kato[1,2], Kentaro Miyata[3], Satoshi Wada[3], Valentin Petrov[4]; *[1]Chitose Inst. of Science and Technology, Japan; [2]Okamoto Optics Inc., Japan; [3]RIKEN, Japan; [4]Max Born Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany.* Temperature-dependent phase-matching conditions for nonlinear frequency conversion in $AgGa_{1-x}In_xSe_2$ are studied using different $CO_2$ laser lines at 9.2714–10.5910 μm by varying the crystal temperature in the 20–180°C range.

**JTu2A.37**
**Cladding-Pumped Neodymium-Doped Fiber Amplifier With 40 dB Gain and Immunity to Seed Dropouts,** Dominic E. Blackledge[1], William R. Kerridge-Johns[1], Johan Nilsson[1]; *[1]Univ. of Southampton, UK.* A simple cladding-pumped single-stage neodymium-doped fiber amplifier reaches 40 dB of gain and 24 dBm of output power at 1.06 μm. The output remains temporally stable and free of pulsing in the absence of seeding.

**JTu2A.38**
**Spectroscopy of $Tm^{3+}$- and $Yb^{3+}$-Doped Monoclinic $MgWO_4$ Crystals in a Revised Dielectric Frame,** Ghassen Z. Elabedine[1], Rosa M. Solé[1], Sami Slimi[1], Magdalena Aguiló[1], Francesc Díaz[1], Weidong Chen[2], Valentin Petrov[3], Xavier Mateos[1]; *[1]Universitat Rovira i Virgili, Spain; [2]State Key Laboratory of Functional Crystals and Devices, Fujian Inst. of Research on the Structure of Matter, China; [3]Max Born Inst., Germany.* We present polarization-resolved spectroscopy of $Tm^{3+}$- and $Yb^{3+}$-doped $MgWO_4$ crystals, including absorption, stimulated emission, and gain cross-sections, analyzed in a revised dielectric frame, as well as luminescence lifetimes, providing new insights into their lasing potential.

**JTu2A.39**
**Resonantly Pumped Tm,Ho:GSAG Laser Tunable Over 138 nm in the 2.1 μm Region,** Dominika Popelová[1], Jan Kratochvíl[1], Jan Sulc[1], Michal Nemec[1], Jan Pejchal[2], Jan Havlíček[2,3], Helena Jelinkova[1], Martin Nikl[2]; *[1]FNSPE CTU in Prague, Czechia; [2]Division of Solid State Physics, Inst. of Physics AS CR, Czechia; [3]Crytur, Ltd., Czechia.* Laser performance and tunability of μ-PD grown Tm,Ho:GSAG were measured under 1688 nm diode pumping, achieving 170 mW maximum average output power, 30% slope efficiency, and wavelength tuning over 138 nm (1995 - 2133 nm).

**JTu2A.40**
**Near-Infrared Efficient Laser Emission From a Diode-Pumped 6.2-at.%Yb:LGSB Crystal Grown by the Czochralski Method,** Gabriela Salamu[1], Madalin Greculeasa[1], Alin Broasca[1], Flavius Voicu[1], Stefania Hau[1], Cristina Gheorghe[1], Nicolaie Pavel[1], Lucian Gheorghe[1]; *[1]Natl Inst Lasers Plasma & Radiation Phys, Romania.* Efficient laser emission at 1.03 μm is reported from a diode-pumped 6.2-at.% $Yb:La_xGd_xSc_{4-x-y}(BO_3)_4$ (Yb:LGSB) crystal. Laser pulses with 5.0-mJ energy at an optical efficiency of 0.68 were obtained; the slope efficiency reached 0.81.

**JTu2A.41**

**the Effect of Fluorine Codoping on the Fluorescence Properties of Tm-Doped Fiber Laser Preforms,** Stefan Kuhn[1], Bruno Poletto Rodrigues[1], Dintu Mathew[1], Sigrun Hein[1], Johannes Nold[1], Nicoletta Haarlammert[1], Thomas Schreiber[1]; *[1]Fraunhofer IOF, Germany.* We present the influence of Fluorine codoping on the fluorescence properties like fluorescence lifetime in Thulium doped fiber laser materials. Among others, it will be shown that Fluorine enhances the fluorescence lifetime largely.

**JTu2A.42**
**Y-Branch Splitters Inscribed in Nd:YAG Ceramics With High-Repetition Rate Picosecond-Laser Pulses,** Gabriela Salamu[1], Madalin Greculeasa[1], Alin Broasca[1], Florin Jipa[1], Nicolaie Pavel[1]; *[1]Natl Inst Lasers Plasma & Radiation Phys, Romania.* Y-branch splitters were inscribed in 1.1-at.% Nd:YAG ceramics using direct-writing technique with a picosecond laser beam. Laser emission at 1.06 μm was obtained under the pump with fiber-coupled diode lasers.

**JTu2A.43**
**90° Phase-Matched Second-Harmonic and sum-Frequency Generation in $CsLiB_6O_{10}$,** Nobuhiro Umemura[1], Ryota Murai[2,3], Masashi Yoshimura[2,4], Tomosumi Kamimura[5,4], Yusuke Mori[2,3]; *[1]Chitose Inst of Science and Technology, Japan; [2]SOSHO-CHOKO, Japan; [3]Graduate School of Engineering, Osaka Univ., Japan; [4]Inst. of Laser Science, Osaka Univ., Japan; [5]Faculty of Engineering, Osaka Inst. of Technology, Japan.* We report 90° phase-matched second-harmonic and sum-frequency generation at 0.237, 0.2059, and 0.1828 μm based on a Nd:YAG laser at 1.0642 μm. The updated Sellmeier equations which reproduce our experimental results for the phase-matching conditions are presented.

**JTu2A.44**
**Parametric Study of Laser Drilling Process on Glass Fiber Reinforced Polymer Composites,** Shaikha Almarzooqi[1], Hamdan Alhashmi[1], Kiran K. Kabotu[1], Sarah AlHosani[1], maryam alraeesi[1], Eisa Alneyadi[1], Edvinas Petraitis[1], Reem Alameri[1], Antaryami Mohanta[1]; *[1]Technology Innovation Inst., United Arab Emirates.* The continuous wave (CW) high-power fiber laser drilling process of Glass Fiber Reinforced Polymer (GFRP) composite samples has been investigated to understand the effects of laser power, beam diameter and sample thickness on drilling time.

**JTu2A.45**
**Chalcogenide Racetrack Resonators With Intrinsic Q Factor Above 5 Million,** Bright Lu[1], James W. Erikson[2], Bo Xu[2], Sinica Guo[1], Mo Zohrabi[2], Juliet Gopinath[2,1], Wounjhang Park[1,3]; *[1]Department of Electrical, Computer, and Energy Engineering, Univ. of Colorado Boulder, USA; [2]Department of Physics, Univ. of Colorado Boulder, USA; [3]Materials Science and Engineering Program, Univ. of Colorado Boulder, USA.* We demonstrate a chalcogenide micro-racetrack resonator with intrinsic quality (Q) factors exceeding 5 million. The resonator design features Euler curves that minimize scattering and bending losses and preserve single-mode operation with a reduced device footprint.

**JTu2A.46 (Student Paper Finalist)**
**High-Quality Silicon Surface Structuring by Combining DLIP and KOH Etching,** Tadas Latvys[1], Darius Gailevičius[1], Dominyka Stonyte[1], Domas Paipulas[1]; *[1]Laser Research Center, Vilnius Univ., Lithuania.* Periodic silicon structures were fabricated via direct laser interference patterning and chemically etched in 20 wt% KOH solution. This hybrid method significantly

increased structure height while maintaining high uniformity, avoiding ablation-induced debris and preserving surface quality.

**JTu2A.47**
**Direct Measurement of the Best Phase-Matching Conditions at 355 nm in the Monoclinic $Ca_5(BO_3)_3F$ (CBF) Nonlinear Crystal,** Slimane Raissi[2], Patricia Segonds[1], Benoit Boulanger[1], jerôme debray[1], David Jegouso[1], Pascal Loiseau[2], Gerard Aka[2]; *[1]Neel Inst., France; [2]Chimie ParisTech–CNRS, France.* We determined the optimal phase-matching conditions at 355 nm in the monoclinic Ca5(BO3)3F (CBF) nonlinear crystal, by recording the angular distribution of the associated conversion efficiency along the tuning curve. This was achieved using Sum Frequency Generation of two incoming wavelengths at 532 nm and 1064 nm.

**JTu2A.48**
**a Platform for Generating Twin-Photons Over 10 Decades of Pump Intensity by Second-Order SPDC,** Julien Bertrand[2,1], Veronique Boutou[1], Benoit Boulanger[2,1]; *[1]Institut Néel, France; [2]Univ. Grenoble Alpes, France.* We generated twin-photons with a flux of 1.1x104 Hz to 1.2x1021 Hz from SPDC in a phase-matched type II KTP crystal pumped between 2.4 W.cm-2 - 3.7 GW.cm-2 in the CW, nanosecond and picosecond regimes.

**JTu2A.49**
**Broadband Wavelength-Tunable Mode-Locked Figure-9 Yb-Fiber Laser,** LIU HAN[1], Yutong Zhang[1], Yang Yu[1], Wenlong Tian[1], Geyang Wang[1], Zhiyi Wei[2,3], Jiangfeng Zhu[1]; *[1]Xidian Univ., China; [2]Chinese Academy of Sciences, China; [3]Univ. of Chinese Academy of Sciences, China.* We demonstrate a broadband wavelength-tunable mode-locked figure-9 fiber oscillator with central wavelength continuously tunable over 1024 to 1076 nm. The compressed pulses ranging from 120 fs to 142 fs.

**JTu2A.50**
**a High-Energy Femtosecond Laser Based on Hybrid Yb: KGW and Yb: YAG Amplification,** Jiajun Song[1], Yinfei Liu[1], Yujie Peng[1], Yuxin Leng[1]; *[1]Shanghai Inst of Optics and Fine Mech, China.* A hybrid Yb: KGW/Yb: YAG amplifier produces femtosecond-compatible pulses with energies exceeding 20 mJ. The broad spectral bandwidth supports future compression to sub-200 fs durations at this energy scale.

**JTu2A.51**
**Coherent Random Lasing via Non-Distributed Feedback in a Disordered Optofluidic Device,** Ashiq K. M.[1], Ladli Patra[2], Shivakiran Bhaktha B. N.[2], Anirban Sarkar[1]; *[1]Department of Physics, National Inst. of Technology Calicut, India; [2]Department of Physics, Indian Inst. of Technology Kharagpur, India.* Emission from an optofluidic device with random scatterers on both sides of a microchannel is investigated. Optical pumping of the device shows non-distributed feedback-based random lasing which is predominantly coherent in nature.

**JTu2A.52**
**Synergistic Influence of Laser Radiation on Strain-Deformations in $SiO_2$, Nanocomposites of Multiwalled Carbon Nanotubes and Polymers,** Anatoliy P. Onanko[1], Lyudmyla V. Kuzmych[1], Yurii A. Onanko[1], Galina V. Voropai[1], Oksana P. Dmytrenko[1], Antonina P. Naumenko[1]; *[1]Physical, Taras Shevchenko national Univ. of Kyiv, Ukraine.* After stopping of laser radiation action of fusion solidification begun exactly from the surface, but the crater

underbody is extended (molten) and created additional squeezing mechanical tension, that pull central part of crater surface.

**JTu2A.53**
**High-Energy Picosecond Pulses for Ultrafast Rydberg Excitation of Atomic Array,** MAHESH T P[1], Florent Cassouret[1], Baptiste Bruneteau[1], Takuya Matsubara[1], Sylvain de Léséleuc[1,3], Kenji Ohmori[1,4], Takunori Taira[1,2]; *[1]Inst. for molecular science(IMS), Japan; [2]RIKEN SPring-8, Japan; [3]RIKEN, Japan; [4]SOKENDAI, Japan.* We present a four-passes, ≥ mJ-energy picosecond Nd:YAG amplifier based on room temperature bonding. Combined with frequency-conversion, it will allow simultaneous excitation of large atomic array to a single Rydberg state in picosecond timescale.

**JTu2A.54**
**Ultra-Compact TE/TM Polarization Combiner Using Slot-Embedded Silicon MMI Structures,** dror malka[1]; *[1]Holon Inst. of Technology (HIT), Israel.* A silicon polarization combiner using compact multimode interference and slot waveguides is presented. Simulations show efficient self-imaging, high extinction ratio, and low loss across the C-band, providing a robust, ultra-compact solution for integrated photonics.

**JTu2A.55**
Withdrawn

**JTu2A.56**
**1 kHz High-Energy Picosecond Laser Based on 4-Passes DFC Amplifier for $^{87}$Rb Rydberg Excitation,** MAHESH T P[1], Florent Cassouret[1], Baptiste Bruneteau[1], Takuya Matsubara[1], Sylvain de Léséleuc[1,2], Kenji Ohmori[1], Takunori Taira[1,2]; *[1]Inst. for molecular science(IMS), Japan; [2]RIKEN Centre for Quantum Computing (RQC), Japan.* Using 4-passes DFC amplifier at 1 kHz, >20 times amplification of 1064 nm ps-pulses were observed. These pulses were then converted to 480 nm for $^{87}$Rb Rydberg excitation with high efficiency and narrow bandwidth.

**JTu2A.57**
**Subwavelength 3D Printed Optical Structures for Terahertz Beam Control,** Adrianna Nieradka[2], Mateusz Kaluza[2], Przemyslaw Zagrajek[1], Agnieszka Siemion[2]; *[1]Inst. of Optoelectronics, Military Univ. of Technology, Poland; [2]Faculty of Physics, Warsaw Univ. of Technology, Poland.* This work presents 3D printed, subwavelength optical components for terahertz radiation. Innovative lenses with a constant thickness were manufactured by changing the fill factor and infill geometry in order to obtain the desired refractive indices.

## 11:30 -- 12:30
## Room: South Hall 3C
## JTu3A • Joint Plenary Session II
*Presider: Tino Eidam; Active Fiber Systems GmbH, Germany*

**JTu3A.1 • 11:30 (Plenary)**
**Light in a Blink: Harnessing Few-Cycle Pulses for Extreme Photonics,** Jens Biegert[1]; *[1]ICFO- The Inst. of Photonic Sciences, Spain.* Few-cycle laser pulses unlock unprecedented control over light-matter interactions. This talk explores the generation of

ultrashort, intense light bursts and their transformative impact on attosecond science, strong-field physics, and next-generation photonic technologies.

