

Optica Advanced Photonics Congress

Session Guide

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

Monday, 14 July

09:00 -- 10:30

Room: Les Goudes 1

JM1A • Introductory Remarks and Joint Plenary Session I

Presider: Klaus Jaeger, Helmholtz-Zentrum Berlin, Germany

JM1A.1 • 09:00 (Plenary)

Light Emissions by Solids: A Unified Model, Jean-Jacques Greffet¹; ¹*Institut d'Optique, France*. Light emission by electronic excitations of a solid is often described using a list of microscopic processes such as incandescence, fluorescence, electroluminescence, scintillation, cathodoluminescence and light emission by inelastic tunneling. These processes are associated with electronic transitions, but no quantitative theories are available for most of them. One difficulty is that beyond the microscopic transition responsible for the emission in the bulk, it is necessary to model the extraction of the photon out of the emitter. On the other hand, electrical engineers can compute emissions by currents in complex environments such as cavities or antennas, which modify drastically the process. We will present in the talk a general framework that reconciles the two points of view and can be used to derive a quantitative model of light emission by solids. We will explore applications to thermal emission and electroluminescence, photoluminescence by metals, laser and photon Bose-Einstein condensation.

JM1A.2 • 09:00 (Plenary)

Satellite Optical and Quantum Communication- Present Capabilities and Future Opportunities, Katarzyna Balakier¹; ¹*European Space Agency, UK*. The talk will focus on the evolution of and recent advancements in Satellite Optical and Quantum Communication. These include ESA's flagship mission, HyDRON (High-thRoughput Optical Network), and the creation of a new initiative dedicated to the development of the Quantum Information Network (QIN). The emphasis is placed on the multi-orbital network that can be seamlessly integrated with the existing terrestrial fiber network as well as the development of optical and photonics technology under the ESA ScyLight program.

11:00 -- 12:30

Room: Les Goudes 1

IM2A • LiNbO3 Circuits

Presider: Euan McLeod; Univ. of Arizona, USA

IM2A.1 • 11:00 (Invited)

Counterpropagating Interactions in Thin Film Lithium Niobate Waveguides, Katia Gallo¹, Tiantong Li¹, Halvor Fergestad¹, Daiheng Fu¹; ¹*Kungliga Tekniska Hogskolan, Sweden*. The talk will highlight the novel capabilities to engineer counterpropagating interactions in linear and nonlinear regimes on lithium niobate integrated nanophotonic platforms.

IM2A.2 • 11:30

Ultrafast Tunable Photonic Integrated Extended-DBR Pockels Laser, Simone Bianconi¹, Anat Siddharth¹, Zheru Qiu¹, Rui Ning Wang¹, Mohammad Bereyhi¹, Johann Riemensberger², tobias kippenberg¹; ¹*École Polytechnique Fédérale de Lausanne, Switzerland*; ²*Norwegian*

Optica Advanced Photonics Congress

Session Guide

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

Technical Univ., Norway. We present the first hybrid integrated Pockels E-DBR laser based on wafer-scale lithium niobate platform with a tuning range greater than 10 GHz at speed greater than 3 PHz/s. This laser enabled cm-resolution coherent ranging and HCN gas spectroscopy.

IM2A.3 • 11:45

Lithium Niobate Tuning Forks as Infrared Photodetectors in Tunable Diode Laser

Absorption Spectroscopy, Aldo F. Cantatore¹, Giansergio Menduni¹, Andrea Zifarelli^{1,2}, Mariagrazia Olivieri¹, Vincenzo Spagnolo^{1,2}, Angelo Sampaolo^{1,2}; ¹*Polysense Lab, Dipartimento Interateneo di Fisica, Univ. and Polytechnic of Bari, Italy*; ²*Polysense Innovations srl, Italy*. A lithium niobate tuning fork deployed as an infrared photodetector in a TDLAS sensor for H₂O is reported, achieving a detection limit of 20 ppm. These results pave the way for all-integrated on-chip sensing platforms.

IM2A.4 • 12:00 (Invited)

Integrated Lithium Niobate Microwave and Millimeter Wave Photonics, Cheng Wang¹; ¹*City Univ. of Hong Kong, Hong Kong*. I will discuss our recent efforts on integrated lithium niobate photonics towards microwave and millimeter-wave applications. We demonstrate chip-scale systems including high-speed microwave photonic signal processors, integrated photonic millimeter-wave radars, and on-chip optical vector analyzers.

11:00 -- 12:30

Room: Callelonge Hall Tier

IM2B • Sensing

Presider: Judith Su; Univ of Arizona, Coll of Opt Sciences, USA

IM2B.1 • 11:00

Design of Multimode Hybrid Plasmonic Waveguide for Refractometry, Mohamad Syahadi^{1,2}, Olivier BERNAL^{1,2}, Frederic Surre³, Christophe CAUCHETEUR⁴, Han-cheng SEAT^{1,2}; ¹*Toulouse INP - ENSEEIHT, France*; ²*LAAS-CNRS, France*; ³*Univ. of Glasgow, UK*; ⁴*Univ. of Mons, Belgium*. We investigate a multimode Si₃N₄-based hybrid plasmonic waveguide measuring less than 2 μ m in length. Increasing Au slot thickness enhances sensitivity, achieving 780 nm/RIU in water medium, enabling high-sensitivity optical biosensing in integrated plasmonic sensors.

IM2B.2 • 11:15

InP-Based Laser Diode for Plasmonic Biosensing, Shayan Saeidi¹, Pavel Cheben², Jens H. Schmid², Pierre Berini¹; ¹*Univ. of Ottawa, Canada*; ²*National Research Council of Canada, Canada*. We theoretically present a plasmonic biosensor based on an InP diode laser. The electrically pumped laser compensates for plasmonic losses and enables fluid sensing by monitoring changes in the characteristics of the output light.

IM2B.3 • 11:30

Inverse-Designed Silicon Nitride Arbitrary Mode Splitters for Interferometric Optical Sensors, Narges Dalvand¹, Julian Leonel Pita Ruiz¹, Michael Menard¹; ¹*Electrical Engineering, École de technologie supérieure, Canada*. We demonstrate a compact, freeform silicon nitride device that splits the input fundamental mode between an output fundamental mode and a

Optica Advanced Photonics Congress

Session Guide

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

designated high-order output mode, specified at the design stage, for interferometric sensing applications.

IM2B.4 • 11:45

Optical Single-Pixel Sensing for Nonlinear Ising Machines, Luana Olivieri¹, Andrew Cooper¹, Luke Peters¹, Vittorio Cecconi¹, Alessia Pasquazi¹, Marco Peccianti¹, Juan S. Toterogongora¹; ¹*Emergent Photonics Research Centre, Loughborough Univ., UK*. Photonic Ising machines leverage large-scale parallelism for solving large combinatorial problems, yet multiple minima hamper Metropolis-based algorithm. A double single-pixel detection approach enables energetic transitions from nonlocal to local Hamiltonians, finding the ground state of complex landscapes.

IM2B.5 • 12:00 (Invited)

Continuous Real-Time Monitoring of Microphysiological Systems With Photonic Sensors, Benjamin Miller¹; ¹*Univ. of Rochester, USA*. Microphysiological systems (MPS) are microfluidic devices finding favor as alternatives to animal models for drug development. This talk will discuss integration of photonic sensors with MPS, enabling continuous monitoring of model organ behavior.

11:00 -- 13:00

Room: Sormiou

NeM2C • AI and ML in Optical Networks

Presider: Carlos Natalino; Chalmers Univ. of Technology, Sweden

NeM2C.1 • 11:00 (Invited)

LLM-Assisted Network Automation Based on Agentic AI Architectures, Pooyan Safari¹, Behnam Shariati¹, Hussein Zaid¹, Aydin Jafari¹, Johannes Karl Fischer¹; ¹*Fraunhofer HHI, Germany*. This talk presents an experimentally validated approach to network automation using open-source large language models (LLMs). Adopting an Agentic AI architecture, the proposed solution addresses real-world automation challenges while maintaining data confidentiality and adhering to NDA requirements.

NeM2C.2 • 11:30 (Invited)

Optical Switching Enhanced Distributed Machine Learning, Xuwei Xue¹; ¹*Beijing Univ. of Posts & Telecom, China*. Abstract not available.

NeM2C.3 • 12:00 (Invited)

Optical Testbed Dataspace: International Testbed Data Sharing Framework for Network AI, Yuki Yoshida¹, Yusule Hirota¹, Angela Mitrovska², Sugang Xu¹, Taiga Suzuki¹, Behnam Shariati², Pooyan Safari², Johannes Karl Fischer², Ronald Freund², Hideaki Furukawa¹, Kouichi Akahane¹, Yoshidnari Awaji¹; ¹*National Inst of Information & Comm Tech, Japan*; ²*Fraunhofer Heinrich Hertz Inst., Germany*. A data sharing framework with data sovereignty and regulatory compliance is presented for optical network testbeds to co-create comprehensive datasets for network AIs. Real-time telemetry sharing and external AI model validation are demonstrated.

Optica Advanced Photonics Congress

Session Guide

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

NeM2C.4 • 12:30 (Invited)

Transfer Learning for QoT Estimation in Time-Varying Optical Networks, Piotr Lechowicz¹, Carlos Natalino¹, Paolo Monti¹; ¹*Department of Electrical Engineering, Chalmers Univ. of Technology, Sweden*. QoT estimation is essential for efficient spectrum utilization and to minimize lightpath reconfigurations. However, the time-varying state of optical networks complicates this task. We explore transfer learning to adapt QoT models to evolving network conditions.

11:00 -- 13:00

Room: Les Goudes 2

NoM2D • Photonic Structure Design and Applications

Presider: Edward Kinzel; Univ. of Notre Dame, USA

NoM2D.1 • 11:00 (Tutorial)

When Metasurfaces Meet With 2D Materials, Cheng-Wei Qiu¹; ¹*National Univ. of Singapore, Singapore*. Abstract not available.

NoM2D.2 • 11:45

Emission Control in Quasi-Bound States in the Continuum and Monolayer WS₂/Si₃N₄ Hybrid Metasurfaces, Yongliang Zhang², Oisin McCormack^{2,1}, Na Jia^{2,3}, Hodjat Hajian^{2,3}, Jack Dobie^{2,1}, Xia Zhang⁴, A. Louise Bradley^{2,1}; ¹*IPIC, Tyndall National Inst., Ireland*; ²*School of Physics, Trinity College Dublin, Ireland*; ³*Advanced Materials and BioEngineering Research, Trinity College Dublin, Ireland*; ⁴*College of Sciences, Northeastern Univ., China*. Si₃N₄ slotted disk metasurfaces with a high Q-factor have been designed and fabricated. Experimental measurements show enhanced emission from monolayer WS₂ – metasurface system. A Rabi splitting energy of 33.55 meV is achieved in the simulation.

NoM2D.3 • 12:00 (Invited)

Energy-Efficient Photonic Neural Networks With Waveguides, Ugur Tegin¹; ¹*Koç Üniversitesi, Turkey*. We present energy-efficient photonic neural networks leveraging waveguides, inverse design, and fiber-based architectures. Highlighting advances in spatiotemporal dynamics, supercontinuum computing, and chaotic attractors, we envision scalable, low-power platforms for next-generation optical machine intelligence.

NoM2D.4 • 12:30

Innovative Inverse Design Deep Learning Methodology for Large-Scale

Metalenses, Arthur Clini de Souza^{1,2}, Stéphane Lanteri¹, Marco Abbarchi², Badre Kerzabi², Hugo Enrique Hernández-Figueroa³, Mahmoud Elsayy¹; ¹*INRIA, France*; ²*Solnil, France*; ³*UNICAMP, Brazil*. We propose an innovative inverse design methodology based on deep learning to optimize large-scale metalenses. Our method enhances efficiency and reduces the computational costs while enabling adjustable focal positions and numerical aperture configurations.

NoM2D.5 • 12:45

Efficient Second Harmonic Generation in Room-Temperature Ferroelectric Nematic Liquid Crystals, Ishika Das^{1,2}, Rajalaxmi Sahoo³, Charles Smith¹, Helen Gleeson³, Patrick

Optica Advanced Photonics Congress

Session Guide

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

Parkinson^{1,2}; ¹*Photon Science Inst., Univ. of Manchester, UK*; ²*Department of Physics and Astronomy, Univ. of Manchester, UK*; ³*School of Physics and Astronomy, Univ. of Leeds, UK*. We investigate second harmonic generation (SHG) in stable room-temperature ferroelectric nematic liquid crystals using transmission-mode detection. FNLCs exhibit strong nonlinear response, polarization and wavelength dependence, and field-induced switching, demonstrating potential for tunable nonlinear optics.

11:00 -- 12:30

Room: Morgiou

SM2E • Radiative Cooling I

Presider: Jorge Dolado; Centro de Física de Materiales, Spain

SM2E.1 • 11:00 (Invited)

Practical Applications for Heating and Cooling Systems in the Built Environment of Photonic Materials (and Garbage Bags), Forrest Meggers¹; ¹*Princeton Univ., USA*. Spectrally selective materials (including garbage bags!) can tune the radiative heat transfer between people and novel building heating and cooling systems to offer practical alternatives to wasteful air conditioning systems.

SM2E.2 • 11:30

Comparative Study of Metakaolin and Fly Ash-Based Geopolymer Coatings for Radiative Cooling, Zainab Malik¹, Urooj Gul¹, Zhong Tao¹, Md Abdul Alim¹; ¹*School of Engineering, Design and Built Environment, Western Sydney Univ., Australia*. This study investigates metakaolin and fly ash based geopolymer coatings on substrates. Thermal tests showed heat emission reductions of 2.4°C and 2.5°C, respectively. Fly ash offers sustainable thermal management and cost-effective alternative for construction applications.

