2013 Conference on Lasers and Electro-Optics

(CLEO 2013)

San Jose, California, USA
9-14 June 2013

Pages 1-532

IEEE Catalog Number: CFP13CLE-POD
ISBN: 978-1-4799-0960-5

Table of Contents

AW3I: OCT: Technology Development and Applications

A&T 02: Environment/Energy

ATh1I: Environmental Sensing

ATh3N: LEDs for Energy Efficiency

ATh4N: Energy from the Sun

A&T 03: Government & National Science, Security & Standards Applications

AF1H: Lasers for Imaging & Data Transmission

AF2H: Lasers for Spectroscopy and Detection

A&T 04: Industrial

ATh3K: Ultrafast Laser Design and Applications

ATh4K: Advanced Sensing & Metrology

ATu2N: Micro and Nanofabrication

CTu3O: Micro and Nano-scale Imaging Microscopy

FS 01: Quantum Optics of Atoms, Molecules and Solids

QM2B: Novel Quantum Systems

FS 02: Quantum Science, Engineering and Technology

QF1B: Quantum Sensing & Imaging

QF2B: Quantum Metrology & Tomography

QM1C: Nonclassical & Nonlocal Quantum States

QM2C: Single Photon Sources

QM3C: Solid State Quantum Information

QM4L: Quantum Detectors

QTu1C: Quantum Logic & Interference

QTu2C: Quantum Key Distribution

FS 03: Metamaterials and Complex Media

QM1A: Active and Nonlinear Metamaterials

QM4A: Optics of Metasurfaces

QTh1A: Novel Phenomena in Complex Media

QTh4A: Engineering Light-Matter Interactions

QTu1A: Complex Plasmonic Structures

QTu2A: Hyperbolic Metamaterials I

QTu3A: Hyperbolic Metamaterials II

QW3A: Optics of Random Media

FS 04: Optical Excitations and Ultrafast Phenomena in Condensed Matter

QM1D: Coherent Effects in Excitons and Polaritons

QM2D: Dynamics of Excitons and Plasmons

QM3D: Ultrafast Dynamics in 1D Systems

QM4B: Quantum Dots, Nanocrystals, & Impurities

QTh3D: Graphene Optics and Photonics

QTh4D: High Field Effects and X-rays Probes

QTu1D: Optical Properties of 2D & Layered Materials

QW3D: Ultrafast Dynamics in Strongly Correlated Materials

QF1D: Integrated Devices and EIT

QF2D: Nonlinear Frequency Conversion

QM1E: Novel Phenomena in Photonic Lattices

QM2E: Self-accelerating Beams

QM3E: Non-conventional Beams and Optical Vortices

QM4E: Nonlinear Imaging and Spatial and Temporal Effects

QTh1E: Quantum Photonics

QTh3E: Plasmonic Nanostructures

QTh4E: Integrated Nonlinear Photonics

QTu1E: Laser Cooling and Novel Pheonomena

QW1E: Laser Filamentation

QW3E: Supercontinuum Generation and Temporal Solitons

FS 06: Nano-Optics and Plasmonics

QF1A: Quantum Nanooptics & Detectors

QF2A: Nano-antennas, Coupling & Absorbers

QM1B: Near-field Imaging & Spectroscopy

QM4C: Hybrid Plasmonics & Novel Effects

QTh1B: Active Plasmonics & Graphene

QTh3B: Thermal & Optomechanical Metamaterials

QTh4B: Nanoemitters & Lasers and Spasers

QTu1B: Mid-IR Plasmonics & Vibrations

QTu2B: Ultrafast and Nonlinear Plasmonics

QW1N: Novel Nanooptical & Plasmonic Fabrication

QW3N: Waveguide & Plasmonics

FS 07: High-Field Physics

QF1C: XUV & X-ray Sources Based on High-harmonic Generation

QF2C: Attosecond Spectroscopy of Atoms and Molecules

QTh1D: Strong-field Interactions

QTh3A: Particle Acceleration by Lasers

QM3B: Quantum Optics with Quantum Dots

QTh1L: Optical Memories and Atomic Ensembles

QTh4C: Quantum Optics with Atoms and Molecules

QTu3C: Selected Topics in Quantum Optics

S&I 01: Light-matter Interactions and Materials Processing