**14:00 -- 16:00**
**Room: South Hall 3C**
**ATu4A • Low Phonon Energy Host Materials**
*Presider: Jan Sulc; Ceske Vysoke Uceni Technicke v Praze, Republic of Czech*

**ATu4A.1 • 14:00**
Withdrawn

**ATu4A.2 • 14:15 (Invited)**
**Industrial-Grade Single-Cycle CEP-Stable 2 µm Lasers,** Nathalie Lenke[1], Philipp Rosenberger[1], Sebastian Gröbmeyer[1], Lukas Brahmann[1], Aleksandar Sebesta[1], Nils-Holger Haag[1]; *[1]PULSED GmbH, Germany.* We present ALBATROSS, a compact, CEP-stable infrared laser delivering single-cycle pulses at 2 µm. Its exceptional phase and intensity stability, combined with broad spectral coverage, enables advanced mid-IR applications in field-resolved spectroscopy and strong-field physics.

**ATu4A.3 • 14:45**
**Efficient Laser Operation in Nd3+-Doped Fluorite Mixed Crystals Co-Doped With Buffer Ions for High-Energy Lasers,** Simone Normani[1], Sébastien Montant[2], Patrice Camy[1], Alain Braud[1]; *[1]CNRS CIMAP, France; [2]CEA CESTA, France.* Record high laser slope efficiency ($\eta$≈60%) is achieved in $Nd^{3+}$:$Gd^{3+}$ doped ($Ca_{1-x}Sr_xF_2$) mixed crystals around 1 µm. The broad laser gain spectrum is engineered through the co-doping with buffer ions and the solid-solution composition of the crystals.

**ATu4A.4 • 15:00**
**Direct Bonding and Laser Operation of Er:$CaF_2$|$CaF_2$ Composite Fluoride Crystals,** Pavel Loiko[1], Vivien Menard[1], Abdelmjid Benayad[1], Gurvan Brasse[1], Sébastien Montant[2], Alain Braud[1], Patrice Camy[1]; *[1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, France; [2]CEA, CESTA, France.* We present an approach of fabricating composite (end-capped) RE:$CaF_2$|$CaF_2$ fluoride crystals with improved thermal properties by direct bonding and annealing. A 5 at.% Er:$CaF_2$|$CaF_2$ laser generated 0.86 W at 2.80 µm with 19.3% slope efficiency.

**ATu4A.5 • 15:15**
**Mid-Infrared Emission Properties of Rare-Earth Doped $BaF_2$ Crystal,** Ngoc Quynh Hoa NGUYEN[1], Pavel Loiko[1], Ei Ei Brown[2], Zackery D. Fleischman[2], Jason Mckay[2], Abdelmjid Benayad[1], Patrice Camy[1], Mark Dubinskii[2], Alain Braud[1]; *[1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, 6 Boulevard Maréchal Juin, France; [2]US Army Research Laboratory, ATTN FCDD-RLA-GA, 2800 Powder Mill Rd, USA.* We overview the mid-infrared (2-5 µm) emission properties of barium fluoride ($BaF_2$) crystals doped with $Tm^{3+}$, $Er^{3+}$, $Ho^{3+}$, and $Dy^{3+}$ ions, including stimulated-emission cross-sections, probabilities of radiative and non-radiative

transitions, and broadly tunable laser operation.

**ATu4A.6 • 15:30**
**High-Repetition-Rate Passively Q-Switched Visible Waveguide Laser,** Ji Eun Bae[1], Jonathan Demaimay[1], Pavel Loiko[1], Fabian Rotermund[2], Gurvan Brasse[1], Alain Braud[1], Patrice Camy[1]; *[1]CIMAP-CNRS-Université de Caen Normandie, France; [2]Korea Advanced Inst. of Science and Technology, South Korea.* We report on a nanosecond high-repetition-rate visible Pr:$LiYF_4$ ridge waveguide laser Q-switched by single-walled carbon nanotubes. The red waveguide laser delivers 26-ns pulses at 6.73 MHz with an average output power of 335 mW.

**ATu4A.7 • 15:45**
**Watt-Level Continuous-Wave Ground-State Laser Operation of Tm:YLF at 0.8 µm,** Sascha Kalusniak[1], Moritz Badtke[1], Stefan Püschel[1], Hiroki Tanaka[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We report on efficient room-temperature laser operation of $Tm^{3+}$:$LiYF_4$ on the $^3H_4 \rightarrow {}^3H_6$ transition with emission wavelengths around 820 nm, yielding slope efficiencies of 54% and a pump-power limited output power of 0.87 W

**14:00 -- 16:00**
**Room: South Hall 3B**
**LTu4B • Surface Modification & Micromachining**
*Presider: Golshan Coleiny; Fundamental Optical Solutions LLC, USA*

**LTu4B.3 • 14:00 (Invited)**
**Overview of HiLASE Laser Surface Modification Technologies,** Sanin Zulic[1], Petr Hauschwitz[1], Jan Brajer[1], Tomas Mocek[1]; *[1]HILASE Center, Czechia.* HiLASE Centre presents advancements in laser surface modification using high-intensity diode-pumped lasers, achieving precise control across metals, polymers, glass, and composites. Innovations cover functionalization, shock peening, micromachining, monitoring, and scalable industrial applications in diverse sectors.

**LTu4B.2 • 14:30 (Invited)**
**From Light to Function: Next-Generation Laser Interference Patterning Technologies,** Bogdan Voisiat[1]; *[1]SurFunction GmbH, Lithuania.* This talk presents recent advances in Direct Laser Interference Patterning (DLIP), focusing on xDLIP and ELIPSYS® technologies developed at SurFunction. Emphasis is placed on scalable laser-based solutions for functional surface design and industrial patterning applications.

**LTu4B.1 • 15:00 (Invited)**
**Athermalized Multi-Spot Beam Shaping Optics for Multi-kW Laser Applications,** Alexander Laskin[1]; *[1]AdlOptica Optical Systems GmbH, Germany.* Performance of multi-kW laser technologies is enhanced by multi-spot beam shapers providing specific temperature distribution in process zone. Athermalized optics made of crystal quartz self-compensating thermal lensing guarantees stable operation without focus shift and aberrations.

**14:00 -- 16:00**
**Room: South Hall 3A**
**LsTu4C • Component Technologies / Quantum Methods for Sensing & Communication**
*Presider: Maureen Szymanski; US Air Force Research Laboratory, USA*

**LsTu4C.1 • 14:00 (Invited)**
**Enhancing Transition Metal Lasers via Hot Isostatic Pressing: Techniques and Applications,** Emily m. Heckman[1]; [1]*Air Force Research Laboratory, USA.* Performance improvements of Chromium-doped Zinc Selenide (Cr:ZnSe) and other transition metal lasers achieved via a novel hot isostatic pressing (HIP) technique are presented, along with a discussion of prospective and emerging applications for this technology.

**LsTu4C.2 • 14:30 (Student Paper Finalist)**
**Intelligent UAV Based Anaerobic Tank Inspection Using LiDAR-IMU SLAM and Camera Imagery,** Yebei Wen[1], Jizhou Lai[1], Shenghong Xie[1], Zehui Fu[1], Hanyu Zhan[1]; [1]*Nanjing Univ Aeronautics & Astronautics, China.* An Intelligent UAV system was developed by integrating LiDAR-IMU SLAM and camera imagery for global navigation satellite system denied space inspections. The system for the first time accomplished the unmanned inspection within anaerobic tanks.

**LsTu4C.3 • 14:45**
**Dual-Mechanism Enhanced Miniature Optical Fiber SPR Bio-Probe Based on Nanodiamonds,** Lina Ma[1], Yuxin Li[1], Xin Xiong[1], Yaofei Chen[1], Yunhan Luo[1], Gui-shi Liu[1], Lei Chen[1], Zhe Chen[2,1]; [1]*Jinan Univ., China;* [2]*JiHua Laboratory, China.* We present a dual-mechanism nanodiamond-enhanced miniature fiber SPR probe. Its synergistic plasmonic/biological enhancement achieves order-of-magnitude sensitivity improvement in mouse IgG immunodetection for ultrasensitive trace-sample biosensing.

**LsTu4C.4 • 15:00**
**Two-Dimensional Beam Steering Using a Dispersive Optical Phased Array Device for LiDAR Applications,** Toijam Sunder Meetei[1], Nan-Ei Yu[1]; [1]*Gwangju Inst. of Science and Technology (GIST)), South Korea.* We demonstrate two-dimensional beam steering via wavelength tuning in 64-channel end-fire silica-based dispersive optical phased array device, providing a FOV of 15.8°×12° and full-angle divergence of 0.125°×0.095°, with a total insertion loss of 4.04 dB.

**LsTu4C.5 • 15:15 (Invited)**
Withdrawn

**LsTu4C.6 • 15:15**
Withdrawn

**16:30 -- 18:30**
**Room: South Hall 3C**
**ATu5A • NLO & Sources for Quantum Optics**
*Presider: Juliet Gopinath; Univ. of Colorado Boulder, USA*

**ATu5A.1 • 16:30**
**1.5 µm Driven High Harmonic Source for Broadband Coherent Imaging,** Will Hettel[1], Nicholas Jenkins[1], Gabriella Seifert[1], Benjamin Shearer[1], Drew Morrill[1], Jeremy M. Thurston[1], Rae Larsen[1], Grzegorz Golba[1], Daniel Carlson[1], Henry Kapteyn[1,2], Margaret Murnane[1], Michaël Hemmer[1]; *[1]Univ. of Colorado Boulder, USA; [2]Kapteyn-Murnane Laboratories, Inc., USA.* We report a robust high harmonic source driven by a 1.5 µm ultrafast laser that is being optimized for broadband imaging at wavelengths from 13.5 nm to near the carbon K-edge.

**ATu5A.2 • 17:00**
**Demonstration of Near-Infrared Triple-Photon-Generation Stimulated Over one Mode in a Phase-Matched KTP Crystal,** Julien Bertrand[1,2], Veronique Boutou[1], Corinne Felix[1], David Jegouso[1], Benoit Boulanger[2,1]; *[1]Institut Néel, France; [2]Univ. Grenoble Alpes, France.* We achieved the first experimental demonstration of Triple-Photon-Generation seeded over one mode using a 1-cm KTP crystal. The linear dependence on the seeding pulse energy and the polarization behavior are in accordance with quantum theory.

**ATu5A.2 • 17:15**
**Red Picosecond Fiber Optical Parametric Oscillator Pumped at 914 nm by a Nd-Doped Fiber Laser Source,** Arnaud Viry[1], Kilian Lecorre[2], Thierry Robin[2], Hervé Gilles[1], Sylvain Girard[1], Mathieu Laroche[1]; *[1]CIMAP, France; [2]Exail, France.* We report a picosecond fiber optical parametric oscillator at 645nm, synchronously pumped in the normal-dispersion regime by a Nd-doped all-fiber MOPA laser source at 914nm. The FOPO delivers 35ps pulse at 645nm, with 80mW output power.

**ATu5A.3 • 17:30 (Student Paper Finalist)**
**All-Fiber-Pumped CSP and ZGP Doubly-Resonant OPO for High-Power Mid-IR Generation,** Dominik Lorenz[1,2], Julian Schneider[1,2], Clément Romano[1], Dieter Panitzek[1,2], Jan Lautenschläger[1,2], Madeleine Eitner[1], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Inst. of Optronics, System Technologies and Image Exploitation, Fraunhofer, Germany; [2]Inst. of Control Systems, Karlsruhe Inst. of Technology, Germany.* An all-fiber-pumped doubly-resonant OPO using CSP and ZGP for high-power mid-IR generation is reported. Conversion efficiencies of 48% and 69% at 13.3 W and 25.8 W mid-IR power are achieved, respectively.

**ATu5A.4 • 17:45**
**Frequency-Stabilized Ultra-Low-Noise Free-Space Brillouin Laser in Diamond,** Longjie Zhang[1,2], Hui Chen[1,2], Wenqiang Fan[1,2], Yulei Wang[1,2], Zhiwei Lu[1,2], Zhenxu Bai[1,2]; *[1]Center for Advanced Laser Technology, Hebei Univ. of Technology, China; [2]Hebei Key Laboratory of Advanced Laser Technology and Equipment, China.* We demonstrate a 14.6 W diamond Brillouin laser with an integrated linewidth of 0.85 kHz and a white frequency noise floor at the hertz level. This first noise characterization reveals the exceptional noise-suppression capability

of high-power free-space Brillouin lasers.

**ATu5A.5 • 18:00**
**Multiwavelength Ultrafast Entangled Photon Sources via Femtosecond-Pumped Parametric Down-Conversion,** Karel Veselsky[2,1], Ashley Driesbach[2], Sanjit Karmakar[2], Chen-Ting Liao[2]; *[1]Ceske Vysoke Uceni Technicke v Praze, Czechia; [2]Indiana Univ., USA.* Multiwavelength, quantum-entangled, ultrashort-pulsed light sources are developed using a 90 fs Yb:KGW laser amplifier. Second- and third-harmonic of the 1030nm pump produces wavelength-tunable, entangled biphotons at 810nm, 1030nm, and 1414nm via spontaneous or high-gain parametric down-conversion.

**ATu5A.6 • 18:15**
**Sum-Frequency Generation of High-Power Single-Frequency low-Noise 840 nm Emission for Quantum Applications,** Thomas N. Dubé[1], Coline Lavit[1], Kentin Poncelet[1,2], Dia Darwich[2], Mathieu Goeppner[2], Germain Guiraud[2], Nicholas Traynor[2], Adèle Hilico[3], Giorgio Santarelli[1]; *[1]LP2N, IOGS, CNRS UMR 5298, Université de Bordeaux, France; [2]Toptica Photonics SAS, France; [3]LPL, Université Sorbonne Paris Nord, CNRS UMR 7538, France.* We report the generation of 13.4 W of low-noise 840 nm emission based on the sum-frequency generation (SFG) of two high-power single-frequency low-intensity noise fiber master oscillator power amplifier (MOPA) systems in a MgO:PPLN crystal.

