Optica Laser Congress and Exhibit Session Guide

Disclaimer: this guide is limited to technical program with abstracts and author blocks as of 10 October. For updated and complete information with special events, reference the online schedule or mobile app.

Monday, 21 October

08:00 -- 10:00
Room: Prince Ballroom E
AM1A • Modelocked Oscillators
Presider: Arno Klenke; FSU Jena

AM1A.1 • 08:00 (Invited)
Instability-Driven Mode-Locking Mechanisms in Tm-Doped Fibre Lasers, Maria Chernysheva[1]; [1]*Ultrafast Fibre Lasers, Leibniz Inst. of Photonic Technology, Germany.* Efficient instability-driven mode-locking mechanisms based on leveraging the nonlinear and dispersive phenomena in the laser cavity allow for achieving a variety of tuneable ultrashort pulse generation regimes that are not impaired by power limitations.

AM1A.2 • 08:30 (Student Paper Finalist)
17-GHz Kerr-Lens Mode-Locked Monolithic Ti:Sapphire Laser, Torben Fiehler[1], Ulrich Wittrock[1]; [1]*Photonics Laboratory, FH Münster, Germany.* We present a self-starting Kerr-lens mode-locked monolithic Ti:sapphire laser generating nearly bandwidth-limited 196 fs pulses at 900 mW average output power with a pulse repetition rate of 16.9 GHz.

AM1A.3 • 08:45
Enhancement of Kerr-Type, All-PM, Linear Mode-Locked Fiber Lasers via Suppression of Cross-Phase Modulation, Marvin Edelmann[1,2], Yi Hua[3], Kemal Safak[3], Yousef El Sharkawy[3], Mikhail Pergament[1], Franz Kärtner[1,2]; [1]*Center for Free Electron Laser Science, Germany;* [2]*Department of Physics, Universität Hambur, Germany;* [3]*Cycle GmbH, Germany.* Here, we comprehensively demonstrate that XPM suppression in Kerr-type all-PM linear mode-locked fiber oscillators via implementation of an intracavity YVO_4-crystal enables reduced timing-jitter and intensity noise, while enhancing time- and frequency-domain output pulse quality.

AM1A.4 • 09:00
73-fs Kerr-Lens Mode-Locked Ho:CALGO Laser at 2.1 µm, Parisa Baghery[1], Weichao Yao[1], Martin Hoffmann[1], Clara J. Saraceno[1]; [1]*Ruhr Universitat Bochum, Germany.* We report on a Kerr-lens mode-locked Ho:CALGO laser generating 73 fs pulse duration at 2.1 µm, the shortest pulse duration so far achieved directly from a mode-locked Holmium laser system.

AM1A.5 • 09:15
Sub-50 fs Kerr-Lens Mode-Locked Yb:KLuW Thin-Disk Laser, Shotaro Kitajima[1], Norihiko Nishizawa[1]; [1]*Nagoya Univ., Japan.* We demonstrated the first Kerr-lens mode-locked Yb:KLuW thin-disk laser operating with 48.9-fs pulses and 32-nm bandwidth at 425 mW of average power. This is the shortest pulse duration achieved by any oscillator based on Yb:KREW.

AM1A.6 • 09:30
Sub-20-fs Kerr-Lens Mode-Locked Yb:$Sr_3Y_2(BO_3)_4$ Laser, Huang-Jun Zeng[1], Hai-Yu Nie[1], Zhang-Lang Lin[1], Ge Zhang[1], Zhoubin Lin[1], Shijia Sun[3], Bing Teng[3], Hsing-Chih Liang[4], Pavel Loiko[5], Xavier Mateos[6], Valentin Petrov[2], Weidong Chen[1,2]; [1]*Fujian Inst of Res Structure of Matter, China;* [2]*Max Born Inst., Germany;* [3]*Qingdao Univ., China;* [4]*National Yang Ming Chiao Tung Univ., Taiwan;* [5]*Université de Caen, France;* [6]*Universitat Rovira i Virgili (URV), Spain.* We

report on a diode-pumped Kerr-lens mode-locked $Yb:Sr_3Y_2(BO_3)_4$ laser generating soliton pulses as short as 19 fs at 1073.1 nm with an average output power of 131 mW at ~74.1 MHz.

AM1A.7 • 09:45

Dispersion-Managed Mode-Locked Fiber Laser Using Anomalous-Dispersion Tm:ZBLAN, Hiroki Kawase[1], Junya Takano[1], Riko Noguchi[1], Takao Fuji[1]; *[1]Laser Science Laboratory, Toyota Technological Inst., Japan.* A dispersion-managed 2 µm ultrafast Tm:ZBLAN fiber laser was demonstrated. By controlling intracavity net dispersion, we observed soliton, stretched-pulse, and dissipative-soliton mode-locked operations, revealing the relationship between net dispersion and spectral bandwidth.

08:00 -- 10:00
Room: Ruby
LM1B • Brittle Materials
Presider: Qiongying Hu; Coherent Corp, USA and Joe Ji; Coherent Corp., China

LM1B.1 • 08:00 (Invited)

Defect-Less Laser-Induced Periodic Nanostructure Formation by Data-Driven Ultrashort Pulse Laser Processing of Transparent Brittle Materials, Aiko Narazaki[1], Takemichi Miyoshi[1,2], Daisuke Nagai[1,2], Hideyuki Takada[1], Dai Yoshitomi[1], Godai Miyaji[2]; *[1]Natl Inst of Adv Industrial Sci & Tech, Japan; [2]Tokyo Univ. of Agriculture and Technology, Japan.* Data-driven laser processing utilizes active feedback control based on in-process monitoring data, realizing higher quality and throughput. By developing the data-driven ultrashort pulse laser processing, defect-less periodic nanostructures can be formed on transparent brittle materials.

LM1B.2 • 08:30 (Invited)

Laser Market and Applications Trends in Brittle Materials Processing, Joe Ji[1]; *[1]Coherent Corp., China.* Lasers offer solutions for cutting, drilling, scribing, marking and otherwise processing a wide range of brittle materials. We will present an overview of trending laser processing applications that are applicable in real world use cases.

LM1B.3 • 09:00 (Invited)

Digital Twins for Laser Microprocessing Based on Large-Scale Experimental Data, Shuntaro Tani[1]; *[1]The Univ. of Tokyo, Japan.* Digital twins, computational replicas of the physical world, are set to replace time-consuming trial-and-error methods for optimizing various parameters. In this talk, we will explain how to build digital twins for laser-based material processing.

LM1B.4 • 09:30 (Invited)

Laser Micromachining of Brittle Materials With sub 100 fs Pulses and an Industrial Grade Laser System, Beat Neuenschwander[1], C. Nussbaum[1], S.M. Remund[1], A. Malki[1], C. Franke[2], K. Fritsch[2], D. Baliukonis[3], U. Hoechner[3]; *[1]Inst. for Applied Laser, Photonics and Surface Technologies, Bern Univ. of Applied Sciences, Switzerland; [2]n2-Photonics GmbH, Germany; [3]Light Conversion, Lithuania.* Recently the sub-100fs pulse duration regime become accessible with industrial grade laser systems. We investigated this regime with 57fs pulses and detected significant benefits in edge quality when machining brittle materials like UVFS and Sapphire.

08:00 -- 10:00
Room: Crystal
LsM1C • Sensing I
Presider: Miranda van Iersel; New Mexico State Univ., USA

LsM1C.1 • 08:00 (Student Paper Finalist)
Deformable Mirror Identification With Spatial Spectral Interferometry for Laser Dispersion Manipulation, Jui-Chi Chang[1], Chia-Yuan Chang[1]; *[1]National Cheng Kung Univ., Taiwan.* We propose an iterative algorithm and closed-loop optimization process to generate Legendre polynomial based optical dispersion modes by using a linear deformable mirror pulse compressor, and dynamic dispersion compensation with closed-loop control is also presented.

LsM1C.2 • 08:15
Analyzing the Effects of Interference on Various Automotive LIDAR Architectures, Christopher R. Valenta[1,2], Engin Esen[2], Keith Dowsett[2], Zoulaiha Daouda[2], Kamri Heath[2,1], Thomas K. Gaylord[2]; *[1]Georgia Tech Research Inst., USA; [2]Electrical and Computer Engineering, Georgia Inst. of Technology, USA.* Interference between autonomous vehicle LIDARs may produce unintended effects. This manuscript summarizes ongoing work to model interference effects on a variety of LIDAR architectures including pulsed time of flight and various methods of FMCW.

LsM1C.3 • 08:30 (Student Paper Finalist)
A Study of Wavelet-Based Algorithms for Reducing Interference Between Automotive and Smartphone LiDARs, Jeongsook Eom[1], Gunzung Kim[1], Soojung Hur[1], Yongwan Park[1]; *[1]Yeungnam Univ., Korea (the Republic of).* Range sensors in autonomous vehicles face mutual interference challenges. This study shows that wavelet-based algorithms can reduce interference between automotive and smartphone LiDARs by up to 87\%, highlighting their potential for improving vehicle safety and efficiency.

LsM1C.4 • 08:45 (Invited)
Short-Range High-Spectral-Resolution Lidar Using a Low Energy Diode-Based Laser, Romain Ceolato[1], Manuela Hoyos[1], Yoshitaka Jin[2]; *[1]ONERA, France; [2]NIES, Japan.* A novel Short-Range High Spectral Resolution Lidar (SR-HSRL) instrument is presented using a non-injection seeded diode-based laser emitting low energy pulses at a high repetition rate and an iodine cell for spectral filtering. This instrument is used as a proof-of-concept to measure separately the aerosol Mie and molecular Rayleigh backscatter signals in the low Planetary Boundary Layer (PBL) using a bi-static bi-axial configuration.

LsM1C.5 • 09:15 (Student Paper Finalist)
Multi-Path-Delayed Interferometer for Overcoming Coherent Ranging Using Multiple FBGs, Won Tae Choe[1], Sang Min Park[1], Chang-Seok Kim[1]; *[1]Pusan National Univ., Korea (the Republic of).* We propose a multi-interferometer design using fiber Bragg gratings and a frequency decoding algorithm to extend the measurable range of coherent LiDAR systems. This approach addresses laser coherence length, demonstrating improved measurable distance.

LsM1C.6 • 09:30 (Invited)
Withdrawn

11:00 -- 12:00
Room: Prince Ballroom E
JM2A • Joint Plenary Session I
Presider: Yushi Kaneda; Univ of Arizona, Coll of Opt Sciences, USA

JM2A.1 • 11:00 (Plenary)
High-Power, High-Beam-Quality, High-Functionality Photonic-Crystal Surface-Emitting Lasers－for Paradigm Shift Towards Realizing Smart Society, Susumu Noda[1]; *[1]Kyoto Univ., Japan.* Realization of single-mode, high-power and high-beam-quality (namely, high-brightness) semiconductor lasers, which can rival or even replace bulky lasers such as gas and solid-state lasers, is one of the ultimate goals of laser physics and photonics. The demand for such ultimate single-mode high-brightness semiconductor lasers is increasing for a wide variety of emerging applications including next-generation remote sensing for smart mobility and high-precision laser processing for smart manufacturing. Photonic-crystal surface-emitting lasers (PCSELs) show promise to meet these demands, based on their broad-area coherent two-dimensional (2D) resonance at a singularity (G) point of their 2D photonic band structure. In this plenary talk, recent progress in PCSEL development, including the formulation of a design guideline for realizing 100W-to-kW-class single-mode operation, the experimental demonstration of a brightness of $1GWcm^{-2}sr^{-1}$ are described. In addition, various functionalities such as 2D beam steering and emissions of arbitrary beam patterns are also discussed.

13:30 -- 15:30
Room: Prince Ballroom E
AM3A • Thulium-doped Laser Materials
Presider: Patricia Segonds; Neel Inst., France

AM3A.1 • 13:30
Optimization of Nanosecond Pulse Energy Extraction From Tm^{3+}-Doped Photonic Crystal Fibers, Julian Schneider[1,2], Dominik Lorentz[1,2], Jan Lautenschläger[1,2], Clément Romano[1], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]Fraunhofer IOSB, Germany; [2]Inst. of Control Systems, Karlsruhe Inst. of Technology, Ghana.* This study discusses the limitations for pulse energy extraction in nanosecond-pulsed rare-earth-doped fiber lasers. Optimization of a Tm^{3+}-doped photonic crystal fiber laser leads to the demonstration of pulse energies of 1.9 mJ at an average output power of 114 W and an emission wavelength of 2050 nm.

AM3A.2 • 13:45
Highly-Efficient Tm:$LiYF_4$ Waveguide Laser Passively Q-Switched by Carbon Nanotubes, Ji Eun Bae[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]Department of Physics, KAIST, Korea (the Republic of).* A Tm:$LiYF_4$ diamond-saw-diced channel waveguide laser passively Q-switched by a single-walled carbon nanotube saturable absorber delivers 1.30 W at 1885 nm with a slope efficiency of 64.2% emitting 45-ns/0.87-μJ pulses at 1.50-MHz repetition rate.

AM3A.3 • 14:00

Intracavity Upconversion Pumped Tm:YLF / Nd:ASL Laser, Hippolyte Dupont[1], Matthieu Glasset[1], Timothée Lenfant[1], Lauren Guillemot[2], Pavel Loiko[2], Thierry Georges[3], Patrice Camy[2], Pascal Loiseau[4], Xavier Delen[1], Bruno Viana[4], Patrick Georges[1], Frédéric Druon[1]; *[1]Institut d'Optique Lab Fabry, France; [2]CIMAP, France; [3]Oxxius, France; [4]Chimie Paris, France.* A Tm:YLF laser operating at 2.3 µm is pumped at 1.05 µm with a diode-pumped Nd:ASL laser via intracavity upconversion pumping. The continuous-wave Tm-laser delivers 1.81 W for 41 W of laser diode power.

AM3A.4 • 14:15

Continuous-Wave 2.3-mm Operation of a Tm^{3+}:Lu_2O_3 Ceramic Laser With Ultrabroad Continuous Tunability Between 1845 and 2328 nm, Yagiz Morova[1], Idil Simsek[1], Alphan Sennaroglu[1]; *[1]Koc Universitesi, Turkey.* We report continuous-wave operation of a 1.5 at.% Tm^{3+}:Lu_2O_3 ceramic laser, which generates 134 mW of output at 2309 nm with 4W of pump power. Ultrabroad, continuous tunability was demonstrated between 1845 and 2328 nm.

AM3A.5 • 14:30

MIR Stimulated Emission via Cascade Laser Action in Tm:$LiYF_4$, Hippolyte Dupont[1], Lauren Guillemot[2], Pavel Loiko[2], Alain Braud[2], Patrick Georges[1], Frédéric Druon[1]; *[1]Institut d'Optique Lab Fabry, France; [2]CIMAP, France.* We study cascade operation of Thulium lasers. This laser scheme can either notably increase the output power at 2.3 µm or extinguish it, depending on the Tm doping level due to the cross-relaxation effect.

AM3A.6 • 14:45

High-Power Tunable Tm-Doped Nested-Ring Fibre Laser Emitting From 1940 to 2090 nm, Richard Svejkar[1], Martin P. Buckthorpe[1], W. A. Clarkson[1]; *[1]ORC, Univ. of Southampton, UK.* A novel thulium fibre with a non-uniformcore doping profile was used to build a power-scalable CW tunable laser emitting up to 96 W at 1940 nm or 60 W in tunable regime (1940-2090 nm).

AM3A.7 • 15:00

Sub-50-fs Tm:$(Lu,Sc)_2O_3$ Ceramic Laser, Zhang-Lang Lin[2,1], Weidong Chen[2,1], Wei Jing[3], Pavel Loiko[4], Xavier Mateos[5], Ge Zhang[1], Uwe Griebner[2], Valentin Petrov[2]; *[1]Fujian Inst of Res Structure of Matter, China; [2]Max Born Inst., Germany; [3]Inst. of Chemical Materials, China Academy of Engineering Physics, China; [4]Université de Caen, France; [5]Universitat Rovira i Virgili (URV), Spain.* We demonstrate a SESAM mode-locked Tm:$(Lu,Sc)_2O_3$ ceramic laser delivering soliton pulses as short as 47 fs at 2063 nm with an average output power of 157 mW at ~73 MHz.

AM3A.8 • 15:15

Highly Compact Stable-Unstable Tm:LLF Thin-Slab Resonator, Jake Sanwell[1], Lucas Groult[1], Richard M. Carter[1], M J Daniel Esser[1]; *[1]Heriot-Watt Univ., UK.* A compact hybrid stable-unstable Tm:LLF thin-slab laser is demonstrated utilising toroidal mirrors, with estimated M^2 of 1.6 and 3.3 in minor and major axes, and over 30 times greater brightness than an equivalent stable resonator.

13:30 -- 15:30
Room: Ruby
LM3B • AI & ML in Materials Processing
Presider: Markus Kogel-Hollacher; Precitec Optronik GmbH, Germany

LM3B.1 • 13:30 (Invited)
Frameworks for Sovereign Knowledge Exchange in Laser-Based Additive Process Chains, Fabian Gast[1], Holger Merschroth[1], Matthias Weigold[1]; *[1]Inst. for Production Management, Technology and Machine Tools (PTW), Technical Univ. of Darmstadt, Germany.* Frameworks for sovereign knowledge exchange in laser-based additive manufacturing address interdisciplinary collaboration challenges, enabling secure data sharing and integration of digital services to improve process quality, cost-efficiency, and sustainability in complex, volatile market conditions.

LM3B.2 • 14:00 (Invited)
AI-Assisted Evaluation of the Feedstock Influence on the Laser Powder bed Fusion Process, Kai Drechsel[1], Patrick Fischmann[1], Frederik Zanger[1]; *[1]Karlsruher Institut für Technologie, Germany.* Feedstock has a significant influence on the laser powder bed fusion process. The quality of the recoated powder layer is a key to avoid defects. AI allows to utilitse expert-knowledge to automatically analyse process data.

LM3B.3 • 14:30 (Invited)
In-Situ Observations of Surfaces in Laser Powder Bed Fusion, Keisuke Nagato[1]; *[1]Mechanical Engineering, The Univ. of Tokyo, Japan.* We developed two methods on L-PBF: high-speed observation of flying particles and one-shot observation of the surface geometry, in order to shorten the evaluation times for the mechanical properties and three-dimensional structures, respectively.

LM3B.4
Withdrawn

13:30 -- 15:30
Room: Crystal
LsM3C • Sensing II
Presider: Nicolas Riviere; Office Natl d'Etudes Rech Aerospatiales, France

LsM3C.1 • 13:30 (Invited)
Super-Resolution Imaging With Relative Motion in a Structured Field, Kevin J. Webb[1]; *[1]Purdue Univ., USA.* Relative motion in a structured field for achieving essentially unlimited spatial resolution at optical wavelengths is reviewed, and recent theoretical and experimental results are presented. Applications addressed include speckle-based imaging through heavily scattering random media.

LsM3C.2 • 14:00 (Invited)
Photonic Lanterns for Lidar and Remote Sensing, Rodrigo Amezcua Correa[1]; *[1]Univ. of Central Florida, CREOL, USA.* Abstract note available.

LsM3C.3
Withdrawn

LsM3C.4 • 15:00
Swept-Source Based Time-Domain Coherent LiDAR Without Coherence Length Limits, Dahun Jung[1], Jaeheung Kim[1], Seongjin Bak[1], Gyeong Hun Kim[2], Chang-Seok Kim[1]; *[1]Pusan National Univ., Korea (the Republic of); [2]Wellman Center for Photomedicine, Harvard Medical School and Massachusetts General Hospital, USA.* In this study, we propose time-domain coherent light detection and ranging (LiDAR) system that can measure distance regardless of light source's coherence length. Using stretched-pulse mode-locked (SPML), we acquired distance information over 10 meters.

16:00 -- 18:00
Room: Prince Ballroom E
AM4A • Novel Concepts
Presider: Mark Dubinskii; US Army Research Laboratory, USA

AM4A.1 • 16:00 (Invited)
Celebrating Solitons in Fiber Optics, Goëry Genty[1]; *[1]Tampereen Teknillinen Yliopisto, Finland.* Solitons have revolutionized nonlinear science, leading to new sources of light and opening many interdisciplinary applications. We review the history of solitons in fiber optic systems since the prediction of their existence 50 years ago.