SM2E.3 • 11:45

Micropatterned Directional Emitters for Passive Thermoregulation of Vertical Facades, Mathis Degeorges¹, Jyotirmoy Mandal^{1,2}; ¹*Civil and Environmental Engineering, Princeton Univ., USA*; ²*Princeton Materials Inst., Princeton Univ., USA*. A low-cost and highly scalable micropatterned directional emitter features angle selective and tailorable emittance across thermal wavelengths. By reducing summertime terrestrial radiative heat gain and wintertime loss, this design enables passive seasonal thermoregulation of buildings.

SM2E.4 • 12:00 (Invited)

Transparent and Self-Cleaning Metamaterials for Radiative Cooling and Indoor Light Management, Gan Huang¹; ¹*Karlsruher Institut für Technologie, Germany*. This study presents a transparent, self-cleaning polymer-based metamaterial with high emissivity (0.98) for radiative cooling (~97 W/m²) and improved light diffusion (73%). It enhances indoor comfort, photosynthesis, and reduces glare, overheating, and maintenance.

Optica Advanced Photonics Congress

Session Guide

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

11:00 -- 12:30

Room: Callelonge Hall Flat

SpM2F • Spatial Division Multiplexing Transmission I

Presider: Callum Deakin; Nokia Bell Labs, USA

SpM2F.1 • 11:00 (Invited)

Dispersion-Diversity Multicore Fibers: Unlocking the Spatial Dimension for Signal Processing, Sergi García¹, Mario A. González¹, Ivana Gasulla Mestre¹; ¹*Universitat Politècnica de València, Spain*. We explore in this invited paper some of our latest experimental signal processing results exploiting both the spatial parallelism and the chromatic dispersion diversity provided by a dispersion-diversity heterogeneous multicore fiber.

SpM2F.2 • 11:30 (Invited)

Crosstalk Analysis in MBoSDM Optical Networks With Programmable Transceiver and Switching Solutions, Laia Nadal Reixats¹, Farhad Arpanaei², Jose Alberto Hernández², JOSE M. Rivas Moscoso³, Josep Maria Fàbrega¹, Michela Svaluto Moreolo¹, Ramon Casellas¹; ¹*Centre Tecnològic Telecom de Catalunya, Spain*; ²*Universidad Carlos III de Madrid, Spain*; ³*Telefónica, Spain*. This study experimentally and analytically investigates the impact of crosstalk (XT) in a multi-band over spatial division multiplexing (MBoSDM) optical network. The analysis employs a 19-core multi-core fiber (MCF) spanning 25.4 km and programmable transceivers.

SpM2F.3 • 12:00

Withdrawn

14:00 -- 16:00

Room: Les Goudes 1

IM3A • Microcombs

Presider: Vittorio Cecconi; Loughborough Univ., UK

IM3A.1 • 14:00

Bistable Quadratic and Kerr Dissipative Coupled Soliton Microcombs, Francesco Rinaldo Talenti^{1,2}, Stefan Wabnitz^{3,4}, Yifan Sun⁵, Tobias Hansson⁶, Luca Lovisolo^{2,1}, Andrea Gerini², Giuseppe Leo^{2,9}, Laurent Vivien¹, Christian Koos⁸, Huanfa Peng⁸, Pedro Parra-Rivas⁷; ¹*CNRS, France*; ²*Laboratoire Matériaux et Phénomènes Quantiques, Université Paris Cité, France*; ³*DIET, Sapienza Univ. of Rome, Italy*; ⁴*CNR, Italy*; ⁵*Université libre de Bruxelles, Belgium*; ⁶*Linköping Univ., Sweden*; ⁷*Univ. of Almeria, Spain*; ⁸*Karlsruhe Inst. of photonics, Germany*; ⁹*Institut universitaire de France, France*. Bistable dissipative coupled soliton comb generation is predicted in a doubly resonant second-harmonic cavity, resulting from the competition between quadratic nonlinearity and the Kerr effect.

IM3A.2 • 14:15

AlGaAs on Insulator Microcomb and Frequency Doubling, Luca Lovisolo^{1,2}, Francesco Rinaldo Talenti^{1,2}, Andrea Gerini¹, Stefan Wabnitz^{3,4}, Martina Morassi², Aristide Lemaître², Abdelmounaim Harouri², Christian Koos⁵, Huanfa Peng⁵, Carlos Alonso-Ramos², Laurent

Optica Advanced Photonics Congress

Session Guide

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

Vivien², Giuseppe Leo^{1,6}; ¹*université paris cite, France*; ²*C2N, France*; ³*Sapienza Univ. of Rome, Italy*; ⁴*Istituto Nazionale di Ottica, Italy*; ⁵*Karlsruhe Inst. of Technology, Germany*; ⁶*Institut Universitaire de France, France*. We propose an AlGaAs-on-insulator microring resonator for the generation of optical frequency combs and frequency doubling. The design, simulations, and a preliminary experimental characterization clearly indicate a $\chi(2) + \chi(3)$ functionality.

IM3A.3 • 14:30

Broadband MmWave Comb Generation via Laser-Cavity Soliton Microcombs, Luke Peters^{1,2}, Andrew Cooper¹, Luana Olivier^{1,2}, Antonio Cutrona^{1,2}, Fedor Getman¹, Vittorio Cecconi^{1,2}, Nitish Paul¹, Debayan Das^{1,2}, Maxwell Rowley², Sai T. Chu³, Brent E. Little⁴, Roberto Morandotti⁵, David Moss⁶, Juan S. Toterogongora^{1,2}, Alessia Pasquazi^{1,2}, Marco Peccianti^{1,2}; ¹*Loughborough Univ., UK*; ²*Univ. of Sussex, UK*; ³*Univ. of Hong Kong, China*; ⁴*Xi'an Inst. of Optics and Precision Mechanics, China*; ⁵*INRS-EMT, Canada*; ⁶*Swinburne Univ. of Technology, Australia*. Laser Cavity Soliton microcombs are utilized to generate ultra-low-noise, broadband mmWave combs without amplification, enabling direct, coherent THz signal generation. This breakthrough offers advanced control, and wave shaping, supporting THz time-domain spectroscopy, and free-space communications

IM3A.4 • 14:45

Soliton Microcomb at 2 Micron Wavelength With Tuning Flexibility in Time and Frequency, Xukun Lin¹, Zhiming Shi¹, Siyang Li¹, Suwan Sun¹, Junqiu Liu^{2,3}, Hairun Guo^{1,3}; ¹*Shanghai Univ., China*; ²*International Quantum Academy, China*; ³*Univ. of Science and Technology of China, Hefei National Laboratory, China*. We demonstrated the single-pump generation of 2 μm Kerr solitons in Silicon Nitride microresonators, observing a 1.84 THz (17.14 nm) Raman self-frequency shift caused by stimulated intrapulse scattering under high intracavity power conditions.

IM3A.5 • 15:00 (Invited)

Efficient Chip-Scale Microcombs, Victor Torres Company¹; ¹*Chalmers Tekniska Högskola, Sweden*. Power-efficient microcombs harness integrated photonics to deliver ultra-low-phase-noise performance at chip scale. I will highlight advances enabling petabit interconnects, optical synthesis, and scalable wafer-level solutions for next-generation communication and signal processing systems.

IM3A.6 • 15:30 (Invited)

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

14:00 -- 16:00

Room: Callelonge Hall Tier

JM3B • Joint IPR and NOMA: Thin Films on Photonic Chips

Presider: Nathalie Vermeulen; Vrije Universiteit Brussel, Belgium

JM3B.1 • 14:00 (Invited)

Nanophotonics and Strong Light-Matter Interaction With Multilayer van der Waals

Materials, Alexander Tartakovskii¹; ¹*Univ. of Sheffield, UK*. Layered van der Waals materials known for their intriguing optical properties in few-atom-thick layers find growing use in nanophotonics in their quasi-bulk form. This progress including our own recent work will be reviewed.

JM3B.2 • 14:30

Carbon Nanotube Emission Enhancement in Silicon Photonic Crystal Nanobeam

Cavity, zijun xiao¹, Francesco Rinaldo Talenti¹, Carlos Alonso-Ramos¹, Delphine Marris-Morini¹, Daniele Melati¹, Eric Cassan¹, Nicolas Dubreuil³, Arianna Filoramo², Laurent Vivien¹; ¹*Center of Nanosciences and Nanotechnologies, France*; ²*French Alternative Energies and Atomic Energy Commission, France*; ³*The Photonics, Numerical and Nanosciences Laboratory, France*. In this study, we introduce a novel hybrid integration design for side-coupling air-mode silicon photonic crystal nanobeam cavity and illustrate substantial enhancement of photoluminescence from single-wall carbon nanotubes.

JM3B.3 • 14:45

Thermal Scanning Probe Lithography for Fabrication of Perforated Metallic Films, Paloma

Pellegrini¹, Francisco T. Orlandini¹, Silvia V. G. Nista¹, Stéphane Lanteri², Hugo Enrique Hernández-Figueroa³, Stanislav Moshkalev¹; ¹*Center for Semiconductor Components and Nanotechnology, Universidade Estadual de Campinas, Brazil*; ²*Inria, CNRS, LJAD, Université Côte d'Azur, France*; ³*School of Electrical and Computer Engineering, Universidade Estadual de Campinas, Brazil*. Thermal scanning probe lithography offers high resolution and versatility, making it a promising alternative for fabricating photonic devices. Here, we introduce a new method that expands its applications by enabling direct fabrication of arbitrary perforated patterns on a silver film.

JM3B.4 • 15:00

Characterization of Electro-Optic Thin Films for High Speed Integrated

Modulators, Jeroen Beeckman², Kobe De Geest^{2,1}, Enes Lievens^{2,1}, Ewout Picavet², Jiayi Liu², Klaartje De Buysse³, Dries Van Thourhout¹; ¹*Ghent Univ., INTEC, Belgium*; ²*Electronics and Information Systems, Ghent Univ., Belgium*; ³*Chemistry, Ghent Univ., Belgium*. Different characterization tools of the Pockels coefficients of ferroelectric thin films using free-space optical setups offer indispensable insight into the material's properties. Optimizing the thin films is necessary to obtain integrated optical modulators with low loss, high efficiency and high speed operation on Si and SiN photonic platforms.

JM3B.5 • 15:15 (Invited)

Progress in Monolithically Integrated III-v Nanowire Lasers on Silicon, Paul Schmiedeke¹,

Cem Doganlar¹, Tobias Schreitmüller¹, Steffen Meder¹, Benjamin Haubmann¹, Sebastian Werner^{1,2}, Markus Döblinger³, Hyowon W. Jeong¹, Jonathan J. Finley¹, Gregor Koblmüller^{1,2}; ¹*Technische Universität München, Germany*; ²*Technische Universität Berlin,*

Optica Advanced Photonics Congress

Session Guide

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

Germany; ³Ludwig Maximilians Univ., Germany.

Si-integrated III-V nanowire lasers are reported, highlighting demonstrations in telecom-band lasing and extending emission wavelengths to the MIR photonics region. In addition, progress in vertical-cavity p-i-n doped NW laser diode structures is also discussed.

JM3B.6 • 15:45

A Pathway for the Integration of Novel Ferroelectric Thin Films on Photonic Integrated Circuits, Enes Lievens¹, Ewout Picavet¹, Kobe De Geest¹, Klaartje De Buysser¹, Dries Van Thourhout¹, Peter Bienstman¹, Jeroen Beeckman¹; ¹*Universiteit Gent, Belgium*. A pathway to directly integrate novel ferroelectric thin films on photonic circuits is presented. These films exhibit a strong Pockels coefficient and provide a means of achieving the next generation of high speed nanophotonic modulators.

14:00 -- 16:00

Room: Sormiou

NeM3C • QKD I

Presider: Rui Lin; Chalmers Tekniska Högskola, Sweden

NeM3C.1 • 14:00 (Invited)

Impact of Protocol Choice on Brazilian Quantum Key Distribution Networks, Valeria L. Da Silva¹, Antonio Z. Khoury², Rafael F. Barros³, Braian P. da Silva¹, Marcos G. de Oliveira², Christiano M. Nascimento¹, Anderson A. Tomkelski¹; ¹*QULLIN, SENAI CIMATEC Univ., Brazil*; ²*Universidade Federal Fluminense, Brazil*; ³*Universidade de São Paulo, Brazil*. The choice of protocol impacts the optimum configuration of a QKD network. We discuss the impact on secret key rate and trusted node placement for 2 different Brazilian networks.

NeM3C.2 • 14:30 (Invited)

Key Allocation Strategies in Quantum-Secured Networks, Catalina Stan¹, Dominique Verchere², Juan José Vegas Olmos³, Idelfonso Tafur Monroy¹, Simon Rommel¹; ¹*Technische Universiteit Eindhoven, Netherlands*; ²*Nokia Bell Labs, France*; ³*NVIDIA Corporation, Israel*. Resource allocation in QKD networks becomes challenging once key consumption rates reach key generation, at least on certain network links. We present different allocation strategies to improve key assignment success rate and key delivery delay.

NeM3C.3 • 15:00

Crosstalk in Multiplexed Continuous-Variable Quantum Passive Optical Networks, Ivan Derkach¹, Olena Kovalenko¹, Vladyslav Usenko¹; ¹*Univerzita Palackého v Olomouci, Czechia*. We address the possibility to expand the recently proposed continuous-variable (CV) quantum passive-optical networks (QPON) using channel multiplexing. Assuming linear crosstalk between adjacent modes, we evaluate limits to performance and scalability of the multiplexed CV-QPON.