**16:30 -- 18:30**
**Room: South Hall 3B**
**LTu5B • ML/AI for Laser Materials Processing**
*Presider: Thomas Grunberger; Plasmo Industrietechnik GmbH, Austria*

**LTu5B.1 • 16:30 (Invited)**
**Sensing Acoustic and Optical Signals for Monitoring Microfabrication Processes,** Andrés F. Lasagni[1]; *[1]Fraunhofer IWS, Germany.* This work describes optical, infrared, and acoustic monitoring approaches for laser microstructuring processes. Real-time sensing enables characterization of LIPSS and DLIP features, providing insights into topography, homogeneity, and process dynamics essential for precision manufacturing.

**LTu5B.2 • 17:00 (Invited)**
**Machine Learning and Thermography as Tools for Local Porosity Prediction in Additive Manufacturing of Metals,** Simon Altenburg[1], Simon Oster[1], Scheuschner Nils[2], Keerthana Chand[3]; *[1]Thermographic Methods, Bundesanstalt für Materialforschung und -prüfung, Germany; [2]Information Technology, Bundesanstalt für Materialforschung und -prüfung, Germany; [3]X-ray Imaging, Bundesanstalt für Materialforschung und -prüfung, Germany.* Quality assurance of metal additive manufacturing (PBF-LB/M) is still a challenge. Offering deep process insights, thermography is a well-suited monitoring technique. Here, we show how machine learning based on thermographic data enables a local part porosity prediction.

**LTu5B.3 • 17:30 (Invited)**
**Multimodal Deep Learning for Real-Time Laser Cutting Monitoring and Control,** Roland Richter[1]; *[1]EMPA - Swiss federal laboratories, Switzerland.* Abstract not available.

**LTu5B.4 • 18:00 (Invited)**
**Physics-Informed Machine Learning for Laser Welding Process Optimization,** Moritz Fuchsloch[1]; [1]*Universität Stuttgart, Germany.* We introduce a physics-informed machine learning framework for laser welding optimization, embedding physical knowledge into Gaussian process models to steer Bayesian optimization toward desired weld geometries while significantly reducing experimental effort.

## Wednesday, 22 October

**08:30 -- 10:30**
**Room: South Hall 3C**
**AW1A • High Energy/Power 2 µm Sources**
*Presider: M J Daniel Esser; Heriot-Watt Univ., UK*

**AW1A.1 • 08:30**
**195 mJ, 20 ns, 2.05-µm Ho:YLF MOPA System at 1-kHz Repetition Rate,** Yuchun Liu[2,1], Enhao Li[2], Panqiang Kang[2], Weichao Yao[2], Yujie Peng[2], Yuxin Leng[2], Zhizhan Xu[2,1]; *[1]School of Physical Science and Technology, ShanghaiTech Univ., China; [2]State Key Laboratory of Ultra-intense Laser Science and Technology, Shanghai Inst. of Optics and Fine Mechanics, China.* A high-energy and high-power 2.05-µm laser with 195.7-mJ pulse energy and 20-ns pulse width at 1-kHz repetition rate is demonstrated from a two-stage Ho:YLF-MOPA system, representing the highest reported pulse energy for kHz-repetition-rate 2-µm lasers.

**AW1A.2 • 08:45**
**Highly Efficient 70 W Core-Pumped Ho-Doped Silica Fibre Laser,** Jan Pokorny[2,3], Richard Svejkar[1], Bara Svejkarova[2,3], Jan Aubrecht[3], Michal Kamaradek[3], Ivo Barton[3], Ivan Kasik[3], Pavel Honzatko[3], W. A. Clarkson[1], Pavel Peterka[3]; *[1]Optoelectronics Research Centre, Univ. of Southampton, UK; [2]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Czechia; [3]Inst. of Photonics and Electronics of the Czech Academy of Sciences, Czechia.* A core-pumped Ho-doped silica fibre laser, pumped at 1940 nm by a Tm-doped laser using a nested-ring active fibre, is demonstrated with a record output power of 70 W and a slope efficiency of 84 %.

**AW1A.3 • 09:00**
**2.6-mJ, 1-kHz Ho:CALGO Regenerative Amplifier at 2.08-µm Wavelength,** Anna Suzuki[1], Boldizsar Kassai[1], Michael Mueller[1,2], Yicheng Wang[1], Sergei Tomilov[1], Clara J. Saraceno[1]; *[1]Ruhr Universitat Bochum, Germany; [2]Rayven Laser, Germany.* We present energy scaling of a Ho:CALGO regenerative amplifier system to 2.6-mJ, achieving 1.4-ps pulses at 1-kHz repetition rate and at 2.08-µm wavelength.

**AW1A.4 • 09:15 (Student Paper Finalist)**
**High-Energy Rectangular-Shaped Nanosecond Pulses From a 200 W Photonic Crystal Fiber Amplifier at 2048 nm,** Julian Schneider[1,2], Dominik Lorenz[1,2], Clément Romano[1], Dieter Panitzek[1], Jan Lautenschläger[1,2], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Fraunhofer IOSB, Germany; [2]Inst. of Control Systems, Karlsruhe Inst. of Technology, Germany.* A linearly polarized photonic crystal fiber amplifier is reported generating 2 mJ rectangular pulses with a pulse width of 49 ns. The system delivers 207 W average power with a narrow linewidth at 2048 nm, high peak power, and excellent beam quality.

**AW1A.5 • 09:30**
**Cr:ZnS Seeded Two-Stage Cr:ZnS/Se CPA Pumped by Radiation 1645 nm Er:YAG Laser,** Rem Danilin[1], Dmitry Martyshkin[1], Sergey Vasilyev[2], Jeremy Pigeon[3], Vladimir Fedorov[1], Sergey B. Mirov[1]; *[1]Univ. of Alabama at Birmingham, USA; [2]IPG Photonics Corporation, USA; [3]Laboratory for Laser Energetics, Univ. of Rochester, USA.* We demonstrate a two-stage

Cr:ZnS and Cr:ZnSe CPA at 2.35 μm wavelength, achieving a single-pass gain of 2400 of fs-pulses in the first stage and 5 mJ pulses after five passes in the second stage.

**AW1A.6 • 09:45**
**Power and Energy Scaling of Tm-Doped Fiber Lasers,** Christian Gaida[1], Mathias Lenski[2], Felix Wanitschke[2,3], Philipp Gierschke[2,4], Mehran Bahri[2], Cesar Jauregui[2,4], Warunya Röder[4], Tobias Heuermann[1], Jens Limpert[2,3], Tino Eidam[1]; *[1]Active Fiber Systems GmbH, Germany; [2]Inst. of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Germany; [3]Helmholtz-Inst. Jena, Germany; [4]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* We present a high-power, in-band-pumped Thulium-doped fiber MOPA laser at 2 μm with high efficiency and high pulse energy extraction. Challenges include reducing quantum defect, managing thermal issues, and optimizing in-band pumping for efficient energy extraction.

**AW1A.7 • 10:00**
**Simulation and Experimental Results of High-Power Single-Frequency Tm-Fiber Amplifiers at 2050 nm for Next-gen GWD,** Stefanie Unland[1], Peter Weßels[1], Jörg Neumann[1], Dietmar Kracht[1,2]; *[1]Laser Zentrum Hannover e.V., Germany; [2]Inst. of Photonics, Germany.* This study investigates laser systems for future gravitational wave detectors, with an emphasis on high-power, linear polarization, and single-frequency operation. Various all-fiber amplifier designs using Tm-doped fibers are numerically simulated and affirmed by experimental results.

**AW1A.8 • 10:15**
**Ultrashort Pulse High-Power Tm-Doped Fiber Laser System,** Donguhn Kang[1], Toshio Otsu[1], Yohei Kobayashi[1]; *[1]Univ. of Tokyo, Japan.* We demonstrated a simple method of generating 75-fs, >1 W, 40 MHz pulses via self-compression in a Tm-doped fiber, and subsequently seeded a 100-W class power amplifier system with them.

**08:30 -- 10:30**
**Room: South Hall 3B**
**LW1B • Fusion Energy**
*Presider: Vincent Issier; MKS Instruments Inc, USA*

**LW1B.1 • 08:30 (Invited)**
**Progress in Laser Fusion Energy,** Edward Moses[1]; *[1]Longview Fusion, USA.* Abstract not available.

**LW1B.2 • 08:45 (Invited)**
**Fusion Ecosystem,** Jana J. Jung[1]; *[1]Marvel Fusion GmbH, Germany.* This presentation explores accelerating progress in laser-driven fusion, political momentum, and investment trends. It presents Marvel Fusion's roadmap, addresses industry challenges, and highlights the need for global collaboration to realize clean, abundant fusion energy soon.

**LW1B.3 • 09:00 (Invited)**
**Title to be Announced,** Franck e. Leibreich[1]; [1]*Thales, France.* Abstract note available.

**LW1B.4 • 09:15 (Invited)**
**Supply Chain Perspective,** Marc Tricard[1]; [1]*Newport Corporation, USA.* A brief industry perspective on the – many and large – photonics supply chain challenges associated with Fusion.

**08:30 -- 10:30**
**Room: South Hall 3A**
**LsW1C • Free Space Optical Communications II**
*Presider: Jaime Anguita; Universidad de los Andes (Chile), Chile*

**LsW1C.1 • 08:30 (Invited)**
**Mitigation of Nonlinearity, Spatial and Temporal Interferences in Optical Wireless Communication Using Artificial Neural Networks,** Sujan Rajbhandari[1]; [1]*Inst. of Photonics, Univ. of Strathclyde, UK.* Optical Wireless Communication (OWC) is one of the important technologies for achieving low-latency, high-speed connectivity in next-generation networks, thanks to the availability of over 300 THz of license-free optical spectrum. Although the optical spectrum offers bandwidth several orders of magnitude greater than that of radio frequencies, practical limitations such as the low bandwidth of optoelectronic devices leading to temporal interference, spatial interference in multiple-input multiple-output (MIMO) systems, and device nonlinearity significantly degrade communication performance and achievable data rates. To overcome these challenges, artificial neural networks (ANNs) can be trained to compensate for individual or combined impairments in OWC systems. In this talk, a novel ANN-based approach to jointly mitigate nonlinearity, spatial, and temporal interference in MIMO-based OWC systems is discussed. The performance of the proposed scheme will be evaluated and compared with traditional techniques, highlighting the improvements in communication performance and the key advantages of adopting ANN-based compensation.

**LsW1C.2 • 09:00**
**Wavefront Measurement Using an Angular-Selective Transmission Filter,** Andreas Zepp[1], Raphael Bellossi[1], Julien Garnier[1,2], Emma Branigan[3], Kevin P. Murphy[3], Szymon Gladysz[1]; [1]*Fraunhofer IOSB, Germany;* [2]*Univ. Paris-Saclay, Institut d'Optique Graduate School, Palaiseau, France, France;* [3]*Centre for Industrial and Engineering Optics, School of Physics, Clinical and Optometric Sciences, Technological Univ. Dublin, Ireland, Ireland.* We propose a wavefront sensor that utilizes the angular selectivity of an optical transmission filter. This sensor converts phase gradients into an intensity distribution. Simulations demonstrate the applicability of the sensor in atmospheric turbulence.

**LsW1C.3 • 09:15**
Withdrawn

**LsW1C.4 • 09:30 (Invited)**
**Turbulence-Resilient and High Data Rate Coherent Optical Wireless Communications,** Szymon Gladysz[1]; [1]*Fraunhofer IOSB, Germany.* In this presentation we will discuss the most relevant effects and manifestations of atmospheric turbulence on coherent free-space optical communications (FSOC) and address the methods of suppressing these

effects. The measurement routines and mitigation strategies have been implemented in an 800-m FSOC link.

**LsW1C.5 • 10:00**
**Characterization of Underwater Optical Turbulence in Lake Superior Using an Autonomous Underwater Vehicle,** Jeremy P. Bos[1], Linda Abro[1], Ian Q. Mattson[1]; *[1]Michigan Technological Univ., USA.* We present an experiment designed to characterize underwater turbulence for optical communication links. An autonomous underwater images a target board with an LED array. Turbulence strength along the path can be analyzed via differential tilts.

**LsW1C.6 • 10:15**
**Progression of OAM Recognition From Spatial to Temporal Domain,** Purnesh S. Badavath[1], Vijay Kumar[1]; *[1]NIT Warangal, India.* This work presents the progression of Orbital Angular Momentum recognition from the spatial to temporal domain, utilizing speckle-learned machine learning algorithms for high-speed information demultiplexing in advanced communication and sensing systems

**10:30 -- 11:30**
**Room: Congress Hall Foyer 3**
**JW2A • Joint Poster Session II**

**JW2A.1**
**Burn Severity Measurement System Using Imaging Photoplethysmography Based on Multi-Wavelength Laser Diodes and Dual-Wavelength Cameras,** Joo Beom Eom[1]; *[1]Department of Biomedical Science, Dankook Univ., South Korea.* We introduce a non-contact burn severity assessment system using the imaging photoelectric plethysmography (IPPG) technique by developing an imaging system using a multi-wavelength laser diode and a dual-wavelength camera.

**JW2A.2**
**Detection of Mineral Pollution Near Basra oil Refineries Using Absorption and Fluorescence Techniques,** Ahmad K. Khedher[1], Thamer M. Mohammed[2]; *[1]Al Nahrain Univ., Iraq; [2]College of Dentistry, Tikrit Univ., Iraq.* This work employed fluorescence and absorption spectroscopy to analyze wastewater near Basra oil refineries using wideband (200–1000 nm) light. Key peaks at 278, 400, and 733 nm identified dissolved metals, providing trustworthy environmental monitoring.

**JW2A.3**
**Microscopic Ghost Imaging With Table top XUV Source,** Sukyoon Oh[1,2], Monalisa Mallick[1], Thomas Siefke[3], Christian Spielmann[1,2]; *[1]Friedrich-Schiller-Universität Jena, Germany; [2]GSI Helmholtz Centre for Heavy Ion Research, Germany; [3]Inst. of Applied Physics, Abbe Center of Photonics, Germany.* Our novel lensless XUV ghost imaging technique, utilizing a compact HHG source, overcomes conventional optical challenges. This enables high-resolution microscopy with low photon flux and reduced radiation, crucial for applications in materials science, biology, and nanotechnology, highlighting the feasibility of tabletop XUV imaging systems.

**JW2A.4**
**Ultrafast Filamentation in air at 333 kHz Employing Coherently Combined Fiber Laser,** Ihsan Fsaifes[1], Corentin Lechevalier[1], Jordan Andrieu[1], Leandro Frigerio[2], Milos Burger[2], Igor Jovanovic[2], Jean-Christophe Chanteloup[1]; *[1]Laboratoire LULI, France; [2]Univ. of Michigan, USA.* Plasma filaments in air are generated using a coherently combined ultrashort fiber laser, reaching the highest repetition rate of 333 kHz reported to date. Cumulative effects on the filament length and longitudinal shift are investigated.