AM4A.2 • 16:30 (Student Paper Finalist)
the Photoinjector Laser System at LCLS-II, Hao Zhang[1,2], Sasha Gilevich[2], Alan Miahnahri[2], Shawn Alverson[2], Axel Brachmann[2], Joseph Duris[2], Paris Franz[2,3], Alan Fry[2], Jack Hirschman[2,3], Kirk Larsen[2], Randy Lemons[2], Siqi Li[2], Brittany Lu[1,2], Agostino Marinelli[2], Mikael Martinez[2], Justin May[2], Erel Milshtein[2], Krishna Murari[2], Nicole Neveu[2], Joseph Robinson[2], John Schmerge[2], Linshan Sun[1], Theodore Vecchione[2], Chengcheng Xu[2], Feng Zhou[2], Sergio Carbajo[1,2]; *[1]Univ. of California, Los Angeles, USA; [2]SLAC National Accelerator Laboratory, USA; [3]Stanford Univ., USA.* **We present a thorough description of the LCLS-II photoinjector laser system, an instrument underpinning ultrafast X-ray sciences. Our presentation will highlight key components and advancements in generating high-quality, high-energy, ultrashort X-ray pulses in X-ray Free Electron Lasers.**

AM4A.3 • 16:45
Efficient Reconstruction of the Temporal Profile of GW-Scale Isolated Attosecond Pulses by All-Optical FROG, Dianhong Dong[1], Hushan Wang[1], Kotaro Imasaka[1,2], Natsuki Kanda[1,2], Eiji j. Takahashi[1,2]; *[1]Ultrafast Coherent Soft X-ray Photonics Research Team, RIKEN Center for Advanced Photonics, RIKEN, Japan; [2]Extreme Laser Science Laboratory, RIKEN Cluster for Pioneering Research, RIKEN, Japan.* The intense isolated attosecond pulses are characterized by an efficient and convenient all-optical FROG method, demonstrating pulse durations of ~227 as and ~148 as with central photon energies at 60 eV and 107 eV, respectively.

AM4A.4 • 17:00
Multi-Watt 2.3-µm Tm:YLF Laser Based on an Off-Resonance Intracavity Upconversion Pumping Scheme, Matthieu Glasset[1], Hippolyte Dupont[1], Lauren Guillemot[2], Pavel Loiko[2], Patrice Camy[2], Patrick Georges[1], Frederic P. Druon[1]; *[1]Laboratoire Charles Fabry,*

France; [2]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, France. An innovative off-resonance Tm upconversion intracavity pumping scheme at 1064 nm is demonstrated employing a Tm:YLF/Nd:YVO4 laser. The 2.3-µm Tm-laser delivers 2.71 W for 20.4 W of diode-pump power, being competitive with direct diode pumping. © 2024 The Author(s)

AM4A.5 • 17:15 (Invited)
Nonlinear Optics and Light Generation: How to Choose the Right Material?, Nathalie Vermeulen[1]; *[1]Vrije Universiteit Brussel, Belgium.* The development of 2D-, meta-, and other novel materials boosted research on nonlinear optics (NLO). I will present a new NLO data table summarizing these advances since 2000 and specifically discuss the case of graphene.

AM4A.6 • 17:45
Simulation and Optimization of a Polarized Nanosecond Hybrid Ho^{3+} and Tm^{3+}-Doped Silica Fiber & Ho^{3+}:YAG MOPA at 2048 nm Targeted for ZGP OPO Pumping, Dominik Lorenz[1,2], Marius Rupp[1,2], Dieter Panitzek[1,2], Clément Romano[1], Julian Schneider[1,2], Katharina Goth[1,2], Johannes Deutsch[1,2], Marc Eichhorn[1,2], Christelle Kieleck[1]; *[1]IOSB, Fraunhofer, Germany; [2]Inst. of Control Systems, Karlsruhe Inst. of Technology, Germany. Ho^{3+}:YAG amplifiers are able to efficiently scale the pulse energy at wavelengths as short as 2048 nm. While maintaining 5.3 dB gain, an output power of 81.6 W and a slope efficiency of 68 % is achieved.*

16:00 -- 18:00
Room: Ruby
LM4B • Laser-Beam Delivery and Beam Manipulation of High-Power Laser Beams
Presider: Gwenn Pallier; Cailabs, France

LM4B.3 • 16:05 (Invited)
Beam Shaping, Process Monitoring and AI – Successful Teamwork to Improve e-Mobility, Markus Kogel-Hollacher[1,2], Jens Reiser[2], Thomas Nicolay[1], Joachim Schwarz[3]; *[1]Precitec Optronik GmbH, Germany; [2]Precitec GmbH & Co. KG, Germany; [3]Precitec Vision GmbH & Co. KG, Switzerland.* Laser welding technology has developed considerably in recent years to improve the quality and efficiency of weld seams. The main driver of this increase in quality is the combination of advanced beam shaping, multi-sensor monitoring and AI-supported analysis, which ultimately enables inline quality control and adaptive process optimization.

LM4B.7 • 16:12 (Invited)
From Laser Fusion to Micro-Welding: Freeform Refractive Beam Shaping, Steve Kidd[1]; *[1]PowerPhotonic Ltd., UK.* The limitations of conventional optics on the performance of a wide variety of laser systems can often been successfully addressed with refractive freeform beam shaping. Examples from very high and low power will be presented.

LM4B.5 • 16:19 (Invited)
Glass via Drilling for Semiconductor Packaging in Panels: Using Advanced Motion Control Strategies to Address Production Scaling Challenges, Bryan Germann[1]; *[1]Aerotech Inc., USA.* Laser drilling vertical, high-aspect-ratio vias in glass semiconductor interposer substrates creates process scaling challenges. This presentation outlines how to address these

challenges using advanced motion control strategies to combine high-dynamic scanner and servo stage motion.

LM4B.6 • 16:26 (Invited)
Holographic Laser Processing With Liquid Crystal Spatial Light Modulator, Yu Takiguchi[1]; [1]*Hamamatsu Photonics K.K., Japan.* Spatial light modulators are devices that can dynamically modulate the intensity, phase and/or polarization of light with electronic signal. We are now applying liquid crystal type device to value-added holographic laser processing.

LM4B.4 • 16:35 (Invited)
Hollow Core Photonic Crystal Fiber: Guiding the Ultrafast Lasers, Jean Sauvage-Vincent[1]; [1]*GLOPhotonics, France.* The Hollow Core Photonic Crystal Fibers are now standard tools to guide ultra short pulse laser from UV to Infrared, we will review the different technologies, application, perspectives and limits.

LM4B.1 • 17:15 (Invited)
Can Beam-Shaping Pave the Way to the Use of kW Femtosecond Lasers?, Beat Neuenschwander[1], B. Lauer[1]; [1]*Bern Univ. of Applied Sciences, Switzerland.* Today's high-power fs-lasers require new beam guiding concepts for kW levels. Beam-shaping, demonstrated with a diffractive optical element and fs pulses up to 2mJ pulse energy, addresses this challenge effectively.

LM4B.2 • 17:30 (Invited)
Potentials of Coherent Beam Combining in Laser Material Processing, Karen Schwarzkopf[1], Michael Schmidt[1,2]; [1]*Inst. of Photonic Technologies (FAU), Germany;* [2]*Friedrich-Alexander Univ. Erlangen-Nürnberg, Germany.* This talk explores the coherent beam combining technology, highlighting its potential to advance spatial and temporal beam shaping in laser material processing. The fundamental working principle is discussed and insights into applications are given.

16:00 -- 18:00
Room: Crystal
LsM4C • Sensing III
Presider: Kyle Drexler; NIWC Pacific, USA

LsM4C.1 • 16:00 (Invited)
Raman LiDAR for Ocean Remote Sensing of Temperature and Salinity, Helen M. Pask[1], Carolyn J. Taylor[1], Simon Curtis[1], David J. Spence[1], Ondrej Kitzler[1], Judith Dawes[1], James Downes[1]; [1]*Macquarie Univ., Australia.* Ocean LiDAR (Light Detection And Ranging) is being used increasingly for the profiling of water properties. We will show how Raman LiDAR can measure water temperature and salinity and discuss key design considerations.

LsM4C.2 • 16:30 (Invited)
Long-Range Fiber Sensing Over Deployed Sub-Sea Cables, Mikael Mazur[1], Nicolas Fontaine[1], Roland Ryf[1], Lauren Dallachiesa[1], Haoshuo Chen[1], David Neilson[1]; [1]*Nokia Bell Labs, USA.* We use laser interferometry to enable deep ocean environmental sensing using live transoceanic telecommunication cables. We use real-time optical frequency domain

reflectometry supporting distances exceeding 10000km. Applications within telecom, earth and environmental science are discussed.

LsM4C.3 • 17:00
Optical System for in-Situ Detection of Microplastics, Geoffrey Campman[2], Miranda van Iersel[1]; *[1]New Mexico State Univ., USA; [2]Chemical and Materials Engineering, Univ. of Dayton, USA.* A portable optical system to detect, identify, continuously monitor, and quantify microplastics is developed. The system uses optical techniques to observe the temporal behavior of the amount of microplastics present at a certain location of a natural water body.

LsM4C.4 • 17:15
Detecting Low-Level Clear Air Turbulence Using LiDAR in Urban Air Mobility, Gunzung Kim[1], Jeongsook Eom[1], Soojung Hur[1], Yongwan Park[1]; *[1]Yeungnam Univ., Korea (the Republic of).* Urban air mobility (UAM) is a transportation system for short-distance travel within cities at low altitudes. It utilizes advanced weather technology and LiDAR-based optical technology to detect clear air turbulences (CATs) for safer operations.

LsM4C.5 • 17:30 (Invited)
Distributed Fiber-Optic Sensing in the Oil and Gas Industry, Islam Ashry[1], Frode Hveding[4], Yuan Mao[3], Chun Hong Kang[1], Ahmed Y. Bukhamsin[2], Muhammad Arsalan[2], Boon S. Ooi[1]; *[1]King Abdullah Univ of Sci & Technology, Saudi Arabia; [2]Saudi Aramco, Saudi Arabia; [3]AK-Sens, Hong Kong; [4]Norlaser AS, Norway.* This work explores the transformative role of distributed fiber-optic sensing technologies—DAS, DTS, and DTSS—in the oil and gas industry. We discuss their applications across the industry's life cycle and future research directions for industry growth.

18:00 -- 18:30
Room: Crystal
AM5A • Special Presentation by Valentine Gapontzev Prize Winner
Presider: Patrice Camy; CIMAP-ENSICAEN, France

AM5A.1 • 18:00 (Invited)
Distributed Fiber-Optic Sensing in the Oil and Gas Industry, Michael Müller[1], *[1]Ruhr University Bochum, Germany.* The talk will discuss the development of multi-kW ultrafast fiber laser systems including technical challenges in their making, main applications, and future scaling potential.

Tuesday, 22 October

08:00 -- 10:00
Room: Prince Ballroom E
ATu1A • Visible, UV, and XUV Lasers
Presider: Adam Borzsonyi; ELI-Hu Nonprofit Kft, Hungary

ATu1A.1 • 08:00 (Invited)
High-Brightness Deep and Vacuum Ultraviolet Laser Sources, John C. Travers[1], Nikoleta Kotsina[1], Teodora Grigorova[1], Mohammed Sabbah[1], Joleik Nordmann[1], Michael Heynck[1], Martin Gebhardt[1], Deepjyoti Satpathy[1], Christian Brahms[1]; *[1]Heriot-Watt Univ., UK.* Bright light sources in the far-ultraviolet (100-300 nm), based on resonant dispersive-wave emission in hollow-capillary fibres, open many important scientific and industrial opportunities. In this talk we review this technology and describe our recent progress.

ATu1A.2 • 08:30
Continuous-Wave and Q-Switched Tb:YLF Lasers at 587 nm, Leonid Kotov[1], Yushi Kaneda[2], Stefan Püschel[3], Hiroki Tanaka[3], Johnathan Hair[4], Amin Nehrir[4], Valery Temyanko[1]; *[1]TIPD, LLC, USA; [2]College of Optical Sciences, Univ. of Arizona, USA; [3]Leibniz-Institut für Kristallzüchtung (IKZ), Germany; [4]NASA Langley Research Center, USA.* High-power orange Tb:YLF lasers are presented. One Watt of output power was achieved in a continuous-wave operation. Moreover, a direct-generation orange Q-switched laser was demonstrated for the first time achieving 0.5 mJ pulse energy

ATu1A.3 • 08:45
2-J, 20-Hz Pulse Laser System Operating at Room Temperature and Wavelength Conversion to 266 nm, Kenichi Hirosawa[1], Nobuo Ohata[1], Arvydas Kausas[2,3], Vincent Yahia[3,2], Takunori Taira[2,3]; *[1]Mitsubishi Electric Corporation, Japan; [2]RIKEN SPring-8 Center, Japan; [3]Inst. for Molecular Science, Japan.* We have developed a 2-J at 1064 nm and 200-mJ at 266 nm laser system using Distributed-Faced-Cooling chips. This paper shows characteristics when the repetition rate was increased from 1 Hz to 20 Hz.

ATu1A.4 • 09:00
Frequency-Stabilized High-Power 589 nm Semiconductor Disk Laser for Guide Star Applications, Mingyang Zhang[1], Nathan Giannini-Hutchin[1,2], Trevor Rubin[1], Hermann Kahle[1], Gar-Wing Truong[3], Catherine Nguyen[3], Garrett Cole[3], Alexander Albrecht[1]; *[1]Univ. of New Mexico, USA; [2]Sandia National Laboratories, USA; [3]Thorlabs Crystalline Solutions, USA.* Over 10 W output at 589 nm with a linewidth below 10 MHz was demonstrated using a semiconductor membrane external-cavity surface-emitting laser (MECSEL), stabilized by referencing the hyperfine transition within the Na D_{2a} line.

ATu1A.5 • 09:15 (Invited)
Attosecond Science With Turn-Key Lasers, Michael Chini[1]; *[1]Univ. of Central Florida, USA.* Attosecond pulses can provide access to electron dynamics in atoms, molecules and solids, but the required lasers remain inaccessible to many laboratories. Here, we describe progress in generating isolated attosecond pulses from turn-key lasers.

ATu1A.6 • 09:45
Efficient Cryogenic Orange Pr:YLF Lasers, Sascha Kalusniak[1], Moritz Badtke[1], Stefan Püschel[1], Hiroki Tanaka[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We investigate cryogenic orange Pr:YLF-lasers at up to 62.5% output coupler transmission. The slope efficiency increases to 58% at 110 K, 1.5× higher than at room-temperature and the threshold decreases by an order of magnitude.

08:00 -- 10:00
Room: Ruby
LTu1B • Laser-Based Additive Manufacturing
Presider: Anna Sailor; EOS GmbH Electro Optical Systems, Germany

LTu1B.1
Withdrawn

LTu1B.2 • 08:30 (Invited)
Practical AM Products by EOS Metal Printers, Kurita Kenya[1]; *[1]JAMPT, Japan.* The talk will introduce the practical AM products by EOS Metal Printers and provide an overview of practical applications of L-PBF Technology.

LTu1B.3 • 09:00 (Invited)
Beam Shaping Freakonomics How Small Changes in Heat Flux Produce Order-of-Magnitude Reductions in Part Cost, Robert Martinsen[1]; *[1]nLIGHT Corporation, USA.* A new generation of powder bed fusion machines employing laser beam shaping are entering the market. We examine how spatial beam control is disrupting the cost of metal AM while stretching our imagination of what can be manufactured.

LTu1B.4 • 09:30 (Invited)
Development of Wire Laser Metal 3D Printer, Keisuke Tanaka[1]; *[1]Mitsubishi Electric Corporation, Japan.* Mitsubishi Electric has developed Japan's first 3D printer "AZ600", combining metal wire and laser for high precision printing. It reduces processing time and cost, contributes to carbon neutrality, and supports task automation.

08:00 -- 09:45
Room: Crystal
LsTu1C • Sensing IV
Presider: Christopher Valenta; Georgia Tech Research Inst., USA

LsTu1C.1 • 08:00 (Student Paper Finalist)
Dynamic all-Optical Beam Steering, Aurélie Hentz[1,2], Jean-Louis Gutzwiller[1], Michel Alassir[1,2], Marc Sciamanna[1,2]; *[1]CentraleSupélec, France; [2]Université de Lorraine, France.* We experimentally explore a beam steering system implementing Risley prism and variable magnification beam expander. It adapts to scanning windows dimensions and distances, with a given spatial resolution, enabling scan in several hundreds milliseconds.

LsTu1C.2 • 08:15
CO_2 DIAL in the 2 µm Region Based on Efficient High Energy Parametric Conversion and Amplification , Jean-Baptiste Dherbecourt[1], Jean-Michel Melkonian[1], Myriam Raybaut[1]; *[1]Office*

Natl d'Etudes Rech Aerospatiales, France. We report on first ground-based CO_2 range resolved Differential Absorption Lidar (DIAL) experiments realized with the multi-species Lidar instrument LEMON based on an efficient and versatile OPO-OPA emitter architecture.

LsTu1C.3 • 08:30 (Invited)
Light Scattering Experiments and Simulations From Laser Beams With Orbital Angular Momentum, Vasanthi Sivaprakasam[1], matthew hart[1], Shawn Divitt[1], Marquise Xavier[3], Owen O'Malley[3], Svetlana Avramov-Zamurovic[2]; *[1]US Naval Research Laboratory, USA; [2]US Naval Acedemy, USA; [3]Summer Student Internship at Naval Research Laboratory, USA.* The angular elastic scattering signal intensity is simulated and measured from suspended single particles for varying order mode, orbital angular momentum laser beams. Comparison between simulation/experiment and to scattering from Gaussian beam is discussed.

LsTu1C.4 • 09:00
Extended Phase Measurement in Swept-Source Optical Coherence Tomography Using Segmented Wavelength Bands, Jaeheung Kim[1], Hwidon Lee[1], Chang-Seok Kim[1]; *[1]Pusan National Univ., Korea (the Republic of).* This study introduces a novel computational approach for multi-wavelength SS-OCT, optimizing wavelength band segmentation to achieve nanometer-scale phase measurements. This method extends the measurement range without altering the system configuration, surpassing conventional phase unwrapping technique.

LsTu1C.5 • 09:15
Non-Mechanical Coherent LiDAR Based on Wavelength Division Multiplexing, Huiyeon Kim[1], Sang Min Park[1], Chang-Seok Kim[1]; *[1]Pusan National Univ., Korea (the Republic of).* We propose a coherent LiDAR using a wideband laser and wavelength division to enable nonmechanical scanning. This laser has a wide bandwidth of 160nm centered at 1535nm, implementing wavelength division with 16 channels.

LsTu1C.6 • 09:30
Wavelength-Switchable Pulsed Raman Fiber Laser With Synchronous Pumping for Photoacoustic Sensing on the C-H Bond, Sang Min Park[1], Seongjin Bak[3], Hyung-Hoi Kim[2], yeong jin kim[2], Hwidon Lee[1], Chang-Seok Kim[1]; *[1]Engineering Research Center for Color-Modulated Extra-Sensory Perception Technology, Pusan national Univ., Korea (the Republic of); [2]Department of Biomedical Research Inst., Pusan National Univ. Hospital, Korea (the Republic of); [3]Department of Cogno-Mechatronics Engineering, Pusan National Univ., Korea (the Republic of).* A wavelength-switchable pulsed Raman fiber laser based on synchronous pumping, with electrically controllable wavelength tuning in the 1700 nm region, has been developed for vibration photoacoustic sensing of C–H bonds

10:00 -- 11:00
Room: Prince Ballroom, Posters
JTu2A • Joint Poster Session I

JTu2A.1
Compressive Sensing Based Distance and Speed Measurement With FMCW Self-Mixing Interferometry, Jinyuan Yuan[2], Ting Zhou[2], Bin Liu[2], Yuxi Ruan[1], Yanguang Yu[1]; *[1]Univ. of Wollongong, Australia; [2]Xiangtan Univ., China.* Compressed sensing has been used with

frequency modulated continuous waveform laser self-mixing interferometry to measure distance and speed, which facilitates the effective restoration of the SMI signal under low sampling conditions. This approach aims to reduce the sampling equipment requirements while ensuring accuracy.

JTu2A.2

Ultra-High-Definition Diffractive Optical Elements for Wide-Angle Structured-Light Patterns to Profilometric Applications, Wei-Feng Hsu[1], Ko-Lun Chang[1]; [1]*National Taipei Univ. of Technology, Taiwan.* This paper presented the pincushion correction, design calculations, and manufacture of the DOEs containing 4840 × 4840 pixels to project the wide-angle ultra-high-definition structured-light patterns. The artificial effect resulted from pincushion correction was successfully eliminated.

JTu2A.3

Optical Feedback Based Optical Frequency Comb Generation and Tunability in Periodic Window, Zhuqiu Chen[1], Can Fang[1], Yuxi Ruan[1], Yanguang Yu[1], Qinghua Guo[1], Jiangtao xi[1], Jun Tong[1]; [1]*Faculty of Engineering and Information Sciences, Univ. of Wollongong, Australia.* Optical frequency comb generation and tunability in a semiconductor laser with external optical feedback are numerically investigated, revealing a 2.91MHz tunable repetition rate within a quasi-periodic period-3 (QP-P3) window.

JTu2A.4

Research on Laser Adaptive Weld Seam Tracking for Oil Pipeline, Changyong Tian[1], Chuanyang Zhou[1]; [1]*Research Center for Laser Physics and Technology, Technical Inst. of Physics and Chemistry CAS, China.* To achieve automatic welding of oil pipelines, we have designed and implemented a laser adaptive weld seam tracking system, enabling spatial adaptive tracking on weld seams with special morphologies such as extreme depth.