NeM3C.4 • 15:15

Synchronization Protocol for Quantum Key Distribution Networks, Tommy van Duijn¹, Sebastian Verschoor², Simon Rommel¹; ¹*Eindhoven Univ. of Technology, Netherlands*; ²*Univ. of Amsterdam, Netherlands*. Quantum Key Distribution Networks (QKDNs) enable information-theoretically secure key exchange but require synchronization to guarantee their security and

Optica Advanced Photonics Congress

Session Guide

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

functional correctness. We present a key synchronization protocol that preserves the security of QKDNs without compromising performance.

NeM3C.5 • 15:30 (Invited)

Quantum Networks: From Quantum Key Distribution to Entanglement Distribution, Rui Wang¹; ¹*Univ. of Bristol, UK*. This talk presents innovations in quantum networks, covering QKD and entanglement-based networking architectures, co-existence with classical channels, optimisation strategies, and advanced control for future quantum communication applications.

14:00 -- 16:00

Room: Les Goudes 2

NoM3D • Novel Materials and Phenomena

Presider: Lan Fu; Australian National Univ., Australia

NoM3D.1 • 14:00 (Tutorial)

Optical Properties and Applications of a Large Family of Metallic 2D Nanosheets – MXenes, Changhoon Park¹, Yury Gogotsi¹; ¹*A.J. Drexel Nanomaterials Inst., Drexel Univ., USA*. A very broad range of absorption spectra, very low or high IR emissivity, efficient light-to-heat conversion, plasmon resonances, and nonlinearity determine applications of MXene ranging from photodetectors and optical modulators to electron transport layers and saturable absorbers.

NoM3D.2 • 15:00 (Invited)

Polaritonics for 2D Materials, Zhanghai Chen¹; ¹*Xiamen Univ., China*. Abstract not available.

NoM3D.3 • 15:30

Anisotropic Photonic Crystals for Extraordinary Chiral Mirror Functionality, Andrea Alessandrini¹, Leone Di Mauro Villari¹, Luca Assogna¹, Matteo Silvestri¹, Matteo Venturi¹, Carino Ferrante², Paola Benassi^{1,2}, Davide Tedeschi¹, Andrea Marini^{1,2}; ¹*Univ. of L'Aquila, Italy*; ²*CNR - SPIN, Italy*. Polarization control is achievable through the optical torque exerted by anisotropic media. We engineer miniaturized uniaxial anisotropic stacks as chiral mirrors reflecting over 99%

of one circular polarization and less than 1% of the opposite.

NoM3D.4 • 15:45

Electromagnetically Induced Transparency and Lasing Without Inversion in Chiral Molecules, Somasree Pal¹, Ambaresh Sahoo¹, Raju Adhikary¹, Matteo Venturi¹, Giovanna Salvitti¹, Carino Ferrante², Davide Tedeschi¹, Paola Benassi^{1,2}, Massimiliano Aschi¹, Andrea Marini^{1,2}; ¹*Univ. Of L'Aquila, Italy*; ²*CNR SPIN, Italy*. We investigate the effect of molecular chirality on electromagnetically induced transparency and lasing without inversion, providing insights into chiroptical effects and quantum coherence phenomena crucial for advanced spectroscopic measurements in chiral molecules.

Optica Advanced Photonics Congress

Session Guide

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

14:00 -- 16:00

Room: Morgiou

SM3E • Thermophotovoltaics

Presider: Jyotirmoy Mandal; Princeton Univ., USA

SM3E.1 • 14:00 (Invited)

Thermophotovoltaics: Photonics and Thermal Management, Rodolphe Vaillon¹, Bhargu Rishi Mishra¹, Oriol Teixidó², Haolin Wang³, Alexis Vossier⁴, Ines Revol¹, Guilhem Almuneau¹, Makoto Shimizu³, Daniel Chemisana²; ¹LAAS-CNRS, France; ²Applied Physics Section of the Environmental Science Department, Univ. of Lleida, Spain; ³Department of Mechanical Systems Engineering, Tohoku Univ., Japan; ⁴PROMES-CNRS, France. Spectral selectivity and heat dissipation are critical to the performance of thermophotovoltaic conversion devices. The presentation will review the recent photonic and thermal management solutions, and how they might be combined.

SM3E.2 • 14:30

Experimental Development of Storage-Integrated Solar Thermophotovoltaics, Maxime Giteau¹, Alexis Vossier¹; ¹PROMES-CNRS, France. We discuss ongoing development of storage-integrated solar thermophotovoltaics technology, combining solar energy harvesting, high-density thermal energy storage, and electricity production using thermophotovoltaics, with the fabrication of a 6-kW prototype and its operation under real illumination.

SM3E.3 • 14:45

Multi-Width Selective Emitter Design for High-Performance Low-Bandgap

Thermophotovoltaics, Nacira HANOUF¹, Jérémie Dreviron¹, Franck Enguehard²; ¹Pprime, France. This study designs a 2D wavelength-selective emitter for low-bandgap thermophotovoltaic systems using RCWA and GWO. A hybrid structure with four widths synergizes magnetic and plasmonic resonances, minimizing sub-bandgap and thermalization losses, enhancing TPV performance.

SM3E.4 • 15:00

Insight Into Cooling Requirements for Thermophotovoltaic Devices, Bhargu Rishi Mishra¹, Alexis Vossier², Ines Revol¹, Guilhem Almuneau¹, Rodolphe Vaillon¹; ¹LAAS-CNRS, France; ²PROMES-CNRS, France. We highlight the necessity of designing thermophotovoltaic devices with an effective cooling system to maintain operable cell temperatures and calculate the required heat transfer coefficient as a function of bandgap for various selected cell temperatures.

SM3E.5 • 15:15

Electroluminescence and Thermophotovoltaics as key Elements of Radiative Heat

Engines, Thomas Chatelet¹, Julien Legendre¹, Olivier Merchiers¹, Pierre-Olivier Chapuis¹; ¹CETHIL, CNRS and INSA Lyon, France. A novel class of heat engines based on the radiative exchange between hot and cold pin junctions is studied by coupling fluctuational electrodynamics and either the detailed-balance approach or the drift-diffusion equations.

Optica Advanced Photonics Congress

Session Guide

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

SM3E.6 • 15:30 (Invited)

Title to be Announced, Jennifer Selvidge¹; ¹*National Renewable Energy Laboratory, USA*. Abstract not available.

14:00 -- 16:00

Room: Callelonge Hall Flat

SpM3F • Access Networks

Presider: Hwan Seok Chung; Electronics and Telecom Research Inst, South Korea

SpM3F.1 • 14:00 (Invited)

Towards Next Generation 200G Optical Access Networks Employing Semiconductor Optical Amplifiers, Lakshmi Narayanan Venkatasubramani¹, Ahmed Galib Reza¹, Liam P. Barry¹; ¹*Dublin City Univ., Ireland*. We present the potential application of the SOA in next-generation optical access networks with SOAs placed at distinct locations in an optical link and as a device enabling system power budgets.

SpM3F.2 • 14:30 (Invited)

Frequency-Division-Multiplexed PON Upstream Enabled by Optical Frequency Comb, Zichuan Zhou¹, Zhixin Liu¹; ¹*Univ. College London, UK*. We demonstrate 2.5-GHz-spaced frequency multiplexing PON upstream communication with aggregated 240 Gbps data capacity, allowing each user to transmit within dedicated optical bands, enabling low latency applications.

SpM3F.3 • 15:00

Impact of Analog FeedForward Equalizer Cells Initialization and Optimization in 50G-PON, Dylan Chevalier^{1,3}, Pascal Scalart², Gaël Simon¹, Laurent Bramerie³, Michel Joindot³, Jérémy Potet¹, Mathilde Gay³, Philippe Chanclou¹, Monique Thual¹; ¹*Orange Labs, France*; ²*IRISA, France*; ³*FOTON Inst., France*. This paper examines Analog FeedForward Equalizer cell initialization in 50G-PON systems. Setting extreme cells to 0 and others randomly yields 98.7% convergence, a 48.3% improvement over fully random initialization.

SpM3F.4 • 15:15

Single Fibre Transmissions up to 25 Gbit/s With Twin Transceivers for Metro/Access/Datacom Networks, Fabienne Saliou¹, Théo Huguenin¹, Mael Bideau¹, Philippe Chanclou¹, Gaël Simon¹, Jérémy Potet¹; ¹*Orange, France*. We propose to use splitters instead of diplexers in optical transceivers to avoid pairing in PtP transmissions. We experimentally demonstrate error free transmissions at 25Gbit/s in 20km SMF, showing penalties of possible back reflections and OBI.

SpM3F.5 • 15:30

Impact of Reducing Bandwidth and Sampling Rate in Simplified Coherent Receiver for 200G-Class PON, Ryo Igarashi¹, Ryo Koma¹, Kazutaka Hara¹, Jun-ichi Kani¹, Tomoaki Yoshida¹; ¹*NTT Corporation, Japan*. We investigate the impact of reducing sampling rate and bandwidth in a simplified coherent receiver. Simulations reveal that 250-Gbps Alamouti-QPSK achieves -29.6 dBm sensitivity with a 70-GHz receiver bandwidth and 250-GHz sampling rate.

SpM3F.6 • 15:45

Optica Advanced Photonics Congress

Session Guide

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

Generalised Partial Response Signaling via IMDD Towards Addressing HS-PON, Michael McCarthy¹, Liam P. Barry¹; ¹*Engineering, Dublin City Univ., Ireland*. A Generalised Partial Response Signaling based modulation format, employing IMDD, towards reconciling future Passive Optical Network data (25Gbps) and reach (25km) requirements using cost effective hardware is demonstrated.

16:30 -- 18:30

Room: Les Goudes 1

IM4A • Heterogeneous and Hybrid Integration

Presider: Victor Torres Company; Chalmers Tekniska Högskola, Sweden

IM4A.1 • 16:30

Hybrid Ge/Sb₂S₃/SiGe Waveguide for Tunable Mid-IR Supercontinuum Generation, Adam Bieganski^{1,2}, Rémi Armand¹, Marko Perestjuk^{1,2}, Lamine Ferhat¹, Vincent Reboud³, Jean-Michel Hartmann³, Thach Nguyen², Arnan Mitchell², Christelle Monat¹, Sébastien Cueff¹, Christian Grillet¹; ¹*Institut des Nanotechnologies de Lyon, France*; ²*RMIT Univ., Australia*; ³*CEA-Leti, France*. We demonstrate supercontinuum generation in the mid-IR using a hybrid Ge/Sb₂S₃/SiGe-on-Si waveguide. By changing the Sb₂S₃ state, we modify the waveguide's dispersion regime and therefore the properties of generated spectra.

IM4A.2 • 16:45

Hybrid Extended Cavity Laser Made of Silicon Nitride Bragg Gratings and GaAs Optical Amplifiers for Frequency Comb Generation Around 965 nm, Mayssa Dammak^{1,2}, Sylvain Boust¹, Quentin Wilmart³, Jonathan Faugier-Tovar³, Sylvain Guerber³, Michel Lecomte¹, Olivier Parillaud¹, Eva Izquierdo¹, Guillaume Daccord¹, Michel Garcia¹, Michel Krakowski¹, Olivier Gauthierlafaye², François Duport¹; ¹*III V Lab, GIE between Thales Research and Technology, Nokia and CEA LETI, France*; ²*LAAS-CNRS, Univ. of Toulouse, CNRS, France*; ³*Univ. Grenoble Alpes, CEA, LETI, France*. We present the characterisation of a silicon nitride chip that includes a Bragg reflector, which, butt-coupled to a Reflective Semiconductors Optical Amplifier, will form an extended cavity laser emitting around 965nm for generating a frequency comb.

IM4A.3 • 17:00

Silicon Pillar Heat Shunts for Hybrid Photonic Integrated Circuits, Giuseppe L. Bui¹, Pascual Muñoz¹, Daniel Pastor¹; ¹*UPV, Spain*. The thermal management of hybrid photonic integrated circuits poses a challenge for the proper functioning of such devices. We present a silicon-pillar-based approach that enhances heat dissipation while maintaining fabrication feasibility.

IM4A.4 • 17:15

Hybrid Integration of Erbium-Doped Oxides on Silicon Nitride Platforms for Light Amplification, Ana M. Statie¹, Alicia Ruid-Caridad², Christine Lafforgue¹, Pablo Bedoya-Rios¹, Zijun Xiao¹, Nathaniel Findling¹, Davide Cammilleri¹, Ludovic Largeau¹, Stefano Pirota¹, Alan Durnez¹, Francois Maillard¹, Daniele Melati¹, Samson Edmond¹, Eric Cassan¹, Guillaume Agnus¹, Delphine Marris-Morini¹, Philippe Lecoœur¹, Carlos Alonso-Ramos¹, Thomas Maroutian¹, Sylvia Matzen¹, Laurent Vivien¹; ¹*C2N, France*; ²*IREC, Spain*. Erbium-doped yttria-stabilized zirconia superlattice stacks were deposited to study and optimize the emission efficiency at telecom wavelengths. Furthermore, they are integrated in different configurations

Optica Advanced Photonics Congress

Session Guide

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

on silicon nitride waveguides to achieve light amplification.