**JW2A.5 (Student Paper Finalist)**
**Termination Control Between Collinear Segments in 3D Laser-Written Photonic Circuits,** Ji Qin[1], Yunuen Montelongo[1], Adithya Pradeep[1], Zhi Kai Pong[1], Zipei Song[1], Tianxin Wang[1], Stephen M. Morris[1], Steve J. Elston[1], Patrick S. Salter[1], Martin J. Booth[1]; *[1]Department of Engineering Science, Univ. Of Oxford, UK.* We investigate coupling efficiency in waveguides fabricated by direct laser writing through experiments and theory. It is realized that precision control of the end facet writing reduces scattering losses, which enables low-loss photonics integration.

**JW2A.6**
**Single-Cycle Pulse Generation With 30 µJ Energy at 3.2 µm and 100 kHz Repetition Rate,** Rajaram Shrestha[1], Roland Nagymihály[1], Katalin Pirisi[1], Zoltán Kis[1], Levente Ábrók[1], Jie Meng[1], Eric Cormier[1,2], Bálint Kiss[1]; *[1]ELI ERIC, ALPS Facility, Hungary; [2]Laboratoire Photonique Numérique et Nanosciences, France.* We demonstrate two-stage post-compression of 3.2 µm, 45 fs pulses to single-cycle 11.2 fs, 30 µJ at 100 kHz, using spectral broadening in $BaF_2$/Si and compression with TOD mirrors and $CaF_2$/$BaF_2$ windows, characterized using TIPTOE and ICE technique.

**JW2A.7**
**Direct Electronical Readout of Surface Plasmon Resonance Biosensor Enabled by on-Fiber Graphene/PMMA Photodetector,** Chao Shen[1], Shiqi Hu[1], Yaofei Chen[1], Gui-shi Liu[1], Lei Chen[1], Zhe Chen[1,2], Yunhan Luo[1]; *[1]Jinan Univ., China; [2]JiHua Laboratory, China.* We present the first optical fiber device integrating hyperbolic-metamaterial SPR sensor with on-fiber graphene/PMMA photodetector, incorporating side-polished fiber for electrical readout in visible to near-infrared spectral range, validated in urea and glucose detection.

**JW2A.8**
Withdrawn

**JW2A.9**
**Compact $Tm^{3+}$:YLF Laser Utilizing a Mechanical Q-Switch,** Johannes Eckhardt[1,2], Marius Rupp[1], Steffen Guentert[1], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Fraunhofer IOSB, Germany; [2]Karlsruher Institut für Technologie, Germany.* This work presents a $Tm^{3+}$:YLF laser setup featuring a compact mechanical Q-switch. Results demonstrate excellent beam quality, a slope efficiency of 30% and a pulse energy of 0.8 mJ with pulse duration of 85 ns.

**JW2A.10**
**Pointing Control of Coherently Combined Laser Beam Without Steering Optics,** Jong-Won Lee[1], Kwang Hyun Lee[1], Hwihyeong Lee[1], Juseung Lee[1], Junhan Park[1], Seungwook Yoon[1], Suhun Jung[1], Joonhoi Koo[1], Seungwon Jun[1], Wansoon Shin[1]; *[1]Agency for Defense*

*Development, South Korea.* Coherent beam combining technique has tremendous advantage to achieve brightness light on target by locking all of phases. Furthermore, by controlling optical phases, beam can be structurally turned. In this paper, we computationally demonstrate pointing control of combined beam using control of phase feedback receiver without the steering optics.

**JW2A.11**
**Phase-Modulated Seeded Commercial Turnkey Q-Switch Lasers: a Solution for Brillouin Effect Challenges in Thick Optics Damage Testing.,** Jean-Francois Gleyze[1], Charles Bouyer[1], Sara Sadocki[1], Jordan Ilien[1], Laurent Lamaignere[1]; *[1]CEA-CESTA, France.* To our knowledge, this is the first industrial integration of a phase-modulated seeder with a control loop in a commercial Q-switch laser, enhancing precision and efficiency without cavity adjustments, based on a CEA patent.

**JW2A.12**
**Multiphysics Simulation of $Tm^{3+}$-Doped Solid-State Resonators: Integrated Laser Dynamics in $Tm^{3+}$:YAP and $Tm^{3+}$:YLF,** Marius Rupp[1], Johannes Eckhardt[1,2], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Fraunhofer Inst. of Optronics, System Technologies and Image Exploitation, Germany; [2]Karlsruhe Inst. of Technology, Germany.* A multi-physics simulation for $Tm^{3+}$-doped solid-state lasers at 2 µm is presented, which integrates rate equations, material parameters, and spectral dynamics. It is validated against $Tm^{3+}$:YAP and $Tm^{3+}$:YLF experiments in compact linear resonators.

**JW2A.13**
**Pump Beam Shaping for Energy Maximization in Passively Q-Switched Nd:YAG-Based Microchip Lasers,** Krystof Kadlec[1], Jan Sulc[1], Helena Jelinkova[1], Karel Nejezchleb[2]; *[1]FNSPE CTU in Prague, Czechia; [2]Crytur, Ltd., Czechia.* Pump beam modification improved nanosecond pulse energy in Nd:YAG-based microchip lasers, achieving over fourfold energy increases: up to 420 µJ at 1.06 µm, 135 µJ at 1.34 µm, and 91 µJ at 1.44 µm.

**JW2A.14**
**Development of a Mid-Infrared Laser Source for Glycomics,** Marie-Celine Gauthier[1], Xavier Délen[1], Michele Natile[2], Marc Hanna[1], Patrick Georges[1]; *[1]Institut d'Optique Laboratoire Charles Fabry, France; [2]33600, Amplitude, France.* We report on a CW-seeded OPA, pumped by an Yb-doped fiber laser, delivering Mid-IR tunable, sub-ns, pulses at high repetition rate. We study the conversion efficiency and output beam quality versus pump energy.

**JW2A.15**
**Investigation of Uni-Directional Planar $Ho^{3+}$:YAG Ring Lasers,** Katharina Goth[1], Marius Rupp[1], Madeleine Eitner[1], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Fraunhofer IOSB, Germany; [2]Karlsruhe Inst. of Technology, Germany.* A four-mirror planar $Ho^{3+}$:YAG ring laser is investigated with regards to cavity design and power scaling. Uni-directional operation is ensured by providing feedback in one operation direction. Simulations support the experimental observations.

**JW2A.16**
**Narrow-Line Tunable Laser With Direct UV Emission Based on Ce$^{3+}$:LiCAF,** Hendrik Büker[1,2], Eduardo Granados[1], Katerina Chrysalidis[1], Marc Eichhorn[2,3]; *[1]Council Europeenne Recherche Nucleaire, Switzerland; [2]Inst. of Control Systems (IRS), Karlsruhe Inst. of*

*Technology (KIT), Germany; [3]Fraunhofer IOSB (Inst. of Optronics, System Technologies amd Image Exploitation, Germany.* We propose a GHz-linewidth deep UV laser based on Ce$^{3+}$:LiCAF as a compact, tunable alternative in nuclear spectroscopy. Its broad Ce-ion emission enables stable, long-term operation across the $285$-$315$\,nm range.

**JW2A.17**
**Hybrid Q-Swithched Mode-Locked Vortex Lasers in an Azimuthal Symmetry Breaking Resonator,** YuanYao Lin[1], Zhen-Ho Wu[1], Jia-Yang Chen[1]; *[1]National Sun Yat-Sen Univ. (Taiwan), Taiwan.* A 12-ps Q-switched mode-locked optical vortex pulse with unit topological charge was generated via hybrid active–passive modulation in an azimuthal symmetry-breaking ring laser resonator, enabling vortex laser emission with high spatiotemporal coherence.

**JW2A.18**
**5J, 8GW Pulses From a Room-Temperature DFC-PowerChip Laser,** Vincent Yahia[2,1], Hideho Odaka[2,1], Mitsuhiro Yoshida[3], Takunori Taira[2,1]; *[1]Inst. for Molecular Science, Japan; [2]RIKEN SPring-8 Center, Japan; [3]KEK, Japan.* We present a room-temperature breadboard-mounted J-class laser based on distributed face-cooling composite gain-chips, delivering 5 J, 620 ps pulses at 5 Hz, and up to 1.8 J at 100 Hz in burst mode.

**JW2A.19 • 10:30**
**Addressing Temporal and Spectral Instabilities in a Tm:LLF Hybrid Stable-Unstable Laser Resonator,** Ross Tully[1], Lucas Sadovy Cockburn[1], Jake Sanwell[1], Leon Martin[1], Lucas Groult[1], M J Daniel Esser[1]; *[1]Inst. of Photonics and Quantum Sciences, Heriot-Watt Univ., UK.* Temporal and spectral instabilities observed in a thin-slab Tm:LLF laser employing a hybrid stable-unstable resonator are investigated using experimental methods and numerical mode analysis.

**JW2A.20**
**Kerr-Beam-Self-Cleaning in a Large-Core GRIN Fiber,** Barak Messica[1], Pavel Sidorenko[1]; *[1]Electrical and Computer Engineering, Technion Israel Inst. of Technology, Israel.* We demonstrate KBSC in a 300 μm GRIN fiber with 220ns/8.5mJ and 7ns/0.4mJ pulses, achieving high-energy pulse delivery. We show that beam-quality improvement is input-limited and the cleaned beam is more environmentally stable than in linear-propagation.

**JW2A.21**
**Eye-Safe Optical Vortex Generation From the Pump-Wave off-Axis Pumped OPO,** Chun-Yu Cho[1], C. W. Li[1], T. Y. Lu[1], Y. H. Huang[1]; *[1]National United Univ., Taiwan.* The eye-safe high-order transverse mode can be generated by using the pump-wave off-axis pumped OPO. A compact continuous-wave output from the intracavity OPO and a kW pulsed output from the extracavity OPO are separately demonstrated.

**JW2A.22**
**Femtosecond Mid-Infrared Cr:ZnS Lasers Utilizing Graphene-ZnSe Saturable Absorber,** Seong Hyeon KIM[1], Dong Ho Shin[2], Young Tea Chun[1], Fabian Rotermund[3], Won Bae Cho[1]; *[1]Department of Nano-Semiconductor Engineering, National Korea Maritime and Ocean Univ., South Korea; [2]Digital Biomedical Research Division, Electronics and Telecommunications Research Inst., South Korea; [3]Department of Physics, Korea Advanced Inst. of Science and Technology, South Korea.* In this work, using monolayer graphene on a ZnSe substrate with high nonlinearity, the passively mode-locked polycrystalline Cr:ZnS laser

generated Fourier transform-limited 128 fs pulses near 2340 nm.

**JW2A.23**
**Spatial Analysis and Temporal Stabilisation of a Diode-Pumped Passively Q-Switched Tm:YLF Laser at 2.3 µm,** Matthieu Glasset[1], Hippolyte Dupont[1], Patrick Georges[1], frédéric druon[1]; *[1]Institut d'optique, Lab Charles Fabry, France.* We report on a diode pumped, Q-switched, Tm:YLF laser emitting at 2.3 µm. Pulse train instabilities analysis shows that dynamics of the different transversal modes is uncorrelated and stability can be achieved by spatial selection.

**JW2A.24**
**TMI Threshold Measurements via Beam Stability Metrics,** Przemyslaw Gontar[1], Lukasz Gorajek[1], Jan Jabczynski[1]; *[1]Inst. of Optoelectronics, Military Univ. of Technology, Poland.* A simple definition of the TMI threshold in high-power fiber lasers is proposed. Demonstrated on a 10 kW system using three diagnostic methods, it shows potential for broader applicability across different measurement and system configurations.

**JW2A.25**
**1605 nm PM Picosecond Fiber Laser,** Jean-bernard Lecourt[1], Jean-Paul Yehouessi[1], Yves Hernandez[1]; *[1]Multitel, Belgium.* SESAM-free Mode-Lock fiber oscillator combined with innovative 4-pass pre-amplifier and Large-Mode-Area Er/Yb amplifier have been developed for delivering 1605nm 20 ps pulses exhibiting kilowatt peak power, Watt-level average power and spectral linewidth under 1 nm.

**JW2A.26**
**9-mJ 1-kHz Yb:CALGO Single Crystal Regen Amplifier,** Fengchen Zhang[1], Yutong Zhang[1], Geyang Wang[1], Yang Yu[1], Wenlong Tian[1], Yishan Wang[2], Jiangfeng Zhu[1], Zhiyi Wei[1]; *[1]Xidian Univ., China; [2]Xi'an Inst. of Optics and Precision, Mechanics (XIOPM), China.* We demonstrated a high-energy Yb:CALGO single-crystal regenerative amplifier, delivering 9.2 mJ output at 1 kHz. The gain narrowing effect was mitigated by using a birefringent filter, enabling an amplified spectrum bandwidth of 10.1 nm.

**JW2A.27**
**922 nm Single-Mode Nd-Doped All-Fiber Laser Using a Chirped Tilted Fiber Bragg Grating.,** Alban Leleux[1], Yigit O. Aydin[1], William Bisson[1], Mathieu Gagné[2], Bertrand Morasse[2], Guillaume Brochu[2], Martin Bernier[1]; *[1]Université Laval, Canada; [2]indie (TeraXion), Canada.* We present a single-mode all-fiber laser emitting 4.7 W at 922 nm, based on a neodymium-doped silica step-index fiber and a chirped tilted fiber Bragg grating cavity filter suppressing the competing amplified spontaneous emission at 1060 nm.

**JW2A.28**
**Development of Yb:YAG Thin Rod Amplifier With Atomic Diffusion Bonding,** Yasuhiro Kamba[1], Ryo Kageyama[1], Atsushi Fuchimukai[1], Taisuke Miura[1], Miyuki Uomoto[2,3], Takehito Shimatsu[2,3]; *[1]Gigaphoton Inc, Japan; [2]Research Inst. of Electrical Communication, Tohoku Univ., Japan; [3]Frontier Research Inst. for Interdisciplinary Sciences, Tohoku Univ., Japan.* A fiber laser seed was amplified using a double-pass Yb:YAG ceramic rod amplifier with atomic diffusion bonding, achieving 33.8 W output and 5.63 mJ pulse energy with enhanced beam

quality and efficiency.