CM1H: Laser Writing and Patterning

CM2M: Fundamentals of Laser-Material Interactions

CM3H: Laser Materials Processing with Shaped Beams

CM4H: Applications of Laser Processing

S&I 02: Advanced Science and Technology for Laser Systems and Facilities

CM1N: Concepts for Scaling & Extending Laser Performance

CTh4I: Thermal Challenges for High Average Power Lasers II

CTu1O: Challenges for High Average Power Lasers I

CTu2D: Laser Technologies for High-intensity Laser Facilities

CTu3D: Short-wave IR Lasers and Laser Beam Propagation

JM2N: Optical Resonators for Laser Systems and Metrology

S&I 03: Semiconductor Lasers

CF1F: High Power and Nitride Semiconductor Lasers

CF2F: Surface-emitting Semiconductor Lasers

CM1K: Mid-infrared QCL's

CM2K: Mid-infrared Semiconductor Lasers

CTh1G: Microdisks, Microrings & DFB's

CTh3G: Photonic Crystal Lasers

CTh4G: Defect & Quantum Dot Emitters

CW1G: Mode-locked Semiconductor Lasers

CW3G: Nano and Polariton Lasers

JTu1J: Terahertz Quantum Cascade Lasers

S&I 04: Nonlinear Optical Technologies

CM1L: NLO in Microresonators and Waveguides

CM2L: Ultrafast Parametric Sources

CM3L: Solitons and Nonlinear Propagation

CM4D: All Optical and Quantum Signal Processing

CTu2E: NLO in Fibers

CTu3E: Advanced NLO Concepts

CW1B: SHG and Parametric Devices

CW3B: Nonlinear Optical Materials

S&I 05: Terahertz Technologies and Applications

CM1J: THz Metamaterials & Plasmonics I

CM2J: THz Metamaterials & Plasmonics II

CM3J: THz Spectroscopy and Sensing

CM4J: Nonlinear THz Technology

CTh1K: THz Waveguides and Resonators

CW1K: Manipulation & Detection of THz Radiation

CW3K: Advanced THz Emission Mechanisms

S&I 06: Optical Materials, Fabrication and Characterization

CF1I: Fabrication and Characterization of Optical Gain Materials

CF2I: Microresonators, Waveguides and their Characterization

CTh1J: Fabrications and Applications I

CTh3J: Fabrications and Applications II

CTh4J: Photodetectors II

CW1O: Optical Materials and Devices I

CW3O: Optical Materials and Devices II

S&I 07: Micro- and Nano-Photonic Devices

CF2M: Non-reciprocity in Nanophotonics/ Quantum Photonic Devices

CM1F: Microresonators I

CM2F: Nanoantennas and Plasmonics

CM3F: Nanolasers & Photodetectors

CM4F: Photonic Crystals

CTh1F: Four-wave Mixing & Frequency Comb Generation

CTh3F: Nonlinear Optics in Nanophotonic Devices

CTh4F: Waveguides and Passive Components

CTu1F: Graphene & Other Novel Materials

CTu2F: Silicon Photonic Modulators

CTu3F: Silicon Photonics

CW1F: Opto-mechanical Systems I

CW3F: Opto-mechanical Systems II

QW1A: New Trends in High-harmonic Generation

S&I 08: Ultrafast Optics, Optoelectronics and Applications

CF1G: Frequency Combs and Arbitrary Waveform Generation

CF2G: Ultrafast Measurement & Spectroscopy

CTh1H: Ultrafast Laser Sources I

CTh3H: Ultrafast Laser Sources II

CTh4M: Attoseconds and CEP Control

CTh4M.2 **Acoustic frequency combs for unconditionally stable long-term carrier-envelope phase stabilization 1762**
B. Borchers, M. Mero, G. Steinmeyer; Germany

CTh4M.3 **Acousto-optic Fastscan Delay for Ultrafast Photonics with sub-20-Attosecond Precision and Scan Rates exceeding 30 kHz 1764**
O. Schubert, M. Eisele, V. Crozatier, N. Forget, D. Kaplan, R. Huber; Germany