JTu2A.5

Polarization Tunability at the Interface of Lithium Niobate Crystal: Impact of Optical Axis Rotation, Priyank Sain[1]; [1]*Indian Inst. of Science, India.* We calculate the phase difference between ordinary and extraordinary polarized wave under total internal reflection for different orientations of the optical axis and at different wavelengths and find out the condition for circular polarization in the totally reflected light.

JTu2A.6

Modeling and Optimization of in-Band Pumped Ho:YAG Lasers for High-Power Operation, Sergei Tomilov[1], Anna Suzuki[1], Pavel Loiko[2], Kirill Eremeev[2], Mykyta Redkin[1], Alain Braud[2], Patrice Camy[2], Clara J. Saraceno[1]; [1]*Photonics and Ultrafast Laser Science, Ruhr-Universität Bochum, Germany;* [2]*Centre de Recherche sur les Ions, Université de Caen, France.* We report on a spectroscopic investigation and a rate-equation model for predicting the performance of high-power in-band pumped Ho:YAG lasers accounting for energy-transfer upconversion. This model is validated experimentally by developing a multi-Watt Ho:YAG bulk oscillator.

JTu2A.7

199 nm VUV Coherent Light Emission From Ultracompact SrB_4O_7 Vertical Microcavity Pumped With Picosecond Laser, Tomoaki Nambu[1], Masashi Yoshimura[1], Yusuke Mori[2], Yasufumi Fujiwara[2,3], Ryota Ishii[4], Yoichi Kawakami[4], Masahiro Uemukai[2,5], Tomoyuki Tanikawa[2,5], Ryuji Katayama[2,5]; *[1]Inst. of Laser Engineering, Osaka Univ., Japan; [2]Graduate School of Engineering, Osaka Univ., Japan; [3]Research Organization of Science and Engineering, Ritsumeikan Univ., Japan; [4]Department of Electronic Science and Engineering, Kyoto Univ., Japan; [5]Quantum Information and Quantum Biology Division, Inst. for Open and Transdisciplinary Research Initiatives, Osaka Univ., Japan.* Using a SrB_4O_7 vertical microcavity, we succeeded in 199 nm vacuum-ultraviolet second harmonic generation with a picosecond laser, surpassing the theoretical minimum of 205 nm for second harmonic generation in BaB_2O_4.

JTu2A.8
A Comparative Study of Supercontinuum Generation in Undoped Scintillator Crystals, Vaida Marciulionyte[1], Gintaras Tamošauskas[1], Matas Šutovas[1], Audrius Dubietis[1]; *[1]Vilnius Univ., Lithuania.* We demonstrate supercontinuum generation covering more than 2 octaves over 0.4 – 2µm range in different undoped bulk scintillator crystals pumped by fundamental harmonic of 180 fs Yb:KGW laser.

JTu2A.9
Diode-Pumped SESAM Mode-Locked Yb:$Ca_3La_2(BO_3)_4$ Laser, Huang-Jun Zeng[1], Zhang-Lang Lin[1], Ge Zhang[1], Zhongben Pan[3], Hsing-Chih Liang[4], Pavel Loiko[5], Xavier Mateos[6], Valentin Petrov[2], Weidong Chen[1,2]; *[1]Fujian Inst of Res Structure of Matter, China; [2]Max Born Inst., Germany; [3]Shandong Univ., China; [4]National Yang Ming Chiao Tung Univ., Taiwan; [5]Université de Caen, France; [6]Universitat Rovira i Virgili (URV), Spain.* We report on a diode-pumped SESAM mode-locked Yb:$Ca_3La_2(BO_3)_4$ laser delivering 35 fs soliton pulses at 1055.9 nm with an average output power of 96 mW at a repetition rate of ~66.5 MHz.

JTu2A.10
Micro-Fluorescence Lifetime and Spectral Imaging of Thulium Doped Laser Materials, Stefan Kuhn[1], Dhersh M. Chacko[1,2], Nicoletta Haarlammert[1], Thomas Schreiber[1]; *[1]Fraunhofer IOF, Germany; [2]Friedrich-Schiller-Univ., Germany.* A scanning confocal fluorescence microscope technique is developed for the spectroscopic analysis of Tm-doped materials. Fluorescence spectra and lifetime can be evaluated with high spatial resolution and the effects of preform fabrication are analyzed.

JTu2A.11
Nd^{3+}-Doping Into Al^{3+}-Site in Bulk-Shaped α-Al_2O_3, Yoichi Sato[1,2], Takunori Taira[1,2]; *[1]RIKEN SPring-8 Center, Japan; [2]Inst. for Molecular Science, Japan.* Hot-isostatic-pressing and the low-temperature sintering accelerate Nd^{3+}-doping into Al^{3+}-sites in α-Al_2O_3. Fluorescence from Nd:Al_2O_3 bulks in this work contained narrow peaks due to crystal-field splitting of Nd^{3+}, while previously reported Nd:Al_2O_3 bulks shows broad emission.

JTu2A.12
Liquid Lens-Based Pulse Compressor for Ultrafast Laser Optimization in Temporal Focusing Microscopy, Cheng-Yu Lee[1], Chia-Yuan Chang[1]; *[1]National Cheng Kung Univ., Taiwan.* The optical dispersion broadens laser pulse width of ultrafast lasers and reduces peak power. This study develops liquid lens compressor to compensate dispersion to restore laser pulse width and improve temporal focusing microscopy performance.

JTu2A.13

Measuring and Modeling of the Optical Activity of α-GeO2, Alexandra Pena[1], Corinne Felix[1], Bertrand Menaert[1], Benoit Boulanger[2,1]; [1]*Institut Néel, France;* [2]*Univ. Grenoble Alpes, France.* We have measured the wavelength dispersion of the optical activity in the visible and near infrared of the two structural isotype crystals α-GeO2 and α-SiO2. We propose an original model that perfectly describes the measurements.

JTu2A.14

Zero Thermal Expansion Diamagnetic Material as a Magneto-Optical Material for Faraday Isolators for High Power Laser Radiation, Ilya L. Snetkov[1,2], Xingxing Jiang[3], Zhesuai Lin[3]; [1]*Inst. of Applied Physics RAS, Russian Federation;* [2]*Lobachevsky State Univ. of Nizhny Novgorod, Russian Federation;* [3]*Functional Crystals Lab, Technical Inst. of Physics and Chemistry, China.* Magneto-optical and thermo-optical properties of close-to-zero thermal expansion single-crystal $Zn_4B_6O_{13}$ were investigated, and shown that it is highly suitable material for an optical isolator for high-average-power lasers wavelength range of 240–350 nm.

JTu2A.15

Exploring the Second Threshold Criterion of the Nd:YVO_4 Passively Q-Switched Laser With Temperature-Elevating, Chun-Yu Cho[1]; [1]*Electro Optical Engineering, National United Univ., Taiwan.* To reach the second threshold criterion for the Nd:YVO_4 passively Q-switched laser with a Cr^{4+}:YAG saturable absorber, the method of temperature-elevating for decreasing emission cross section with a proper gain-medium-to-absorber-mode-size-ratio resonator is explored.

JTu2A.16

Growth, Spectroscopy and Laser Operation of a "Mixed" Calcium Aluminate Tm,Ho:Ca(Gd,Y)AlO_4, Peixiong Zhang[3], Zhang-Lang Lin[1], Pavel Loiko[4], Kirill Eremeev[4], Zhen Li[3], Zhenqiang Chen[3], Ge Zhang[1], Xavier Mateos[5], Patrice Camy[4], Alain Braud[4], Uwe Griebner[2], Valentin Petrov[2], Weidong Chen[1,2]; [1]*Fujian Inst of Res Structure of Matter, China;* [2]*Max Born Inst., Germany;* [3]*Jinan Univ., China;* [4]*Université de Caen, France;* [5]*Universitat Rovira i Virgili (URV), Spain.* We report on the growth, polarized spectroscopy and laser operation of a "mixed" tetragonal calcium aluminate crystal, Tm,Ho:Ca(Gd,Y)AlO_4. A maximum continuous-wave output power of 585 mW is achieved at 2093.5 nm with 27.3% slope efficiency.

JTu2A.17

Temperature Dependence of Phase-Matched Nonlinear Frequency Conversion in $CdGeAs_2$, Kiyoshi Kato[2,3], Kentaro Miyata[1], Valentin Petrov[4]; [1]*RIKEN, Japan;* [2]*Chitose Inst. of Science and Technology, Japan;* [3]*Okamoto Optics, Inc., Japan;* [4]*Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany.* Temperature-dependent phase-matching conditions in $CdGeAs_2$ are studied for second-harmonic and sum-frequency generation of a CO_2 laser operating at 10.5910 μm by varying the crystal temperature in the 20–140°C range.

JTu2A.18

Laser Induced Damage Evaluation for Laser Material Development, Akihiro Osanai[1], Arvydas Kausas[1,2], Takunori Taira[1,2]; [1]*RIKEN SPring-8 Center, Japan;* [2]*Inst. for Molecular Science, Japan.* The laser induced damage in crystals with inhomogeneity can be distinguished as derived from an intrinsic factor and deterioration factors. We investigated the dependency of each damage threshold value upon irradiated laser beam condition.

JTu2A.19
Withdrawn

JTu2A.20
Nanohardness and Optical Damage Studies of CdSe, Ginka Exner[2], Amelia Carpenter[3], Kevin Cissner[3], Anne Hildenbrand-Dhollande[4], Stephan Schmitt[4], Aleksandar Grigorov[2], Marcin Piotrowski[4], Shekhar Guha[3], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]Plovdiv Univ. Paisii Hilendarski, Bulgaria; [3]AFRL, WPAFB, USA; [4]ISL, France.* Nanohardness, Young's modulus and optical damage threshold measurements are performed on randomly oriented samples of CdSe. Surface damage is studied at 1550, 2053, and 9569 nm using nanosecond pulses and different experimental conditions.

JTu2A.21
Flexible Dye-Doped Cholesteric Liquid Crystal Polymer Film Laser With Thermal Stability, Ja-Hon Lin[1], Zong- Han Xie[1], Chiung-Cheng Huang[2]; *[1]National Taipei Univ. of Technology, Taiwan; [2]Tatung Univ., Taiwan.* Using ISO-$(6OBA)_2$ as the chiral molecule, we produced a band-edge laser from dye-doped cholesteric liquid crystal film, which exhibits a red shift when subjected to mechanical stress and excellent stability as the temperature increases.

JTu2A.22
Thermo-Mechanical Properties of Orthorhombic $PbGa_2GeSe_6$, Michael Susner[2], Jonathan Goldstein[2], Ginka Exner[3], Aleksandar Grigorov[3], Ryan Siebenaller[2,4], Kentaro Miyata[5], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]AFRL, USA; [3]Plovdiv Univ. Paisii Hilendarski, Bulgaria; [4]The Ohio State Univ., USA; [5]RIKEN, Japan.* Linear thermal expansion in the 70-350 K range, and nanohardness and Young's modulus at room temperature are measured for the newly developed quaternary nonlinear crystal $PbGa_2GeSe_6$ applicable in the mid-IR part of the spectrum.

JTu2A.23
Measurement of Thin-Glass Refractive Index on Single-Shot Image, Hiroki Morita[1], Ryo Kurihara[1], Kento Kowa[2], Yoshitomo Nakashima[2], Hiroyuki Kowa[2], Naoji Oya[2], Takeshi Higashiguchi[1]; *[1]Utsunomiya Univ., Japan; [2]TRIOPTICS Japan, Japan.* We have developed a measurement method of the refractive index of a thin-glass sample on a single-shot image by using the low-coherence interferometry. This method enables quick measurement, simplifies alignment, and reduces system costs.

JTu2A.24
Prediction of Accurate Phase-Matching Conditions for Mixed Chalcopyrite $AgGa_{1-x}in_xS_2$, Kiyoshi Kato[2,3], Kentaro Miyata[1], Valentin Petrov[4]; *[1]RIKEN, Japan; [2]Chitose Inst. of Science and Technology, Japan; [3]Okamoto Optics, Inc., Japan; [4]Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany.* Phase-matching conditions of $AgGa_{1-x}In_xS_2$ having different In contents (x = 0, 0.14, 0.54) are investigated along with the theoretical index model based on a new set of Sellmeier equations for $AgGaS_2$ and $AgInS_2$.

JTu2A.25
Research on Yb Doped Silica Fibers for High Power Narrow Linewidth Fiber Laser MOPA System, Chunlei Yu[1,2], Qiubai Yang[1], Yafei Wang[1], Fan Wang[1], Mengting Guo[1], Shikai Wang[1],

Meng Wang[1], Lei Zhang[1], Suya Feng[1], Lei Wen[1], Dongbing He[1], Lili Hu[1,2]; *[1]Shanghai Inst of Optics and Fine Mech, China; [2]Hangzhou Inst. for Advanced Study, Univ. of Chinese Academy of Sciences, China.* This research mainly focuses on how to improve the performance of high-concentration doped silica fibers and large-mode-area doped silica fibers, ultimately obtaining high performance single-frequency laser seed sources and fiber amplifiers with high-mode instability thresholds.

JTu2A.26
Recovery Time Impact of a Saturable Absorber on the Dissipative Soliton Formation of a Tm^{3+}-Doped Fiber Laser, Suh-young Kwon[1], Jinho Lee[2], Ju Han Lee[1]; *[1]Univ. of Seoul, Korea (the Republic of); [2]Macquarie Univ., Australia.* The impact of saturable absorber recovery time on the pulse formation dynamics of a dissipative-soliton mode-locked thulium-doped fiber laser was numerically investigated. An appropriate recovery time was found to be between 2 and 3.8 ps.

JTu2A.27
An Optical Fiber Cladding Light Stripper With a Backscattering Level of <0.1%, Jihwan Kim[1,2], Taeho Woo[1], Jaehak Choi[1], Suh-young Kwon[1], Ju Han Lee[1,2]; *[1]Univ. of Seoul, Korea (the Republic of); [2]Kromanet Inc., Korea (the Republic of).* A cladding light stripper based on 10/125μm LMA DCF was designed and fabricated with a configuration of alternating chemically etched and unetched sections. A ~21-dB cladding attenuation and a <0.1% backward scattering level was achieved.

JTu2A.28
Simulation-Based Process for Characterization of Hexagonal Photonic Crystal Fibers Used in Supercontinuum Generation, John Rosses[1,2], Salvador Torres[1], Pere Pérez[1], Jaime Cascante[2]; *[1]FYLA LASER, Spain; [2]Universidad de Costa Rica, Costa Rica.* A two-step simulation approach for characterizing hexagonal photonic crystal fibers is presented, examining key parameters for supercontinuum generation. The simulation enables a customized supercontinuum design targeting specific short wavelength.

JTu2A.29
Withdrawn

JTu2A.30
High Energy and Average Power Solid-State UV Laser for Industrial Applications, Olivier Casagrande[1], Nicolas Bruel[1], Christophe Derycke[1], Damien Delobel[1], Hervé Besaucele[1]; *[1]THALES LAS France, France.* A cost-effective UV laser for industrial applications, offering high energy and average power, has been developed. With a nanosecond UV diode pumped solid-state design, it addresses operational challenges and provides efficient performance for diverse industries.

JTu2A.31 (Student Paper Finalist)
Simultaneous Upconversion and Spectral Phase Control in Gas-Filled Fibers, Hao Zhang[1,2], Linshan Sun[1], Jack Hirschman[2,3], Federico Belli[4], Sergio Carbajo[1,2]; *[1]Univ. of California, Los Angeles, USA; [2]SLAC National Accelerator Laboratory, USA; [3]Stanford Univ., USA; [4]Heriot-Watt Univ., UK.* We explore balancing spectral phase transfer efficiency and

spectral phase mapping via four-wave mixing in gas-filled hollow-core fibers for applications in high-power lightwave shaping.

JTu2A.32 (Student Paper Finalist)
Synthesis and Characterization of Laser Ablated Vanadium Disulfide Quantum Dots for Optical Limiting Applications, Hasana J. EK[1], Vijisha Mullassery Vinu[2], Anagha Purayil[1], Chandrasekharan Keloth[1]; *[1]National Inst. of Technology Calicut, India; [2]Cochin Univ. of Science and Technology, India.* We introduce the synthesis of vanadium disulfide quantum dots by pulsed laser ablation of a vanadium disulfide target in diacetone alcohol. We demonstrate the ability of these fluorescent quantum dots to be used in optical limiting applications.

JTu2A.33
Advanced Laser Cladding of Fe-Cr-Ni-v Alloy for the Restoration of Steel Rollers, Hsuan-Kuan Chen[1], Chun-Wei Yueh[1], Tai-Sheng Chen[1], Wei-Tien Hsiao[1]; *[1]Industrial Technology Research Inst., Taiwan.* The steel roller has a martensitic hard surface, and welding repairs cause cracks. Laser clad stainless steel adhesion layer and wear-resistant high-temperature alloys will improve cracking and provide stability.

JTu2A.34
Spectral Reflectance of Femtosecond Laser-Induced Columnar Structures on Al, Taehoon Park[1], Yong-dae Kim[1], Byounghwak Lee[2], Taek Yong Hwang[1]; *[1]Korea Inst. of Industrial Technology, Korea (the Republic of); [2]Korea Military Academy, Korea (the Republic of).* In this work, we investigate the spectral reflectance of femtosecond laser-induced columnar structures on Al, and find that the spectral reflectance of the structures unusually increases with the number of irradiating pulses.

JTu2A.35
Initiation Mechanisms of Femtosecond Laser-Induced Microscale Structures on Aluminum, Taehoon Park[1], Yong-dae Kim[1], Hyo Soo Lee[1], Hai Joong Lee[1], Jeongjin Kang[1], Jongweon Cho[2], Taek Yong Hwang[1]; *[1]Korea Inst. of Industrial Technology, Korea (the Republic of); [2]Myongji Univ., Korea (the Republic of).* By irradiating femtosecond pulses to the surface of Al, we found that the re-deposition of ablated particles would initiate the formation of microscale laser-induced surface structures growing above the surface level rather than hydrodynamical processes.

JTu2A.36
Ablation Efficiency Improvement Through Ultrafast Pulse Repetition Rate Scaling, Paul Repgen[1,2], Mesut Laçin[1,2], Amirhossein Maghsoudi[1,2], Fatih Ö. Ilday[1,2]; *[1]Bilkent Universitesi, Turkey; [2]Fakultät für Elektrotechnik und Informationstechnik, Ruhr-Universität Bochum, Germany.* We present a tenfold gain in ablation efficiency compared to conventional single-pulse processing and a sixfold increase over previously reported results by increasing the repetition rate to 50 GHz.

JTu2A.37 (Student Paper Finalist)
Structured Laser Beam Based on Ray Tracing Model, X. L. Zheng[1], Yung-Fu Chen[1]; *[1]National Yang Ming Chiao Tung University, Taiwan.* Using ray tracing models based on geometric optics, the equivalent cavity length difference caused by birefringent crystals can be accurately quantified, revealing the emergence of the Lissajous structured laser beam.

JTu2A.38
Evaluation of Surface Roughness of Ceramic-Metal Clad Beds via Laser Speckles and Support Vector Regression, Doaa Youssef[1], Samar R. AlSayed Ali[1]; [1]*Laser Inst. (NILES) Cairo Univ., Egypt.* This study presents a new optical imaging system based on laser speckles and machine learning regression to quantify the surface roughness, a critical parameter for surface properties evaluation, of composite clad beds on titanium specimens.

JTu2A.39 (Student Paper Finalist)
Off-Center Feedback-Based Phase Synchronization in Tiled Array Coherent Beam Combination, Sooraj M S[1], Satyajit Maji[1], Viswanathan Sankar[1], Balaji Srinivasan[1]; [1]*IIT Madras, India.* We propose and experimentally demonstrate a novel method for phase synchronization in hexagonal tiled array coherent beam combination based on single point partial feedback from an off-center location in the far field.

JTu2A.40
Assessment of Surface and Edge Quality in Femtosecond Laser Cutting of Glass in KOH, Harish Chandra[1]; [1]*Indian Inst. of Technology Bombay, India.* This study investigates the influence of KOH as an ambient media for efficient cutting of glass samples using a femtosecond laser and found that the surface quality can be enhanced with minimal burrs.

JTu2A.41
Innovative Beam Shaping Concepts for Advanced Laser Processes, Andre Volkert[1]; [1]*asphericon GmbH, Germany.* This paper explores enhancing laser technology accessibility through advanced beam shaping techniques, improving precision in cutting, welding, and surface structuring, resulting in cleaner cuts, stronger welds, and finely controlled surfaces for broader industrial use.

JTu2A.42
Withdrawn

JTu2A.43
Laser-Induced Breakdown Spectroscopy Based Depth-Wise Compositional Analysis for Micro-LED Repair, WoonKyeong Jung[1,2], Gookseon Jeon[1], Hohyun Keum[1], Youngjoo Kim[2], Janghee Choi[1]; [1]*Industrial Transformation Technology, Korea Inst. of Industrial Technology, Korea (the Republic of);* [2]*School of Mechanical Engineering, Yonsei Univ., Korea (the Republic of).* This study reports laser-induced breakdown spectroscopy (LIBS)-based depth profiling of micro-LEDs, demonstrating a novel repair technique by monitoring plasma emissions to identify layers, suggesting electrode reuse and selective LED portion removal for repair.