**JW2A.29**
**Radiation-Hardened Er-Doped Figure-8 Mode-Locked Fiber Lasers for Spaceborne Optical Frequency Comb,** Mitsuru Musha[1], Yuichi Takeuchi[1], Nozomu Takagi[1], Sou Aiba[1], Ren Kondo[1], Yushi Tanaka[1], Aru Suemasa[2], Saya Matsushita[2], Toshitaka Sasaki[2], Hiroshi Takiguschi[2], Isao Kawano[2], Satoshi Kogure[2]; *[1]Inst. for Laser Science, Univ. of Electro-communications, Japan; [2]Japan Aerospace Exploration Agency, Japan.* We have developed spaceborne optical frequency comb with figure-8-type mode-locked fiber lasers, in which specially-customed radiation-hardened high-doped Er-doped fibers are used for further enhancement of radiation tolerance up to total dose of 150 krad.

**JW2A.30**
**Sub-fs Timing Jitter Control for a ULtrafast Regenerative Amplifier,** Niu Siyuan[1], Yang Yu[1], Wenlong Tian[1], Geyang Wang[1], Jiangfeng Zhu[1], Zhiyi Wei[2], Wu Bowen[1]; *[1]Xidian Univ., China; [2]Inst. of Physics, Chinese Academy of Sciences, China.* We report on 0.876 fs RMS timing fluctuation correction between a free-runing femtosecond seed source and regenerative amplifier using the fast-slow loop feedback within four hours.

**JW2A.31**
**Narrowband ZGP OPO Emission at 3.98 µm in Non-Planar Ring Cavity With Si Etalons,** Marcin Piotrowski[1], Achille Bogas-Droy[1], Gerhard Spindler[2], Stefano Bigotta[1], Anne Hildenbrand-Dhollande[1]; *[1]French-German Research Inst. of Saint-Louis, France; [2]Independent Researcher, Germany.* We present a study of high-power ZGP OPO in the non-planar resonator with spectral narrowing by intra-cavity elements down to single nanometres linewidths around 4 µm.

**JW2A.32**
**Design of 7-Channel Fiber Positioner Array With Parallelogram-Structured PZT Actuators for Coherent Beam Combining,** Suhun Jung[1], Hwihyeong Lee[1], Joonhoi Koo[1], Junhan Park[1], Juseung Lee[1], Seungwook Yoon[1], Jong-Won Lee[1], Seungwon Jun[1], Kwang Hyun Lee[1], Wansoon Shin[1]; *[1]Agency for Defense Development, South Korea.* We propose a seven-channel tiled fiber laser array integrated with a fiber positioner for coherent beam combining. The fiber positioner incorporates four piezoelectric benders in a parallelogram configuration allowing high-precision control. The PZT actuator module was evaluated through step response and target-in-the-loop (TIL) experiments.

**JW2A.33**
**Thin-Disk Laser Module Comparison ,** Sabina Kudelkova[1], Radim Kudelka[1], Antonin Fajstavr[1], Michal Chyla[2], Pawel Sikocinski[2], Jiri Muzik[2]; *[1]CRYTUR spol. s.r.o., Czechia; [2]Hilase, Czechia.* Thin-disk laser modules produced in Crytur for high power applications are introduced. SiC and diamond substrates and different coating techniques are compared in terms of heat management and resulting output efficiency.

**JW2A.34**
**Pulsed 1062.78-nm Yb Doped Fiber Amplifier for Generating Light Source of Hydrogen Lyman-α Resonance Light,** Tatsuya Shinozaki[1], Norihito Saito[1], Yu Oishi[2,3], Takayo Ogawa[1], Satoshi Wada[1]; *[1]Photonics Control Technology Team, RIKEN, Japan; [2]Muon Science*

*Laboratory, Institue of Materials Structure Science, KEK, Japan; [3]Muon Science Section, Inst. of Materials and Life Science Division, J-Parc Center, Japan.* we report a pulsed 1062.78-nm light source. The pulsed light was generated by an intensity modulator. It was amplified a Yb doped fiber amplifier. The output energy was 20 nJ at 100 kHz.

**JW2A.35**
**Tunable Single-Frequency Cascaded Stokes Orders in Monolithic Diamond Raman Lasers,** Eduardo Granados[1], Cyril Bernerd[1], Katerina Chrysalidis[1], Daniel T. Echarri[1], Valentin N. Fedosseev[1], Reinhard Heinke[1], Bruce Marsh[1], Eva Roiková[1], Sebastian Rothe[1], Georgios Stoikos[1]; *[1]Council Europeenne Recherche Nucleaire, Switzerland.* We present results of a temperature-tunable, cascaded single-frequency diamond Raman laser that significantly extends the wavelength coverage in the visible spectral range, enabling broader isotope shift measurements at CERN.

**JW2A.36**
**Wavefront Stabilization of High-Energy Few-Cycle Pulses via Vacuum Enclosure in SYLOS2,** Janos Csontos[1], Szabolcs Tóth[1], László T. Tóth[1], István Dóra[1], Dániel Abt[1], Prabhash P. Geetha[1], Balázs Kovalovszki[1], Tamás Somoskoi[1], Balázs Nagyillés[1], Balázs Farkas[1], Zsolt Divéki[1], Andor Körmöczi[1], Adam Borzsonyi[1]; *[1]ELI-HU, Hungary.* Vacuum-enclosing the SYLOS2 laser's beam expansion and pre-compression stages significantly improved wavefront stability by reducing air-induced aberrations, enhancing beam quality for attosecond and particle source applications at ELI ALPS.

**JW2A.37**
**Investigating the Evolution of Optical Vortex Arrays in Laser Beams via Second Harmonic Generation,** Jung-Chen Tung[1], Jia-Ming Chen[1], Chen-Kai Sung[1]; *[1]National Taipei Univ. of Technology, Taiwan.* High-order laser modes are generated via off-axis pumping and second-harmonic generation, converted into vortex arrays using an astigmatic mode converter, and analyzed theoretically in terms of their propagation, phase fields, and gradients.

**JW2A.38**
**Laser Architecture for Burst-Mode Electro-Optic Frequency Combs Beyond 100 W,** Eva Roiková[1,2], Vitaliy Goryashko[2], Eduardo Granados[1]; *[1]CERN, Switzerland; [2]Department of Physics and Astronomy, Uppsala Univ., Sweden.* We propose a burst-mode laser architecture based on a combination of Yb fiber and Nd bulk gain media for amplifying an electro-optic frequency comb to more than 100 W, enabling laser-particle interaction experiments at high intensity.

**JW2A.39**
**Passively Q-Switched Tm:YLF Laser Utilizing Ho:YAG Saturable Absorber at 1907 nm,** Salman Noach[1], Neria Suliman[1], Ishay Shalman[1], Rotem Nahear,[1]; *[1]Jerusalem College of Technology, Israel.* Demonstration of enhanced performance of a passively Q-switched Tm:YLF laser using Ho:YAG as saturable absorber, wavelength-stabilized using etalons to the 1907 nm holmium absorption peak, achieving pulse energies up to 4.2 mJ with 9.6% optical efficiency.

**JW2A.40**
**Picosecond Synchronously Pumped Crystalline Raman Lasers for Advanced Applications - Overview,** Milan Frank[1], Michal Jelinek[1], David Vyhlídal[1], Václav

Kubeček[1]; *[1]Czech Technical Univ., Czechia.* In this contribution, unique, comprehensive and complex overview of picosecond synchronously pumped Raman lasers based on crystalline medium is presented. The experimentally achieved results and theoretical simulations are commented in detail.

**JW2A.41**
**ESTER: a Compact 60 mJ Air-Cooled Q-Switched Nd:YAG Laser for Field Application,** Krystof Polak[1], Antonin Fajstavr[1], Michal Chyla[2], Matej Zacek[2], Pavel Porizka[3]; *[1]CRYTUR spol. s.r.o., Czechia; [2]HiLASE Centre, Inst. of Physics CAS, Czechia; [3]Lightigo s.r.o., Czechia.* ESTER is a 1064~nm nanosecond laser source delivering 10~ns pulses with energies exceeding 60~mJ at 50~Hz and over 50~mJ at 100~Hz, featuring excellent pulse-to-pulse stability. It is fully air-cooled, powered by 24~V, with integrated electronics.

**JW2A.42**
**Method to Calculate Resonator Losses Including Diffractive Elements,** Hendrik Büker[1,2], Eduardo Granados[1], Katerina Chrysalidis[1], Marc Eichhorn[1,2]; *[1]Council Europeenne Recherche Nucleaire, Switzerland; [2]Inst. of Control Systems (IRS), Karlsruhe Inst. of Technology (KIT), Germany.* A ray transfer matrix approach incorporates birefringence, and diffractive effects to quantify spectral resonator losses. The framework supports design optimization for advanced resonators in linewidth variable and tunable laser systems.

**JW2A.43**
**Ultra-Short Single-Frequency DFB Yb-Doped Fiber Laser,** Artem Shigapov[1], Evgenii Seregin[1], Mikhail Likhachev[1], Yulia Gromova[1]; *[1]GREITLEX PHOTONICS DOO, Serbia.* The record-short (~ 10 mm) single-frequency DFB Yb-doped laser operated near 1064 nm have been demonstrated. Output power of more than 13 mW (pump power of ~ 240 mW) was achieved.

**JW2A.44**
**Thermal Management Efficiency Investigation of Passive Elements in SWIR Fiber Lasers,** Helena Picmausova[1,2], Michael Pisarik[1], Clément Romano[1], Dieter Panitzek[1], Jan Farlík[2], Marc Eichhorn[1,3], Christelle Kieleck[1]; *[1]Fraunhofer IOSB, Germany; [2]Univ. of Defence, Czechia; [3]Inst. of Control Systems (IRS), Karlsruhe Inst. of Technology (KIT), Germany.* This paper presents a numerical and experimental investigation of passive thermal management of fiber lasers and amplifiers, emphasizing fiber splice performance. Strategies for reducing thermal stress and improving heat transfer in fiber lasers are highlighted.

**JW2A.45**
**Cascaded Optical Parametric Generation of mid-Wave Infrared Nanosecond Pulses in $CdSiP_2$,** Marius-Andrei Codescu[1], Joel Murray[2], Kevin T Zawilski[3], Peter G. Schunemann[3], Timothy H. Runcorn[1], Robert T. Murray[1], Shekhar Guha[4]; *[1]Imperial College London, UK; [2]UES, Inc., USA; [3]BAE Systems, Inc, USA; [4]Materials and Manufacturing Directorate, Air Force Research Laboratory, USA.* We demonstrate tunable 3.7–4.3 μm mid-wave infrared generation using cascaded optical parametric generation in non-critically cut CdSiP2, pumped by two different 1.064 μm lasers at 10 Hz–5 mJ and 1 kHz–1 mJ.

**JW2A.46**
**Broadband Incoherent Source Based on Semiconductor Optical Amplifier for Fusion Applications,** Loïc Meignien[1], Titouan Degrandcourt[1], Marc Hanna[1], Pierre Lebegue[1], Patrick Audebert[1], Jean Christophe Delagnes[1]; *[1]CNRS, France.* This work presents a broadband incoherent laser source based on a semiconductor optical amplifier, suitable for inertial confinement fusion. It enables efficient temporal shaping, high contrast, and shows promising potential for ICF experiments.

**JW2A.47**
**High-Efficiency All-Solid-State Deep-Ultraviolet Femtosecond Laser,** junxiao bai[1], Geyang Wang[1], Wenlong Tian[1], Yang Yu[1], Zhiyi Wei[2], Jiangfeng Zhu[1]; *[1]xidian Univ., China; [2]Inst. of Physics, Chinese Academy of Sciences (IOPCAS), China.* This paper reports on a high-efficiency all-solid-state deep-ultraviolet femtosecond laser system with 19.87% and 2.85% conversion efficiencies from the fundamental 1-μm laser to 259 nm and 207 nm lasers, respectively.

**JW2A.48**
**Thin-Disk Laser Head as a Pump Module for Pumping Thin-Disk Gain Media,** Petr Bjorgen[1], Antonin Fajstavr[1], Sabina Kudelkova[1], Martin Smrz[2], Michal Chyla[2], Jiri Muzik[2], Pawel Sikocinski[2]; *[1]CRYTUR, spol. s r. o., Czechia; [2]Centrum HiLASE, Czechia.* Thin-disk laser head with active medium for high-power solid-state laser was fully tested with a laser source power of up to 1 kW, with an average output power exceeding 500 W in MM and 300 W in SM.

**JW2A.49**
**All-Coaxial Optical Waveform Manipulator for Sub-Petahertz-Band Harmonics Light,** Kazumichi Yoshii[1], Ryo Mitsumoto[1]; *[1]Ryukoku Univ., Japan.* We demonstrate that all-coaxial method for amplitude and phase manipulation works for harmonic light with a bandwidth of 0.8 peta-Hz, generating a pulse width of 520 attoseconds with a pulse interval of 3.5 fs.

**JW2A.50**
**Record Pulse Energy From Compact Nanosecond Nd:YAG/v:YAG Laser Emitting at 1.3 μm,** Jan Sulc[1], Krystof Kadlec[1], Helena Jelinkova[1], Matej Zacek[2], Martin Smrz[2], Lukáš Beran[3], Radim Kudelka[3], Karel Nejezchleb[3]; *[1]Czech Technical Univ. in Prague, Czechia; [2]HiLASE Centre, Inst. of Physics ASCR, v.v.i., Czechia; [3]Crytur, Ltd., Czechia.* We present a compact passively Q-switched laser producing sub-3 ns pulses at 1338 nm. Cavity and pump optimization enabled pulse energies exceeding 1 mJ and peak powers up to 0.4 MW.

**JW2A.51**
**Deep Learning-Assisted Angle-Resolved Scatterometry of 3D NAND Channel Hole Structure,** Lingjie Li[1], Yichi Pan[1], Haokang zhang[1], Wei Liang[1], Chong Shen[1], Dekun Yang[1]; *[1]Hainan Univ., China.* Nanoscale critical dimension profiling of high-aspect-ratio channel holes in 3D NAND flash memory is achieved via optical metrology and neural networks, enabling accurate, high-throughput, and non-destructive measurement for advanced semiconductor memory manufacturing.