CTh4M.4 **Reduction of Timing Jitter to the Sub-20-Attosecond Regime in Free-Running Femtosecond Mode-Locked Fiber Lasers 1766**
H. Kim, P. Qin, J. Shin, Y. Song, C. Kim, K. Jung, C. Wang, J. Kim; Korea, Republic of

CTh4M.5 **Towards Optical Attosecond Pulses: Broadband Phase Coherence between an Ultrafast Laser and an OPO via Lock-to-zero CEO Stabilization 1768**
R. McCracken, J. Sun, C. Leburn, D. Reid; United Kingdom

CTu3J: Novel Pulse Generation and Synthesis

CTu3J.1 **Sub-100-fs mode-locking of the Cr:YAG laser using monolayer graphene saturable absorber 1770**
S. Di Dio Cafiso, E. Ugolotti, A. Schmidt, V. Petrov, U. Griebner, A. Agnesi, W. Cho, B. Jung, F. Rotermund, S. Bae, B. Hong, G. Reali, F. Pirzio; Germany

CTu3J.2 **Tunable megawatt soliton pulse generation covering the optimum wavelength window for tissue penetration 1772**
K. Wang, N. Horton, C. Wang, D. Ouzounov , C. Xu; United States

CTu3J.3 **Synthesis of arbitrarily polarized optical waveforms using vectorial temporal Talbot effect 1774**
C. Chen, C. Hsieh, S. Yang, C. Huang; Taiwan

CTu3J.4 **Linear time-lens techniques based on intensity modulation 1776**
B. Li, M. Li, S. Lou, J. Azana; Canada

CTu3J.5 **A Scheme Allowing Synthesis and Characterization of Ultrafast Waveforms Using Coherent Raman Sidebands 1778**
K. Wang, M. Zhi, X. Hua, A. Sokolov; United States

CTu3J.6 **Construction of a beat-wave pulse train for quasi-phase-matched high-harmonic generation 1780**
C. Yang, S. Kao, J. Wang, H. Chu; Taiwan

CTu3J.7 **Breaking the energy-bandwidth limit of electro-optic modulators: theory and a device proposal 1782**
J. Hu, H. Lin, O. Ogbuu, J. Liu, L. Zhang, J. Michel; United States

CTu3J.8 **Sub-50fs pulse generation directly from a 750MHz repetition rate dispersion managed Yb:fiber ring laser 1784**
C. Li, G. Wang, T. Jiang, A. Wang, Z. Zhang; China

CW1H: Ultrashort Pulse Measurement

CW3H: Ultrafast Nonlinear Optics

CTh1C: Microresonators III

CTh3L: Photodetectors I

CTh4L: Novel Components and Applications

CTu1L: Photonic Integration and Interconnects

CTu2G: Microwave Photonics I

CTu3G: Microwave Photonics II

S&I 10: Biophotonics and Optofluidics

CM1M: Optofluidic Particle Manipulation

CM2H: Microcavity Optofluidic Sensors

CTh3I: Biosensors

CTu2M: Imaging & Microscopy I

CTu3N: Imaging & Microscopy II

S&I 11: Fiber, Fiber Amplifiers, Lasers and Devices

CF1E: Applications of Fiber Nonlinearities

CM1I: Mode-locked Fiber Lasers

CM1I.1 **Passively Mode-Locked Fiber Laser Incorporating Adaptive Filtering and Dispersion Management 1984**
X. Yang, H. Kamal, D. J. Richardson, P. Petropoulos; United Kingdom

CM1I.2 **Supermode noise suppression in an actively mode-locked fiber laser with pulse intensity feed-forward 1986**
R. Wang, K. Xu, Y. Dai, F. Yin, J. Li, Y. Ji, J. Lin; China

CM1I.3 **Multi-Bound Pulse State in a 250 GHz Mode-Locked Fiber Laser Based on a Silicon Micro-Ring Resonator 1988**
S. Jyu, L. Yang, C. Yeh, C. Chow, H. Tsang, Y. Lai; Taiwan