IM4A.5 • 17:30 (Invited)

Convergence of Light and Technology: Advanced Heterogeneous Integration in Silicon Photonic Platform and Applications, Ashok Kodigala¹; ¹*Sandia National Laboratories, USA*. Silicon photonic platforms enable a variety of applications including atom interferometry. In this talk, I will present our work on heterogeneous integration of many photonic components and also novel bound states in the continuum light sources.

IM4A.6 • 18:00 (Invited)

Withdrawn

16:30 -- 18:30

Room: Callelonge Hall Tier

IM4B • Metasurfaces

Presider: Luke Peters; Loughborough Univ., UK

IM4B.1 • 16:30 (Invited)

All-Dielectric Magneto-Optical Metasurfaces Exhibiting Giant Faraday Rotation Utilizing Bound States in the Continuum, Siyuan Gao¹, Kota Taniguchi¹, Takeru Yambe¹, Satoshi Iwamoto^{2,3}, Yasutomo Ota¹; ¹*Department of Applied Physics and Physico-Informatics, Keio Univ., Japan*; ²*Research Center for Advanced Science and Technology, The Univ. of Tokyo, Japan*; ³*Inst. of Industrial Science, The Univ. of Tokyo, Japan*. Magneto-optical (MO) effects enable passive and handy nonreciprocal optical devices. However, MO effects are intrinsically weak in the optical domain, which hinders the miniaturization of MO devices. In this talk, we present the design of an all-dielectric metasurfaces exhibiting a giant enhancement of Faraday rotation within an ultrathin MO layer.

IM4B.2 • 17:00

Withdrawn

IM4B.3 • 17:15

Topology Optimization of Blazed Metasurfaces for High-Efficiency Spectrographs, Simon Ans^{1,2}, Guillaume Demésy², Frédéric Zamkotsian¹, Quentin Tanguy³, Roland Salut³, Andrei Mursa³, Nicolas Passilly³; ¹*Laboratoire Astrophysique Marseille, France*; ²*Institut Fresnel, France*; ³*FEMTO-ST, France*. A metasurface grating is presented, developed using a 3D, in-house developed Finite Element model. It is manufacturable and exhibits nearly 60% of average diffraction efficiency on the -1st order between 400 and 1500 nm.

IM4B.4 • 17:30

Simultaneous Spectrum and Angle Retrieval Using CMOS-Compatible Metasurface Based Fabry-Perot Resonators, Ram P. S¹, Mondher Besbes¹, Henri Benisty¹; ¹*Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, France*. This work presents a miniaturized on-chip spectrometer for simultaneous spectral reconstruction and angle retrieval using metasurface-based FP resonators. Combining angle-tolerant high-Q and angle-sensitive low-Q filters with a reconstruction algorithm enables precise

Optica Advanced Photonics Congress

Session Guide

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

spectrum and angle determination.

IM4B.5 • 17:45

Dispersion Correction in Wide Field of View Metalens for Broadband Operation, Jian Cao¹, Sarra Salhi¹, Jonathan Peltier¹, Jean-René Coudeville¹, Samson Edmond¹, Sandeep-Yadav Golla¹, Etienne Herth¹, Cédric Villebasse¹, Laurent Vivien¹, Carlos Alonso-Ramos¹, Daniele Melati¹; ¹*C2N, France*. We propose a novel approach to compensate dispersion in wide field of view metalenses. Our metalens experimentally demonstrate a field of view of 86° and a relative focal shift of 1.3% over a 100 nm band.

IM4B.6 • 18:00 (Invited)

Nonlinear Image Processing Through Upconversion in Dielectric Metasurfaces, Dragomir N. Neshev¹; ¹*Australian National Univ., Australia*. We present novel image processing through nonlinear upconversion from infrared to visible light in resonant dielectric metasurfaces. We further discuss the ability to perform image processing beyond linear operations for advanced night vision applications.

16:30 -- 18:30

Room: Sormiou

NeM4C • Access Networks

Presider: Lena Wosinska; Chalmers Tekniska Högskola, Sweden

NeM4C.1 • 16:30 (Invited)

Cost-Effective Solutions for Future PON, António Teixeira¹; ¹*PICadvanced, Portugal*. Abstract not available.

NeM4C.2 • 17:00 (Invited)

Coexistence in Future Optical Access Networks, Gaël Simon¹, Jérémy Potet¹, Fabienne Saliou¹, Dylan Chevalier¹, Georges Gaillard¹, Joseph Zanduetta¹, Philippe Chanclou¹; ¹*Orange, France*. This talk will review the current status of Passive Optical Networks (PONs), the way they coexist on the field, and the challenges of future PONs, including VHSP (200Gb/s PON).

NeM4C.3 • 17:30

TDM-PON Supporting IEEE-802.11CB Based Deterministic Networking for Reliability in Industrial TSN Networks, Sandip Das¹, Md Mosaddek Hossain Adib¹, Michael Straub¹, rene bonk¹; ¹*Nokia Solutions and Networks, Germany*. We demonstrate a novel scheme and configuration that allows commercial TDM-PON systems to support 802.11CB-FRER for enhanced reliability in TSN. We experimentally evaluate and compare the performance of 802.11CB-FRER traffic flow and normal (non-FRER) traffic flow co-existing in the same TDM-PON infrastructure in case of link-fault.

NeM4C.5 • 17:45 (Invited)

Enabling Immersive XR Collaborations Over FTTR Networks, SOURAV MONDAL¹, Elaine Wong¹; ¹*Univ. of Melbourne, Australia*. Fiber-To-The-Room is a potential solution to achieve in-premise extended reality collaborations. This paper explores predictive bandwidth allocation and seamless handover schemes over FTTR, showing high-quality immersive experience for in-premise collaborations can be achieved.

Optica Advanced Photonics Congress

Session Guide

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

16:30 -- 18:30

Room: Les Goudes 2

NoM4D • Infrared Optics and Applications

Presider: Brandon Shaw; US Naval Research Laboratory, USA

NoM4D.1 • 16:30 (Invited)

Ion Beams for Photonic Integrated Circuits, Carsten Ronning¹; ¹*Friedrich-Schiller-Universität Jena, Germany*. Ion beam technologies are routine, large-scale methods in electronic device manufacturing, but their potential for photonics is still unseen. Thus, I will present several experiments for the manipulation of the optical properties of materials using ion beams, together with corresponding strategies for the realization of photonic integrated circuits. This includes the emission enhancement of erbium in plasmonic waveguides as well as the realization of integrated erbium-doped amplifiers.

NoM4D.2 • 17:00 (Invited)

New Dimensions Open to Ultrafast Laser Silicon Modifications, Niladri Ganguly¹, Qiong Xie¹, Pol Sopeña¹, David Grojo¹; ¹*CNRS / Aix-Marseille Univ., LP3 UMR 7341, France*. Introducing new degrees of control for intense infrared light, we study highly-confined interactions inside silicon. We address the remaining challenges for internal precision writing and contribute to the advent of three-dimensional solutions for semiconductor technologies.

NoM4D.3 • 17:30

Metastructured Hierarchical Metal Foam for Tailored Infrared Emissivity and Enhanced Thermoelectric Waste Heat Recovery, Shan-Chiao Yang¹, Wen Hsin Chang¹, Wei Hsuan Kung¹, Hsuen-Li Chen^{1,2}; ¹*National Taiwan Univ., Taiwan*; ²*Center of Atomic Initiative for New Materials, National Taiwan Univ., Taiwan*. We investigate metastructured hierarchical metal foam with tailored mid-infrared emissivity (0.15-0.82) and high thermal conductivity (7.3 W/m K), enhancing thermoelectric power generation by 50% at 120°C and achieving 97.2% thermal camouflage similarity from 40–160°C.

NoM4D.4 • 17:45

Infrared Spectroscopic Ellipsometry Study of Thermochromic SmNiO₃ Thin Film, Pierre-Antoine Tostivint¹, Simon Hurand², Jérémie Drevillon², Fabien Capon¹; ¹*Institut Jean Lamour, France*; ²*Institut Pprime, France*. Few studies have explored infrared thermochromism using spectroscopic ellipsometry. This work investigates the metal-insulator transition in thin films of the rare-earth nickelate SmNiO₃, obtained by sputtering and soft-annealing.

NoM4D.5 • 18:00

Hybrid Graphene-Dielectric-Metal Metamaterial for Electrostatically Tunable Thermal Radiation Management, Jayden Craft^{1,2}, Michael Leuenberger^{1,2}, Ihsan Uluturk³, Jin Ho Kim³, Richard M. Osgood³; ¹*NanoScience Technology Center, Univ. of Central Florida, USA*; ²*Department of Physics, Univ. of Central Florida, USA*; ³*U.S. Army Combat Capabilities Development Command Soldier Center, USA*. Using finite-difference time domain (FDTD) calculations we show that hybrid graphene-dielectric-metal metamaterials can achieve tunable thermal radiation management. The metal nanoparticles on the dielectric-graphene heterostructure host acoustic graphene plasmons that allow for electrostatic tuning of their

Optica Advanced Photonics Congress

Session Guide

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

resonance wavelengths.

NoM4D.6 • 18:15

Copper-Doped InP/ZnSe/ZnS Quantum Dots for High-Performance Luminescent Solar Concentrators, Tarik S. Kaya¹, Ugur B. Caliskan², Parsa Kaviani², Asim Onal³, Eren Tekinay¹, Guncem Ozgun Eren³, Mehmet Silme⁴, Kadriye Kutlay⁴, Ugur Unal⁵, Sedat Nizamoglu²; ¹*Department of Material Science and Engineering, Koç Univ., Turkey*; ²*Department of Electrical and Electronics Engineering, Koç Univ., Turkey*; ³*Department of Biomedical Science and Engineering, Koç Univ., Turkey*; ⁴*Berteks Tekstil Sanayi ve Ticaret A.S., Turkey*; ⁵*Department of Chemistry, Koç Univ., Turkey*. Cu-doped InP/ZnSe/ZnS quantum dots (QDs) emitting short-wave infrared at 960 nm were synthesized with a high quantum efficiency of 66%. Efficient luminescent solar concentrators with an optical efficiency of 7.36% were fabricated via liquid-state QD-injection.

16:30 -- 18:30

Room: Morgiou

SM4E • Thermal Photonics I

Presider: Gan Huang; Karlsruher Institut für Technologie, Germany

SM4E.1 • 16:30 (Invited)

Dynamic Metasurfaces and Thermal Management With Conducting Polymers, Magnus Jonsson^{1,2}; ¹*Laboratory of Organic Electronics, Linköping Univ., Sweden*; ²*Wallenberg Wood Science Center, Sweden*. This presentation will focus on our latest research on electroactive conducting polymers for dynamic optical metasurfaces, adaptable camouflage, and tunable radiative cooling, and the combination with cellulose materials and solar heating for powering ionic thermoelectric systems.

SM4E.2 • 17:00

Thermal Management of Solar Modules With Infrared-Antireflective Coatings, Klaus Jaeger^{1,2}, Jyotirmoy Mandal³, Forrest Meggers³, Barry P. Rand³, Christiane Becker^{1,4}; ¹*Helmholtz-Zentrum Berlin, Germany*; ²*Zuse Inst. Berlin, Germany*; ³*Princeton Univ., USA*; ⁴*Hochschule für Technik und Wirtschaft Berlin, Germany*. Infrared-antireflective coatings can help to reduce the operating temperature of PV modules. We estimate the temperature reduction for silicon PV modules for five locations in North America and the effect on the annual energy yield.

SM4E.3 • 17:15

Optimization of Wavelength-Selective Metasurfaces for Thermal Management of Photovoltaic Modules, Jérémy Werlé^{1,2}, Diederik S. Wiersma^{3,2}, Lorenzo Pattelli^{1,2}; ¹*Metrology of innovative materials and life sciences, INRIM, Italy*; ²*LENS, Italy*; ³*Physics and Astronomy department, Univ. of Florence, Italy*. Passive radiative cooling materials emit heat to space, reducing solar cell temperatures. We optimize numerically a polymer pattern coating to enhance heat dissipation, improving on thermal management and efficiency while rejecting sub-bandgap solar radiation.

SM4E.4 • 17:30

Optica Advanced Photonics Congress

Session Guide

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

Oxygen Deficiency-Induced Enhanced Photo-Thermal Conversion Capability in Tungsten Oxide Photonic Crystals, Silpa S¹, Ann Eliza Joseph¹, Vinayak Kamble¹; ¹*IISER Thiruvananthapuram, India*. We report high photo-thermal conversion capability in oxygen-deficient tungsten oxide photonic crystal (PhC) thin films. Oxygen vacancies, which are the origin of F-center, lead to enhanced visible absorption in PhCs compared to dense thin film.

SM4E.5 • 17:45 (Invited)

Emerging Polar Materials for Directional and Chiral Thermal Emission., Mitradeep Sarkar¹, Michael Enders¹, Evgenia Klironomou¹, Julien Legendre¹, Georgia Papadakis¹; ¹*ICFO -Institut de Ciències Fotoniques, Spain*. We present a pattern-free platform for directionally controlled infrared (IR) thermal emission using suspended SiC nanomembranes, phase retardation of mid-IR light using single α -MoO₃ flakes, as well as chiral thermal emission using twisted bilayers of α -MoO₃.

SM4E.6 • 18:15

A Ceramic Radiative Cooler With Near-Ideal Solar Reflectance and Intrinsic Selective Emittance, Nithin J. Varghese¹, Jyotirmoy Mandal¹; ¹*Princeton Univ., USA*. A ceramic bi-layer, owing to its porosity, long wavelength infrared Christiansen effect, and Reststrahlen band behavior, exhibits a near-ideal solar reflectance and a high selective LWIR emittance without the use of any metal backings.