JTu2A.44
Wear Resistance Enhancement of TC21 Titanium Alloy Using Laser Cladding Composite Coatings, Samar R. AlSayed Ali[1], Ahmed Magdi Elshazli[1], Ramadan N. Elshaer[2]; [1]*Laser Inst. (NILES) Cairo Univ., Egypt;* [2]*Department of Mechanical Engineering, Tabbin Inst. for Metallurgical Studies (TIMS), Egypt.* This study performs laser surface cladding of TC21 alloy based on different percentages of stellite-6 and WC powder to investigate the surface microstructure, hardness, and wear resistance of the composite layers on the TC21 specimens.

JTu2A.45
Machine Learning Assisted Automated Laser Profile Tracking, Seif Eldin Refaat[1], Haitham A. Omran[1]; *[1]Laboratory of Micro Optics, Faculty of Information Engineering and Technology (IET), German Univ. in Cairo, Egypt.* We investigate three convolutional neural networks machine-learning models —YOLO, Faster R-CNN, and DETR— in precision detection and tracking of laser profiles. Automated tracking is achieved by coupling trained models to nano-positioning system. We achieved detection mean-average-precision (mAP) of 99% with 20um spatial tracking resolution.

JTu2A.46
Thermal Sensitivity of Optical Elements in Quantum key Distribution Systems, Boris Nasedkin[1], Azat Ismagilov[1], Egor Oparin[1], Alexey Kalinichev[3], Andrei Gaidash[1,2], Anton Tcypkin[1], Anton Kozubov[1,2]; *[1]ITMO Univ., Russian Federation; [2]Department of Mathematical Methods for Quantum Technologies, Steklov Mathematical Inst. of Russian Academy of Sciences, Russian Federation; [3]St. Petersburg State Univ., Russian Federation.* We examine the influence of thermal effects on fiber optic components and their implications for the security of quantum key distribution systems against potential attacks. This study was conducted within a wavelength range of 1250–1650 nm and a temperature range of 0–90^{o}C.

JTu2A.47
Reference Data Augmentation With Phase Retrieval Against Axial Misalignment for Laser Speckle Authentication, Jumpei Naka[1], Kazuya Kitano[1], Rui Ishiyama[1], Takuya Funatomi[1], Yasuhiro Mukaigawa[1]; *[1]Nara Inst. of Science and Technology, Japan.* This study proposes a method to enhance the robustness of laser speckle authentication against axial misalignment by using speckle patterns captured at different distances and augmenting the reference data through phase retrieval, mitigating accuracy degradation.

JTu2A.48
Generation of Brillouin Structured Light in Diamond, Hui Chen[1], Yulei Wang[1], Zhiwei Lu[1], Zhenxu Bai[1]; *[1]Hebei Univ. of Technology, China.* A free-space Brillouin structured lasing, including both fundamental Gaussian and Hermite-Gaussian transverse modes, was demonstrated for the first time using a diamond. Moreover, Brillouin vortex beams with orders in the range 1-4 through an extra-cavity astigmatic conversion device were obtained.

JTu2A.49
Revealing the Underlying Mechanism for Noise Suppression in Phase-Biased Mode-Locked NALM Lasers, Saeid Ebrahimzadeh Niari[1], James Maldaner[2], Sakib Adnan[1], Campbell Rea[1], Yishen Li[1], Gil Porat[1,2]; *[1]Department of Electrical and Computer Engineering, Univ. of Alberta, Canada; [2]Department of Physics, Univ. of Alberta, Canada.* We move beyond anecdotal reports on intensity noise in phase-biased nonlinear amplifying loop mirror mode-locked fiber lasers, and experimentally show that pump noise filtering through saturation of self-amplitude modulation is the mechanism underlying noise suppression.

JTu2A.50
A Very-High-Order 2D Hermite-Gaussian Mode Laser, Quan Sheng[1], Jingni Geng[1], Shijie Fu[1], Wei Shi[1], Takashige Omatsu[2]; *[1]Tianjin Univ., China; [2]Chiba Univ., Japan.* Selective ultra-high-order two-dimensional (2D) Hermite-Gaussian (HG) mode output up to $HG_{86,95}$, including over 10,000 different single HG modes, is realized by simply introducing astigmatism to the

cavity of an off-axis pumped $Nd:YVO_4$ laser to suppress the competition from the one-dimensional HG modes.

11:00 -- 12:00
Room: Prince Ballroom E
JTu3A • Joint Plenary Session II
Presider: To be Announced

JTu3A.1 • 11:00 (Plenary)
Ignition Achieved: Next Steps in the Path Toward an Inertial Fusion Energy Future, Tammy Ma[1]; *[1]Lawrence Livermore National Laboratory, USA.* The 5x achievement of ignition on the NIF lays the groundwork to explore laser inertial fusion as a path toward clean, abundant, safe energy for climate and energy security. We will discuss the international landscape.

13:30 -- 15:30
Room: Prince Ballroom E
ATu4A • Fiber Lasers I
Presider: Lynda Busse; US Naval Research Laboratory, USA

ATu4A.1 • 13:30 (Student Paper Finalist)
Single Hollow-Core Fiber for Guidance of IR (1030 nm) and Visible (515 nm) Ultrafast Laser Beams, Bowen Chen[1,2], Tim Kühlthau[1], Götz Kleem[1], Thomas Graf[1], Marwan Abdou Ahmed[1]; *[1]Institut für Strahlwerkzeuge (IFSW), Univ. of Stuttgart, Germany; [2]Graduate School of Excellence advanced Manufacturing Engineering (GSaME), Univ. of Stuttgart, Germany.* In the present contribution, we demonstrate the first 8-tube inhibited-coupling guiding hollow-core fiber capable of delivering ultrafast laser beams at a wavelength of 1030 nm and its second harmonic at 515 nm with low losses.

ATu4A.2 • 13:45
Deep-Ultraviolet to Near-Infrared Supercontinuum Generation in a Resonance-Free Hollow-Core Anti-Resonant Fiber, Mohammed Sabbah[1], Robbie Mears[2], Kerrianne Harrington[2], William Wadsworth[2], James M. Stone[2], Tim Birks[2], John C. Travers[1]; *[1]Heriot-Watt Univ., UK; [2]Department of Physics, CPPM, UK.* We demonstrate a resonance-free supercontinuum spanning from 250 nm to 750 nm in an argon-filled anti-resonant hollow-core fiber with an as-drawn wall thickness of ~85 nm.

ATu4A.3 • 14:00
Yellow Laser Emission From $Dy:BaF_2$ Nanoparticle Doped Aluminosilicate Fiber, Jinho Lee[1], Mary Ann Cahoon[2], Bailey Meehan[2], Yan Ososkov[1], Thomas Hawkins[2], John Ballato[2], Stuart Jackson[1]; *[1]Macquarie Univ., Australia; [2]Clemson Univ., USA.* We experimentally demonstrate a yellow laser based on $Dy:BaF_2$ nanoparticle (NP) doped aluminosilicate fiber. We obtain an output laser with a center wavelength of ~581.5 nm and a maximum output power of ~21 mW.

ATu4A.4 • 14:15
Glass Cladded Yb:YAG Crystal Fiber, Brandon Shaw[1], Daniel J. Gibson[1], Rafael R. Gattass[1], Robert R. Nicol[2], Shyam S. Bayya[1], Woohong Kim[1], Daniel L. Rhonehouse[1], Patrick M. Hemmer[3], Frederic H. Kung[3], Jasbinder S. Sanghera[1]; *[1]US Naval Research Laboratory,*

USA; [2]Jacobs Engineering, USA; [3]Univ. Research Foundation, USA. We report on fabrication improvements of glass cladded single crystal Yb:YAG fiber. We demonstrate 3.2 W output average power with 14.7 dB gain from a glass cladded 100 µm core Yb:YAG fiber using a MOPA architecture.

ATu4A.5 • 14:30
Holmium-Doped Silica Fiber Combining High Doping and High Efficiency, Jan Pokorný[1,2], Bára Švejkarová[1,2], Jan Aubrecht[1], Michal Kamrádek[1], Ivo Barton[1], Ivan Kašík[1], Pavel Honzátko[1], Pavel Peterka[1]; *[1]IPE Czech Academy of Sciences, Czechia; [2]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical Univ. in Prague, Czechia.* We present a 2.1 µm holmium-doped fiber laser, core pumped by a 1.94 µm thulium-doped fiber laser, using a highly holmium-doped silica fiber (3850 ppm), achieving 81 % efficiency with respect to absorbed pump power.

ATu4A.6 • 14:45
Watt-Level Er:$YAlO_3$ Waveguide Laser at 2920 nm, Ji Eun Bae[1], Pavel Loiko[1], Carolina Romero[2], Javier R. Vázquez de Aldana[2], Weidong Chen[3,4], Dunlu Sun[5], Peixiong Zhang[6], Xavier Mateos[7], Alain Braud[1], Ammar Hideur[8], Valentin Petrov[4], Patrice Camy[1]; *[1]CIMAP, Université de Caen Normandie, France; [2]Univ. of Salamanca, Spain; [3]Fujian Inst. of Research on the Structure of Matter, Chinese Academy of Sciences, China; [4]Max Born Inst. for Nonlinear Optics and Short Pulse Spectroscopy, Germany; [5]Anhui Inst. of Optics and Fine Mechanics, Hefei Inst.s of Physical Science, Chinese Academy of Sciences, China; [6]Department of Optoelectronic Engineering, Jinan Univ., China; [7]Universitat Rovira i Virgili (URV), Spain; [8]CORIA UMR 6614, CNRS-INSA-Université de Rouen Normandie, France.* Depressed-cladding low-loss (0.12 dB/cm) buried channel waveguides are produced in an Er:$YAlO_3$ crystal by femtosecond direct laser writing. The waveguide laser delivers 1.12 W at 2920 nm with a linear polarization in a single-mode output.

ATu4A.7 • 15:00
Uniform 50-fs Pulse Bursts via Gain-Managed Nonlinear Amplification, Amirhossein Maghsoudi[1,2], Paul Repgen[1,2], Mesut Laçin[1,2], Aladin Sura[1,2], Fatih Ö. Ilday[1,2]; *[1]Ruhr-Universität Bochum, Germany; [2]Bilkent Univ., Turkey.* By studying gain dynamics in burst-mode amplifiers, we report the first gain-managed nonlinear amplifier generating 50 fs, 600 nJ pulses with uniform bursts, resulting in optimal pulse parameters for ultrafast material processing.

ATu4A.8 • 15:15
10-Watt Red Fluoride Double-Clad Fiber Laser, Esrom Kifle[3,1], amandine baillard[1], Pavel Loiko[1], thibaud berthelot[2], Franck joulain[2], Laurine Bodin[2], Florence Pau[3], Gilles Recoque[3], Thierry Georges[3], Patrice Camy[1]; *[1]CIMAP-ENSICAEN, France; [2]Le Verre Fluoré, France; [3]Oxxius, France.* A continuous-wave 442-nm blue diode-pumped double-clad Pr:ZBLAN fiber laser yields 9.1 W at 635 nm with 27.0% slope efficiency and a single-mode output and in the quasi-continuous-wave regime, it is scaled to 10.32 W.

13:30 -- 15:30
Room: Ruby
LTu4B • Surface Modification
Presider: Heather George; TRUMPF SE & Co.KG, USA

LTu4B.1 • 13:30 (Invited)
Laser Surface Technology – An Overview With Examples From E-Mobility, Marc Kirchhoff[1]; [1]*TRUMPF Inc., USA.* We provide an overview of applications for surface technology for E-mobility and the application of high-speed laser metal deposition for brake disc coating for upcoming EURO7 in the European union.

LTu4B.2 • 14:00 (Invited)
Recent Progress of Laser-Induced Periodic Nanodot Structures on Solid Material, Masaki Hashida[1,2], Mitsuhiro Kusaba[3], Hitoshi Nakano[4]; [1]*RIST, Tokai Univ., Japan;* [2]*ICR, Kyoto Univ., Japan;* [3]*Osaka Sangyo Univ., Japan;* [4]*NIFS, Japan.* We have found the nano dot structures were produced by laser pulses below melting threshold fluence. The tips of nano dot structure is approximately 20nm. The recent progress of nano dot structures will be presented.

LTu4B.3 • 14:30 (Invited)
Holographic Beam Shaping for Industrial Laser Processing, Yoshio Hayasaki[1], Nami Kuroo[1], Satoshi Hasegawa[1]; [1]*Utsunomiya Univ., Japan.* A computer-generated hologram (CGH) is optimized in the laser processing machine to generate two- and three-dimensionally shaped beams with high spatial and temporal qualities, depending on the industrial applications.

LTu4B.4
Withdrawn

13:30 -- 15:30
Room: Crystal
LsTu4C • Basic Technologies I
Presider: Farzin Amzajerdian; NASA Langley Research Center, USA

LsTu4C.1 • 13:30 (Invited)
Space-Grade Packaging of Photonic Integrated Circuits, Nathan Dostart[1], Aram Gragossian[1], Farzin Amzajerdian[1], Randa Elhertani[1], Christin Lundgren[1], Glenn D. Hines[1], Frederick G. Wilson[1]; [1]*NASA Langley Research Center, USA.* We describe development of robust packaging of a silicon photonic optical transceiver suitable for survival and operation in space. We discuss design considerations and demonstrate negligible performance degradation during standard NASA environmental tests.

LsTu4C.2 • 14:00 (Invited)
Visualizing Excitons With Time-Resolved Photoemission Spectroscopy, Julien Madeo[1]; [1]*Femtosecond Spectroscopy Unit, Okinawa Inst of Science & Technology, Japan.* Recent progress in ultrafast table-top and photoemission techniques have enabled access to the dynamical, spatial and momentum properties of few-particle states in condensed matter systems, including the visualization of dark excitons and the excitonic wavefunction.

LsTu4C.3 • 14:30
Ultra-Narrow Linewidth and Long-Term Stabilized Self-Injected Qdash Semiconductor Comb Laser for Ultrafast Optical Ranging Systems, Youcef Driouche[1], Badr-Eddine Benkelfat[1], Kamel Merghem[1]; [1]*Télécom SudParis, France.* We demonstrate the significant impact of resonant feedback on the long-term stability, phase noise, and optical linewidth of a

single-packaged quantum-dash comb laser using a hybrid feedback architecture, aiming to enhance performance for LiDAR systems.

LsTu4C.4 • 14:45
Stretched Pulse Active Mode-Locking Comb Swept Laser for Extended Measurable Range, Seongjin Bak[1], Gyeong Hun Kim[2], Hwidon Lee[1], Chang-Seok Kim[1]; *[1]Pusan National Univ., Korea (the Republic of); [2]Massachusetts General Hospital, USA.* We propose a stretched pulse active mode-locking comb-swept laser for extended measurable ranging. The optical subsampling with the laser allows the system to measure an extended range within the limited electrical bandwidth of the digitizer.

LsTu4C.5
Withdrawn

16:00 -- 18:00
Room: Prince Ballroom E
ATu5A • Fiber Lasers II
Presider: Marc Eichhorn; KIT, Germany

ATu5A.1 • 16:00 (Invited)
Overcoming Limitations in High Power Fiber Laser Systems, Cesar Jauregui[1,2], Yahia Khalil[1], Gonzalo Palma-Vega[1,2], Yiming Tu[1], Sobhy Kholaif[1], Mehran Bahri[1], Arno Klenke[1,2], Jens Limpert[1,2]; *[1]Friedrich-Schiller-Universität Jena, Germany; [2]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany.* The unprecedented power-scaling of fiber laser systems could only be unlocked by finding creative solutions to multiple limitations. Here we will review such limitations and their mitigation, including the most recent research on multicore fibers.

ATu5A.2 • 16:30
Ultrafast Laser System With Record GHz Repetition Rate in Burst Mode From All Single-Mode Fiber, Mesut Laçin[1,2], Paul Repgen[1,2], Amirhossein Maghsoudi[1,2], Fatih Ö. Ilday[1,2], Umut Aydemir[4], Aladin Sura[1,3]; *[1]Ruhr-Universität Bochum, Germany; [2]Bilkent Universty, Turkey; [3]UNAM-National Nanotechnology Research Center, Bilkent Univ., Turkey; [4]Bursa Uludag Universty, Turkey.* We present a novel laser system integrated within strictly single-mode fibers, capable of generating bursts of 100-fs pulses at a 50 GHz repetition rate with an average power of 100 W. This configuration facilitates highly efficient and precise material processing in the ablation-cooled regime.

ATu5A.3 • 16:45
5 W Single-Stage Nanosecond Er^{3+}-Doped Fluoride Fiber Amplifier Operating at 2.78 µm, Martin Bernier[1], Quentin Perry-Auger[1], Stanislav Leonov[1], Daiying Zhang[2], Darren Kraemer[2], Réal Vallée[1]; *[1]Laval Univ., Canada; [2]Light Matter Interaction Inc., Canada.* We report a single-stage 100 µm core Er^{3+}-doped fluoride fiber amplifier operating at 2.78 µm that delivers 5 W of average power and 1 mJ of pulse energy with 1.8 ns pulses at 5 kHz repetition rate.

ATu5A.4 • 17:00
100 W High Efficiency 2.1 µm Ho^{3+}-Doped Triple Clad Fiber Laser Cladding-Pumped at 1.9 µm, Nicolas DALLOZ[1], Christophe Louot[1], Thierry Ibach[1], Alexandre Barnini[2], Laurent

Lablonde[2], Gilles Mélin[2], Kévin Audo[2], Thierry Robin[2], Benoît Cadier[2], Anne Hildenbrand-Dhollande[1]; [1]*ISL, France;* [2]*Exail, France.* We report on a high efficiency triple clad Ho^{3+}-doped fiber laser emitting 100 W at 2119 nm, cladding-pumped at 1940 nm thanks to a triple clad fiber combiner specifically developed for this laser source.

ATu5A.5 • 17:15
680-W Continuous-Wave Monolithic Tm^{3+}-Doped Fiber Laser at 2036 nm, Christophe Louot[1], Félix Sanson[1,2], Arnaud Motard[1], Nicolas Dalloz[1], Stefano Bigotta[1], Caterina Clemente[1,3], Inka Manek-Hönninger[2], Anne Hildenbrand-Dhollande[1]; [1]*Inst Franco-Allemand Recherches St Louis, France;* [2]*Université de Bordeaux, CNRS CEA, CELIA UMR5107, France;* [3]*Université de Rennes, CNRS ISCR UMR6226, France.* We report on a single-oscillator monolithic Tm^{3+}-doped fiber laser emitting 680 W at 2036 nm in CW operation mode, with an optical efficiency of 44 %. Simulations and experimental results are compared.

16:00 -- 18:00
Room: Ruby
LTu5B • Micro-Nano Machining
Presider: Johannes Trbola; Trbola Engineering, Germany

LTu5B.1 • 16:00 (Invited)
Title to be Announced, Jens Gottmann[1]; [1]*Rheinish Westfalische Tech Hoch Aachen, Germany.* Abstract not available.

LTu5B.2 • 16:30 (Invited)
GHz Burst Mode Femtosecond Laser Processing: Ablation, Surface Nanostructuring, TPP, Koji Sugioka[1]; [1]*RIKEN, Japan.* We show that GHz burst mode femtosecond laser ablation provides distinct characteristics in fabrication efficiency, speed, and quality. We further show that the GHz burst mode can form unique laser induced periodic surface structures (LIPSS) and improve the fabrication resolution in two-photon polymerization.

LTu5B.3 • 17:00
Laser-Induced Periodic Surface Structures Formation on Fused Silica by Repeated Ablation on a Single Scanning Path, Daisuke Yano[1], Shoichi Kubodera[1]; [1]*Soka Univ., Japan.* Laser-induced periodic surface structures (LIPSS) were formed on the surface of fused silica by ablating several time over a single scanning path. LIPSS were observed from the second pass of scanning at higher scanning speed.

LTu5B.4
Withdrawn

16:00 -- 18:00
Room: Crystal
LsTu5C • Atmospheric Propagation and Characterization I
Presider: Romain Ceolato; ONERA, France

LsTu5C.1 • 16:00 (Invited)
Entropy Measures in Sensing Through Turbulent Environments, Erandi Wijerathna[1], Travis Crumpton[1], Xiaojing Weng[1], Altai Perry[1], Luat Vuong[1]; [1]*Univ. of California at Riverside, USA.*

Fractal-structured beams offer non-line-of-sight sensing, self-similar statistics that redundantly encode information, and robustness to turbulence. We will summarize our knowledge of entropy measures and fractal beam statistics for wave propagation in turbulent environments.

LsTu5C.2
Withdrawn

LsTu5C.3 • 17:00 (Invited)
Comprehensive Study of the Optical Turbulence Experimentally Generated by Rayleigh–Bénard Natural Convection, Svetlana Avramov-Zamurovic[1]; [1]*US Naval Academy, USA.* We characterize optical turbulence experimentally generated by Rayleigh–Bénard natural convection in water. We find scintillation index and angle of arrival from intensity measurements, deriving refractive index structure constant under various conditions.