CM1I.4 **285 mW High Power, Dissipative-Soliton Mode-Locked, Er-doped Fiber Laser using Carbon Nanotube 1990**
Y. Nozaki, N. Nishizawa, H. Kataura, E. Omoda, Y. Sakakibara; Japan

CM1I.5 **A Low-Loss Carbon-Nanotube-Based Linear Cavity Fiber Laser for High Energy Pulse Generation 1992**
H. Liu, Y. Yang, K. Chow; Singapore

CM1I.6 **Dissipative Soliton Resonance in an All-Normal-Dispersion Graphene Oxide Mode-Locked Yb-Doped Fiber Laser 1994**
Z. Cheng, W. Sida, S. Hongxing, J. Xu, Q. Yang, P. Wang; China

CM1I.7 **Directly Imprinted Graphite Nano-Particle with Improved Quality for Sub-400 fs Passively Mode-Locked Fiber Laser 1996**
Y. Lin, G. Lin; Taiwan

CM1I.8 **High-energy noise-like pulses generated by a dispersion-mapped Yb-doped fiber laser 1998**
A. Zaytsev, C. Lin, Y. You, C. Chung, C. Wang, C. Pan; Taiwan

CM2I: Ultrafast Fiber Sources

CM2I.1 **Extended Self-Similar Pulse Evolution in a Laser with Dispersion-Decreasing Fiber 2000**
H. Liu, F. Yu, A. Chong, J. C. Knight, F. W. Wise; United States

CM2I.2 **Ytterbium Fiber Oscillator with Higher-Order-Mode Fiber Generating 7-nJ, 60-fs Pulses at 1035 nm 2002**
A. Fernández, L. Zhu, V. Kalashnikov, A. Verhoef, D. Lorenc, A. Baltuska; Austria

CM2I.3 **Mode-locked Nd-doped fiber laser at 930 nm 2004**
A. Hideur, K. Qian, H. Wang, M. Laroche; France

CM2I.4 **3 GHz, femtosecond Raman soliton source 2006**
G. Chang, H. Chen, J. Lim, S. Xu, Z. Yang, F. X. Kärtner; United States

CM2I.5 **110 MHz Soliton Mode-Locked High Power Er-doped Fiber Laser using Carbon Nanotube Polyimide Film 2008**

H. Kawagoe, S. Ishida, M. Aramaki, Y. Sakakibara, E. Omoda, H. Kataura, N. Nishizawa; Japan

CM2I.6 **Enhanced Bandwidth Generation in an Er Amplifier Similariton Fiber Laser 2010**
H. Liu, F. W. Wise; United States

CM2I.7 **Stable frequency comb derived from a narrowband Yb-fiber laser: pre-chirp management for self-referenced fCEO stabilization 2012**
J. Lim, H. Chen, G. Change, F. X. Kärtner; United States

CM2I.8 **All-fiber fundamentally mode locked 12 GHz laser comb for stable microwave generation 2014**
R. Thapa, E. Wilson, D. Nguyen, J. Zong, A. Chavez-Pirson; United States

CM3I: Special Fiber Design & Fabrication

CM3I.1 **Angle splice of large-core kagome hollow-core photonic crystal fiber for gas-filled microcells 2016**
C. Wang, T. Bradley, Y. Wang, K. L. Corwin, F. Gérôme, F. Benabid; United States

CM3I.2 **Long rubidium vapor lifetime in aluminosilicate sol-gel coated hypocycloidal core shape kagome HC-PCF 2018**
T. Bradley, J. J. McFerran, J. Jouin, P. Thomas, F. Benabid; United Kingdom

CM3I.3 **Design of single-moded, large-mode-area fibers with symmetric bend compensation 2020**
J. M. Fini, J. W. Nicholson; United States

CM3I.4 **Low-Loss, Single-Mode Propagation in Large-Mode-Area Leakage Channel Fiber from 1 to 2 μm 2022**
C. Jollivet, K. Wei, B. Samson, A. Schulzgen; United States

CM3I.5 **Low Mode Asymmetry Highly Birefringent Microstructured Fibers 2024**
A. N. Denisov, A. E. Levchenko, S. L. Semjonov, E. M. Dianov; Russian Federation