16:30 -- 18:30

Room: Callelonge Hall Flat

SpM4F • Machine Learning in Optical Communication I

Presider: Camille Delezoide; Nokia Bell Labs, France

SpM4F.1 • 16:30 (Tutorial)

Advances and Future Relevance of Photonic Machine Learning, Daniel Brunner¹; ¹*FEMTO-ST, France*. Photonic neural networks stimulate great interest and have approached maturity that puts application relevance within reach. I will introduce the various conceptual approaches to photonic neural networks and discuss the respected opportunities and challenges.

SpM4F.2 • 17:30 (Invited)

End-to-End Learning for Optical Communication Systems, Sergio Hernandez¹, Søren F. Nielsen², Christophe Peucheret³, Francesco Da Ros¹, Mikkel Schmidt¹, Darko Zibar¹; ¹*Danmarks Tekniske Universitet, Denmark*; ²*WS Audiology, Denmark*; ³*CNRS, FOTON - UMR6082, Univ Rennes, France*. We demonstrate the effectiveness of end-to-end learning for mitigating distortion in fiber-based intensity modulated direct detection systems. We furthermore discuss the effectiveness of our method when applied to free-space optical links.

SpM4F.3 • 18:00

Wavelength Multiplexing Image Transportation Through Multimode Fiber Using Physics-Informed Deep Learning, Zefeng Feng^{1,2}, Wei Zhou^{1,2}, Baoteng Xu^{1,2}, Jialin Liu^{1,2}, Daxi Xiong^{1,2}, Jiawei Sun^{1,2}, Xibin Yang^{1,2}; ¹*School of Biomedical Engineering (Suzhou), Division of Life Sciences and Medicine, Univ. of Science and Technology of China, China*; ²*Suzhou Inst. of Biomedical Engineering and Technology, Chinese Academy of Sciences, China*. We propose a physics-informed deep learning framework for efficient wavelength-multiplexed image

Optica Advanced Photonics Congress

Session Guide

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

transmission through multimode fiber. Experimental results demonstrate its potential for preserving high-fidelity information transfer while ensuring robustness and high resolution in multimode fiber systems.

SpM4F.4 • 18:15

Machine Learning-Enhanced Denoising for Structured Light Modes in Realistic Optical Channels, Khadija Rana², Abdullah N. Khan¹, Mohammed Zahed M. Khan⁴, Usman Younis², Mudassir Masood^{1,3}; ¹*Interdisciplinary Research Center for Communication Systems and Sensing, King Fahd Univ. of Petroleum and Minerals, Saudi Arabia*; ²*Department of Computer and Software Engineering, Information Technology Univ., Lahore, Pakistan*; ³*Electrical Engineering Department, King Fahd Univ. of Petroleum and Minerals, Saudi Arabia*; ⁴*Electrical and Electronics Engineering, School of Engineering and Built Environment, Anglia Ruskin Univ., UK*. This work proposes a Covolutional Autoencoder based denoising method enhanced with morphological feature extraction to restore noisy Laguerre-Gaussian modes and achieves improved denoising performance, with an average PSNR of 45.28 dB, preserving essential structural features.

Optica Advanced Photonics Congress

Session Guide

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

Tuesday, 15 July

09:00 -- 10:30

Room: Les Goudes 1

ITu1A • Computational Methods

Presider: Cheng Wang; City Univ. of Hong Kong, Hong Kong

ITu1A.1 • 09:00 (Invited)

Hyperspectral Information Processing and Dimensionality Reduction, Myoung-Gyun Suh¹; ¹*NTT Research Inc., USA*. Hyperspectral information processing, which exploits optical parallelism through simultaneous frequency and two-dimensional spatial multiplexing, offers significant potential for high-throughput optical systems. In this talk, I will present our latest work on hyperspectral information processing using optical frequency combs for AI hardware accelerators and AI-assisted imaging, with a focus on dimensionality reduction.

ITu1A.2 • 09:30

Physics-Informed Bayesian Optimization of Nanophotonic Devices, Philipp-Immanuel Schneider^{1,2}, Ivan Sekulic^{1,2}, Matthias Plock^{1,2}, Martin Hammerschmidt^{1,2}, Sven Rodt³, Stephan Reitzenstein³, Sven Burger^{1,2}; ¹*JCMwave GmbH, Germany*; ²*Zuse Institute Berlin, Germany*; ³*Inst. of Solid State Physics, Technische Universität Berlin, Germany*. We present physics-informed Bayesian optimization that learns the physical input of the loss function of a photonic device. We show that this approach can converge faster than standard BO or heuristic optimization approaches.

ITu1A.3 • 09:45

Inverse Design Methodologies for a Foundry Compatible Compact Integrated TM-Pass Polarizer, Prankush Agarwal¹, Jacob M. Hiesener¹, Michael J. Probst¹, Arjun Khurana¹, Stephen E. Ralph¹; ¹*Georgia Inst. of Technology, USA*. We present inverse design workflows for a TM-pass polarizer with < 0.5 dB TM insertion loss and up to 18.9 dB extinction ratio for the TE mode that meets commercial foundry design rule checks.

ITu1A.4 • 10:00

Photonic Crystal Design: Singular Transfer Matrices for Bound States in Continuum, Ovidiu Lipan¹, Aldo De Sabata²; ¹*Physics, Univ. of Richmond, USA*; ²*Department of Measurements and Optical Electronics, Politehnica Univ. of Timisoara, Romania*. Bound states in the continuum (BICs) in photonic crystals yield high-Q devices for lasing and sensing. We craft BICs via singular transfer matrices, mapping parameter spaces analytically to show topological links. Full-wave simulations confirm robust, novel designs for nano- and meta-photonic applications, advancing device theory and optimization.

ITu1A.5 • 10:15

Efficient Topology Optimized Binary Bandpass Filters for Compact and Scalable WDM, Yuri Grinberg¹, Dusan Gostimirovic², Martin Vachon³, Odile Liboiron-Ladouceur², Dan-Xia Xu¹; ¹*Digital Technologies Research Center, National Research Council Canada, Canada*; ²*Department of Electrical and Computer Engineering, McGill Univ., Canada*; ³*Quantum and Nanotechnologies Research Center, National Research Council Canada, Canada*. We propose topology optimized compact 3 μm \times 10 μm binary bandpass filters featuring ultra-flat

Optica Advanced Photonics Congress

Session Guide

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

wide passband (up to 70 nm) and >1.4 dB/nm roll-off. A cascade of such filters realizes compact and scalable wavelength division multiplexing functionality.

09:00 -- 10:30

Room: Callelonge Hall Tier

ITu1B • Photonics for Quantum Applications

Presider: Andrea Blanco-Redondo; Univ. of Central Florida, CREOL, USA

ITu1B.1 • 09:00 (Invited)

Withdrawn

ITu1B.2 • 09:30

Quantum Squeezing in an Integrated Si₃N₄ Microring Under Bichromatic Pumping: Detection and Optimization, Andrei Danilin^{1,3}, Timur Yunusov^{1,2}, Alexey Dushanin^{1,2}, Dmitry Chermoshentsev^{1,2}, Anatoly Masalov¹, Igor Bilenko^{1,3}; ¹*Russian Quantum Center, Russian Federation*; ²*Moscow Inst. of Physics and Technology, Russian Federation*; ³*Faculty of Physics, Lomonosov Moscow State Univ., Russian Federation*. We report of the detailed characterization of quadrature squeezing in a sub-threshold degenerate optical parametric oscillator within a Si₃N₄ microring, reveal squeezing dependence on pump laser offsets, and propose a single-EDFA scheme for phase-noise reduction.

ITu1B.3 • 09:45

Transverse Orientation Patterned Gallium Phosphide Waveguides, Antoine Lemoine¹, Brieg Le Corre^{1,2}, Lise Morice¹, Abdelmounaim Harouri², Luc Le Gratiet², gregoire beaudoin², Julie Le Pouliquen¹, Karine Tavernier¹, Arnaud Grisard³, Sylvain Combrié³, Bruno Gérard⁴, Charles Cornet¹, Christophe Levallois¹, Yannick Dumeige¹, Konstantinos Pantzas², Isabelle Sagnes², Yoan Léger¹; ¹*Institut FOTON, France*; ²*C2N, France*; ³*Thales Research and Technology, France*; ⁴*III-V Lab, France*. We present the first realization of Transverse orientation-patterned gallium phosphide (TOP-GaP) waveguides by direct bonding and their first linear and nonlinear characterization. These structures use vertical susceptibility control to achieve modal phase matching with large mode overlap, achieving high efficiency second harmonic generation.

ITu1B.4 • 10:00 (Invited)

Title to be Announced, Jelmer Renema¹; ¹*QuiX Quantum B.V., Netherlands*. Abstract not available.

09:00 -- 10:30

Optica Advanced Photonics Congress

Session Guide

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

Room: Sormiou

NeTu1C • Energy Efficient Networking

Presider: Carlos Natalino; Chalmers Univ. of Technology, Sweden

NeTu1C.1 • 09:00 (Invited)

Optimization of Energy Consumption of Public Networks, Andreas Gladisch¹; ¹*Andreas Gladisch Network Architect Group Technology Deutsche Telekom, Germany*. Public networks consume significant energy, but this can be optimized through architectural redesign, strategic tech migration, and load-adaptive operation. Costs drop further by leveraging market price fluctuations with energy storage, and overarching control.

NeTu1C.2 • 09:30

Transceiver Guidelines for Energy-Efficient Horseshoes Based on Digital Subcarrier Multiplexing, Carlos Castro¹, Pablo Torres-Ferrera¹, Mohammad Hosseini¹, Antonio Napoli¹; ¹*Nokia, Germany*. In filterless horseshoe networks, DSCM enables point-to-multipoint communications and granular control over bandwidth resources. By analyzing various volumes of traffic and typical intraday behavior, we provide guidelines for energy-efficient DSCM-transceiver deployments compared to single-carrier solutions.

NeTu1C.3 • 09:45 (Invited)

Withdrawn

09:00 -- 10:30

Room: Les Goudes 2

NoTu1D • THz Sensing and Communication

Presider: Sedat Nizamoglu; Koç Üniversitesi, Turkey

NoTu1D.1 • 09:00

Enhanced THz Emission from Spintronics Using Plasmonic Core-Shell Nanostructures, Vittorio Cecconi^{1,2}, Akash Dominic Thomas¹, Jitong Wang¹, Cheng-Han Lin¹, Anoop Dhoot¹, Antonio Cutrona^{1,2}, Abhishek Paul¹, Yi Tian², Luke Peters^{1,2}, Luana Olivieri^{1,2}, Elchin Isgandarov¹, Juan S. Toterogongora^{1,2}, Alessia Pasquazi^{1,2}, Marco Peccianti^{1,2}; ¹*Loughborough Univ., UK*; ²*Physics, Univ. of Sussex, UK*. We demonstrate enhanced spintronic terahertz (THz) emission through ultrafast plasmonic-mediated heating. Placing SiO₂-Au core-shell nanoparticles on a spintronic stack significantly improves optical to THz conversion, overcoming optical coupling limitations in ultra-thin spintronic layers.

NoTu1D.2 • 09:15 (Invited)

Light-Driven Nanoscale Vectorial Currents and Ultrafast Terahertz Radiation Generation in Optoelectronic Metasurfaces, Hou-Tong Chen¹; ¹*Los Alamos National Laboratory, USA*. By breaking the inversion symmetry in a class of optoelectronic metasurfaces, we observe light-driven nanoscale vectorial currents. They serve as efficient and versatile sources of ultrafast terahertz radiation, particularly enabling ultrabroadband complex terahertz vector beams.

NoTu1D.3 • 09:45

Optica Advanced Photonics Congress

Session Guide

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

Metamaterial Filters for Terahertz Cancer Therapy, Joo-Hiuk Son¹; ¹*Univ. of Seoul, Korea (the Republic of)*. Metamaterial-based filters were used to selectively transmit or block 1.6 THz radiation, resonant with cancer DNA. Band-pass filtered THz reduced DNA methylation by 19%, confirming molecular resonance's role in demethylation for targeted cancer therapy.

NoTu1D.4 • 10:00 (Invited)

Withdrawn

09:00 -- 10:30

Room: Morgiou

STu1E • Radiative Cooling II

Presider: Refet Yalcin; Saint-Gobain Recherche, France

STu1E.1 • 09:00 (Invited)

Enabling Multifunctional Radiative Cooling With Composite Materials, Ioannis Papakonstantinou¹; ¹*Univ. College London, UK*. Composite materials, composed of multiple components such as organic hosts with air pores or inorganic pigments, have emerged as versatile platforms for radiative cooling. By integrating materials with distinct properties, multifunctionality can be achieved. This talk will cover their application in selective emitters, self-adaptive radiative cooling systems, self-cleaning surfaces, and spectral-shifting technologies tailored for horticultural and broader energy-saving uses.

STu1E.2 • 09:30

Vacuum Shielded Radiative Cooling to Suppress Environmental Dissipation: Below and Above Ambient Temperature, Jaesuk Hwang¹; ¹*Centre for Quantum Technologies, Singapore*. A radiative cooling surface enclosed in a vacuum shield suppresses environmental dissipation to enable cooling far below ambient temperature and purely radiative heat dissipation above ambient temperature.