LsTu5C.4 • 17:30 (Invited)
Withdrawn

Wednesday, 23 October

08:00 -- 10:00
Room: Prince Ballroom E
AW1A • Nonlinear Amplification and Compression
Presider: Tino Eidam; Active Fiber Systems GmbH, Germany

AW1A.1 • 08:00 (Student Paper Finalist)
Record-High 10.3W Average Power at 3.1 µm From an Optical Parametric Oscillator, Vito F. Pecile[1], Michael Leskowschek[1], Norbert Modsching[2], Valentin J. Wittwer[2], Thomas Südmeyer[2], Oliver Heckl[1]; *[1]Faculty of Physics, Univ. of Vienna, Austria; [2]Laboratoire Temps-Fréquence (LTF), Institut de Physique, Université de Neuchâtel, Switzerland.* We present an optical parametric oscillator synchronously-pumped with a 125MHz Yb:fiber chirped pulse amplifier and achieve a record-high average power of 10.3W at 3.1 µm with a free-running power stability of 0.84%.

AW1A.2 • 08:15
Revealing the Single-Shot Pulse Evolution Dynamics in a CW-Seeded Femtosecond Optical Parametric Amplifier, Jintao Fan[1], Jue Wang[1], Haosen Shi[2], Günter Steinmeyer[3,4], Minglie Hu[1]; *[1]Tianjin Univ., China; [2]East China Normal Univ., China; [3]Max Born Inst., Germany; [4]Humboldt Univ., Germany.* We present a first approach towards measuring resulting phase noise fluctuations, taking advantage of the temporal resolution of the dispersive temporal interferometry technique for experimentally unveiling the carrier-envelope phase dynamics of a cw-seeded femtosecond OPA.

AW1A.3 • 08:30
Highly Efficient Microlaser-Pumped Subnanosecond Mirrorless Optical Parametric Oscillator, Jonas Banys[1], Jonas Jakutis[1,2], Andrius Zukauskas[3], Valdas Pasiskevicius[3], Vygandas Jarutis[1], Julius Vengelis[1]; *[1]Faculty of Physics, Vilnius Univ., Lithuania; [2]Department of Aerospace Science and Technology, Inst. for Advanced Studies (IEAv), Brazil; [3]Department of Applied Physics, Royal Inst. of Technology (KTH), Sweden.* We demonstrate the first Mirrorless Optical Parametric Oscillator based on Rb:PPKTP crystal with 427 nm grating period and pumped by subnanosecond pulses from Nd:YAG microlaser which allows to achieve nearly transform-limited pulses and diffraction-limited beams of the signal and idler waves

AW1A.4 • 08:45
Sub-15 fs Jitter After Multi-Pass Cell Pulse Compression at the Beamline FL23 of the FLASH Facility, David Schwickert[1], Skirmantas Alisauskas[1], Nick Kschuev[1], Anne-Laure Calendron[1], Ayhan Tajalli Seifi[1], Giovanni Cirmi[1], Stefan Düsterer[1], huseyin cankaya[1], Ingmar Hartl[1], Sebastian Schulz[1], Holger Schlarb[1]; *[1]Deutsches Elektronen Synchrotron, Germany.* The temporal stability of laser pulses after a high-energy compression stage using a multi-pass cell with transport beamline was investigated, resulting in correctable ~1 ps long-term drift, and 11 fs residual jitter (10 s integration).

AW1A.5 • 09:00
Ultrahigh Contrast of a Second-Harmonic Pulse of a Hybrid Optical Parametric Chirped-Pulse–Amplification and Nd:Glass Laser, Ildar A. Begishev[1], Christophe Dorrer[1], Jake Bromage[1], Jonathan Zuegel[1]; *[1]Univ. of Rochester, USA.* The ultrahigh contrast of 10^{19} at

second-harmonic pulses has been measured on a hybrid optical parametric chirped-pulse–amplification and Nd:glass laser. The source of the prepulses has been identified.

AW1A.6 • 09:15
Power Scalable Self-Compression of Near-200-fs Yb:KGW Laser to 7 fs at 100 kHz in an Anti-Resonant Hollow-Core Photonic Crystal Fiber, SHAOBO FANG[1,2], Yuzhe Liu[1,2], Aokun Zhang[1,2], Yifan Liu[1,2], Yicheng He[1,2], Chun Zhou[3], Chen Qingqing[4], Wei Ding[4]; *[1]CAS Inst. of Physics, China; [2]Univ. of Chinese Academy of Science, China; [3]CAS Inst. of Plasma Physics, China; [4]Jinan Univ., China.* We experimentally demonstrated self-compression of near-200-fs Yb:KGW laser to 7 fs at 100 kHz in a single gas-filled anti-resonant hollow-core photonic crystal fiber.

AW1A.7 • 09:30
Multipass Cell for mJ-Level, sub-two Cycle Nonlinear Pulse Compression With >100W Average Power at 1.9 µm , Ziyao Wang[1], Warunya Röder[2], Tobias Heuermann[1,3], Philipp Gierschke[1,2], Yi Zhang[1], Maximilian Karst[1,3], Mathias Lenski[1], Lucas Eisenbach[2], Jan Rothhardt[1,3], Jens Limpert[1,2]; *[1]Inst. of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Univ. Jena, Germany; [2]Fraunhofer Inst. for Applied Optics and Precision Engineering, Germany; [3]Helmholtz-Inst. Jena, Germany.* In this work, we present a nonlinear post-compression with an average power exceeding 100 W based on a gas-filled multipass cell providing sub-two-cycle pulses. It is enabled by a thulium-doped fiber chirped-pulsed amplification system.

AW1A.8 • 09:45
Power Scaling of a Narrowband PPLN Non-Resonant Optical Parametric Oscillator, Subhasis Das[1,2], Tugba Temel[1,3], Robert T. Murray[3], Andre Schirrmacher[4], Ivan Divliansky[5], Li Wang[1,6], Weidong Chen[1,6], Oussama Mhibik[5], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]Burdwan Univ., India; [3]Imperial College London, UK; [4]CANLAS GmbH, Germany; [5]Univ. of Central Florida, USA; [6]CAS, China.* Using a Volume-Bragg-Grating at the signal wavelength in a periodically-poled $LiNbO_3$ (PPLN) non-resonant optical parametric oscillator we achieve a total average power of 11.35 W at 20 kHz corresponding to a conversion efficiency of 63%.

08:00 -- 10:00
Room: Ruby
LW1B • Fusion Energy
Presider: Gabrielle Thomas; Menlo Systems GmbH, Germany

LW1B.1 • 08:00 (Invited)
Tm:YLF Lasers for Emerging Applications, Leily S. Kiani[1], Zbynek Hubka[1], Issa Tamer[1], Jason Owens[1], Andrew Church[1], Frantisek Batysta[1], Thomas Galvin[1], Drew Willard[1], Andrew Yandow[1], Justin Galbraith[1], David Alessi[1], Colin Harthcock[1], Brad Hickman[1], Candis Jackson[1], James Nissen[1], Sean Tardif[1], Hoang Nguyen[1], Emily Sistrunk[1], Thomas Spinka[1], Brendan Reagan[1]; *[1]Lawrence Livermore National Lab, USA.* We present Tm:YLF laser technology development including joule-level short pulse amplification and gas-cooling at high heat loads in two separate experiments, which shows the potential suitability of Tm:YLF based lasers for drivers of emerging applications.

LW1B.2 • 08:30 (Invited)
Recent Progress in Optical Enhancement Cavity Laser for Fusion Energy Applications, Paul Rudy[1], Seita Iizuka[2], Yuya Ohara[1]; *[1]Blue Laser Fusion Inc., USA; [2]Blue Laser Fusion, Japan.* Blue Laser Fusion has been developing a laser system based on the Optical Enhancement Cavity for fusion applications. We will share the current status of our ongoing development in collaboration with Osaka University.

LW1B.3 • 09:00 (Invited)
Fan-out, Fiber-Coupled, Focal-Plane Array of Detectors for Laser Ionization Diagnosis in the TCABR Tokamak and Validation of Plasma Density Models, Niklaus U. Wetter[1], Fernando A. Albuquerque[2], José H. Severo[2], Gustavo Canal[2]; *[1]Centro de Lasers e Aplicações - IPEN/SP, Brazil; [2]Instituto de Física da Universidade de São Paulo, Brazil.* Brazil's Ministry of Science, Technology, and Innovation is launching a National Program for Nuclear Fusion, including the construction of a National Fusion Laboratory. The program features an advanced Laser Ionization Diagnosis system for accurate plasma neutral density measurement.

LW1B.4 • 09:30 (Invited)
Developments in Laser Driven Fast Ignition for Fusion Energy Production, Warren McKenzie[1], Sergey Pikuz[1]; *[1]HB11 Energy Pty Ltd., Australia.* Laser fusion is now a leading technology in the pursuit of the world's first fusion power plant. This presentation will give an overview of developments, upcoming challenges and opportunities to participate in emerging global initiatives.

08:00 -- 09:45
Room: Crystal
LsW1C • Atmospheric Propagation and Characterization II
Presider: Svetlana Avramov-Zamurovic; US Naval Academy, USA

LsW1C.1 • 08:00 (Invited)
Lidar Techniques for Quantifying Atmospheric Effects on Optical Propagation, Leda Sox[1], Christopher R. Valenta[1], Don Harris[1]; *[1]Georgia Tech Research Inst., USA.* A subset of lidar techniques that provide quantitative measurements of parameters relevant to optical propagation through the atmosphere will be presented in this talk.

LsW1C.2 • 08:30 (Invited)
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.

LsW1C.3 • 09:00 (Invited)
Development of mid-Infrared and Visible Pulsed Solid-State Lasers for Doppler Wind Lidar Applications, Atsushi Sato[1]; *[1]Tohoku Inst. of Technology, Japan.* Solid-state lasers operating in the mid-infrared and visible wavelength regions have been investigated for Doppler wind lidar applications. In this paper, our recent results on the development of holmium and alexandrite lasers are presented.

LsW1C.4 • 09:30
Frequency Modulated Pulsed Coherent Wind Lidar for Short Range Measurement, Laurent Lombard[1], Matthieu Valla[1], David-Tomline Michel[1]; *[1]DOTA, ONERA, Université Paris Saclay, France.* We present and demonstrate an innovative laser source to mitigate the short-range limitation of coherent wind lidars (CWL). This frequency modulated pulsed coherent wind lidar (called "tweet lidar") effectively allows short-distance (~7m instead of 150m) clean wind speed measurement with accuracy of the order of a few dm/s.

10:00 -- 11:00
Room: Prince Ballroom, Posters
JW2A • Joint Poster Session II

JW2A.1
Synchronization of Dissipative Soliton Resonance Lasers via Cascaded Cross-Phase and Cross-Absorption Modulation for Mid-Infrared Mode-Locked Pulse Generation, Piotr Bojes[1], Piotr Jaworski[1], Karol Krzempek[1]; *[1]Wroclaw Univ. of Science and Tech., Poland.* Cross-phase and cross-absorption modulation effect is used to synchronize the pulse repetition frequency and duration of two dissipative soliton resonance mode-locked lasers, which were subsequently used in to generate mid-infrared pulses via difference frequency generation.

JW2A.2
Generation of Intense Attosecond Soft X-ray Field by High-Precision Focusing System, Kotaro Imasaka[1,2], Natsuki Kanda[1,2], Dianhong Dong[1], Bing Xue[1], Satoru Egawa[3,4], Takuya Hosobata[3], Masahiro Takeda[3], Yutaka Yamagata[3], Eiji j. Takahashi[1,2]; *[1]Ultrafast Coherent Soft X-ray Photonics Research Team, RIKEN Center for Advanced Photonics, RIKEN, Japan; [2]Extreme Laser Science Laboratory, RIKEN Cluster for Pioneering Research, RIKEN, Japan; [3]Ultrahigh Precision Optics Technology Team, RIKEN Center for Advanced Photonics, RIKEN, Japan; [4]Mimura Lab, Research Center for Advanced Science and Technology, The Univ. of Tokyo, Japan.* The peak intensity from high harmonic generation source is approaching PW/cm2, which enables us to observe attosecond nonlinear optical phenomena in solids. We developed a high-precision focusing system to improve the peak intensity.

JW2A.3
CEP Stable Hybrid Ultrashort Laser System at 4 Micrometer Wavelength Based on Fe:ZnS, Amir Hen[1], Gilad Marcus[1]; *[1]The Hebrew Univ., Jerusalem, Israel.* NIR laser system whereas a CEP stable seed is generated by mixing a Yb:fiber oscillator pulse with its spectra broadened replica, and amplify it in a Fe:ZnS amplifier, pumped by a gain switched Cr:ZnSe laser.

JW2A.4
Efficient Continuous-Wave and Passively Q-Switched Operations of a Femtosecond Laser Inscribed Tm/Ho:YLF Waveguide Laser at 2.05 µm, Berke Ayevi[1], Yagiz Morova[1,2], Eugenio Damiano[3], Mauro Tonelli[3], Alphan Sennaroglu[1,2]; *[1]Koc Universitesi, Turkey; [2]Surface Science and Technology Center (KUYTAM), Koc Universitesi, Turkey; [3]Mega Materials srl and Dipartimento di Fisica dell'Università di Pisa, Italy.* We describe the continuous-wave(CW) and passively Q-switched(PQS) operations of a femtosecond laser written 2.05-µm Tm/Ho:YLF

waveguide laser, yielding a high CW efficiency of 38% and 64-kHz pulses as short as 25 ns during PQS operation.

JW2A.5
Multi-kW Peak Power Frequency Comb MOFPA in Nanosecond Pulsed Regime for Lidar Applications, Jonathan F. Pouillaude[1,2], Pierre Pichon[1], Xavier Delen[2], Patrick Georges[2], Laurent Lombard[1]; *[1]ONERA, France; [2]Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, France.* Rugged laser systems are mandatory for onboard high-altitude lidar wind measurement. We propose a combination of methods to overcome SBS limitation for narrow linewidth pulses (50ns/40kHz) in fibers while being compatible with lidar applications.

JW2A.6
Generation of High-Power 2nd, 3rd, 4th, and 5th Harmonics of 1064 nm With a 1.5 kW Polarization-Maintaining, Continuous-Wave Yb-Doped Fiber Laser, Vartan Ter-Mikirtychev[1], Nicholas M. Kearns[1], Joseph Cheeney[1], Matthew Kalinowski[1], Jens Schumacher[2], Dominic Loiacono[1]; *[1]Coherent Corp, USA; [2]Menlo Systems, Inc., USA.* A 1.5kW polarization-maintaining CW fiber laser produced 860W of 532nm, 220W of 355nm, 16W of 266nm, and 0.4W of 213nm with $M^2 \leq 1.45$ and high stability. Fiber coupling and intensity modulation of the harmonics has been demonstrated.

JW2A.7
Power Scaling of a Four-Wave Mixing Source at 730 nm, Brandon Shaw[1], Rafael R. Gattass[1], Augustus X. Carlson[1], Daniel L. Rhonehouse[1], Patrick M. Hemmer[2], Geoffrey D. Chin[2], Jasbinder S. Sanghera[1]; *[1]US Naval Research Laboratory, USA; [2]Univ. Research Foundation, USA.* We demonstrate 9.1 W output at 730 nm by four-wave mixing in a photonic crystal fiber using an all-fiber spliced configuration with a quasi-CW pump at 1053 nm.

JW2A.8
An Update on the Commissioning Status of the High Energy Ti:Sa Amplifier in the New EPAC Facility, Danielle L. Clarke[1,2], Paul Mason[1], Robert Heathcote[1], Luke McHugh[1], Thomas Butcher[1], Cristina Hernandez-Gomez[1], John Collier[1]; *[1]STFC Rutherford Appleton Laboratory, UK; [2]Heriot-Watt Univ., 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 10Hz.

JW2A.9
Ho:YAG Slab Amplifier for Ultra-Short-Pulse Laser Processing of Infrared Optical Materials, Lucas Groult[1], Jake Sanwell[1], Tara Van Abeelen[1], Adrian Dzipalski[1], Richard M. Carter[1], Duncan P. Hand[1], M J Daniel Esser[1]; *[1]Heriot-Watt Univ., UK.* A bespoke ultra-short-pulse seed laser is amplified by an in-house developed Ho:YAG pre-amplifier and Ho:YAG thin-slab main amplifier to micro-Joule energies at 23 MHz, aimed at non-linear material processing of infrared optical materials.

JW2A.10
Development Status of the Petawatt Laser of ELI ALPS, Roland Nagymihály[1], Viktor Pajer[1], Levente Lehotai[1], János Bohus[1], Balázs Tari[1], Adam Borzsonyi[1], Franck Falcoz[2], Benoit Bussiere[2], Pierre-Mary Paul[2], Katalin Varjú[1], Gábor Szabó[1], Mikhail Kalashnikov[1]; *[1]ELI-ALPS,*

ELI-HU Non-Profit Ltd., Hungary; [2]Amplitude, France. We investigate high rep-rate operation and spatio-spectral challenges in the petawatt laser of ELI ALPS. User readiness, next steps and potential issues of development towards the final 2 PW 17 fs output are also discussed.

JW2A.11
Efficient Frequency Doubling of a 49-Core Ytterbium-Doped, ns-Class Fiber Laser, Mehran Bahri[1], Cesar Jauregui[1], Arno Klenke[1], Johannes Nold[2], Nicoletta Haarlammert[2], Thomas Schreiber[2], Jens Limpert[1]; *[1]Inst. of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Albert-Einstein-Straße 15, 07745 Jena, Germany, Germany; [2]Fraunhofer Inst. for Applied Optics and Precision Engineering, Albert-Einstein-Straße 7, 07745 Jena, Germany, Germany.* Second harmonic generation at 515-nm with 57% conversion efficiency utilizing an Ytterbium-doped, 49-core, fiber laser resulted in 18-mJ energy at 1.5 kHz. Further energy scaling as well as THG will be presented at the conference.

JW2A.12
Diode-Pumped Ho:YAG Thin-Disk Laser for Energetic Pulse Generation in the 2 µm Wavelength Range, Yuya Koshiba[1], Jirí Muzík[1], Antonin Fajstavr[2], Sabina Malecová[2], Martin Smrz[1], Tomáš Mocek[1]; *[1]HiLASE Centre, Czechia; [2]CRYTUR spol. s r.o., Czechia.* We demonstrate a highly stable Ho:YAG thin-disk Q-switched laser employing direct in-band diode pumping, generating 5.3-mJ, 2.09-µm nanosecond pulses with peak power of 18 kW in a single mode. Cavity-dumped regime results will also be reported.

JW2A.13
Kerr-Lens Mode-Locked GHz-Repetition-Rate Yb:CALYO Laser With 11-W Average Power, Jie Tao[1], Tian Wenlong[1], Li Zheng[2], Geyang Wang[1], Yang Yu[1], Xiaodong Xu[3], Zhiyi Wei[4], Jiangfeng Zhu[1]; *[1]Xidian Univ., China; [2]School of Physics and Telecommunication Engineering, Shaanxi Univ. of Technology, Hanzhong, 723001, China, China; [3]School of Physics and Electronic Engineering, Jiangsu Normal Univ., Xuzhou 221116, China, China; [4]Beijing National Laboratory for Condensed Matter Physics, Inst. of Physics, Chinese Academy of Science, Beijing 100190, China, China.* We report on a 1-GHz Kerr-lens mode-locked Yb: CYA laser pumped by a multimode LD, which can directly deliver 149-fs pulses with an average power of 11.1 W for the first time.

JW2A.14
Withdrawn

JW2A.15
Amplifying Watt-Level Femtosecond Pulses at 1770 nm Using Tm:Tb:ZBLAN Fibers, Dina Grace C. Banguilan[1], Kaito Okada[1], Takao Fuji[1]; *[1]Toyota Technological Inst., Japan.* We have developed a laser system that can amplify watt-level pulses at 1770 nm using thulium- and terbium-doped fluoride fibers, and can compress these pulses to 259 fs using a grating-prism pair.

JW2A.16
Amplification of Narrow Linewidth 2-Wavelength Light for THz Wavelength Conversion, Kei Takeya[1,2], Vincent Yahia[1,2], Hideki Ishizuki[2,1], Takunori Taira[2,1]; *[1]Inst. for Molecular Science, Japan; [2]RIKEN SPring-8 Center, Japan.* Using a degenerate optical parametric system with a

VBG, 1064 nm light was converted to 2126 nm and 2130 nm. This method addresses THz wave generation challenges, confirming THz waves and amplification using PPMgLN.