CM3I.6 **Strong and Robust Bragg Gratings in Photo-Thermo-Refractive Glass Fiber 2026**
P. Hofmann, C. Jollivet, R. Amezcua-Correa, E. Antonio-Lopez, D. Ott, M. SeGall, I. Divliansky, L. Glebova, L. Glebov, A. Schulzgen; United States

CM3I.7 **All-fiber Mode-locked Dissipative Thulium-doped Fiber Laser by Optically Deposited SWCNTs 2028**
Q. Wang, T. Chen, M. Li, B. Zhang, Y. Lu, K. Chen; United States

CM3I.8 **Atomic polarization relaxation time measurement of Rb filled hypocycloidal core shape Kagome HC-PCF 2030**
T. Bradley, J. J. McFerran, J. Jouin, F. Benabid, P. Thomas, E. Ilinova; United Kingdom

CM4I: Short Wavelength Fiber Lasers and Effects

CM4I.1 **20 W cladding-pumped Nd3+-doped fiber laser at 910nm 2032**
M. Laroche, B. Cadier, H. Gilles, S. Girard, L. Lablonde, T. Robin; France

CTh3M: Fiber Parametric Amplifiers

CTh4H: Fiber Devices & Sensors

CTu1K: High Power Fiber Lasers

CTu2K: What's (really) New in Fibers?

CTu3K: Structured Fibers and Structured Light

CW1M: Infrared Fiber Lasers

CW3M: Single Frequency Fiber Lasers

CM1G: Advanced Modulation Formats & Digital Signal Processing

CM2G: Approaching Fundamental Limits in Optical Communication

CM3G: RF over Fiber

CM4G: OTDM Technologies

CTu1G: Parametric Optical Signal Processing

CTu2J: Technologies for Access & Datacom Networking

CTu3L: Nanophotonics in Optical Communications

S&I 13: Active Optical Sensing

CM4O: Micro-sensors

CTu1H: Remote Sensing and Imaging

CTu2H: Measurements in Extreme Environments

CTu3H: Novel Trace Gas Sensing

CW1L: Quantum Cascade Lasers

CW3L: Atmospheric Sensing

S&I 14: Optical Metrology

CM3N: Attosecond & XUV Metrology

CM4N: Long Distance Ranging and Frequency Transfer

CTu1I: Optical Frequency Combs

CTu2I: Frequency Combs: Applications

CTu3I: Precision Spectroscopy

S&I 15: LEDS, Photovoltaics and Energy-Efficient ('Green') Photonics

CF1M: Novel Light Emitters

CF2E: Photon Manipulation for Improved Efficiency

CTh1M: Next Generation Photovoltaics

Symposium 01: Advances in Extreme UV Science and Applications

JTu3B: Advances in Extreme UV Science and Applications I

JTu3B.1 **Coherent EUV High Harmonic Sources for Applications in Imaging, Materials Dynamics and Nanometrology 2416**
M. M. Murnane, H. Kapteyn, T. Popmintchev, D. adams, M. Seaberg, D. Nardi, K. Hoogeboom-Pot; United States

JTu3B.2 **High Average Power, 100 Hz Repetition Rate, Table-top EUV/Soft X-ray Lasers 2417**
B. A. Reagan, K. Wernsing, C. Baumgarten, L. Durivage, M. A. Berrill, F. Furch, A. Curtis, C. Salsbury, B. Luther, D. Patel, C. S. Menoni, J. Rocca; United States

JTu3B.3 **Biological Microscopes N/A**
A. Merkle;

JTu3B.4 **Probing of Atomic and Molecular Dynamics with Attosecond EUV Pulses 2419**
S. R. Leone; United States

JW1D: Advances in Extreme UV Science and Applications II

JW1D.1 **High power EUV LPP N/A**
D. J. Brown, R. J. Rafac, A. Schafgans, I. V. Fomenkov, D. Myers, A. I. Ershov, R. L. Sandstrom, G. O. Vaschenko, P. Das, W. J. Dunstan, D. Riggs, R. Bergstedt, T. Yezheng; United States