STu1E.3 • 09:45

Passive Radiative Cooling: Engineering Multilayer Structures for Sustainable Thermal Management, Hassan BENAÏT², Aotmane En naciri¹, Jean-Francois Pierson², Fabien Capon²; ¹*Université de Lorraine, LCP-A2MC, F-57000 Metz, France, France*; ²*Université de Lorraine, CNRS, IJL, F-54000 Nancy, France, France*. We designed and characterized a multilayer structure using silver, HfO₂, SiO₂, and Si₃N₄ for passive radiative cooling. This device synthesized by magnetron sputtering achieved 5°C below ambient temperature under sunlight, demonstrating its potential for energy-efficient thermal management.

STu1E.4 • 10:00 (Invited)

Concrete as a Radiative Cooling Material, Jorge Dolado¹; ¹*Centro de Física de Materiales, Spain*. This talk summarizes recent advancements in concrete-based radiative cooling materials, highlighting their role in lowering building energy use and helping to mitigate the urban heat island effect through innovative sustainable design solutions

09:00 -- 10:30

Room: Callelonge Hall Flat

Optica Advanced Photonics Congress

Session Guide

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

SpTu1F • Quantum Communications

Presider: Paola Parolari; Politecnico di Milano, Italy

SpTu1F.1 • 09:00 (Invited)

Recent Progress in Security Theory of Quantum Key Distribution, Masato Koashi¹; ¹*The Univ. of Tokyo, Japan*. Continuous-variable QKD with homodyne detection has many practical merits compared to QKD with photon detection, but proving its full security is harder. This talk will introduce recent proof techniques to improve its applicability and performance.

SpTu1F.2 • 09:30

Joint Sensing and Quantum Key Distribution for Invulnerable Access

Networks, Alessandro Gagliano¹, Marco Fasano¹, Andrea Madaschi¹, Alberto Gatto¹, Pierpaolo Boffi¹, Paolo Martelli¹, Paola Parolari¹; ¹*Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano, Italy*. Data and infrastructure protection is a crucial aspect for future optical networks. This paper analyses the feasibility of the integration of sensing, quantum and data communications for a fully-protected passive optical network.

SpTu1F.3 • 10:00

Quantum Walks in Synthetic Photonic Lattices for Time-Bin Entanglement

Processing, Agnes George¹, Monika Monika^{1,2}, Farzam Nosrati^{1,3}, Stefania Sciarra¹, Riza Fazili¹, Andre Luiz Muniz^{1,2}, Arstan Bisianov^{1,2}, Nicola Montaut¹, Rosario Lo Franco³, William J Munro⁴, Mario Chemnitz^{5,1}, Ulf Peschel², Roberto Morandotti¹; ¹*INRS, Canada*; ²*Inst. of Solid State Theory and Optics, Germany*; ³*Dipartimento di Ingegneria, Università di Palermo, Italy*; ⁴*Okinawa Inst. of Science and Technology Graduate Univ., Japan*; ⁵*Leibniz Inst. of Photonic Technology, Germany*. We employ a coupled fiber-loop system to simulate a synthetic photonic lattice in the temporal domain and control the quantum walk evolution of time-bin entangled states, enabling improved detection efficiency and enhanced coincidence counts.

11:00 -- 12:30

Room: Les Goudes 1

ITu2A • LiNbO3 and Other Chi(2) Materials

Presider: Christelle Monat; Ecole Centrale de Lyon, France

ITu2A.1 • 11:00 (Invited)

A Standardized Thin-Film Lithium Niobate Platform for Photonic Integrated

Circuits, Alberto Della Torre¹, Homa Zarebidaki¹, Arno Mettraux¹, Florian Dubois¹, Jacopo Leo¹, Dorian Herle¹, Ivan Prieto¹, Olivier Dubochet¹, Michel Despont¹, Hamed Sattari¹; ¹*CSEM, Switzerland*. We present the advancements in our thin-film lithium niobate photonic integrated circuits foundry platform. We show propagation losses below 1 dB/cm, V_{π} -L around 2 V.cm, and electro-optic bandwidth beyond 50 GHz through different fabrication runs.

ITu2A.2 • 11:30

Barium Titanate's Permittivity and Pockels Coefficients From MHz to sub-THz for

Integrated Photonic Devices, Daniel Chelladurai¹, Manuel Kohli¹, Joel Winiger¹, David Moor¹, Andreas Messner², Yuriy Fedoryshyn¹, Mohamed Eleraky¹, Yuqi Liu¹, Hua Wang¹, Juerg Leuthold¹; ¹*ETH Zurich, Switzerland*; ²*Zurich Instruments, Switzerland*. Barium titanate's (BTO)

Optica Advanced Photonics Congress

Session Guide

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

exceptionally large Pockels coefficients and permittivity are shown to have a strong frequency dependence from 100 MHz to 330 GHz. These data and the integrated characterization method are crucial for developing high-speed photonic integrated circuits.

ITu2A.3 • 11:45

Second Harmonic Generation in Polycrystalline Zinc Sulfide Nanowaveguides, Antoine Lemoine¹, Lise Morice¹, Brieg Le Corre^{1,2}, Antoine Létoublon¹, Alex Naïm¹, Thomas Batte¹, Mathieu Perrin¹, Julie Le Pouliquen¹, Karine Tavernier¹, Charles Cornet¹, Christophe Levallois¹, Yannick Dumeige¹, Yoan Léger¹; ¹*Institut FOTON, France*; ²*C2N, France*. In this work, we investigate ZnS thin films for nonlinear photonics. Deposited via magnetron sputtering, they exhibit excellent properties. We fabricate and characterize ZnS nanowaveguides, demonstrating second harmonic generation and their potential for advanced photonic applications.

ITu2A.4 • 12:00 (Invited)

Vectorial Brillouin Scattering in Anisotropic Platforms: From Lithium Niobate to Lithium Tantalate Integrated Photonics, Gustavo S. Wiederhecker¹; ¹*UNICAMP, Brazil*. We demonstrate cross-polarized backward SBS in Lithium Niobate waveguides and highlight its vectorial nature; as an outlook, we report initial SBS measurements in Lithium Tantalate, a scalable platform for future anisotropic Brillouin photonics.

11:00 -- 12:30

Room: Callelonge Hall Tier

ITu2B • Metamaterials

Presider: Daniele Melati; C2N - CNRS, Université Paris-Saclay, France

ITu2B.1 • 11:00 (Invited)

Metamaterial-Enhanced Silicon Photonics: Design and Applications, Winnie N. Ye¹; ¹*Carleton Univ., Canada*. This paper explores the integration of subwavelength metamaterials with silicon photonics to enhance device performance and functionality. Key advancements include devices for polarization control, coupling, and beam steering, enabling high-speed communications, quantum photonics, and biomedical sensing.

ITu2B.2 • 11:30

A Machine Learning-Based Framework for Pseudo-3D Optimization of Metamaterial Grating Couplers, Qiang Wang³, Norman Israel³, Dan-Xia Xu¹, Yuri Grinberg², Lora Ramunno³; ¹*Advanced Electronics and Photonics Research Center, National Research Council of Canada, Canada*; ²*Digital Technologies Research Center, National Research Council of Canada, Canada*; ³*Department of Physics, and Nexus for Quantum Technologies Inst., Univ. of Ottawa, Canada*. We present Metastrip Net, a machine learning (ML) framework designed to accurately predict the environment-dependent effective index, facilitating the efficient design of metamaterial grating coupler through the integration of multi-objective optimization.

ITu2B.3 • 11:45

Laser Machining Achieves Bulk-Glass Metaphotonic Devices, Nicolas Sanner^{1,2}, Srijoyee Datta^{1,2}, Raphaël Clady^{1,2}, David Grojo^{1,2}, Olivier Uteza^{1,2}; ¹*Aix-Marseille Univ., France*; ²*CNRS LP3, France*. A functional metaprism device, made of assembly of hollow nanochannels, is engraved directly inside the bulk of standard silica glass within a single-step, maskless and

Optica Advanced Photonics Congress

Session Guide

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

digital approach: direct laser machining.

ITu2B.4 • 12:00 (Invited)

Active Meta-Components for Future Dense Integration of Photonic ICs, Tingyi Gu¹; ¹*Univ. of Delaware, USA*. Subwavelength engineering on SOI slab waveguides enables compact designs for photonic integrated circuits to demonstrate multi-mode conversion, non-Hermiticity, non-reciprocity, mathematical convolution, hyperspectral image classification, and spectrometry.

11:00 -- 12:45

Room: Sormiou

NeTu2C • Optical Transmission

Presider: Oskars Ozolins; RISE Research Inst.s of Sweden AB, Latvia

NeTu2C.1 • 11:00 (Invited)

212.5 Gbaud OOK Transmission in C-Band Over 11.1 km Long HCF Using Silicon Photonics TW-MZM, Suttikarn Wantee³, Darja Cirjulina², Armands Ostrovskis², Hao Liu³, Kyle Bottrill³, Gregory T. Jasion³, Hesham Sakr³, John R. Hayes³, Vjaceslavs Bobrovs², Francesco Poletti³, Xiaodan Pang², Periklis Petropoulos³, Oskars Ozolins^{2,1}; ¹*RISE Research Inst.s of Sweden AB, Latvia*; ²*Riga Technical Univ., Latvia*; ³*Univ. of Southampton, UK*. We demonstrate up to 212.5 Gbaud on-off keying transmission in C-band over 11.1 km long hollow core fiber using a Silicon Photonics traveling-wave Mach-Zehnder modulator (TW-MZM) with performance satisfying 6.25% overhead HD-FEC requirements.

NeTu2C.2 • 11:30

ML-Assisted Gaussian Noise Modeling of NLI Accumulation in Dispersion Managed Optical Links, Rosario Ietro¹, Emanuele E. Virgillito¹, Antonio Napoli², Sai K. Bhyri², Gabriele Galimberti², Walid Wakim², Vittorio Curri¹; ¹*Politecnico di Torino, Italy*; ²*Nokia, Germany*. Coherent accumulation of non-linearity on QAM modulated signals can be severe in dispersion-managed links. We propose a machine learning assisted, spatially disaggregated model able to provide a fast and accurate non-linearity estimation in this scenario.

NeTu2C.3 • 11:45

Experimental 100GHz-Wide Filtering of 95 GBaud Channels, Thierry Zami^{2,1}, Amirhossein Ghazisaeidi¹, MAel Le Monnier^{2,1}, bruno lavigne^{2,1}; ¹*Nokia Corporation, France*; ²*ASN, France*. We simulate and experimentally assess the conditions for effectively routing up to 95 GBaud channels in a transparent WDM network with 100 GHz channel spacing.

NeTu2C.4 • 12:00

Combined Direct / External Laser Modulation for Generation of DAC-Less 50G PAM4 Signals, Marcos Costas¹, Lakshmi Narayanan Venkatasubramani¹, Prajwal Lakshmijayasimha², Richard Phelan², Diarmuid Byrne², Brian Kelly², Liam P. Barry¹; ¹*Dublin City Univ., Ireland*; ²*Eblana Photonics, Ireland*. The potential for DAC-less 50 Gb/s PAM-4 generation using a directly modulated laser followed by an external modulator is demonstrated. We employ a laser with 16GHz bandwidth and achieve BER as low as 10⁻⁵.

NeTu2C.5 • 12:15 (Invited)

Optica Advanced Photonics Congress

Session Guide

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

Leveraging the Potential of Coherent Pluggable Transceivers Across Diverse Network Applications, Joao Pedro^{1,2}; ¹*Optical Networks, Nokia, Portugal*; ²*Instituto de Telecomunicações, IST, Portugal*.

Coherent pluggable transceivers are increasingly pervasive in optical networks. This paper describes diverse network applications that can leverage these transceivers and the sub-system / system customizations that enable to maximize their potential in each application.

11:00 -- 12:30

Room: Les Goudes 2

NoTu2D • Bioelectronics and Photostimulation

Presider: Brandon Shaw; US Naval Research Laboratory, USA

NoTu2D.1 • 11:00 (Invited)

Skin-Conformable Sensors and Displays Using Stretchable Optoelectronic

Materials, Naoji Matsuhisa¹; ¹*The Univ. of Tokyo, Japan*. We demonstrate displays and sensors that are as soft as human skin. The devices can be directly attached to the skin and are imperceptible during wear to enable long-term usage.

NoTu2D.2 • 11:30

Quantum Dot-Interfaced Nanowire Arrays for Effective Near-Infrared Photostimulation of

Neurons, Tarik S. Kaya¹, Andrea Corna², Hümeýra Nur Kaleli³, Ridvan Balamur⁴, Asim Onal⁵, Ugur B. Caliskan⁴, Roya Mohajeri⁴, Günther Zeck², Sedat Nizamoglu⁴; ¹*Department of Material Science and Engineering, Koç Univ., Turkey*; ²*Inst. of Biomedical Electronics, TU Wien, Austria*; ³*Research Center for Translational Medicine, Koç Univ., Turkey*; ⁴*Department of Electrical and Electronics Engineering, Koç Univ., Turkey*; ⁵*Department of Biomedical Science and Engineering, Koç Univ., Turkey*. An optoelectronic biointerface incorporating AgBiS₂ nanocrystals and ZnO nanowires was nanoengineered for infrared neural modulation. The biointerface exhibits high photostability and efficient charge injection, enabling ex-vivo retina photostimulation.