JW2A.17
Novel Ultrafast THz Radiation Source Based on Yb Femtosecond Oscillator, Qian Li[1], Tian Wenlong[1], Xuan Tian[1], Zuoqi Min[1], Geyang Wang[1], Yang Yu[2], Zhiyi Wei[3], Jiangfeng Zhu[1]; *[1]School of Optoelectronic Engineering, Xidian Univ., China; [2]Academy of Advanced Interdisciplinary Research, Xidian Univ., China; [3]Beijing National Laboratory for Condensed Matter Physics and Inst. of Physics, Chinese Academy of Science, China.* A novel ultrafast THz radiation source was experimentally demonstrated. We used a Yb-doped all-solid-state femtosecond oscillator with 20 W average power to pump GaP crystal. An average power of 192 μW terahertz radiation was generated.

JW2A.18
Spectrally-Divided Broadband Chirped Pulse Amplification Using a Compact Zigzag Compressor, Zhengru Guo[1,2], Edgar Kaksis[3], Vinzenz Stummer[3], Audrius Pugzlys[3], Heping Zeng[2], Andrius Baltuska[3]; *[1]School of Optical Electrical and Computer Engineering, Univ. of Shanghai for Science and Technology, China; [2]State Key Laboratory of Precision Spectroscopy, East China Normal Univ., China; [3]Photonics Inst., TU Wien, Austria.* We propose a scalable folding geometry for CPA dispersion management that allows a 10-fold increase of the stretched pulse duration and a 3-fold increase of damage-limited extractable pulse energy compared to a standard grating-pair compressor with the same aperture.

JW2A.19
A New Versatile Front-end for the PETAL Ultra-High-Intensity Laser Facility, Emmanuel Hugonnot[1], Florent Scol[1], Nathalie Santacreu[1], Nathalie Blanchot[1], Vincent Leroux[2], Thomas Morbieu[2], Nicolas Bruel[2], Béatrice Fréchet[2], Eric Durand[2], Olivier Chalus[2], Olivier Casagrande[2]; *[1]Commissariat a l'Energie Atomique, France; [2]THALES, France.* PETAL is a PW laser facility operating in the multi-hundred Joules and sub-picosecond range. A new front-end with temporal contrast control, pulse duration adjustment and two delayed beams is currently developed to improve PETAL performances.

JW2A.20
>100 mJ High Repetition Rate Front End for 10 J Yb:YAG Amplifier, Jan Bartonicek[1,2], Jan Eisenschreiber[1], Martin Fibrich[1], Jonathan T. Green[1], Petr Vlčák[2], Bedrich Rus[1]; *[1]Extreme Light Infrastructure ERIC, Czechia; [2]Department of Physics, Faculty of Mechanical Engineering, Czech Technical Univ. in Prague, Czechia.* We present a description of the front end for a >10 J Yb:YAG amplifier which is under development at ELI-Beamlines with an emphasis on the last stage – a double–sided, diode–pumped ring amplifier providing >100 mJ, temporally shaped nanosecond pulses with a repetition rate 20 Hz.

JW2A.21
Synthesis of Circularly-Polarized THz Vortex by Direct Optical Rectification of Infrared Vortex Beams, Yaqun Liu[1], Valdas Pasiskevicius[1]; *[1]Royal Inst. of Technology, Sweden.* A circularly-polarized THz vortex was generated using field synthesis in optical rectification of two interfering near-infrared delayed vortices. Two-dimensional electro-optic imaging and terahertz polarimetry techniques were employed for frequency-resolved THz field amplitude and phase characterization.

JW2A.22
Sub-2 ps, W-Level $\chi^{(2)}$–Lens Mode-Locked Nd:LuVO$_4$ Laser, Hristo L. Iliev[1,2], Veselin Aleksandrov[3], Valentin Petrov[4], Lyuben Petrov[1,2], Huaijin Zhang[5], Haohai Yu[5], Ivan Buchvarov[1,2]; *[1]Faculty of Physics, Sofia Univ. St. Kliment Ohridski, Bulgaria; [2]John Atanasoff Center for Bio and Nano Photonics (JAC BNP), Bulgaria; [3]Rutherford Appleton Laboratory, Central Laser Facility, UK; [4]Max-Born-Inst. for Nonlinear Optics and Ultrafast Spectroscopy, Germany; [5]State Key Laboratory of Crystal Materials and Inst. of Crystal Materials, Shandong Univ., China.* $\chi^{(2)}$-lens mode-locking of an in-band pumped Nd:LuVO$_4$ laser using a PPKTP crystal for phase-mismatched SHG is demonstrated, achieving pulses as short as 1.6 and 7.5 ps at average powers of 0.7 and 4.6 W, respectively.

JW2A.23
Circulator-Free Integrated Chalcogenide Brillouin Lasers, Di Xia[1], Zhixin Li[1], Huangjie Chen[1], Liyang Luo[1], Yufei Li[1], Zhaohui Li[1], Bin Zhang[1]; *[1]Sun Yat-Sen Univ., China.* We present a circulator-free Brillouin laser in an add-drop integrated GeSbS microresonator. Using two integrated couplers to separate pump and Stokes modes, we achieve a 20-dB higher forward-propagating Brillouin laser compared to the backward direction.

JW2A.24
Single Optical Frequency Comb Line Extracted by Fiber Brillouin Amplification, Xiong yatan[1], Jiaqi Zhou[1], Yan Feng[1]; *[1]Shanghai Inst. of Optics & Fine Mech., China.* The extraction and amplification of a single optical frequency comb line up to 1.2 W via fiber Brillouin amplification is demonstrated. Phase and intensity noise performance of the scheme is detailly investigated.

JW2A.25
Withdrawn

JW2A.26
On Chaos and Instability Dynamics of a Passively Q-Switched Mid-Infrared Tm:YLF Laser, Hippolyte Dupont[1], Matthieu Glasset[1], Pavel Loiko[2], Patrick Georges[1], Frederic P. Druon[1]; *[1]Laboratoire Charles Fabry, France; [2]CIMAP, France.* A 2.3-µm Tm:YLF laser passively Q-switched by Cr^{2+}:ZnSe is prone to chaotic behavior. We analyze this atypical chaotic dynamic using a consecutive cascade laser at 2.3 µm and 1.9 µm as a sensitive tool.

JW2A.27
Withdrawn

JW2A.28
Computational Spectroscopic Measurements Using a Reconfigurable Electro-Optic Frequency Comb Generator, Jordi Navarro-Alventosa[1], Vicente Duran[1]; *[1]Universitat Jaume I, Spain.* We perform frequency comb spectroscopy by acquiring a series of power measurements when an electro-optic comb generator is sequentially reconfigured. The spectral response of a sample is retrieved computationally by solving an inverse problem.

JW2A.29
Stable, High-Power, and Tunable Visible Laser System Seeded by Gain Managed Nonlinear Fiber Amplifier, Abbas Shiri[1], Brittany Lu[1], Keith Wernsing[2], Sergio Carbajo[1,3]; *[1]Univ. of California Los Angeles, USA; [2]Mesa Photonics, USA; [3]SLAC National Accelerator Laboratory and Stanford Univ., USA.* We present the design and simulation of a nonlinear pulsed laser system, tunable across 1010-1180 nm with an average power of above 4 Watts. The seed source is a gain managed nonlinear fiber amplifier.

JW2A.30
1931 nm Thulium MOPA Fiber Laser, Jan Lautenschläger[2,1], Clément Romano[2], Dominik Lorentz[2,1], Julian Schneider[2,1], Dieter Panitzek[2,1], Marius Rupp[2,1], Marc Eichhorn[2,1], Christelle Kieleck[2]; *[1]Karlsruhe Inst. of Technology, Germany; [2]Fraunhofer IOSB, Germany.* A compact, high-power 1931 nm diode-pumped, all-fiber MOPA laser with up to 100W of output power and narrow linewidth is demonstrated. The laser achieves a slope efficiency as high as 59%.

JW2A.31
Development of Fiber Rod Type High Repetition Rate and Average Power Femtosecond Laser System Based on FCPA, Jokubas Pimpe[1], Jonas Banys[1], Simona Armalyte[1], Vygandas Jarutis[1], Julius Vengelis[1]; *[1]Laser Research Center, Vilnius Univ., Lithuania.* We demonstrate an ytterbium-doped rod type fiber amplifier laser system emitting high repetition rate (76 MHz) and average output power (80 W) pulses with nearly transform limited duration of 112 fs and excellent beam quality.

JW2A.32
Withdrawn

JW2A.33
Wavelength-Tunable, Dual 2 µm Light Source for High-Brightness THz-Wave Generation, Hideki Ishizuki[1,2], Takunori Taira[1,2]; *[1]RIKEN SPring-8 Center, Japan; [2]Inst. Mol. Science, Japan.* For high-brightness THz wave generation, combination of $KTiOPO_4$-OPO, PPMgLN-OPA and DFG wavelength conversion scheme pumped by sub-nanosecond source was proposed. Tunable dual 2 µm-waves generation was evaluated for first demonstration.

JW2A.34
Characterizing High-Peak-Power Vector Structured Pulses by a Tight-Focusing Pumped Nd:YAG/Cr^{4+}:YAG Laser, Pi-Hui Tuan[1], Shu-Cheng Liu[1], Bo-Xiang Peng[1]; *[1]National Chung Cheng Univ., Taiwan.* High-order vector structured pulses with inhomogeneous polarization states and intriguing polarization switching dynamics are created in an Nd:YAG/Cr^{4+}:YAG laser. With stable output pulse trains, the peak power of total vector fields can exceed 1.1 kW.

JW2A.35
Applying a Novel Start-to-End High Power Laser System Simulator to Machine Learning and Optimization, Jack Hirschman[1,2], Efan Abedi[3], Minyang Wang[3], Hao Zhang[3], Randy Lemons[2], Sergio Carbajo[2,3]; *[1]Stanford Univ., USA; [2]SLAC National Accelerator Laboratory, USA; [3]UCLA, USA.* We present a novel start-to-end simulation framework for complex cascaded laser systems involving CPA and NLO processes and showcase a machine learning surrogate for sum-frequency generation that achieves a 250x speedup over traditional numerical simulation.

JW2A.36
Phase- and Group-Locked Vector Solitons in a Femtosecond Mode-Locked Ho-Laser, Weidong Chen[1,2], Zhang-Lang Lin[1,2], Uwe Griebner[1], Robert T. Murray[3], Xavier Mateos[4], Pavel Loiko[5], Zhongben Pan[6], Ge Zhang[2], Valentin Petrov[1]; *[1]Max Born Inst., Germany; [2]Fujian Inst. of Research on the Structure of Matter, Chinese Academy of Sciences, China; [3]Imperial College London, UK; [4]Universitat Rovira i Virgili (URV), Spain; [5]Université de Caen, France; [6]Shandong Univ., China.* Group-velocity locked vector solitons are observed in a mode-locked femtosecond solid-state laser at ~2 µm. Under certain conditions, stable phase-locking of the two polarizations occurs in the soliton regime: a phase- and group-locked vector soliton.

JW2A.37
Highly-Stable 1064 nm Laser for High-Fidelity Quantum-Operations, Baptiste Bruneteau[1], Hwan Hong Lim[1], Takunori Taira[1,2]; *[1]Inst. for Molecular Science, Japan; [2]Riken SPring-8 Center, Japan.* Design of a high-brightness 1064 nm laser is presented. It deals with passively-Q-switched lasers' timing-jitter through injection seeding, with pulse-to-pulse energy instability by amplification in saturated regime and with thermal effects in amplifier using Distributed-Face-Cooling.

JW2A.38
Power Scaling of Optical Frequency Comb Sources at λ = 1.4 µm Using Fiber Raman Amplifier, Norihiko Nishizawa[1], Yui Ozawa[1], Shotaro Kitajima[1], Momo Mukai[1], Hideki Tomita[1], Koji Hashiguchi[2], Hiroshi Abe[2]; *[1]Nagoya Univ., Japan; [2]AIST, Japan.* Power scaling of spectral peaked and pulsed comb was demonstrated at λ = 1.4 µm using fiber Raman amplifier. Maximum gain up to 43.6 dB and maximum power up to 1.06 W were successfully obtained.

JW2A.39
Octave-Spanning Supercontinuum Generation With a Diode-Pumped 1-GHz Ti:Sapphire Laser, Alexander A. Lagatsky[1]; *[1]Fraunhofer UK Research Ltd., UK.* An octave-spanning supercontinuum spectrum is generated in a photonic-crystal fiber using 1-GHz repetition rate, 30-fs diode-pumped Ti:sapphire laser. 390-mW of supercontinuum power is produced in about 550-1100 nm range from 850 mW of pump radiation.

JW2A.40
All Optical Detection of Phase Differences in Divided Pulse Amplification, Haruyuki Miyake[1], Kazuki Yoshizawa[1], Henrik Tünnermann[2], Akira Shirakawa[1]; *[1]Univ. of Electro-Communications, Japan; [2]Deutsches Elektronen-Synchrotron, Germany.* Using second harmonic generation to detect phase differences between divided pulses in divided pulse amplification with 4 or more division is proposed. Modulation-free, all optical phase detection was experimentally demonstrated in 4 division.

JW2A.41
Withdrawn

JW2A.42
Withdrawn

JW2A.43
Modeling of Amplified Spontaneous Emission in High-Power Solid-State Laser Amplifiers: Toward Modern and Versatile Simulation Chain, Paul Quinoman[1], Hervé COÏC[1], Julien Moreau[1], Edouard Bordenave[1], Jérôme Néauport[1]; *[1]CEA, France.* The three-dimensional modeling of optical pumping of a high-power solid-state laser amplifier is presented. The energy deposition obtained from Zemax is used to compute the gain distribution and the bi-dimensional amplified spontaneous emission flux.

JW2A.44
Withdrawn

JW2A.45
Highly Efficient 900 W LD Stack Pump Module for Yb:YAG Thin-Disk Laser, Kohei Hashimoto[1], Pawel Sikocinski[1], Martin Smrz[1]; *[1]HiLASE, Czechia.* We report an extremely compact LD stack pumped thin-disk laser module. The non-suitable pump spot shape which is obtained ordinal fiber coupled LD pumping was compensated by optimizing optical elements geometry and configuration.

JW2A.46
Nonlinear Pulse Amplification in an Erbium-Doped Fiber Laser System, Guoqi Ren[1], A. Amani Eilanlou[1], Yusuke Ito[1], Naohiko Sugita[1], Atsushi Iwasaki[1]; *[1]The Univ. of Tokyo, Japan.* We report nonlinear pulse amplification in a 50.47 MHz erbium-doped fiber master oscillator power amplifier up to 3 W of output power using a narrowband laser oscillator yielding a compressed pulse duration of 1.2 ps.

JW2A.47
Withdrawn

JW2A.48
All-Solid-State UV Laser for Skin Diseases, Young-Seok Seo[1], Han-Young Ryu[1], Ji-Young Lee[1], Soung-Woong Choi[1], Joo Beom Eom[2]; *[1]WONTECH Co., Ltd., Korea (the Republic of); [2]College of Medicine, Dankook Univ., Korea (the Republic of).* We have achieved an all-solid-state oscillation of an ultraviolet laser that is convenient to move, easy to maintain, and operates efficiently. The developed laser effectively treats autoimmune skin diseases such as vitiligo, psoriasis, and atopic dermatitis.

JW2A.49
Densely-Bunched Noise-Like Pulse in Dispersion-Managed Low-Threshold Thulium Doped Fiber Laser, Li-Ting Kao[1], Hsuan-Sen Wang[2], Chao-Kuei Lee[2], Gong-Ru Lin[1]; *[1]National Taiwan Univ., Taiwan; [2]Department of Photonics, National Sun Yat-sen Univ., Taiwan.* By inserting normal dispersion fiber for group-velocity dispersion, its effect on the noise-like pulsation of a thulium-doped fiber laser with a threshold pump power as low as 200mW at 2-μm is characterized.

JW2A.50
Characteristics of High-Energy KGW Yellow Raman Lasers With Unstable External Resonators, Aleksandr Tarasov[1], Hong Chu[1]; *[1]Laseroptek, Ltd., Korea (the Republic of).* The conditions, allowing to reduce angular divergence of high-energy KGW Raman lasers using

unstable resonators, are determined. It was shown that angular divergence of laser, operated in high-energy burst-pulsed mode, does not exceed the divergence in single pulse mode.

JW2A.51

Exploration of Dynamical Multiple Optical Vortices Generated From Frequency-Doubled Laser Beams, Jung-Chen Tung[1], Chen-Kai Sung[1], Bo-Hong Chen[1]; [1]*National Taipei Univ. of Technology, Taiwan.* Criteria for dynamically rotating optical vortices were analyzed and applied to design concave-flat laser resonators, producing frequency-doubled structured beams, which were then astigmatically transformed to create rotating multiple vortices.

JW2A.52

Dynamic Evolution of Harmonic Mode-Locking in a SESAM-Based Mode-Locked Semiconductor Laser, Yu-Hsin Hsu[1], Yung-Fu Chen[1]; [1]*National Yang Ming Chiao Tung Univ., Taiwan.* We demonstrate the natural dynamic evolution of harmonic mode-locking by increasing the pump power with only three components of a VECSEL gain chip, a semiconductor saturable absorber, and a focusing lens.

11:00 -- 12:00
Room: Prince Ballroom E
JW3A • Joint Plenary Session III
Presider: Miranda van Iersel; New Mexico State Univ., USA

JW3A.1 • 11:00 (Plenary)

Communicating Distortion-Free With Structured Light, Andrew Forbes[1]; [1]*Univ. of Witwatersrand, South Africa.* Structured light holds tremendous promise for increased speed and security in optical communication, but unfortunately is easily distorted in perturbing media, e.g., atmospheric turbulence. Here I outline recent progress in structuring distortion-free light for communication across noisy channels.

13:30 -- 15:30
Room: Prince Ballroom E
AW4A • Nonlinear Crystals
Presider: Kentaro Miyata; RIKEN, Japan

AW4A.1 • 13:30 (Invited)

Nonlinear Crystals, Daniel Rytz[1]; [1]*Electro-Optics Technology GmbH, Switzerland.* Absract not available.

AW4A.2 • 14:00

High-Power mid-IR ns-Pulsed $CdSiP_2$ OPO Pumped at 2.06 µm Compared to $ZnGeP_2$ OPO, Marcin Piotrowski[1], Achille Bogas-Droy[1], Gerhard Spindler[1], Anne Hildenbrand-Dhollande[1]; [1]*Inst Franco-Allemand Recherches St Louis, France.* In a compact cavity, we use a CSP OPO pumped by a Ho:LLF laser (2.06 µm) to achieve more than 8 W of mid-IR power.We compare the performance of the CSP non-linear crystal to commonly used ZGP for mid-IR applications.

AW4A.3 • 14:15
Singly Resonant Infrared Tunable Optical Parametric Oscillator Based on a Cylindrical 5%MgO:PPLN Crystal Pumped by a 1064 nm Sub-Nanosecond Microchip Laser, Baptiste Bruneteau[3], Basile Faure[4], Jerome debray[1], Patricia Segonds[2], Takunori Taira[3], Benoit Boulanger[2,1]; *[1]Institut Néel, France; [2]Univ. Grenoble Alpes, France; [3]IMS, Japan; [4]TEEM PHOTONICS, France.* We designed a singly resonant optical parametric oscillator tunable from 1410 to 4330 nm using a 5%MgO:PPLN partial cylinder pumped by a sub-nanosecond microchip laser emitting at 1064 nm with a repetition rate of 1kHz.

AW4A.4 • 14:30
TR-ARPES end-Station Pumped by a mid-IR High Repetition Rate OPA at ALLS, Gaetan Jargot[1], Adrien Longa[1], Dario Armanno[1], Benson Frimpong[1], Fabio Boschini[1], François Légaré[1]; *[1]INRS, Canada.* We have developed a TR-ARPES end-station to explore quantum materials under intense optical excitation in the near- and mir-infrared range. These intense pulses, generated using our in-house-built optical parametric amplifier (OPA) ranging from 1.6 to 8 µm with a duration of around 100 fs, are fully characterized using the FROSt technique.

AW4A.5 • 14:45
MWIR Generation Through Frequency Doubling of a 100 ns Duration, Low Repetition Rate CO_2 Laser in Orientation Patterned GaAs, $CdGeAs_2$, $ZnGeP_2$ and $AgGaSe_2$ Crystals, Amelia Carpenter[1], Alan Martinez[1], Joel Murray[1], Kevin Zawilski[2], Peter Schunemann[3], Shekhar Guha[1]; *[1]US Air Force Research Laboratory, USA; [2]BAE, Inc., USA; [3]Onsemi, Inc., USA.* Frequency doubling of 100 ns duration CO_2 laser operating at 9.271 µm is demonstrated for the first time in an OPGaAs crystal. Performance relative to other state of the art nonlinear crystals is studied.

AW4A.6 • 15:00 (Invited)
Integrated Nonlinear Photonics, Tobias J. Kippenberg[1]; *[1]Ecole Polytechnique Federale de Lausanne, Switzerland.* Absrract not avaiable.

13:30 -- 15:30
Room: Ruby
LW4B • EUV, X-Ray Generation & Particle Acceleration I
Presider: Lahsen Assoufid; Argonne National Laboratory, USA

LW4B.1 • 13:30 (Invited)
A Laser-Plasma Based Injector for DESYs Future PETRA IV Synchrotron, Andreas R. Maier[1]; *[1]DESY, Germany.* I will discuss DESYs recent activities in laser-plasma acceleration and high power laser development with a special focus on a plasma-based injector for the future PETRA IV synchrotron.