JW1D.2 **Laser-based plasma sources at 6.6 and 60 nm 2421**
M. Masnavi, J. Szilagyi, H. Parchamy, M. Richardson; United States

JW1D.3 **Metrology Sources for EUV Lithography N/A**
S. Home, P. Blackborow, M. M. Bensen, M. J. Partlow, D. Gustafson, M. Goldstein; United States

JW1D.4 **Development of a Coherent EUV Scatterometry Microscope 2423**
H. Kinoshita, T. Harada, Y. Nagata, T. Watanabe, K. Midorikawa; Japan

JW1D.5 **Soft X-Ray Image Plane Holographic Microscopy 2425**
J. Nejdl, I. Howlett, D. Carlton, W. Chao, E. H. Anderson, M. Marconi, J. Rocca, C. S. Menoni; United States

Symposium 02: Applied Optical Measurements in Fabrication Processes and Products

AF1J: Applied Optical Measurements in Fabrication Processes and Products I

AF1J.1 **An Optically Enabled Biosensor for Medical Diagnostics N/A**
C. J. Myatt; United States

AF1J.2 **Gas sensing using a resilient polymer photonic crystal nanocavity with ultra-high quality factor 2427**

AF2J: Applied Optical Measurements in Fabrication Processes and Products II

Symposium 03: Fundamentals of Absorption and Emission in Nanostructures and Composite

JM2A: Novel Optics in Plasmonic and Hyperbolic Systems

JM3A: Optics of Low-dimensional and Quantum Structures

Symposium 04: High Power Diode Laser Arrays: Technology and Applications

JW1J: High Power Diode Laser Arrays I

JW3J: High Power Diode Laser Arrays II

Symposium 05: Lab-on-a-Chip Applications

AM3M: Lab on Chip I

AM4M: Lab on Chip II

ATu1N: Lab on Chip III

Symposium 06: Mid-infrared Laser Sources

JM3K: Mid-infrared Laser Sources I

JM4K: Mid-infrared Laser Sources II

Symposium 07: Nanophotonics at the DOE/SC Nanoscale Science Research Centers

QTu1P: Biophotonics

QTu2O: Optical Processes in Semiconductor Nanostructures

QTu3P: Nanoplasmonics

QW1P: Active and Passive Optical Metamaterials

Symposium 08: Nonlinear Terahertz Science and Technology

JF1K: Nonlinear THz Science and Technology I

JF2K: Nonlinear THz Science and Technology II

Symposium 09: Novel Light Sources for Biomedical Applications

JM1O: Light Sources for Optical Coherence Tomography

JM2O: Multimodal Imaging: Light Sources and Applications

JM3O: New Advances in Solid State and Semiconductor Lasers

Symposium 10: Optogenetics and Optical Control of Biological Processes

JF2L: Opto-genetics and Optical Control of Biological Processes

Symposium 11: Quantum Simulators

QW1C: Quantum Simulators I

QW3C: Quantum Simulators II

Symposium 12: The Path to Sustainable Energy: Laser Driven Inertial Fusion Energy

ATh1O: Alternative Laser ICF Concepts

ATh3O: ICF Target Design and Fabrication

ATh4O: Future Perspective of ICF as Sustainable Energy Source

ATu1M: Physics of Laser Driven ICF

ATu2L: Technology of ICF: Drive Lasers and Laser Facilities

ATu3M: Technology of ICF: Drive Lasers, Optical and Nuclear Diagnostics

QTh3C: Photon Pair Sources and Entanglement

JTh2A: POSTER SESSION III: Light-Matter Interactions, ultrafast & Quantum Optics

JTu4A: POSTER SESSION I: Nanophotonics, Lightwave Communications and Biophotonics Poster Session

JTu4A.71 **Widely wavelength tunable thermo-optic bandpass filters based on long-range surface plasmon polaritons 3009**
J. LEE, M. A. Belkin; United States

JTu4A.72 **Zero-index Metamaterial for Directive Emission 3011**
Y. Yang, P. Moitra, Z. Anderson, J. G. Valentine; China

JTu4A.73 **Omnidirectional Light-Focusing Metalens 3013**
Y. Yang, J. G. Valentine; China