**JW2A.52**
**Experimental Study on Laser Surface Texturing of AISI 416 Stainless Steel Verified by Speckle Imaging,** Samar R. AlSayed Ali[1], Doaa Youssef[1]; *[1]Laser Inst. (NILES) Cairo Univ.,*

*Egypt.* This study investigated laser surface texture as a primary factor improving AISI 416 stainless steel surface by varying the laser processing parameters. Surface modification was evaluated and confirmed through affordable, nondestructive laser speckle imaging.

**JW2A.53**
**Laser Surface Modification of Nodular Graphite Cast Iron (NGCI) by High Power Nd:YAG Laser,** Samar R. AlSayed Ali[1], Adel Nofal[2]; *[1]Laser Inst. (NILES) Cairo Univ., Egypt; [2]Central Metallurgical Research and Development Inst. (CMRDI), Egypt.* Microstructural modification of NGCI was investigated as a function of laser parameters, including laser power, scanning speed, and interaction time. High laser energy transformed and refined the microstructure, resulting in enhanced surface hardness.

**JW2A.54**
**2.3 W, 2.79 μm Emission From a Diode-Pumped Er:CaF2 Single-Crystal Fiber Laser,** Xu Wu[1], zhen zhang[1], Xiabing Zhou[2], Dapeng Jiang[1], Guoqiang Xie[2], Liangbi Su[1]; *[1]Shanghai Inst. of Ceramics, Chinese Academy of Sciences, China; [2]Shanghai Jiao Tong Univ., School of Physics and Astronomy, Key Laboratory for Laser Plasmas (Ministry of Education), Collaborative Innovation Center of IFSA (CICIFSA), China.* A 2.3 W continuous-wave (CW) Er:CaF2 laser at 2.79 μm has been achieved with laser diodes pumping a Φ1mm×40mm single crystal fiber fabricated by the laser heated pedestal growth (LHPG) method.

**JW2A.55**
**Enhanced Energy Transfer From Laser Radiation to Matter Doped by Resonating Nanoantennas,** Konstantin Zsukovszkij[1]; *[1]Wigner Research Center for Physics, Hungary.* Nanodopes in matter subject to laser radiation increases energy of ions. 3D-crossed nanoantennas yield 3-4 times higher energy than a resonating dipole, which gives almost 100 times energy gain.

**JW2A.56**
**Benchmarking THz Imaging of Painted Canvases:Absorption, Pearson Correlation, and Label-Free PCA for Hidden Underdrawings,** Emma Vannini[1,2], Dal Fovo Alice[1], Raffaella Fontana[1], Ilaria Catapano[3], Alessandra Rocco[1], Roberto Aiello[1], Valentina Di Sarno[1], Pasquale Maddaloni[1]; *[1]CNR-Istituto Nazionale di Ottica, Italy; [2]Dipartimento di Fisica e Astronomia, Universita di Firenze, Italy; [3]IREA-CNR, Italy.* We benchmark absorption, Pearson correlation, and label-free PCA on THz-TDS canvases. Together they robustly reveal concealed underdrawings: absorption quantifies spectral parameters, correlation is frequency-agnostic, and PCA provides reference-free masks—complementary strengths enabling resilient heritage imaging workflows.

**JW2A.57**
**Cryogenically–Cooled Yb:YAG Amplifier for Pumping High Energy and High Repetition Rate OPCPA,** Jan Bartonicek[1,2], Jan Eisenschreiber[1], Martin Fibrich[1], Jonathan T. Green[1], Bedrich Rus[1]; *[1]Extreme Light Infrastructure ERIC, Czechia; [2]Department of Physics, Faculty of Mechanical Engineering, Czech Technical Univ. in Prague, Czechia.* We report on the latest results in the developement of a cryogenically–cooled ≥10 J Yb:YAG DPSSL for pumping OPCPA at 20 Hz providing 100TW class pulses for laser wakefield acceleration.

**11:30 -- 12:30**
**Room: South Hall 3C**
**JW3A • Joint Plenary Session III**
*Presider: Miranda van Iersel, New Mexico State University, USA*

**JW3A.1 • 11:30 (Plenary)**
**Has the Time for Optical Wireless Communications Finally Arrived?** Harald Haas[1]; [1]*Univ. of Cambridge, UK.* This plenary address explores how optical wireless communications can tackle connectivity challenges and enhance networks underwater, on land and in space, while also addressing current limitations and proposing potential solutions.

**14:00 -- 16:00**
**Room: South Hall 3C**
**AW4A • Visible Laser Materials**
*Presider: Pavel Loiko; CIMAP, Université de Caen Normandie, France*

**AW4A.1 • 14:00**
**Cryogenic Cascade Lasing of Tm:YLF With 39 mW Output Power at 450 nm,** Moritz Badtke[1], Sascha Kalusniak[1], Hiroki Tanaka[1], Christian Kraenkel[1]; [1]*Leibniz-Institut für Kristallzüchtung, Germany.* We report on UV-pumped room-temperature laser experiments with $Tm^{3+}$:$LiYF_4$ at 1.9 µm and cryogenic 450-nm/1.9-µm cascade lasing at 78 K yielding 39 mW output power and 17% slope efficiency at 450 nm.

**AW4A.2 • 14:15**
**Nd-Doped LGYSB: a New Bifunctional Crystal for Efficient Laser Emission and Frequency Conversion,** Alin Broasca[1], Madalin Greculeasa[1], Flavius Voicu[1], Stefania Hau[1], Cristina Gheorghe[1], Gabriela Croitoru[1], Nicolaie Pavel[1], Lucian Gheorghe[1]; [1]*INFLPR, Romania.* Nd-doped LGYSB crystals with a noncentrosymmetric structure were grown using the Czochralski method. Laser experiments at 1062 nm demonstrated high slope efficiencies, confirming their strong potential for efficient laser emission and frequency conversion.

**AW4A.3 • 14:30**
**Effect of Lanthanum on the Spectroscopy and Laser Performance of Pr:$Sr_{1-x}La_xMg_xAl_{12-x}O_{19}$ Hexaaluminates,** Alix Guerber[1], Jonathan Demaimay[2], Florent Cassouret[1], Noémie Sandre[1], Zhonghuan Zhang[3], Pavel Loiko[2], Alain Braud[2], Patrice Camy[2], Xavier Mateos[3], Xiaodong Xu[4], Alban Ferrier[1], Pascal Loiseau[1], Gerard Aka[1]; [1]*PSL Univ., Chimie ParisTech - CNRS, Institut de Recherche de Chimie Paris IRCP, France;* [2]*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, France;* [3]*Universitat Rovira i Virgili (URV), Física i Cristallografia de Materials (FiCMA), Spain;* [4]*Jiangsu Key Laboratory of Advanced Laser Materials and Devices, School of Physics and Electronic Engineering, Jiangsu Normal Univ., China.* We systematically study the effect of lanthanum addition on the spectroscopic and laser properties of Pr:$Sr_{1-x}La_xMg_xAl_{12-x}O_{19}$ (Pr:ASL) hexaaluminates. A 465-nm GaN-diode pumped red Pr:ASL laser generated 156 mW at 644 nm with 12.2% slope efficiency.

**AW4A.4 • 14:45**

**Violet, Blue and Infrared Cryogenic Lasing From the $^5D_3$ Level in $Tb^{3+}$,** Moritz Badtke[1], Sascha Kalusniak[1], Hiroki Tanaka[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We report on cryogenic laser operation using the $^5D_3$ level in Tb:YLF as the upper laser level. At 78 K, lasers at 413 nm, 435 nm and 1746 nm are realized under UV pumping.

**AW4A.5 • 15:00 (Student Paper Finalist)**
**Yellow Lasing From $Dy^{3+}$-Doped Fluoride Whispering Gallery Mode Microsphere,** Abhishek Sureshkumar[1], Loraien R. Kalathil[1], Jonathan Demaimay[2], Georges Perin[1], Christelle Velly[1], Hélène Ollivier[1], Yannick Dumeige[1], Pavel Loiko[2], Gurvan Brasse[2], Alain Braud[2], Patrice Camy[2], Stéphane Trebaol[1]; *[1]Univ. of Rennes, France; [2]Univ. of Caen Normandy, France.* $Dy^{3+}$-doped amorphous fluoride microspheres are fabricated from Dy:$LiYF_4$ crystals by the plasma torch method. Yellow lasing at 573 nm is achieved under blue GaN-diode pumping at 454 nm with a threshold of 190 µW.

**AW4A.6 • 15:15**
**Diode-Pumped, Q-Switched $Sm^{3+}$:YLF Laser at 605 nm,** Yushi Kaneda[1], Hiroki Tanaka[2], Val Temyanko[3]; *[1]Univ of Arizona, Coll of Opt Sciences, USA; [2]IKZ Berlin, Germany; [3]TIPD LLC, USA.* We report the first Q-switched operation of $Sm^{3+}$:YLF laser at 605 nm. An average power of >100 mW and a pulse width of 250 ns were observed at a repetition rate of 500 Hz.

**AW4A.7 • 15:30 (Invited)**
**Nanostructured GLAD Coatings for High-Power Lasers: Antireflective, High-Reflective, and Polarizing Optics,** Lina Grineviciute[1]; *[1]Ctr for Physical Sciences & Technology, Lithuania.* Only silica-based antireflective and high-reflective coatings exhibit superior laser damage thresholds and low stress. Anisotropic thin-film designs enable the development of waveplates and 0° AOI polarizers, demonstrating high performance for UV nanosecond lasers and beyond.

## 14:00 -- 16:00
## Room: South Hall 3B
## LW4B • EUV, X-Ray Generation & Particle Acceleration I
*Presider: Lahsen Assoufid; Argonne National Laboratory, USA*

**LW4B.1 • 14:00 (Invited)**
**Laser-Powered Accelerators at High Average Powers,** Stephen Milton[1]; *[1]Tau Systems, USA.* Abstract not available.

**LW4B.2 • 14:30 (Invited)**
**From Plasma Waves to Coherent Light: Compact XUV FEL Development via LWFA,** Yanjun Gu[1]; *[1]The Univ. of Osaka, Japan.* Quasi-monoenergetic electron beams with the energy spread less than 1%, pointing stability less than 0.5mrad, energy stability less than 6% and a central energy of 400MeV have been generated. By sending these beams into undulator, a FEL gain in XUV range has been demonstrated.

**LW4B.3 • 15:00 (Invited)**
**DFG THz Generation for the Particle Acceleration Using High Power 1 um Laser and Large PPMgLN,** Mitsuhiro Yoshida[1]; *[1]KEK, Japan.* The PPMgLN is currently best candidate for

intense DFG THz generation.The hybrid Yb fiber, Yb:YAG disk and DFC(Distributed Face Cooling) laser system is developed for the THz DFG generation.

**LW4B.4 • 15:30 (Invited)**
**Emerging Long-Wave IR Lasers for Particle Acceleration and x-ray Radiation Sources,** Igor V. Pogorelsky[1], Mikhail N. Polyanskiy[1], Mark N. Palmer[1], Marcus N. Babzien[1], William N. Li[1], Navid Vafai-Najafabadi[2,1], Mikhail N. Fedurin[1], Yusuke N. Sakai[1], Sandra Biedron[3,4]; *[1]Brookhaven National Laboratory, USA; [2]Stony Brook Univ., USA; [3]Element Aero, USA; [4]Center for Bright Beams, USA.* Expanding spectral coverage of ultra-intense, ultra-fast lasers into Long-Wave IR (~9-11 mm) spectral range opens new opportunities for perfecting novel laser-based mechanisms of charged particle acceleration and generation of radiation from THz to gammas.

**14:00 -- 16:00**
**Room: South Hall 3A**
**LsW4C • Remote Sensing III**
*Presider: Hanyu Zhan; Nanjing Univ Aeronautics & Astronautics, China*

**LsW4C.1 • 14:00 (Invited)**
**Laser Sensing for Autonomous Mobility: Lidar-Driven Navigation in Unmanned Systems,** Cheng Yuan[1]; *[1]Nanjing Univ Aeronautics & Astronautics, China.* As unmanned systems tackle more complex missions, robust navigation in challenging environments becomes essential. This presentation introduces a Lidar-driven multi-sensor fusion framework enabling reliable missions in dynamic and GPS-denied conditions.

**LsW4C.2 • 14:30 (Invited)**
**Blue GaN Laser Diodes for Underwater Sensing and Communication,** Ondrej Kitzler[1], Zixuan Li[1], Carolyn Taylor[1], Judith M. Dawes[1], David J. Spence[1], James E. Downes[1], Helen M. Pask[1]; *[1]Macquarie Univ., Australia.* Blue GaN laser diodes enable compact, high-speed optical systems. Their short wavelength and modulation capabilities make them ideal for underwater LiDAR and communication, offering superior resolution and data rates in marine environments.

**LsW4C.3 • 15:00**
**Neural Network-Based FEature Tracking Models for Studying Atmospheric Refraction,** Haoxin Tian[1], Hanyu Zhan[1], Jizhou Lai[1], Cheng Yuan[1]; *[1]Nanjing Univ Aeronautics & Astronautics, China.* Field measurements of scenes viewed through the lower atmosphere are made by using a time-lapse camera system. We develop and employ neural network models for the precise tracking of subtle feature shifts between frames due to atmospheric refraction.

**LsW4C.4 • 15:15**
**Negative-Index Terahertz Metamaterial Sensor ith Merged Circular SRRs for Ultra-Sensitive Refractive Index Detection**, Sumaia Jahan Mishu[1], Yaser M. Banad[1], Sarah Sharif[1]; [1]*Univ. of Oklahoma, USA*. The study presents a novel terahertz metamaterial absorber with a merged circular SRR design that achieves perfect absorption at 2.55 THz, exhibiting a Q- factor of 71.8, sensitivity of 892 GHz/RIU, and FoM of 26.2 for RI sensing.

**LsW4C.5 • 15:30 (Invited)**
Withdrawn

**LsW4C.6 • 16:00**
Withdrawn

**16:30 -- 17:30**
**Room: South Hall 3C**
**AW5A • Near Infrared Lasers**
*Presider: Takunori Taira; RIKEN / IMS, Japan*

**AW5A.1 • 16:30**
**Spectroscopy and Mode-Locked Laser Operation of a Disordered $Yb:LaCa_4O(BO_3)_4$ Crystal,** Honghao Xu[3], Huang-Jun Zeng[1], Hai-Yu Nie[1], Zhang-Lang Lin[1], Ge Zhang[1], Yuxia Zhang[3], Sami Slimi[4], Xavier Mateos[4], Pavel Loiko[5], Hsing-Chih Liang[6], Valentin Petrov[2], Weidong Chen[1,2]; *[1]Fujian Inst of Res Structure of Matter, China; [2]Max Born Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Germany; [3]Qingdao Univ., China; [4]Universitat Rovira i Virgili (URV), Spain; [5]Université de Caen, France; [6]National Yang Ming Chiao Tung Univ., Taiwan.* We report on spectroscopy and SESAM mode-locked laser operation of a disordered borate crystal, $Yb:LaCa_4O(BO_3)_4$. 37-fs soliton pulses are generated at 1052.2 nm with an average output power of 246 mW at ~74 MHz.