LW4B.2 • 14:00 (Invited)
Advances of Laser-Driven Neutron Source and its Applications at Osaka University, Akifumi Yogo[1]; *[1]Inst. of Laser Engineering, Osaka Univ., Japan.* We report the activities of the Laser-driven Nentron Source and its applications ranging from non-destructive inspection to nuclear astrophysics. The experiments were performed at the LFEX PW laser facility of Osaka

University, where the neutron resonance spectroscopy measurement was realized with a single laser shot for the first time.

LW4B.3 • 14:30 (Invited)
Laser-Generated Protons for Material Science, Patrizio Antici[1]; *[1]EMT, INRS, Canada.* The advent of high-power ultra-short lasers has opened up the field of laser-driven particle sources, interesting for their improved characteristics. Here, I will present the use of laser-accelerated proton beams in different material science applications.

LW4B.4 • 15:00 (Invited)
Laser-Driven X-ray Sources for Non Destructive Testing in Industry: Opportunities and Challenges, Antoine Courjaud[1]; *[1]Amplitude Laser, France.* Ultrafast lasers can drive X-ray sources with high penetration power and high spatial resolution, particularly of interest for nondestructive testing for industry. We will review the opportunities and challenges for Bremsstrahlung and betatron sources.

13:30 -- 15:00
Room: Crystal
LsW4C • Coherent LiDAR Sensing
Presider: Nicolas Riviere; Office Natl d'Etudes Rech Aerospatiales, France

LsW4C.1 • 13:30 (Invited)
A New Concept for Global Wind Profile Measurements From Space, Aram Gragossian[1], Kristopher Bedka[1], Michael Kavaya[1], John Marketon[1], Shelley Stover[1], Sammy W. Henderson[3], Sidney Wood[2], George Emmitt[2]; *[1]NASA Langley Research Center, USA; [2]Simpson Weather Associates, USA; [3]Beyond Photonics, USA.* We propose a constellation of coherent Doppler wind lidars strategically placed in Earth orbit to provide global wind measurements. The accuracy of wind velocity measurements by coherent Doppler wind lidar combined with global coverage will be an invaluable addition to weather prediction models. Increased accuracy and coverage enable better route planning for commercial aircraft.

LsW4C.2 • 14:00
Demonstration of a Coherent Lidar Onboard the First Commercial Lunar Lander, Farzin Amzajerdian[1], Glenn D. Hines[1], Aram Gragossian[1], Elisa Leal Acevedo[1], Jonathan Hsu[1], Sean A. Laughter[1], Nathan Dostart[1], Jacob M. Heppler[1], Kaitlin A.K. Liles A. Liles[1], Kimberly J. Martin[1], Frederick G. Wilson[1], Daniel K. Litton[1]; *[1]NASA Langley Research Center, USA.* A coherent Doppler lidar has been developed for providing vehicle altitude and vector velocity during descent phase of landing on planetary bodies. Performance of this sensor onboard Odysseus lunar lander will be discussed.

LsW4C.3
Withdrawn

16:00 -- 17:00
Room: Prince Ballroom E
AW5A • Bonded and Composite Media
Presider: Christian Kraenkel; Leibniz-Institut für Kristallzüchtung, Germany

AW5A.1 • 16:00
Room Temperature Bonded Cr:LiSAF Crystal for High-Power Broadband Laser, Florent Cassouret[1], Yoichi Sato[2], Arvydas Kausas[2], Takunori Taira[2,1]; [1]*Inst. for Molecular Science, Japan;* [2]*Riken SPring-8 Center, Japan.* 1.5 at.% Cr^{3+}:$LiSrAlF_6$ crystal was successfully bonded to sapphire at room temperature, leading to a 3x improvement of the thermal diffusivity compared to bulk crystal. Design of bonded chip for high-power emission is also discussed.

AW5A.2 • 16:15
Optimization of the Gain Medium Distribution in a Diode-Side-Pumped Bonded Laser Amplifier, Sebastien Montant[1], Thomas Dube[1], Alain Braud[2], Dominique Lupinski[3], Patrice Camy[2]; [1]*CEA Cesta, France;* [2]*CIMAP, UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, France;* [3]*CRISTAL LASER, France.* This work focuses on the reduction of thermal effects in a bonded laser rod under lateral pumping. Both material combination and gain medium distribution of the samples are discussed using simulations and experiments.

AW5A.3 • 16:30
Improved Effective Thermal Conductivity of DFC-PowerChip Fabricated by il-SAB, Yoichi Sato[1,2], Arvydas Kausas[1,2], Takunori Taira[1,2]; [1]*RIKEN SPring-8 Center, Japan;* [2]*Inst. for Molecular Science, Japan.* Thermal resistance between bonded surfaces in composite media fabricated by inter-layer surface activated bonding (il-SAB) is negligible. It indicates 10-W/mK thermal conductivity of YAG can be enhanced over 27.9-W/mK using DFC-PowerChip by il-SAB.

AW5A.4 • 16:45
Augmentation of the Emission Bandwidth by Spectrum Tailoring With Nd-Doped Garnets and Bixbyites, Yoichi Sato[1,2], Takunori Taira[1,2]; [1]*RIKEN SPring-8 Center, Japan;* [2]*Inst. for Molecular Science, Japan.* Wide emission spectrum bandwidth of 6 nm was confirmed with the spectrum tailored gain medium composed of Nd-doped garnets using the spectrum tailoring. We also proposed the temperature tuning of spectrum tailoring using Nd:garnet composites.

16:00 -- 17:00
Room: Ruby
LW5B • EUV, X-Ray Generation & Particle Acceleration II
Presider: Lahsen Assoufid; Argonne National Laboratory, USA

LW5B.1 • 16:00 (Invited)
Pointing Stable low-Divergence 100 keV-Class Electron Beam Generation From Microcapillary Target Under Sub-Relativistic Laser Intensity, Michiaki Mori[1], Ernesto Barraza-Valdez[2], Hideyuki Kotaki[1], Yukio Hayashi[1], Masaki Kando[1], Kiminori Kondo[1], Tetsuya Kawachi[1], Donna Strickland[3], Toshiki Tajima[2]; [1]*National Inst. Quantum & Rad Sc & Tech, Japan;* [2]*Univ. of California, Irvine, USA;* [3]*Department of Physics and Astronomy, Univ. of Waterloo, Canada.* Pointing stable low-divergence 100 keV-class electron beam generation driven by near-critical density laser wakefield acceleration was performed. The capillary

microstructure provides a very stable and low divergence beam and will be a valuable tool for various applications such as radiotherapy.

LW5B.2 • 16:30 (Invited)
Demonstration of High-Gain Operation of a Laser Plasma Accelerator Driven Free Electron Laser, Jeroen Van Tilborg[1], S. Barber[1], F. Kohrell[1,2], K. Jensen[1], C. Doss[1], C. Berger[1], A. Gonsalves[1], K. Nakamura[1], G. Plateau[1], R. van Mourik[3], S. Milton[3], C. Schroeder[3], E. Esarey[1]; *[1]Lawrence Berkeley National Laboratory, USA; [2]Univ. of Hamburg, Germany; [3]TAU Systems, Inc., USA.* Laser plasma accelerators (LPAs) have emerged as a promising alternative to classical accelerators for a variety of applications, due to their ability to produce high brightness beams and significantly higher accelerating gradients. This allows for more compact designs of future light sources, like free electron lasers (FELs). FEL technology based on LPA sources is advancing rapidly, with several significant milestone demonstrations achieved in recent years. Despite this progress, critical work remains to transition from proof-of-concept experiments to the reliable operation of LPA driven FELs. Recent efforts at the BELLA center's Hundred Terawatt Undulator beamline, which features an electron beam transport section that leads to a 4-meter-long, strong focusing undulator, have successfully demonstrated the reliable operation of a high-gain FEL in the SASE regime. This work was supported by the U.S. Department of Energy (DOE) Office of Science under Contract No. DE-AC02-05CH11231, and through a CRADA with Tau Systems.

17:00 -- 18:00
Room: Prince Ballroom E
JW6A • ASSL Postdeadline Paper Presentations
Presider: Jonathan Evans; US Air Force Inst. of Technology, USA

JW6A.1 • 17:00
Ultra-Low NA Yb-Doped Bend Insensitive Fiber Design Demonstrated for Multi-kW Operations, Matthew A. Cooper[2], Angel Flores[1], Stephanos Yerolatsitis[2], Jose E. Antonio-Lopez[2], Axel Schulzgen[2], Rodrigo Amezcua Correa[2]; *[1]Air Force Research Lab, USA; [2]UCF/CREOL, USA.* Experimental demonstration of ultra-low NA Yb-doped LMA gain fiber maximizing differential mode loss of HOM content at 2 kW output power is presented. Four fold increase in TMI threshold is achieved as compared to identical step-index fiber.

JW6A.2 • 17:12
Yellow Solid-State Laser With 61% Slope Efficiency, Moritz Badtke[1], Sascha Kalusniak[1], Stefan Püschel[1], Hiroki Tanaka[1], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany.* We report on highly efficient yellow laser operation of a cryogenic Tb^{3+}:$LiYF_4$ laser, yielding record-high slope efficiencies of 61% at 581 nm and 100 K as well as 37% at 587 nm and room temperature.

JW6A.3 • 17:24
Upconversion Pumped Tm^{3+}:KY_3F_{10} Channeled Waveguide Laser at 2.3 µm and 1.9 µm, Faik D. Ince[1,2], Yagiz Morova[1,3], Mauro Tonelli[4], Alphan Sennaroglu[1,3]; *[1]Laser Research Laboratory, Departments of Physics and Electrical-Electronics Engineering, Koç Univ., Turkey; [2]Department of Industrial & Systems Engineering, Manufacturing and Automation Research Laboratory, Rutgers Univ. - New Brunswick, USA; [3]Surface Science and Technology Center (KUYTAM), Koç Univ., Turkey; [4]MEGAMATERIALS s.r.l and Dipartimento di Fisica*

dell'Università di Pisa, Università di Pisa, Italy. We demonstrate, for the first time, a femtosecond laser written $Tm^{3+}:KY_3F_{10}$ waveguide laser at 2.3 µm in continuous-wave regime and at 1.9 µm in continuous-wave and passively Q-switched regimes by upconversion pumping at 1064 nm.

JW6A.4 • 17:36
Tuneable Megawatt-Scale sub-15 fs Visible Pulses via Dispersive Wave Emission Pumped by a Gain Managed Fiber Amplifier, Mohammed Sabbah[1], Robbie Mears[2], Kerrianne Harrington[2], James M. Stone[2], Tim Birks[2], John C. Travers[1]; *[1]Heriot-Watt Univ., UK; [2]Department of Physics, CPPM, UK.* We demonstrate tuneable sub-15 fs pulses covering 550 nm to 700 nm with up to megawatt peak power by pumping an argon-filled antiresonant hollow-core fiber with 34 fs pulses directly from a compact ytterbium fiber oscillator gain managed nonlinear power amplifier.

JW6A.5 • 17:48
Watt-Level Ultrafast Praseodymium-Doped ZBLAN Fiber Amplifier, Junya Takano[1], Tatsuki Yamada[1], Takao Fuji[1]; *[1]Toyota Technological Inst., Japan.* Watt-level chirped pulse amplification based on praseodymium-doped ZBLAN fibers has been demonstrated. The output power was 1.14 W, which has never been achieved with any praseodymium-doped fiber amplifier.

Thursday, 24 October

08:00 -- 10:00
Room: Prince Ballroom E
ATh1A • High Power & High Energy Sources

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

ATh1A.1 • 08:00 (Invited)
Hollow Core Fibers for HP Applications, Jose E. Antonio-Lopez[1], Rodrigo Amezcua-Correa[1]; [1]*Univ. of Central Florida, CREOL, USA.* Recent advances in fiber optics technology enable the fabrication of Anti-resonant hollow-core fibers tailored for various applications. Examples of hollow-core fibers for high-power applications will be presented.

ATh1A.2 • 08:30
Thermally-Induced Depolarization Compensation for the 'Bivoj' DiPole 100J @ 10 Hz System, Dominika Jochcová[1,2]; [1]*HiLase, IOP AS CR, Czechia;* [2]*Czech Technical Univ. in Prague Faculty of Nuclear Sciences and Physical Engineering, Czechia.* Development in thermal-stress-induced birefringence compensation in complex laser systems by means of Mueller-matrix polarimetry introduces analytical alternative to four-parameter numerical approach. Validated on Bivoj/DiPOLE100 data, it offers deeper insight and faster suppression of power losses.

ATh1A.3 • 08:45
Phase Conjugation of High-Energy Nd:Glass Laser Pulses With Spatial and Temporal Fidelity, Raphaël Humblot[2,1], Stéphane Branly[2], Loïc Meignien[3], Patrick Audebert[3], Frédéric Druon[1]; [1]*Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, France;* [2]*Amplitude, France;* [3]*LULI-CNRS, CEA, Université Sorbonne, Ecole Polytechnique, Institut Polytechnique de Paris, France.* We report the successful operation of a phase conjugate mirror operating at unprecedented energy level of 122 J. The component was able for the first time to reflect arbitrary temporal profiles with good fidelity

ATh1A.4 • 09:00
Coherent Combining of Large-Beam High-Energy Nd:Glass Laser Amplifier in a Sagnac-Interferometer Configuration, Pierre Lebegue[1,2], Joanna De Sousa[2], Cyril Rapeneau[2], Doina Badarau[2], Jordan Andrieu[2], Patrick Audebert[2], Frédéric Druon[1], Dimitris Papadopoulos[2]; [1]*Institut d'Optique Lab Fabry, France;* [2]*Laboratoire pour l'Utilisation des Lasers Intenses, France.* We present, coherent combining of two 10-Joules nanosecond pulses in a Sagnac-interferometer configuration including large-diameter Nd:glass flash-pumped amplifiers. A good stability between the shots and an average efficiency of 92 % is demonstrated.

ATh1A.5 • 09:15
Overview and Progress on the XCAN Digital Laser, Corentin Lechevalier[1], Jordan Andrieu[1], Claude-Alban Ranély-Vergé-Dépré[1,2], Ihsan Fsaifes[1], Gerben Boer[3], Jean-Christophe F. Chanteloup[1]; [1]*Ecole Polytechnique, France;* [2]*Thales LAS France, France;* [3]*Arcoptix, Switzerland.* We present recent progress achieved on XCAN coherent beam combining laser, enabling versatile capabilities such as on-demand far-field energy distribution, polarization control, and access to several pulse durations, while operating in a digital mode.

ATh1A.6 • 09:30

Neural Network Coherent Beam Combination With Low Differential Phase Noise Ytterbium Fiber Amplifiers, William R. Kerridge-Johns[1], Fedor Chernikov[1], Weilong Yu[1], Changshun Hou[1], Ben Mills[1], Michalis Zervas[1], Johan Nilsson[1]; *[1]Optoelectronics Research Centre, Univ. of Southampton, UK.* Parallel two channel Yb-fiber amplifiers with low differential phase noise above 100 Hz, up to 200 W, were phase-locked for coherent beam combination using neural networks and principal component analysis, with lambda/120 stability at 900 cycles/s control.

ATh1A.7 • 09:45

25 Hz, 2 J Pulses Generated by DFC-PowerChip Amplifier, Vincent Yahia[1,2], Arvydas Kausas[2,1], Hideho Odaka[2,1], Takunori Taira[2,1]; *[1]Division of Research Innovation and Collaboration, Inst. for Molecular Science, Japan; [2]Innovative Synchrotron Radiation Facility Division, RIKEN SPring-8 Center, Japan.* Subnanosecond pulses of 2.3 J are generated at 25 Hz after two-stage amplification, based on room-temperature diode-pumped composite DFC-PowerChip Nd:YAG gain medium bonded to transparent Sapphire heat sinks.

08:00 -- 10:00
Room: Ruby
LTh1B • THz Generation and Applications
Presider: To be Announced

LTh1B.1 • 08:00 (Invited)

Phase-Randomizing Absorber for Terahertz Wave Using Metal-Coated Spirulina Microcoils, Chiko Otani[1,2], Tomokazu Iyoda[3], Naoki Kurahashi[4], Gouki Satoh[5], Yuji Kobori[5], Masahiro Koide[5], Toshichika Ohki[5]; *[1]RIKEN, Japan; [2]Physics, Tohoku Univ., Japan; [3]Doshisha Univ., Japan; [4]Kyoto Prefectural Technology Center, Japan; [5]PANAC Co. Ltd., Japan.* We have developed a terahertz absorber with phase-randomizing capability using metal-plated microcoils from Spirulina algae dispersed in polystyrene foam. Temporal reflection waveforms by terahertz time-domain spectroscopy exhibited multiple pulses, demonstrating the phase-randomizing effect.

LTh1B.2 • 08:20 (Invited)

Yb:YAG Fiber, Disk and DFC Hybrid Amplifier for DFG THz Generation, Mitsuhiro Yoshida[1,2], Arvydas Kausas[2], Hideki Ishizuki[3,2], Takunori Taira[3,2], Zhang R. Rui[1], Xiangyu Zhou[1]; *[1]Accelerator Division, High Energy Accelerator Research Organization, Japan; [2]Inst. for Molecular Science, Japan; [3]RSC, RIKEN, Japan.* Yb disk and DFC(Distributed Face Cooling) laser are developed for the two wavelength laser or chirped pulsed laser for the DFC and chirp and delay respectively.

LTh1B.3 • 08:40

Industrialized Fiber-Laser-Based THz Spectrometers for Precision Characterization and Inspection, Lauren Gingras[1], Martin Mangold[1], Alexander Schreiber[1], Prince Bawuah[1], Gabrielle M. Thomas[1], Enno Rönneberg[1], Ronald Holzwarth[1,2]; *[1]Menlo Systems GmbH, Germany; [2]Laser Spectroscopy Division, Max-Planck-Institut für Quantenoptik, Germany.* THz time-domain spectrometers are finding increasing applications in cutting-edge science and demanding industry environments. We present an industrialized THz spectrometer with enhanced high-power performance, and unprecedented flexibility for easy integration and turn-key operation.

LTh1B.4 • 09:00 (Invited)
Title to be Announced, Hiroaki Minamide[1]; [1]*RIKEN, Japan.* Abstract not available.

LTh1B.5 • 09:20 (Invited)
30 Years of Experience: Laser Systems for Efficient THz Generation, Ignas Abromavičius[1]; [1]*Light Conversion, Ltd., Lithuania.* Light Conversion's femtosecond lasers are advanced tools used for THz generation. Offering sub-50fs in MIR and sub-10fs in NIR, these lasers enable efficient THz radiation via optical rectification, photoconductive antennas, and plasma generation. Their high power and unmatched stability make them ideal for cutting-edge research in ultrafast phenomena.

08:00 -- 09:30
Room: Crystal
LsTh1C • Communications I
Presider: Mitchell Cox; Univ. of the Witwatersrand, South Africa

LsTh1C.1 • 08:00 (Invited)
Mode Multiplexer With an Embedded Photonic Integrated Circuit for Generation and Detection of Turbulence Defined Orthogonal Channels, Ultan Daly[1], Aleksandr Boldin[1], Martin P. Lavery[1]; [1]*Univ. of Glasgow, UK.* Mode-division-multiplexing can increase capacity and lower the energy per bit for free-space-communications when turbulence induced aberrations are mitigated. We present a reactive spatial multiplexer with an embedded photonic integrated circuit to determine channel defined spatial modes, enabling >3Tbps communications rates over a 1km FSO link.

LsTh1C.2 • 08:30
Quantum Squeezing in on-Chip Degenerate Optical Parametric Oscillator Microring, Andrei Danilin[1,2], Dmitry A. Chermoshentsev[1,3], Anatoly V. Masalov[1,4], Igor A. Bilenko[1,2]; [1]*Russian Quantum Center, Russian Federation;* [2]*Faculty of Physics, Lomonosov Moscow State Univ., Russian Federation;* [3]*Skolkovo Inst. of Science and Technology, Russian Federation;* [4]*Lebedev Physical Inst., Russian Academy of Sciences, Russian Federation.* We report the direct observation of 2 dB squeezed vacuum in Si_3N_4 optical microring degenerate parametric oscillator. After accounting for optical losses, the inferred on-chip squeezing is approximately ~5 dB.

LsTh1C.3 • 08:45
Laguerre-Gaussian Beam Propagation Through Anisotropic Turbulence: a Comparison of the Extended Huygens-Fresnel Principle and Perturbation Method, Elaheh Ghanati[2], Miranda van Iersel[1]; [1]*New Mexico State Univ., USA;* [2]*Electro-Optics and Photonics, Univ. of Dayton, USA.* A Laguerre-Gaussian beam is propagated through anisotropic atmospheric turbulence using the extended-Huygens-Fresnel principle and perturbation method. The normalized intensity profile and spot size are calculated using both methods and compared.