JTu4A.74 **Surface Plasmonic Optical Tweezers Based on Standard Single-Mode Fiber 3015**
L. Zhu, M. Vasilyev; United States

JTu4A.75 **Twisting Electromagnetic Fields with Singular Transformation Optics 3017**
Y. Zhang, Z. Zhao, X. Duan; China

JTu4A.76 **Electric control of reflection in metamaterial - twisted nematics liquid crystal cell structure 3019**
Y. Lee, J. Kim, J. Woo, E. Choi, E. Kim, J. Wu; Korea, Republic of

JTu4A.77 **Magneto-optical effects in clusters of superparamagnetic iron oxide and plasmonic gold nanoparticles 3021**
W. Brullot, S. Vandendriessche, T. Verbiest; Belgium

JTu4A.78 **Three-dimensional Indefinite Metamaterial Nanocavities with Anomalous Scaling Law 3023**
J. Rho, X. Yang, J. Yao, X. Yin, X. Zhang; United States

JTu4A.79 **Demonstration of Dielectric Optical Magnetic Mirrors Using Phase-locked Infrared Time-domain Spectroscopy 3025**
S. Liu, Y. Jun, T. S. Mahony, J. Ginn, D. A. Bender, J. R. Wendt, J. F. Ihlefeld, P. G. Clem, J. B. Wright, M. B. Sinclair, I. Brener; United States

JTu4A.80 **Truncated Lévy sum approach to intensity statistics in random lasers 3027**
R. Uppu, S. A. Mujumdar; India

JTu4A.81 **Influence of the Metamaterial Geometry on Ultra-Strong Light-Matter Interaction 3029**
A. Benz, S. Campione, I. Montano, S. Liu, J. Klem, M. B. Sinclair, F. Capolino, I. Brener; United States

JTu4A.82 **Defect and surface states in complex mesh lattices 3031**
M. Miri, A. Regensburger, M. Wimmer, U. Peschel, D. N. Christodoulides; United States

JTu4A.83 **Dispersion control of near-infrared surface plasmon polariton using hyperbolic metamaterials 3033**
I. Kim, S. Campione, S. W. Howell, G. S. Subramania, R. K. Grubbs, I. Brener, H. Chen, S. Fan, M. B. Sinclair, T. S. Luk; United States

JTu4A.84 **Observations of collimating bound surface states in slow-light photonic crystal superlattices 3035**

JTu4A.98 **Enhancing Optical Multi-Pulse Pulse Position Modulation Using Hybrid BPSK-Modified MPPM 3063**
H. selmy, H. Shalaby, Z. Kawazaki; Egypt

JTu4A.99 **Accurate transmission of time and frequency signals over optical fibers based on WDM and two way optical compensation techniques 3065**
F. Yang, D. Xu, Q. Liu, N. Cheng, Y. Gui , H. Cai; China

JTu4A.100 **Coherent OIDMA technique for next generation long reach PONs 3067**
E. elfiky, A. Morsy, Z. El-Sahn, H. Shalaby; egypt

JTu4A.101 **Rapidly adapting mechanoreceptor-inspired transducer with all-optofluidic realization of self-digitization and pulse code modulation 3069**
J. Paek, J. Lee, J. Kim; United States

JTu4A.102 **Low Level Detection of Organic Compounds Based on Autofluorescence in Optofluidic Liquid Jet Waveguide 3071**
G. Persichetti, G. Testa, R. Bernini; italy

JTu4A.103 **Slow Light Waveguide and Enhanced Area Microcavity Engineering for High Sensitivity Photonic Crystal Sensors 3073**
L. Zhu, S. Chakravarty, C. Hsieh, W. Lai, R. T. Chen; United States

JTu4A.104 **Detection of mode splitting with microcavity Raman laser 3075**
B. Li, X. Jiang, Q. Gong, Y. Xiao; China

JTu4A.105 **Polarization-modulated, Giant Goos-Hanchen Shift Sensing for Common Mode Drift Suppression 3077**
Y. Wan, Z. Zheng, S. Li, S. Dong, J. Liu; China