**AW5A.2 • 16:45**
**Nd:LuAP Laser at 1083 nm for Atmospheric Helium LiDAR,** Sascha Kalusniak[1], Steffen Ganschow[1], Markus Stypa[1], Christian Büdenbender[2], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany; [2]Institut für Physik der Atmosphäre, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany.* We present growth, spectroscopy and laser operation of $Nd:LuAlO_3$ (Nd:LuAP) for the detection of atmospheric helium and obtain up to 64% slope efficiency at 1083 nm with 1.6 W of output power under Ti:sapphire-pumping.

**AW5A.3 • 17:00**
**Kerr-Lens Mode-Locked $Yb:SrF_2$ Laser,** Huang-Jun Zeng[1], Zhang-Lang Lin[1], Ge Zhang[1], Pavel Loiko[3], Abdelmjid Benayad[3], Patrice Camy[3], Xavier Mateos[4], Valentin Petrov[2], Weidong Chen[1,2]; *[1]Fujian Inst of Res Structure of Matter, China; [2]Max Born Inst., Germany; [3]Université de Caen, France; [4]Universitat Rovira i Virgili (URV), Spain.* We report on a Kerr-lens mode-locked $Yb:SrF_2$ laser delivering 37 fs soliton pulses at 1066.4 nm with an average output power of 85 mW at a repetition rate of ~71.8 MHz.

**AW5A.4 • 17:15 (Student Paper Finalist)**
**Protocols and Analysis of Wavefront Distortions in Nd:Glass Amplifiers During Flash-Pumping : Towards the Active Coherent Beam Combining of Kilojoule-Class Laser Chains.,** Pierre Lebegue[1,2], Cyril Rapeneau[2], Doina Badarau[2], Marie Froidevaux[2], Joanna de Sousa[2], Loïc MEIGNIEN[2], Ivan Doudet[3], Nolan Chan[3], Benoit Wattelier[3], Patrick Audebert[2], Dimitris Papadopoulos[2], frédéric druon[1]; *[1]Institut d'Optique Lab Fabry, France; [2]Laboratoire pour l'utilisation des lasers intenses, France; [3]Phasics S.A, France.* We present an innovative protocol to characterize “on-shot aberrations” of large-scale flash-lamp amplifiers. Our results are obtained with a high-speed wavefront sensor at 61k-fps and aim to pave the way to active

coherent beam combing

**16:30 -- 17:30**
**Room: South Hall 3B**
**LW5B • EUV, X-Ray Generation & Particle Acceleration II**
*Presider: Lahsen Assoufid; Argonne National Laboratory, USA*

**LW5B.1 • 16:30 (Invited)**
**ELI Beamlines Facility – Technology for Advanced Laser Experiments,** Pavel Bakule[1], Bedrich Rus[1], Daniele Margarone[1]; *[1]ELI, Czechia.* We present an overview of the large-scale laser technologies and associated user stations available at ELI Beamlines, and demonstrate the current capabilities, including the beam transport systems that enable fast switching between multiple user stations.

**LW5B.2 • 17:00**
**Filament Assisted X-ray Generation Using Ultrashort Pulses and Loose Focusing ,** Balys Momgaudis[1], Vakaris Lekas[1], Vytautas Jukna[1], Audrius Dubietis[1]; *[1]Vilnius Univ., Lithuania.* Applicability of ultrashort pulses for generation of X-rays at intermediate distances is investigated. UV luminescence was validated as a proxy to direct X-ray spectroscopy and impact on brightness from pulse parameters and interaction geometry measured.

**17:30 -- 18:30**
**Room: South Hall 3C**
**AW6A • Postdeadline Paper Session**
*Presider: Yushi Kaneda; Univ of Arizona, Coll of Opt Sciences, USA*

**AW6A.1 • 17:30**
**Beam Shaping With Neural Network Coherent Beam Combination,** William R. Kerridge-Johns[1], Fedor Chernikov[1], Zedi Zhang[1], Dominic Blackledge[1], changshun Hou[1], Ben Mills[1], Michalis Zervas[1], Johan Nilsson[1]; *[1]Optoelectronics Research Centre, UK.* Three Yb-fiber amplifier outputs were phase-locked and beam-shaped in a tiled aperture CBC array using a neural network algorithm executed at 1100Hz, achieving low differential phase noise (40mrad, lambda/150) with beam shaping in a single step (1ms).

**AW6A.2 • 18:00**
**>1.14 kW QCW Thulium-Doped Fiber Laser at 2 µm,** Dieter Panitzek[1,2], Michael Pisarik[1], Helena Picmausova[1,3], Julian Schaal[1,2], Jan Lautenschläger[1,2], Dominik Lorenz[1,2], Julian Schneider[1,2], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Fraunhofer IOSB, Germany; [2]Inst. of Control Systems, Karlsruhe Inst. of Technology, Germany; [3]Univ. of Defence, Czechia.* This paper reports on a thulium-doped fiber laser in QCW operation. A peak power of 1142 W at 2031 nm is obtained and modulation instabilities caused by intermodal FWM are investigated.

**AW6A.3 • 18:15**
**Towards Ultra-Compact 1-GHz VIS-to-MIR Frequency Combs With one-Step Self-Referencing on-Chip,** xuan zhang[3,1], Yuchen Wang[3], Junguo Xu[3,1], Qiankun Li[2], Xueying Sun[2], Yongyuan Chu[2], guangzi feng[3,4], Xia Hou[3], Chengbo Mou[2], Hairun Guo[2,5], Sida Xing[3]; *[1]Univ. of*

*Chinese Academy of Science, China; [2]Key laboratory of Specialty Fiber Optics and Optical Access Networks, Shanghai Univ., China; [3]Shanghai Inst. of Optics and Fine Mechanics, Chinese Academy of Sciences, China; [4]ShanghaiTech Univ., China; [5]Hefei National Laboratory, Univ. of Science and Technology of China, China.* We demonstrate a compact 1-GHz fiber-chip-hybrid frequency comb that generates a three-octave supercontinuum (350–3280 nm, 0.76 PHz) and provides a robust f-3f beat note for direct carrier-envelope-offset stabilization, enabling high-speed broadband spectroscopy and metrology.

## Thursday, 23 October

### South Hall 3C
### 08:30 -- 10:30
### ATh1A • Mid-IR Laser Materials and Technologies
*Presider: Marcin Piotrowski; Inst Franco-Allemand Recherches St Louis, France*

**ATh1A.1 • 08:30 (Invited)**
**High-Power Continuous-Wave Mid-Infrared Laser Form Erbium-Doped Fluorite Crystals,** Liangbi Su[1]; *[1]Shanghai Inst. of Ceramics CAS, China.* A room-temperature 15 W continuous-wave Er:CaF2 laser at 2.79 μm has been realized by optimization of mode-match and heat dissipation in a dual-end pumped crystal slab scheme.

**ATh1A.2 • 09:00**
Withdrawn

**ATh1A.3 • 09:15**
**High-Power and Highly-Efficient Polycrystalline Fe:ZnSe Laser at 4.1 μm,** Richard Svejkar[1], Jan Sulc[1], Adam Riha[1], Helena Jelinkova[1]; *[1]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Czechia.* We demonstrate multi-watt operation of Fe:ZnSe laser at 77 K, pumped by DPSS Er:YAG laser. The compact set-up allowed to generate up to 16.3 W of output power at 4.1 μm with 45 % slope efficiency.

**ATh1A.4 • 09:30 (Student Paper Finalist)**
**Watt-Level Raman Amplification at 3.98μm in Nitrogen-Filled Silica Hollow-Core Fiber Pumped at 2.06μm,** Achille Bogas-Droy[1,3], Nicolas Dalloz[1], Stefano Bigotta[1], Michael Frosz[3], Marcin Piotrowski[1], Anne Hildenbrand-Dhollande[1], Nicolas Y. Joly[2,3]; *[1]French-German Research Inst. of Saint-Louis, France; [2]Friedrich-Alexander Universität Erlangen-Nürnberg, Germany; [3]Max Planck Inst. for the Science of Light, Germany.* We present a Raman amplifier emitting over 1W average power at 3.98 μm using a nitrogen-filled silica hollow-core fiber, pumped by a 2.06 μm nanosecond laser and seeded with a spectrally narrowed ZGP OPO.

**ATh1A.5 • 09:45**
**Ultrafast Laser Inscription of Mid-Infrared Waveguides in $Pr^{3+}$-Doped Sulfide Glasses,** Mariel Ledesma[1], Ngoc Q. Nguyen[2], Pavel Loiko[2], Patrice Camy[2], Alain Braud[2], Pascal Masselin[3], Catherine Boussard-Plédel[1], David Le Coq[1]; *[1]Université de Rennes, France; [2]CIMAP, France; [3]Université du Littoral Côte d'Opale, France.* Mid-infrared single-mode waveguides consisting of a hexagonal mesh of positive refractive index channels are produced in $Pr^{3+}$-doped sulfide glasses with a broadband emission at 3.5-5.5 μm. The waveguides are studied by μ-Raman and μ-luminescence spectroscopy.

**ATh1A.6 • 10:00**
Withdrawn

**ATh1A.7 • 10:15**
**2.8 μm $Er^{3+}$:$LiYF_4$ Channeled Waveguide Laser Upconversion Pumped Near 1.5 μm,** Berke Ayevi[1], Yagiz Morova[1,3], Melih K. Kadioglu[1], Mauro Tonelli[4], Alphan Sennaroglu[1,2]; *[1]Laser*

*Research Laboratory, Departments of Physics and Electrical-Electronics Engineering, Koç Universitesi, Turkey; [2]Koç Univ. Surface Science and Technology Center (KUYTAM), Koc Univ., Turkey; [3]Physics Department, Istanbul Technical Univ., Turkey; [4]MEGA Materials, Italy.* We present the first demonstration of a room-temperature, continuous-wave, femtosecond laser written channeled $Er^{3+}$:$LiYF_4$ waveguide laser operating at 2810 nm which is upconversion pumped near 1.5 μm with a threshold pump power as low as 93 mW.

**08:30 -- 10:30**
**Room: South Hall 3B**
**LTh1B • THz Generation & Applications**
*Presider: Kei Takeya; Inst. for Molecular Science, Japan*

**LTh1B.1 • 08:30 (Invited)**
**Optoelectronic THz Systems and Emerging Industrial Applications,** Anselm Deninger[1]; *[1]TOPTICA Photonics AG, Germany.* Over the past years, optoelectronic terahertz instrumentation has improved significantly. My presentation reviews the concepts of time-domain and frequency-domain approaches, and presents emerging applications such as thickness gauging, semiconductor inspection and high-bandwidth vector network analysis.

**LTh1B.2 • 09:00 (Invited)**
**THz-Field Generation and Control for High-Field Applications From Accelerating Electrons to Exciting Material Collective Modes,** Nicholas H. Matlis[1]; *[1]Physics, Arizona State Univ., USA.* We describe methods to generate and control THz-frequency electromagnetic fields for novel applications like electron acceleration and collective-mode control in condensed-matter systems requiring field strengths and pulse energies bordering gigavolts per meter and millijoules, respectively.

**LTh1B.3 • 09:30 (Invited)**
**Dynamically Selectable Terahertz-Wave Parametric Down-Conversion by Slant-Stripe-Type Quasi-Phase Matching,** Yuma Takida[1], Hiroaki Minamide[1]; *[1]RIKEN, Japan.* We present highly efficient and dynamically selectable terahertz (THz)-wave parametric down-conversions achieved by backward and forward quasi-phase matching (QPM) in a slant-stripe-type periodically poled lithium niobate (PPLN) crystal.

**LTh1B.4 • 10:00 (Invited)**
**Materials and Devices for THz Wave Generation ,** Junji Hirohashi[1]; *[1]Oxide Corporation, Japan.* Several methods of THz Wave Generation by using ferroelectrics (such as $LiNbO_3$ and $LiTaO_3$) are demonstrated. Cherenkov and DFG types of THz generation methods are investigated from material/device fabrication point of view.

**11:00 -- 13:00**
**Room: South Hall 3C**
**ATh2A • Fiber Lasers**
*Presider: Anne-Laure Calendron; Deutsches Elektronen Synchrotron, Germany*

**ATh2A.1 • 11:00**
**Static and Dynamic Mode Coupling in Polarization Maintaining Yb-Doped 20/400µm Fiber Amplifier,** Friedrich P. Möller[1], Gonzalo Palma-Vega[1], Till Walbaum[1], Thomas Schreiber[1]; *[1]Fraunhofer IOF, Germany.* We experimentally investigate modal energy transfer below the transverse mode instability threshold in polarization-maintaining Yb-doped fiber amplifiers in 20/400 µm geometry. Our findings verify earlier published numerical simulations and define requirements for polarization stabilization methods.

**ATh2A.2 • 11:15**
**Compact 500 W-Class Ultrafast Laser Based on Multi-Core Fiber Amplification,** Vincent Leonhardi[1], Francisco Schwarzl[1], Yannik Atzbach[1], Arno Klenke[2,3], Stefano Wunderlich[1], Christian Gaida[1], Jens Limpert[2,3], Tino Eidam[1]; *[1]Active Fiber Systems GmbH, Germany; [2]Inst. of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität, Germany; [3]Helmholtz-Inst. Jena, Germany.* We present a coherently combined femtosecond fiber chirped-pulse-amplification system based on a rod-type, ytterbium-doped, multicore fiber with 4×4 cores. A high average power of up to >500 W could be achieved with excellent beam quality. This architecture is intrinsically power scalable by increasing the number of cores in the fiber.

**ATh2A.3 • 11:30 (Invited)**
**High Power Fluoride Fiber Laser OPerating at Long-Wavelength,** Wei Shi[1], lu Zhang[1], Shijie Fu[1], Quan Sheng[1], Junxiang Zhang[1], Jianquan Yao[1]; *[1]Tianjin Univ., China.* Recent works of our group on power scaling, wavelength extension and single-frequency operation of Er-doped fluoride fiber lasers operating with $^4F_{9/2}\rightarrow{}^4I_{9/2}$ transition were comprehensively reviewed.