LsTh1C.4
Withdrawn

10:30 -- 12:30
Room: Prince Ballroom E
ATh2A • Ultrafast Lasers
Presider: Martin Bernier; Université Laval, Canada

ATh2A.1 • 10:30 (Invited)
High Average Power Laser-Driven THz Sources, Clara J. Saraceno[1]; *[1]Ruhr Universität Bochum, Germany.* We will present latest progress in the development of high average power, laser-driven few-cycle Terahertz pulses and present future disruptive application areas for these new sources.

ATh2A.2 • 11:00
100-µJ, 100-kHz, Broadband Ho:CALGO Regenerative Amplifier at 2.08 µm, Anna Suzuki[1], Boldizsar Kassai[1], Sergei Tomilov[1], Yicheng Wang[1], Ignas Stasevičius[2], Ignas Astrauskas[2], Julius Darginavičius[2], Clara J. Saraceno[1]; *[1]Ruhr Universitat Bochum, Germany; [2]Light Conversion, Lithuania.* We report on a broadband and high-energy pulse amplification at 2.08 µm, using the gain material Ho:CALGO. A pulse energy of 100 µJ was obtained at a repetition rate of 100 kHz.

ATh2A.3 • 11:15
Up to 7 GHz Pulse Repetition Rate Programmable Burst-Mode Picosecond Laser at the kW Average Power Level, Hanyu Ye[1], Lilia Pontagnier[1], Abdelkrim Bendahmane[1], Annalisa Guandalini[2], Matthias Kemnitzer[2], Martin Gorjan[2], Jürg Aus der Au[2], André Loescher[3], Florian Bienert[3], Marwan Abdou Ahmed[3], Giorgio Santarelli[1], Eric Cormier[1]; *[1]Université de Bordeaux, France; [2]Spectra-Physics, MKS Instruments, Inc., Austria; [3]Universität Stuttgart, Institut für Strahlwerkzeuge (IFSW), Germany.* Fully configurable picosecond pulses at 1 to 7.5 GHz with tens to thousands pulses per burst are demonstrated at the kW average power level and several mJ energy per burst.

ATh2A.4 • 11:30
Efficient and Scalable Scheme for Overcoming the Pulse Energy Bottleneck of sub-Cycle Laser Sources, Kaito Nishimiya[1], Eiji j. Takahashi[1]; *[1]RIKEN Center for Advanced Photonics, RIKEN, Japan.* We evaluate the amplification characteristics for the development of a multi-TW MIR sub-cycle laser by advanced dual-chirped optical parametric amplification method, which aims to generate high harmonics with a continuous region of >70%

ATh2A.5 • 11:45
1 GHz Single-Cycle Frequency Comb at 2 Watt, Yanyan zhang[2], Sida Xing[1]; *[1]SIOM, China; [2]Northwestern Polytechnical Univ., China.* We demonstrate a 1 GHz frequency comb emitting 7.1 fs pulses at 1.8 W average power. The pulse center contains 57% energy, yielding 110 kW peak power. The retrieved carrier-envelope-offset frequency enables future comb stabilization.

ATh2A.6 • 12:00
Net Gain Bandwidth Broadening in Yb:CALYO Amplifiers: Prospect for 30-100 fs Multi-mJ Near Infrared Pulses, Lyuben Petrov[1,2], Dimitar Velkov[1], Kaloyan C. Georgiev[1,2], Stefan Georgiev[1], Anton Trifonov[3,2], 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. Implementing a net gain bandwidth broadening in a Yb:$CaYAlO_4$ CPA-laser, we demonstrate 97 fs pulses with 2.7 mJ energy at 1038 nm, 1 kHz, and a robust, scalable nonlinear post-compression to 58 fs pulse durations.

ATh2A.7 • 12:15
2.05 µm CPA System Delivering 75-mJ Pulses With 2.2 ps Duration at 1-kHz Repetition Rate, Uwe Griebner[1], Martin Bock[1], Tamas Nagy[1], Mark Mero[1]; *[1]Max Born Inst., Germany.* We report on a ps Ho:YLF CPA delivering pulses with 34-GW peak power at 1 kHz. Starting with a novel seed source, the implemented regenerative amplifier provides 22-mJ input pulses for two booster stages.

10:30 -- 12:30
Room: Ruby
LTh2B • Laser Shock Peening
Presider: To be Announced

LTh2B.1 • 10:30 (Invited)
Outlook for the Contract Business Using Laser Peening in Japan, Yuji Kobayashi[1]; *[1]Sintokogio, Ltd., Japan.* In Japan, shot peening is performed on contract. Laser peening provides different characteristics from shot peening. However, replacing shot peening and laser peening is not a good idea. We would like to propose characteristics that only laser peening can provide.

LTh2B.2 • 11:00 (Invited)
Laser Peening in Tooling Industry, Jan Kaufman[1,2]; *[1]HiLASE, Czechia; [2]Inst. of Physics of the Czech Academy of Sciences, Czechia.* Molds, dies and cutting tools often go through extreme thermomechanical cycles which significantly reduce their life. By targeting critical areas of complex shapes, LSP creates new kind of tool with enhanced fatigue and wear properties.

LTh2B.3 • 11:30 (Invited)
Nuclear Reactor Maintenance Using Pulsed Lasers and Applications of Laser Ultrasonic to Manufacturing Processes, Setsu Yamamoto[1]; *[1]Toshiba Energy Systems & Solutions Corporation, Japan.* Ensuring stable energy supply requires maintaining power plant integrity and stable manufacturing capabilities. This study discusses high-power pulsed laser peening and laser ultrasonics systems and their actual applications.

LTh2B.4 • 12:00 (Invited)
Laser Cavitation Peening Using a Nd:YAG Laser and a Fiber Laser, Hitoshi Soyama[1]; *[1]Tohoku Univ., Japan.* Additive manufactured metals are attractive materials, however, fatigue strength is nearly half of bulk metals. We proposed cavitation peening by laser induced bubbles to enhance the fatigue strength using a fiber laser (50kHz) is proposed.

10:30 -- 11:30
Room: Crystal
LsTh2C • Communications II
Presider: Kyle Drexler; NIWC Pacific, USA

LsTh2C.1 • 10:30 (Invited)
Connecting the Unconnected in South Africa With "Fibre," Before the Fibre, Mitchell A. Cox[1]; *[1]Univ. of the Witwatersrand, South Africa.* There is no universal solution to internet access, and low-income communities face unexpected challenges. Community-owned WiFi mesh networks offer a solution but suffer from scalability issues, which we are mitigating using low-cost WiFi over free-space optics (WiFoO). In this talk, we describe aspects of the digital divide and present preliminary results using FSO systems to connect the unconnected.

LsTh2C.2 • 11:00
High-Accuracy Laser Beam Simulation in Turbulent Environments Using Adaptive Graph Models, Aniceto Belmonte[1]; *[1]Universitat Politecnica de Catalunya, Spain.* An adaptive triangular mesh graph-based approach accurately simulates light beam propagation through atmospheric turbulence, enhancing resolution and accuracy by adjusting to wavefront curvature and turbulence conditions, outperforming non-adaptive methods.

LsTh2C.3 • 11:15
Performance Evaluation of Beams Carrying Orbital Angular Momentum in Optical Turbulence in Rayleigh-Bénard Underwater Convection, Svetlana Avramov-Zamurovic[1], Nathaniel Ferlic[2], Owen O'Malley[1], Peter Judd[3]; *[1]US Naval Academy, USA; [2]Naval Air Warfare Center Aircraft Division, USA; [3]NRL, USA.* We compare the propagation of a Gaussian beam to the beams that carry OAM in moderate and strong underwater optical turbulence created by Rayleigh Bénard convection. Analysis focuses on scintillation index and frame-to-frame correlations.

14:00 -- 16:00
Room: Prince Ballroom E
ATh3A • Rare-earth-doped Laser Crystals
Presider: Weidong Chen; Fujian Inst of Res Structure of Matter, China

ATh3A.1 • 14:00
Novel Pr^{3+}-Doped Materials – in Quest of Mid-IR Laser Media With Efficiency Enhanced by a "3-for-1" Cross-Relaxation, Ei Ei E. Brown[1], Zackery Fleischman[1], Jason McKay[2], Larry Merkle[2], Uwe Hommerich[3], Althea Bluiett[5], Witold Palosz[4], Sudhir Trivedi[4], Mark A. Dubinskii[1]; *[1]DEVCOM Army Research Laboratory, USA; [2]General Technical Services, LLC, USA; [3]Physics, Hampton Univ., USA; [4]Brimrose Technology Corporation, USA; [5]Norfolk State Univ., USA.* Ultra-low maximum-phonon energy of the ternary-halide crystalline hosts and multi-millisecond-long $^3H_5$ level lifetimes of Pr^{3+} dopant make them promising gain media for mid-infrared lasers in the 4.6-5.1 mm spectral domain with "3-for-1" enhanced laser efficiency.

ATh3A.2 • 14:15 (Student Paper Finalist)
Thermo-Optical and Chirped Pulse Amplification Performance of Yb:CALYO and Yb:CALGO Crystals, Kaloyan C. Georgiev[1,3], Lyuben Petrov[1,3], Stephan Shishkov[1], Nina Danchova[1], Dimitar Velkov[1], Anton Trifonov[2,3], Xiaodong Xu[4], Ivan Buchvarov[1,3]; *[1]Sofia Univ. St.*

Kliment Ohridski, Bulgaria; [2]IBPhotonics Ltd, Bulgaria; [3]John Atanasoff Center for Bio and Nano Photonics (JAC BNP), Bulgaria; [4]Jiangsu Normal Univ., China. Thermo-optical and chirped pulse amplification performance of Yb:CALYO and Yb:CALGO crystals are theoretically and experimentally studied, demonstrating similar thermal characteristics, ideal for sub-100-130 fs multi-kHz laser amplifiers.

ATh3A.3 • 14:30
Polarized Spectroscopy of Er:CALGO for 2.8 µm Lasers, Florent Cassouret[1], Simone Normani[2], Pavel Loiko[2], Zhongben Pan[3], Luigi Giordano[4], Bruno Viana[4], Weidong Chen[5], Patrice Camy[2]; *[1]Inst. for Molecular Science, Japan; [2]CIMAP, Ensicaen, France; [3]School of Information Science and Engineering, and Key Laboratory of Laser and Infrared System of Ministry of Education, Shandong Univ., China; [4]Institut de Recherche de Chimie Paris, PSL Univ., France; [5]Fujian Inst. of Research on the Structure of Matter, Chinese Academy of Science, China.* We report on polarization-resolved spectroscopy and excited-state dynamics of Er^{3+} ions in CALGO highlighting its potential for mid-infrared lasers. The stimulated-emission cross-section is 2.63×10^{-20} cm^2 at 2730 nm for π-polarization (emission bandwidth: 28 nm).

ATh3A.4 • 14:45
Er:CaF_2 Crystal and Laser Ceramic: a Comparative Study, Simone Normani[1], Pavel Loiko[1], Shiyan Gan[2], Weiwei Li[2], Bingchu Mei[2], abdelmjid benayad[1], Venkatesan Jambunathan[1], Alain Braud[1], Weidong Chen[3], Patrice Camy[1]; *[1]CIMAP-ENSICAEN, France; [2]State Key Laboratory of Advanced Technology for Materials Synthesis and Processing, China; [3]Fujian Inst. of Research on the Structure of Matter, China.* Spectroscopy and mid-infrared laser performance are compared for Er:CaF_2 single-crystal and hot-pressed transparent ceramic. The 2.8-µm Er:CaF_2 crystal laser delivers 0.81 W with 32.6% slope efficiency and outperforms the ceramic due to enhanced ion clustering.

ATh3A.5 • 15:00
Spectroscopic Investigation of High Concentration Ho3+ in Fluoride Crystals, Vivian Hedberg[1], DeShano Bradley[3], Thomas R. Harris[2], Jonathan W. Evans[1]; *[1]US Air Force Inst. of Technology, USA; [2]Azimuth Corporation, USA; [3]Sensors Directorate, Air Force Research Laboratory, USA.* The spectroscopic properties of high concentration Ho3+ in birefringent fluoride crystal hosts have been investigated for the first time. The polarized optical crosssections and fluorescence lifetimes were obtained for the principal mid-IR Ho3+ laser transitions.

ATh3A.6 • 15:15
Efficient Long Wavelength Laser Operation and Spectroscopic Characterization of Yb:$LaLuO_3$, Sascha Kalusniak[1], Christo Guguschev[1], Ramazan Koc[1], Darell Schlom[1,2], Christian Kraenkel[1]; *[1]Leibniz-Institut für Kristallzüchtung, Germany; [2]Department of Materials Science and Engineering, Cornell Univ., USA.* We present growth, spectroscopy and laser operation of Yb:$LaLuO_3$. Czochralski-grown crystals were used to determine absorption, fluorescence and fluorescence lifetime. Laser operation with 75% slope efficiency was realized at wavelengths up to 1124 nm.

ATh3A.7 • 15:30
Eliminating Discrepancies in Er^{3+}:YLF Emission Cross-Sections at ~3 mm , Nikolay Ter-Gabrielyan[1], Mark A. Dubinskii[1], viktor fromzel[1]; *[1]US Army Research Laboratory,*

USA. Comprehensive study of spectral kinetics of a free-running, pulsed, ~3-mm Er:YLF laser versus Er^{3+} concentration, pump energy and temperature eliminates discrepancy in existing data on emission cross-sections of inter-Stark transitions between the $^4I_{11/2}$ and $^4I_{13/2}$ manifolds.

ATh3A.8 • 15:45
in-Band Pumped Ho:KLu(WO_4)$_2$ Laser, Sami Slimi[1,2], Xavier Mateos[2], Rosa Sole[2], Magdalena Aguilo[2], Francesc Diaz[2], Weidong Chen[1,3], Pavel Loiko[4], Cui Chen[1,5], Uwe Griebner[1], Valentin Petrov[1]; [1]*Max Born Inst., Germany;* [2]*Universitat Rovira i Virgili, Spain;* [3]*CAS, China;* [4]*Universite de Caen Normandy, France;* [5]*CAS, China.* Multi-Watt continuous-wave operation is reported for the first time for an in-band pumped Ho:KLu(W)$_4$)$_2$ laser emitting at 2078 nm in N_m polarization.

14:00 -- 16:00
Room: Ruby
LTh3B • Lasers for Manufacturing Applications in Mobility
Presider: To be Announced

LTh3B.1 • 14:00 (Invited)
The Challenging Aspects of Laser Welding in E-Mobility: Which Innovations Are Setting Trends?, Markus Kogel-Hollacher[1]; [1]*Precitec Optronik GmbH, Germany.* Abstract not available.

LTh3B.2 • 14:30 (Invited)
Efficient Texturation and Cutting of Batteries Electrodes With High Power Femtosecond Lasers, Antoine Courjaud[1]; [1]*Amplitude Laser, France.* Abstract not available.

LTh3B.3 • 15:00 (Invited)
Laser Processing in Electric Vehicle Manufacture, Sullivan Smith[1]; [1]*TWI Ltd., UK.* The theme of E-Mobility covers many forms of electrified transportation. Electric motors are powered by rechargeable battery systems (e.g. electric cars or bicycles) or power taken directly from a grid supply (e.g. trains or trams). In all cases the purpose of the electrified system is to provide some form of mobility for humans or a payload with zero exhaust pipe emissions and lower carbon footprint of service. The proliferation of E-Mobility solutions marks a significant step towards Net Zero targets.

LTh3B.4 • 15:30 (Invited)
Laser Based Manufacturing Solutions for E-Mobility and EV Batteries, Shigeto Mizutani[1]; [1]*Coherent Corporation, Japan.* Abstract not available.

14:00 -- 16:00
Room: Crystal
LsTh3C • Communications III
Presider: Miranda van Iersel; New Mexico State Univ., USA

LsTh3C.1 • 14:00 (Invited)
Deep Space Optical Communications Technology Demonstration, Abhijit Biswas[1], Meera Srinivasan[1], Jason P. Allmaras[1], Erik Alerstam[1], Angel E. Velasco[1], Emma E. Wollman[2]; [1]*Optical Communications Systems Group, Jet Propulsion Laboratory, California Inst. of Technology, USA;* [2]*Jet Propulsion Laboratory, USA.* Space-to-ground high data-rate (6.25 to 267 Mb/s) deep space optical communications over distances of 0.2 to 2.5 astronomical units

(AU) were demonstrated with a space payload hosted by the National Aeronautics and Space Administration (NASA) Psyche Mission spacecraft, (launched, October 13, 2023), and ground assets. The system implementation and results are summarized.

LsTh3C.2 • 14:30 (Invited)
Recent Trends of Space Laser Communications for Beyond 5G/6G Era, Morio Toyoshima[1]; [1]*National Inst. of Information and Communications Technology, Japan.* Research and development of Non-Terrestrial Networks (NTN) for Beyond 5G (B5G) and 6G are actively conducted. Space laser communications will be a solution to provide the high-capacity wireless communications network in B5G and 6G era.

LsTh3C.3 • 15:00 (Invited)
Ground to GEO Satellites Optical Feeder Links: Status and Challenges, Aurelie Montmerle Bonnefois[1], Cyril Petit[1], Nicolas Védrenne[1], François Gustave[1], Yann Lai-Tim[1], Karine Caillault[1], Andres Bedoya[1], Axel Vincent[1], Léa Krafft[1], Jérôme Henrion[1], Laurent Coret[2], Sarah Montigaud[2], Thomas Anfray[2], Sylvain Poulenard[2], Elyès Chalali[1], Xavier Gnata[2], Timothée Vène[1], Jean-Christophe F. Chanteloup[2]; [1]*Office Natl d'Etudes Rech Aerospatiales, France;* [2]*Airbus Defence and Space, France.* In 2024, pre-compensated optical links using adaptive optics are underway between ONERA's ground station, FEELINGS, and ADS's GEO payload, TELEO. Performance and challenges are discussed through an in-depth comparison between experimental results and models.

LsTh3C.4 • 15:30 (Invited)
Toward New Developments in Secure Free-Space Quantum Communication, Kentaro Kato[1]; [1]*Tamagawa Univ., Japan.* Quantum stream ciphers have the potential to provide secure free-space optical communication. Herein, the future directions of quantum stream ciphers are presented in terms of free-space communication.

09:00 -- 11:00
Room: Crystal
JD1 • Joint On-Demand Session

JD1.1 • 09:00
Investigation of Energy-Transfer Mechanisms Between Dy^{3+} to Tb^{3+} Ions in LuAG Transparent Ceramics, Angela Pirri[1], Enrico Cavalli[2], Jiang Li[3], Elisa Sani[4], Longfei Wu[3,5], Yanqiu Jing[3,5], Guido Toci[4]; [1]*CNR, IFAC, Ist. Fis. Applicata N Carrara, Italy;* [2]*Department of Chemical Sciences, Life and Environmental Sustainability,, Univ. of Parma, Italy;* [3]*Transparent Ceramics Research Center, Shanghai Inst. of Ceramics, Chinese Academy of Sciences, China;* [4]*Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche, CNR-INO, Italy;* [5]*School of Material Science and Engineering, Jiangsu Univ., China.* LuAG:Dy^{3+} co-doped Tb^{3+} transparent ceramics were fabricated and characterized to assess their potentialities as yellow emitting laser materials. The research focused on identifying and characterizing energy-transfer mechanisms from Dy^{3+} to Tb^{3+} ions, and *vice versa*.

JD1.2
Withdrawn

JD1.3
Withdrawn

JD1.4 • 09:45
Speckle-Learned Regression of Orbital Angular Momentum Superpositions, Chayanika Sharma[1], Venugopal Raskatla[2], Vijay Kumar[1]; *[1]NIT Warangal, India; [2]Univ. of Southampton, UK.* The coefficients of the orbital angular momentum modes in a superposition state are determined using the machine learning regression technique. Instead of directly utilizing modal intensity images, their corresponding speckle patterns are employed.

JD1.5 (Student Paper Finalist)
Marine Surface Layer Optical Turbulence Measurements Over a Vertical Path With Mobile Aerial Platforms, Winston B. Maa[2], Svetlana Avramov-Zamurovic[2], Miranda van Iersel[1], Peter Lee[2]; *[1]Electrical and Computer Engineering, New Mexico State Univ., USA; [2]Weapons Robotics and Control Engineering, USA Naval Academy, USA.* A mobile aerial platform is used in a laboratory environment at a distance of up to 4 meters to record the Gaussian laser light intensity fluctuations from a downlink and calculate scintillation index.

JD1.6 • 10:15
Detection of Buried Objects Using 2D-Array Laser Multi-Beam Differential Interferometric Vibration Sensor and Airborne and Mechanically-Coupled Vibration, Vyacheslav Aranchuk[1], Boyang Zhang[1], Ina Aranchuk[1], John Heffington[1]; *[1]Univ. of Mississippi, USA.* Experiments on detection of buried objects by using the recently developed 2D-array laser multi-beam differential interferometric sensor have been accomplished. Detection of buried objects has been demonstrated for excitation with air-borne sound and seismic sources.