JTu4A.106 **Stability of Dual-Beam Fiber-Optical Traps for Low Refractive Index Contrast Particles 3079**
J. E. Sharping, T. M. Pinon, L. S. Hirst; United States

JTu4A.107 **Chemical Probes for Two-Photon Bioimaging Based on Surfactant Nanomicelles and Ormosil PEBBLEs 3081**
A. A. Khan, E. R. DeLeon, T. Ahmed, S. K. Fullerton-Shirey, K. R. Olson, S. S. Howard; United States

JTu4A.108 **Bessel Beam as Optical Injector of Particles for X-ray Morphology 3083**
N. Eckerskorn, R. A. Kirian, W. Krolikowski, J. Küpper, D. P. DePonte, H. N. Chapman, A. V. Rode; Australia

JTu4A.109 **Dispersion-tuned wavelength-swept fiber laser using a reflective SOA and a grating pair for OCT application 3085**
Y. Takubo, S. Yamashita; Japan

JTu4A.110 **Automated, Portable, Low-Cost Optical Microscope 3087**
K. Chau, S. Schaefer; Canada

Joint Session

JW2A: POSTER SESSION II: Energy, Sensing, and Nonlinear Optics

JW2A.53 **Domain engineered EDIT waveguides on *z*-cut $LiNbO_3$ 3195**
T. D. Crasto, H. Steigerwald, V. Sivan, A. Boes, A. Mitchell; Australia

JW2A.54 **Spontaneous and induced optical absorption in ultra-low loss amorphous Ta2O5 and SiO2 dielectric thin films 3197**
A. Markosyan, R. Route, M. Fejer, D. Patel, C. Menoni; United States

JW2A.55 **Emission from a Dipole-Forbidden Energy State in a GaAs Quantum-Ring Induced by Dressed Photon 3199**
T. Yatsui, W. Nomura, T. Mano, H. T. Miyazaki, K. Sakoda, T. Kawazoe, M. Ohtsu; Japan

JW2A.56 **Electro-optic Switching of VO2 for Infrared Spatial Light Modulation 3201**
A. Hache, B. Abdel Samad, M. Chaker, A. Herndaoui, S. Vigne; Canada

JW2A.57 **Directional fiber-optic level meter based on a micro-air- bubble drifted in a liquid core fiber Fabry-Pérot interferometer 3203**
C. Lee, Y. Zheng, H. Chang; Taiwan

JW2A.58 **A high-speed quantum random number generator prototype 3205**
F. Xu, B. Qi, H. Xu, J. Xuan, X. Ma, H. Lo, L. Qian; Canada

JW2A.59 **Fiber-optic DTS Application in Performance Assessment of Pre-drainage Boreholes 3207**
N. Noraei Danesh, S. M. Aminossadati, M. S. Kizil, E. Prochon; Australia

JW2A.60 **Edge Self-Interference of a Laser Beam and Application to Thin Film Metrology 3209**
A. Hache, P. Do, M. Touaibia; Canada

JW2A.61 **Precise Measurement of High-Speed Vibration Displacement Using Triangle-Wave Phase Modulation 3211**
Y. Tanaka, N. Miyata, T. Kurokawa; Japan

JW2A.62 **Cladding Mode Recoupling based Displacement Sensor by Concatenating Up Taper and Chirped Fiber Bragg Grating 3213**
T. Qi, S. Xiao, J. Shi, Z. Zhou, M. Bi; China

JW2A.63 **Development of the External Cavity Quantum Cascade Laser for spectroscopic applications 3215**
D. Marchenko , J. Mandon, S. M. Cristescu, F. Harren; Netherlands

JW2A.64 **High sensitivity tapered fiber Mach-Zehnder interferometer with optical attractive near-field force for active microsensing 3217**
N. Chen, T. Yang, Y. Chen, Z. Chen, S. Liaw; Taiwan

JW2A.65 **Mid-Infrared Chemical Sensors On-a-Chip Using Air-clad Pedestal Silicon Waveguides 3219**
P. T. Lin, V. Singh, J. Hu, K. Richardson, J. Musgraves, I. Luzinov, J. Hensley, A. Agarwal, L. Kimerling; United States