NoTu2D.3 • 11:45

AgBiS₂ Quantum Dots as Pseudocapacitive Optoelectronic Nanocrystals for

Neurostimulation, Tarik S. Kaya¹, Ridvan Balamur², Selin Sariyer³, Hümeýra Nur Kaleli⁴, Asim Onal⁵, Ugur B. Caliskan², Murat Hasanreisoglu^{6,4}, Rezan Demir-Cakan³, Sedat Nizamoglu²; ¹*Department of Material Science and Engineering, Koç Univ., Turkey*; ²*Department of Electrical and Electronics Engineering, Koç Univ., Turkey*; ³*Department of Chemical Engineering, Gebze Technical Univ., Turkey*; ⁴*Research Center for Translational Medicine, Koç Univ., Turkey*; ⁵*Department of Biomedical Science and Engineering, Koç Univ., Turkey*; ⁶*Department of Ophthalmology, Medical School, Koç Univ., Turkey*. This study presents a bioelectronic design using AgBiS₂ quantum dots (QDs) as a photoabsorber, hole transporter, and pseudocapacitive interface. QDs lead to safe photocurrents based on reversible Faradaic reactions, enabling neuronal stimulation without oxidative stress.

NoTu2D.4 • 12:00 (Invited)

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

11:00 -- 12:30

Room: Morgiou

STu2E • Thermal Photonics II

Presider: Ioannis Papakonstantinou; Univ. College London, UK

STu2E.1 • 11:00 (Invited)

Radiative Transfer in Dense Media: Theory and Applications, Refet A. Yalcin¹; ¹*Saint-Gobain Research, France*. Here, we discuss the methods and improvements to model radiative transfer through dense and/or correlated disordered media including boundary reflection. Applications include but are not limited to colloids, aerogels, dependent scattering map and estimating effective refractive index.

STu2E.2 • 11:30

Combining Metallic Glass and Epsilon-Near-Zero Thin Films for Thermal Camouflage and Thermal Management Within the Atmospheric Window, Wei Hsuan Kung¹, Pei-Chi Hsieh¹, Shan-Chiao Yang¹, Wen Hsin Chang¹, Hsuen-Li Chen^{1,2}; ¹*National Taiwan Univ., Taiwan*; ²*Center of Atomic Initiative for New Materials, National Taiwan Univ., Taiwan*. A new structure design was proposed by combining metallic glass with the Berreman mode of epsilon-near-zero (ENZ) thin films to achieve a dual-function system for infrared camouflage and thermal management within the atmospheric window.

STu2E.3 • 11:45

Microlens Array for Broadband Directional Control of Thermal Radiation, Yung Chak Anson Tsang¹, Jyotirmoy Mandal^{1,2}; ¹*Civil and Environmental Engineering, Princeton Univ., USA*; ²*Princeton Materials Inst., Princeton Univ., USA*. A microarray of hypo-hemispherical lenses patterned on flexible infrared transparent substrates can control the polar transmission and reflection of broadband infrared radiation. Selection of geometric parameters and materials allows tuneability in the angular transmission range.

STu2E.4 • 12:00

Thermal Emission by sub-Wavelength Planar Finite Objects, Kyriaki Kontou¹, Olivier Merchiers¹, Azeddine Tellal², Taha Benyattou², Jean-Louis Leclerc², Pierre-Olivier Chapuis¹; ¹*CETHIL, INSA Lyon & CNRS, France*; ²*INL, INSA Lyon, UCBL, CNRS, France*. We study experimentally thermal emission by holes smaller than and of the order of the thermal wavelength. We perform a characterization as a function of temperature and size and compare with theoretical results from literature.

STu2E.5 • 12:15

Withdrawn

11:00 -- 12:30

Room: Callelonge Hall Flat

SpTu2F • Next Generation Transmission Systems I

Presider: Christoph Füllner; Nokia Bell Labs, Germany

SpTu2F.1 • 11:00

Optica Advanced Photonics Congress

Session Guide

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

Modulation-Format Transparent Carrier Phase Recovery Based on Multilayer

Perceptron, Chenrui Xu¹, Tobias Blatter¹, Serge Kaufmann¹, Laurenz Kulmer¹, Juerg Leuthold¹; ¹*ETH Zurich, Switzerland*. This paper presents a novel carrier phase recovery algorithm using multilayer perceptrons, achieving modulation-format transparency, robust performance across a large SNR range, and computational efficiency. In both simulations and experiments, it outperforms 2S-BPS and U-CPE.

SpTu2F.2 • 11:30 (Invited)

Optical Techniques for THz Bandwidth Coherent Transceivers, Callum Deakin¹; ¹*Nokia Bell Labs, USA*. We review work on optical techniques to scale the bandwidth of optical coherent transceivers beyond the bandwidth of the constituent electronic devices.

SpTu2F.3 • 12:00 (Invited)

InP-Based High-Speed Transceivers Heterogeneously Integrated on Silicon: the Quest for Efficiency, Low-Cost Manufacturing and Performance, Joan Manel Ramirez¹, Delphine Neel¹, Claire Besancon¹, nicolas vaissiere¹; ¹*Nokia Bell Labs France, France*. I will review our recent progress on high-speed integrated InP-based transceivers for silicon photonics. The most relevant figures of merit for integrated lasers and electro-absorption modulators for high-speed optical communications will be discussed, as well as my vision for future development.

15:30 -- 17:00

Room: Expo Reception Hall

JTU3A • Joint Poster Session

JTu3A.1

Characterization of DC Kerr Effect in Silicon Microring Resonators, Abdou Shetewy¹, Weizhong Zhang¹, Menglong He¹, Kambiz Jamshidi¹; ¹*Technische Universität Dresden, Germany*. In this work, the DC Kerr effect in a silicon microring resonator is characterized. The DC Kerr effect contributes up to (85%) of the total change in refractive index of the waveguide.

JTu3A.2

InAlGaAs Based O-Band IA-EML With Selective Area Growth for 6G Fronthaul

Network, Seungchul Lee^{1,2}, namje kim¹, Jun-Hwan Shin¹, Miran Park¹, Jonghwa Shin², O-Kyun Kwon¹; ¹*Electronics and Telecommunications Research Inst., Korea (the Republic of)*; ²*Department of Material Science and Engineering, Korea Advanced Inst. of Science and Technology, Korea (the Republic of)*. We present modified IA-EML using selective area growth, optimizing to eliminate the absorptive waveguide and enhance gain without complicated regrowth processes. We introduce improved static and dynamic characteristics for future 6G networks.

JTu3A.3

Silicon Nitride Ring Resonator Integrated Tunable Lasers Using Chip-to-Chip Butt-

Coupling Technology, Jong-Hoi Kim¹, Jang-Uk Shin¹, Sang-Ho Park¹, Young-Tak Han¹, Dong-Hoon Lee¹; ¹*Electronics and Telecom Research Inst, Korea (the Republic of)*. We present hybrid-integrated tunable lasers based on optical butt-coupling between a silicon nitride ring resonator and a semiconductor optical amplifier, showing wavelength tuning range of 47 nm

Optica Advanced Photonics Congress

Session Guide

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

over C + L band

JTu3A.4

Continuous-Variable Quantum Key Distribution With Silicon Photonics Modulator and Detector, Yiming Bian¹, Xuesong Xu¹, Xin Hua², Lu Fan¹, Song Yu¹, Lei Zhang¹, Xi Xiao², Yichen Zhang¹; ¹*Beijing Univ. of Posts and Telecommunications, China*; ²*National Information Optoelectronics Innovation Center, China*. We report a chip-based continuous-variable quantum key distribution featuring a modulator and detector integrated on a standard silicon photonic platform, achieving 3.9 Mbps key rate at 5 km in a free-running configuration.

JTu3A.5

Tilted Subwavelength Grating Assisted Directional Coupler Based WDM., Ravi R. Kumar¹, Rajarshi Guchhait¹, Devendra Chack¹; ¹*Indian Inst. of Technology Dhanbad, India*. A compact dual-wavelength multiplexer has been proposed, utilizing a tilted subwavelength-grating coupler with insertion losses of less than 0.93dB and cross-talk -18 dB and -16.5 dB at 1500/1600 nm wavelength.

JTu3A.6

Highly Efficient and Compact non-Uniform Waveguide Grating Antenna for off-Chip Coupling, DIKSHA MAURYA¹, Devendra Chack¹, Ravi R. Kumar¹; ¹*Electronics, Indian Inst. of Technology (ISM) Dhanbad, India*. We proposed a highly efficient non-uniform waveguide grating antenna for off-chip coupling in the C band. The waveguide grating antenna is optimized using the genetic algorithm to achieve high diffraction efficiency and compact size.

JTu3A.7

Polarization-Dependent Optical Switching and Complex Cylindrical Vector Beam Generation Using an All-Dielectric Chiral Metasurface, Bharathy J¹, Nithyanandan Kanagaraj¹; ¹*Indian Inst. of Technology Hyderabad, India*. This work introduces a novel chiral metasurface that acts as an optical switch under RCP and LCP light and generates CVVBs under linear polarization, enabling advanced beam control for optical communications in next-generation photonic systems.

JTu3A.8

Ultra High Efficient Grating Coupler for 800 nm Thick Silicon Nitride Platform, Pravin Rawat¹, Siddharth Nambiar¹, Shankar k. selvaraja¹; ¹*IISc, India*. We propose an ultra-high efficient grating coupler design for 800 nm thick SiN waveguide. We obtain a simulated peak coupling efficiency of 95% or -0.22 dB and 3 dB bandwidth of more than 100 nm.

JTu3A.9

Photonic Integrated Circuit (PIC) on Fiber Tips for Lab-on-Fiber Sensing., Arthur D. Bouamra^{1,2}, Jui Hung Chen², Andrea Fiore¹, Shuo-Yen Tseng², René van Veldhoven¹; ¹*Technologic Univ. of Eindhoven, Netherlands*; ²*National Cheng Kung Univ., Taiwan*. We demonstrate a method for packaging photonic integrated circuits on a fiber tip, based on the membrane-on-fiber transfer technology and a vertical-coupling grating design, It can enable the next generation of high resolution and multiplexed fiber sensors.

JTu3A.10

Optica Advanced Photonics Congress

Session Guide

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

PCS Direct Communication for Low-Latency Optical Memory Interconnection, Chanh Park¹, Hun-Sik Kang¹; ¹*Electronics & Telecommunication Research, Korea (the Republic of)*. We implemented a communication method suitable for optical switches by modifying the PCS layer encoding, enabling low-latency packet transmission. Using this, we reduced latency by 37% compared to traditional methods.

JTu3A.11

Withdrawn

JTu3A.12

Linear and Nonlinear Optical Responses in QDs, Xue Bai¹, Shenghao Wang¹, Wei Zhou¹, Lingzhi Wu¹, Xueli Dong¹, Yixuan Li¹, Waseem Yasin Muhammad¹, John James Magan¹, Gaozhong Wang¹; ¹*Shanghai Inst of Optics and Fine Mech, China*. In this work, the influence of dimensions, shapes and compounds on the linear and nonlinear optical properties of a variety of QDs are obtained.

JTu3A.13

Large-Area QD EL Devices Using Green InP Multishell QDs Based on P(DEA)₃ Precursor, Sunghyun Cho¹, Hyeok Kim², Do Hwan Kim³, Jiwan Kim¹; ¹*Department of Advanced Materials Engineering, Kyonggi Univ., Korea (the Republic of)*; ²*School of Electrical Engineering, Univ. of Seoul, Korea (the Republic of)*; ³*Department of Chemical Engineering, Hanyang Univ., Korea (the Republic of)*. Green InP quantum dots with an InP/ZnSe/ZnS heterostructure were synthesized using a P(DEA)₃ precursor. Optimized QDs exhibited 528 nm emission and 37 nm FWHM and EL devices show the luminance over 4000 cd/m². Additionally sputtered ZnMgO ETL improved large-area fabrication with enhanced stability.

JTu3A.14

Correlated Disordered Nanostructures for Light Trapping in Ultrathin Solar Cells, Laura DE ALMEIDA¹, Inès REVOL¹, Jean-Baptiste Doucet¹, Mathieu Arribat¹, Guilhem Almuneau¹, Stéphane Collin^{2,3}; ¹*LAAS-CNRS, France*; ²*C2N, France*; ³*IPVF, France*. We present a low-cost colloidal lithography process for creating correlated disorder nanostructures to enhance light trapping in ultra-thin silicon solar cells. This approach optimizes light-matter interactions and reduces manufacturing costs.

JTu3A.15

Withdrawn

JTu3A.16

Near-Infrared Sensitive Homo-Tandem Photodiodes Using Quantum Dots for Retina Implants, Tarik S. Kaya¹, Parsa Kaviani², Ridvan Balamur², Asim Onal³, Sedat Nizamoglu²; ¹*Department of Material Science and Engineering, Koç Univ., Turkey*; ²*Department of Electrical and Electronics Engineering, Koç Univ., Turkey*; ³*Department of Biomedical Science and Engineering, Koç Univ., Turkey*. We developed and characterized near-infrared (NIR)-sensitive photovoltaic cells with tandem photodiodes employing quantum dots (QDs). The tandem structure shows good biocompatibility, enables higher electrochemical photocurrents, and allows for enhanced neuron stimulation in infrared.

JTu3A.17

Optica Advanced Photonics Congress

Session Guide

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

Towards Accurate Determination of Optical Gaps in Layered Chalcogenides Using Universal Scaling

Law, Shahzad Ahmad¹, Muhammad Zubair¹, Usman Younis¹; ¹*Information Technology Univ., Pakistan.* Fractional Coulomb potential model is developed to accurately capture exciton binding energies from monolayer to bulk 2D materials. A linear fit to material parameters demonstrates power-law transition for layer-dependent exciton binding energies in TMDs.