**ATh2A.4 • 12:00**
**Above-3kW Average Power, 3x3 Multicore Fiber Laser System,** Yahia Khalil[1], Mehran Bahri[1], Arno Klenke[1,2], Felix Wanitschke[1,2], Cesar Jauregui[1,3], Johannes Nold[3], Nicoletta Haarlammert[3], Thomas Schreiber[3], Jens Limpert[1,2]; *[1]Inst. of Applied Physics, Germany; [2]Helmholtz-Inst. Jena, Germany; [3]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* We present a 3.2kW, Yb-doped, pump-limited, multi-core fiber laser system with excellent short- and long-term stability (RMS of 0.14% and 0.11%, respectively). The system exhibited an optical-to-optical efficiency of 86.3%.

**ATh2A.5 • 12:15**
**Efficiency Enhancement of Frequency Doubling via Spatio-Temporal Beam Shaping in Multi-Core Fiber Lasers,** Mehran Bahri[1], Yucheng Sun[1], Arno Klenke[1], Cesar Jauregui[1], Jens Limpert[1]; *[1]Friedrich-Schiller-Universität Jena, Inst. of Applied Physics, Germany.* We present the scaling of the second-harmonic conversion efficiency by tailoring the temporal and spatial shapes of the incoherent beamlet array emitted from a 49-core Ytterbium-doped fiber. A conversion efficiency of up to 67% was achieved.

**ATh2A.6 • 12:30**

**Nonlinear Thulium-Doped Fiber Amplifier With Up-Chirped Pulse Evolution for Energy Scaling,** Benedikt Schuhbauer[1], Joe Pius[1], Frithjof Haxsen[1], Uwe Morgner[1,3], Jörg Neumann[1,2], Dietmar Kracht[1,4]; *[1]Laser Zentrum Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering Innovation Across Disciplines), Germany; [3]Institut für Quantenoptik, Leibniz Universität Hannover, Welfengarten 1, 30167 Hannover, Germany, Germany; [4]Leibniz Univ. Hannover, Inst. of Photonics, Nienburger Straße 17, 30167 Hannover, Germany, Germany.* A monolithic PM nonlinear fiber amplifier based on thulium is presented, which allows to generate ultrashort pulses with over 50 nJ pulse energy, corresponding to wide spanning spectra and compressed pulse durations of 121 fs.

**ATh2A.7 • 12:45**
**Longitudinally Segmented Thulium-Doped Fiber for High-Power Fiber Lasers,** Bara Svejkarova[1,2], Martin Grábner[1], Jan Aubrecht[1], Richard Svejkar[3], Jan Pokorny[1,2], Michal Kamaradek[1], Ondrej Podrazky[1], Ivan Kasik[1], Pavel Honzatko[1], W. A. Clarkson[3], Pavel Peterka[1]; *[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; [3]Optoelectronics Research Centre, Univ. of Southampton, UK.* Thulium-doped fiber laser using a longitudinal gradient of doping to reduce the heat load local maxima is presented. Laser achieved 50 W of output power at 1939 nm with a slope efficiency exceeding 62 %.

## 11:00 -- 13:00
## Room: South Hall 3B
## LTh2B • Global Security and Directed Energy
*Presider: Sandra Biedron; Element Aero, USA*

**LTh2B.1 • 11:00 (Invited)**
**EUV Lasers for Lithography, X-ray Lasers for Metrology – Securing the Supply Chain,** Erik Hosler[1]; *[1]PsiQuantum, USA.* Abstract not availble.

**LTh2B.2 • 11:15 (Invited)**
**High-Power Laser-Plasma Chemistry: Radiation, Particles, Currents, Fields, and Chemical Reactions in Large Laser Sparks,** Libor Juha[1]; *[1]FZU - Inst. of Physics of the Czech, Czechia.* A review will be given of chemical reactions initiated by plasmas produced in molecular gases by focused beams of high-power lasers. The relationship between the physics and chemistry of large laser sparks will be discussed.

**LTh2B.3 • 11:30 (Invited)**
**Unique Remote Sensing,** Sergio Carbajo[1]; *[1]Univ. of California Los Angeles, USA.* We present computationally intelligent photon-diversity techniques for quantum atmospheric sensing and adaptive beam control. It aims to overcome deep turbulence and enable predictive stewardship for directed energy and similar systems.

**LTh2B.4 • 11:45 (Invited)**

**Laser Overview,** Franck e. Leibreich[1]; *[1]Thales, France.* Abstract not available.

**LTh2B.5 • 12:00 (Invited)**
Laser Directed Energy Systems'
**Laser Directed Energy Systems,** Ian Thomson[1]; *[1]Leonardo UK Ltd, UK.* We present an introduction to the Leonardo Dragonfire beam director. The beam director steers a high-energy laser source onto incoming threats such as drones or munitions.

**14:30 -- 16:30**
**Room: South Hall 3C**
**ATh3A • Advanced NLO & Frequency Conversion**
*Presider: Patricia Segonds; Neel Inst., France*

**ATh3A.1 • 14:30**
**Nonlinear Characterizations of $YAl_3(BO_3)_4$ Crystals for Frequency Conversion in Green and UV Ranges,** Florent Cassouret[1], Helinand Robin[2,1], Denis Balitski[4], Slimane Raissi[2], Pascal Loiseau[2], Gerard Aka[2], Takunori Taira[3,1]; *[1]Inst. for Molecular Science, Japan; [2]Institut de Recherches de Chimie Paris, PSL Univ., France; [3]Laser-Driven Electron-Acceleration Technology group, Riken SPring-8 center, Japan; [4]Cristal Laser, France.* In this work we characterize YAB properties for second harmonic generation at 532 nm and 266 nm. Angular and thermal acceptances are measured as well as conversion efficiencies for both wavelengths' generation.

**ATh3A.2 • 14:45**
**Q-Switched Tb3+:YLF Laser Frequency Doubled to 293 nm,** Valery Temyanko[1], Leonid Kotov[1], adoum mahamat[1], Hiroki Tanaka[2], Johnathan Hair[3], Amin Nehrir[3], Yushi Kaneda[4,5]; *[1]TIPD LLC, USA; [2]IKZ, Germany; [3]NASA, USA; [4]Optical Sciences, Univ. of Arizona, USA; [5]Oxide, Japan.* We report 293 nm output by intracavity frequency-doubling of Q-switched Tb3+:YLF laser. The output is 0.2 mJ at 500 Hz in 165 ns in bidirectional outputs, which are combined by polarization for O3 DIAL application.

**ATh3A.3 • 15:00**
**Bright Tabletop Vacuum-Ultraviolet Laser for Thorium-229 Spectroscopy,** Jeremy M. Thurston[1], Emma Burton[1], Ivan Dickson[1], Drew Morrill[1], Will Hettel[1], Keegan Finger[1], Margaret Murnane[1], Henry Kapteyn[1,2]; *[1]Univ. of Colorado at Boulder JILA, USA; [2]Kapteyn-Murnane Laboratories, USA.* We present a bright tunable tabletop VUV laser amenable to upconverting ultrastable infrared frequency combs to the thorium-229m nuclear isomer at 8.36 eV.

**ATh3A.4 • 15:15**
**Continuous-Wave Radiation Source at 148 nm for Excitation of the Nuclear Transition in $^{229}$Th,** Vishal Lal[1], Maksim Okhapkin[1], Johannes Tiedau[1], Niels Irwin[1], Valentin Petrov[2], Ekkehard Peik[1]; *[1]Physikalisch-Technische Bundesanstalt, Germany; [2]Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany.* We demonstrate continuous-wave second-harmonic generation in random quasi-phase matched strontium tetraborate $SrB_4O_7$ (SBO) at 148.4 nm for the excitation of the nuclear isomeric transition in $_{229}$Th with a power of $0.9^{-0.4+0.5}$ nW.

**ATh3A.5 • 15:30**
**Offset-Phase-Tunable Burst-Pumped fs OPA for Hyper Resolution Stimulated Raman Spectroscopy,** Matthias Schneller[1], Vinzenz Stummer[1], Hongtao Hu[1], Xinhua Xie[2], Edgar Kaksis[1], Audrius Pugzlys[1,3], Andrius Baltuška[1,3]; *[1]Photonics Inst., TU Wien, Austria; [2]Paul Scherrer Inst., SwissFEL, Switzerland; [3]Center for Physical Sciences & Technology, Lithuania.* We demonstrate an efficient two-color laser source for nonlinear coherent Raman spectroscopy of gases which achieves spectral resolution below 0.2 $cm^{-1}$ and replaces conventional tuning of pump and/or Stokes frequencies with an AOM-based phase scan.

**ATh3A.6 • 15:45**
**Passively Stable Femtosecond Pulse Generation in Continuous-Wave Pumped Optical Parametric Oscillator,** Himani Sharma[1], Rojalin Padhi[1], Alfredo Daniel Sanchez[2,3], Gopal Prasad Sahu[1], Majid Ebrahim-Zadeh[3,4], Kavita Devi[1]; *[1]Indian Inst. of Technology Dharwad, India; [2]FunGlass, Alexander Dubček Univ. of Trenčín, Študentská, Slovakia; [3]ICFO-Institut de Ciencies Fotoniques, Spain; [4]Institució Catalana de Recerca i Estudis Avancats (ICREA), Spain.* We present sub-50-fs pulse generation in a compact, SESAM-driven, dispersion-compensated cw OPO, which has been numerically analyzed and found to offer high peak intensity, broad spectral bandwidth, and potential for optical frequency comb applications.

**ATh3A.7 • 16:00**
**Diode-Pumped 320nm CW Efficient, Low Noise, Single Frequency Laser Based on a Monolithic Cavity,** Thierry Georges[1], Julien Rouvillain[1], Christophe Bonnin[1], Nicolas Landru[1]; *[1]Oxxius SAS, France.* A GaN diode pumped 320 nm laser based on a Pr:YLF amplifier and a monolithic cavity demonstrates low noise 80 mW single-frequency operation with a 16% slope efficiency

**ATh3A.8 • 16:15**
**CW Injection-Seeded, Non-Resonant Optical Parametric Oscillator Based on Periodically-Poled $LiNbO_3$ ,** Tugba Temel[1,2], Subhasis Das[1,3], Gerhard Spindler[4], Andre Schirrmacher[5], Robert T. Murray[2], Marcin Piotrowski[6], Li Wang[7], Weidong Chen[1,8], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]Imperial College London, UK; [3]Burdwan Univ., India; [4]Untere Gaisäckerstr. 10, Germany; [5]CANLAS GmbH, Germany; [6]ISL, France; [7]Anhui Inst. of Optics and Fine Mechanics, China; [8]Fujian Inst. of Research on the Structure of Matter, China.* A PPLN non-resonant optical parametric oscillator injection-seeded by narrowband CW radiation at the signal wavelength produces >3-W average idler power at 2376 nm for a 20-kHz repetition rate, with a spectral linewidth of ∼2 nm.

## 14:30 -- 16:30
## Room: South Hall 3B
**JTh3B • Joint: Use of Laser Momentum Transfer to Help Remediate Space Debris (LAC & LS&C)**
*Presider: Fabien Armogathe, EutelSat, USA*

**JTh3B.1 • 14:30 (Invited)**
**ESA Project "ADAMO": High-Power Adaptive Optics for Laser Momentum Transfer,** Szymon Gladysz[1]; *[1]Fraunhofer IOSB, Germany.* In the ESA-funded project "ADAMO",

Fraunhofer IOSB, Fraunhofer IOF, and HEIG-VD will develop demonstrators for adaptive optics technologies, which are necessary to efficiently pre-compensate high-energy lasers in order to make laser momentum transfer effective in low-Earth orbit.

**JTh3B.2 • 14:45 (Invited)**
**Laser Applications to Space Safety,** Massimiliano Vasile[1]; *[1]Univ. of Strathclyde, UK.* This talk will be dedicated to the application of lasers to space safety. A few examples of high- power lasers for asteroid manipulation, debris detumbling and removal will be presented before introducing the concept of a reconnaissance mission where lasers are used to measure the mass of asteroids during fast flybys.

**JTh3B.3 • 15:00 (Invited)**
**OMLET Phase a/B1 Study,** Martin Divoky[4], Jürgen Kästel[2], Jens Rodmann[2], Stefan Scharring[2], Micheal Steinbatz[3], Ivana Novak[5], Daniel Hampf[6], Anton Kürten[6], Laurent Jolissaint[7], Didrik Karlsen[8], Bente Larsen[8], Catherine Yuriko Teisset[9], Katja Grünfeld[10], Doris Grosse[12], Nadezhda M. Bulgakova[1], Alexander Bulgakov[1], Inam Mirza[1], Ondrej Denk[4], Yoann Levy[4], Andrea Di Mira[11], Tim Flohrer[11]; *[1]FZU - Inst. of Physics of the Czech Academy of Sciences, Czechia; [2]Inst. of Technical Physics, German Aerospace Center, Germany; [3]ASA Astrosysteme GmbH, Austria; [4]HiLASE, Inst. of Physics of the Czech Academy of Sciences, Czechia; [5]Cosylab Switzerland GmbH, Switzerland; [6]DiGOS Potsdam GmbH, Germany; [7]Haute École Spécialisée de Suisse Occidentale, Switzerland; [8]Rheinmetall Nordic AS, Norway; [9]TRUMPF Scientific Lasers GmbH + Co. KG,, Germany; [10]Univ. of Cologne, Germany; [11]ESOC, European Space Agency (ESA), Germany; [12]ANU Enterprise Pty Ltd, Australia.* Orbit Maintenance via Laser Momentum Transfer (OMLET) is an ESA project on the concept design of a Laser Momentum Transfer Engineering Station. Subsystems, functional and performance requirements, as well as laboratory experiments will be presented.

**JTh3B.4 • 15:15 (Invited)**
**Laser Propulsion for Space Debris Removal: Problem Overview, Present Tactics, and Strategy,** Nadezhda M. Bulgakova[1]; *[1]FZU - Inst. of Physics of the Czech, Czechia.* Enhanced risk for space missions from increasing population of artificial space debris requires urgent development of measures that will be overviewed, focusing on laser propulsion. Raising propulsion efficiency with spatiotemporally shaped beams will be discussed.

**JTh3B.5 • 15:30 (Invited)**
Withdrawn