Tu3A.18

Design and Modeling of Cu/TiO₂ (Core/Shell) Nanoparticles for High Performance SERS Substrates: a Pathway to Food

Contamination Detection, Vijay Janyani¹; ¹*Malaviya National Inst of Tech Jaipur, India.* This study demonstrates design and optimization of Cu/TiO₂ nanoparticles-based Surface-enhanced Raman scattering (SERS) substrate for detecting food contaminants with good sensitivity and achieving a high electromagnetic field enhancement factor. The core (Cu)/ shell (TiO₂) design offers chemical stability and surface modification potential.

JTu3A.19

Controlling Light Matter Interaction in a Hybrid Resonator, Belkis Gokbulut¹; ¹*Department of Physics, Bogazici Univ., Turkey.* In this study, a hybrid photonic-plasmonic device, which consists of a single Au nanoparticle and a partially encapsulated 1D photonic crystal waveguide, is introduced to control light–matter interaction for integrated photonic platforms.

JTu3A.20

Plasmonic-Enhancement of Vibrational Circular Dichroism in Plasmonic Nanostructures

Embedding Chiral Drugs, Raju Adhikary¹, Matteo Venturi¹, Giovanna Salvitti¹, Ambaresh Sahoo¹, Carino Ferrante², Paola Benassi^{1,2}, Francesco Di Stasio³, Andrea Toma³, Hatice Altug⁴, Massimiliano Aschi¹, Andrea Marini^{1,2}; ¹*Univ. of L'Aquila, Italy;* ²*CNR-SPIN, Italy;* ³*IIT, Italy;* ⁴*EPFL, Switzerland.* We investigate the mid-infrared chiroptical response of Aluminum-doped Zinc Oxide (AZO)-based plasmonic nanostructures incorporating pharmaceutical chiral drug solutions. We systematically examine plasmon-enhanced vibrational circular dichroism (VCD) of the chiral drug solution to develop efficient chiroptical sensing techniques.

JTu3A.21

Enhanced Sensing of Chiral Drug Molecules in Epsilon-Near-Zero Disordered

Metamaterials., ASHIS K. PAUL¹, Matteo Venturi¹, Raju Adhikary¹, Giovanna Salvitti¹, Carino Ferrante², Davide Tedeschi¹, Francesco Di Stasio³, Andrea Toma³, Hatice Altug⁴, Andrea Marini^{1,2}; ¹*Department of Physical and Chemical Sciences, UNIV. OF LAQUILA, Italy;* ²*CNR-SPIN, c/o Dip.to di Scienze Fisiche e Chimiche, Via Vetoio, L'Aquila 67100, Italy, Italy;* ³*Istituto Italiano di Tecnologia, Via Morego 30, Genova 16136, Italy, Italy;* ⁴*Inst. of Bioengineering, Ecole polytechnique federale de Lausanne (EPFL), Lausanne 1015, Switzerland, Switzerland.* We report enhanced optical rotation and circular dichroism in a disordered chiral metamaterial composed of metallic nanospheres randomly dispersed in a chiral drug solution in the epsilon-near-zero regime.

JTu3A.22

Optica Advanced Photonics Congress

Session Guide

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

Withdrawn

JTu3A.23

Amplifying Light-Matter Interactions by Manipulating Topologically-Protected Tamm Plasmon Polaritons in Photonic Hypercrystal, Bartosz Janaszek^{2,1}, Tomasz Smiarowski^{2,1}, Anna Tyszk-Zawadzka², Pawel Szczepanski^{2,1}; ¹*National Inst. of Communications, Poland*; ²*Faculty of Electronics and Information Technology, Warsaw Univ. of Technology, Poland*. We demonstrate and investigate method for controlling topological edge states in synthetic geometrical space, taking form of Tamm Plasmon Polaritons in real space, to enhance light-matter interaction in linear and nonlinear photonic crystals and hypercrystals.

JTu3A.24

LUminescent Materials in Photovoltaic Concentrated Solar Power, Georgios E. Arnaoutakis¹; ¹*Hellenic Mediterranean Univ., Greece*. Combined photovoltaics and concentrated solar power can concurrently provide electricity and heat. Spectral management is required in these systems to separate and store the absorbed solar energy. In this work, the performance of luminescent materials is assessed for photovoltaic concentrated solar power plants.

Optica Advanced Photonics Congress

Session Guide

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

Wednesday, 16 July

09:00 -- 10:30

Room: Les Goudes 1

JW1A • Joint Plenary Session II

Presider: Judith Su; Univ of Arizona, Coll of Opt Sciences, USA

JW1A.1• 09:00 (Plenary)

What Will You Use Those Extra GPUs for? Designing Scalable Optical Networks for an AI-Driven World, Polina Bayvel¹; ¹*Univ. College London, UK*. To support growing data demands, partly driven by AI applications, optical networks must deliver massive capacity with intelligence and efficiency. However, optical networks are not just sets of transparent pipes, they have physical transmission and graph properties which must be integrated into the network design – both for new networks and to evolve existing network infrastructure. Optimising over tens of formats, hundreds of independent channels over thousands of kms through brute force optimisation is hard, if not impossible! Reduction of complexity is key. By integrating advanced optimisation and machine learning, we must learn to design that match the complexity of future applications and the talk will look at some possible direction to achieve this.

JW1A.2• 09:00 (Plenary)

Photonic Integrated Circuit Scaling Pathways, Anna Tauke-Pedretti¹; ¹*Defense Advanced Res Projects Agency, USA*. This talk will share recent DARPA program investments for increasing the size and complexity of photonic integrated circuits. It will also discuss the challenges and opportunities the creation of these circuits present. The needed ecosystem advancements to increase access to and further mature photonic integrated circuit technology will also be covered.

11:00 -- 12:30

Room: Les Goudes 1

IW2A • Switching Devices

Presider: Michael Menard; École de technologie supérieure, Canada

IW2A.1 • 11:00 (Invited)

Nonvolatile Magneto-Optic Switch and Memory for Photonic Computing, Yuya Shoji¹; ¹*Inst. of Science Tokyo, Japan*. Nonvolatile magneto-optic (MO) switch is driven by MO effect and its switching state is held by magnetic material. MO memory is investigated by controlling the magnetization of magnetic material by light pulse.

IW2A.2 • 11:30

Enhancement of Optical Bistability in Suspended Photonic Crystal Cavity for Switching Application, Pratip Ghosh¹; ¹*Indian Inst. of Science, India*. We demonstrate optical nonlinearity in a one-dimensional photonic crystal cavity, achieving bistability at 0.125 mW. Suspending the cavity enhances nonlinear effects, improves optical confinement, and makes it promising for ultra-low-power optical switching applications.

Optica Advanced Photonics Congress

Session Guide

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

IW2A.3 • 11:45

Analysis and Synthesis of Silicon Based Optical (De)Multiplexer to Enable AO-OFDM, Enzo G. da Cruz¹, Felipe da Silva¹, Mateus Coelho¹, Pablo Marciano¹, Luís da Silva¹, Maxwell Monteiro², Maria Pontes¹, Marcelo Segatto¹; ¹*Federal Univ. of Espirito Santo, Brazil*; ²*Federal Institue of Espirito Santo, Brazil*. This work proposes an all-optical orthogonal frequency division multiplexing with high spectral efficiency capable of transmitting more than 90 Gbps with base-band modulation formats and theoretically achieving 200 Gbps for the PAM-4 modulation format.

IW2A.4 • 12:00

Low-Voltage Nanoelectromechanical Photonic Switches Based on Laterally Driven Directional Coupler, Kamma N. Pedersen¹, Ali N. Babar^{1,2}, Bingrui Lu^{1,2}, Jesper L. Sand¹, Mathias L. Korsgaard¹, Nikolaj B. Hougs¹, Thor A. Weis^{1,2}, Søren Stobbe^{1,2}, Babak Vosoughi Lahijani¹; ¹*DTU Electro, Denmark*; ²*NanoPhoton -- Center for Nanophotonics, Denmark*. We present a nanoelectromechanical photonic switch based on laterally driven directional couplers and show that switching nodes can be programmed to achieve full tunability with a driving voltage of less than 6 V.

IW2A.5 • 12:15

Platform-Dependent Feasibility of All-Optical Switching in Photonic Integrated Circuits, Pedro H. Godoy¹, Lucas C. Ahler¹, Simon T. Thomsen¹, Emil Z. Ulsig¹, Nicolas Volet¹; ¹*Department of Electrical and Computer Engineering, Aarhus Univ., Denmark*. We conduct a feasibility study on integrated Kerr all-optical switching using ring resonators across InGaP, GaN, and Si₃N₄. Simulations are used to determine performance and reliability, showing InGaP has the most promise.

11:00 -- 12:30

Room: Callelonge Hall Tier

SpW2B • Photonics for RF and Free Space Optical Communication

Presider: Dora van Veen; Nokia Corporation, USA

SpW2B.1 • 11:00 (Invited)

Adaptive Beam Control Techniques for Free-Space Optical Communications, Kim S. Hoon¹; ¹*Korea Advanced Inst of Science & Tech, Korea (the Republic of)*. We review the adaptive beam control techniques for free-space optical communication systems where the beam divergence and convergence angles are adjusted adaptively to the channel conditions at the transmitter and receiver, respectively, to mitigate the adverse impact of beam misalignment.

SpW2B.2 • 11:30 (Invited)

Architectures and Demonstrations of Free-Space Optical Communication and Sensing Systems at TRT : From the Short to the mid Infrared Regions, Bruno Martin¹, Aude Martin¹, Vincent Billault¹, Luc Leviandier¹, Jérôme Bourderionnet¹, Patrick Feneyrou¹, Loïc Morvan¹, Nicolas Berthou², Mohammadreza Saemian³, Djamel Gacemi³, Carlo Sirtori³; ¹*Thales Research & Technology, France*; ²*Thales SIX, France*; ³*Laboratoire de Physique de l'Ecole Normale Supérieure, France*. By using photonic integrated coherent beam combining, modulating retroreflectors and

Optica Advanced Photonics Congress

Session Guide

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

thanks to recent progress in mid-infrared high-speed optoelectronics, we investigate the use of state-of-the-art components to improve optical links bitrates and robustness against atmospheric perturbations.

SpW2B.3 • 12:00

Demonstrating FSO Link in Weak Turbulence Environment for 5G Picocell

Networks, Saad Saeed¹, Abdullah N. Khan^{1,2}, Usman Younis¹; ¹*Information Technology Univ., Pakistan*; ²*The Interdisciplinary Research Center for Communication Systems and Sensing, King Fahd Univ. of Petroleum and Minerals, Saudi Arabia*. A weak turbulence channel model is proposed to deploy indoor FSO link using log-normal distribution. Atmospheric turbulence along with estimated OSNR and BER are calculated using C_n^2 and σ_I^2 which agree with the measured results.

11:00 -- 12:30

Room: Sormiou

NeW2C • QKD II

Presider: Catalina Stan; Technische Universiteit Eindhoven, Netherlands

NeW2C.1 • 11:00 (Invited)

Physical-Layer Impairment in Integrating QKD to Optical Fiber Networks, Rui Lin¹, Seyed Morteza Ahmadian¹, Chao Lei¹; ¹*Chalmers Tekniska Högskola, Sweden*. We will review the integration challenges of Quantum Key Distribution (QKD) into telecommunication infrastructures, with particular focus on the physical-layer impairments caused by the co-propagation of classical signals within the fiber and during switching processes.

NeW2C.2 • 11:30

Placement of Trusted Nodes in QKD-Enabled Networks, María Álvarez Roa¹, Catalina Stan¹, Simon Rommel¹, Sebastian Verschoor²; ¹*Technische Universiteit Eindhoven, Netherlands*; ²*Informatics Inst., Univ. of Amsterdam, Netherlands*. We study the placement of trusted relay nodes (TRNs) when upgrading a network with quantum key distribution. Taking equal spacing of TRNs as first approximation, we analyze various topologies and estimate the required TRNs.

NeW2C.3 • 11:45 (Invited)

Practical Considerations for Adapting Optical Transport Networks for Quantum and Classical Communications, Antonio Melgar¹, JOSE M. Rivas Moscoso¹, Michela Svaluto Moreolo², Masab Iqbal², Jeison Tabares³, Pablo Armingol¹, Borja Villanueva³, Sebastián Etcheverry³, Rafael Cantó¹, Jesús Folgueira¹; ¹*Telefónica CTIO, Spain*; ²*CTTC, Spain*; ³*LuxQuanta, Spain*. Based on previous numerical results from deploying CV-QKD systems in coexistence scenarios with partial and full C-Band utilization over existing metro networks, we offer practical considerations to maximize the classical signal power range that enables quantum-classical coexistence.

Optica Advanced Photonics Congress

Session Guide

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

11:00 -- 12:45

Room: Les Goudes 2

NoW2D • Novel Fabrication Process and Materials for Nonlinear Applications

Presider: Francois Chenard; IRflex Corporation, USA

NoW2D.1 • 11:00

Extrusion of Chalcogenide Glasses Towards Small-Core Step-Index Fibres for Mid-IR Supercontinuum Generation., Richard Crane¹, Getinet Woyessa¹, Jakob Janting¹, Ole Bang^{1,2}; ¹*DTU Electro, Technical Univ. of Denmark, Denmark*; ²*Norblis, Denmark*. Standard

assembly rod-in-tube fibre preforms are prone to defects at the core-clad interface.

Manufacturing fibres via preform extrusion and drawing is shown to be suitable to produce lower loss fibres with fewer physical defects.

NoW2D.2 • 11:15 (Invited)

Plasmonic Metamaterials for Optical Sensing and Photocatalysis, Anastasia

Zaleska¹; ¹*King's College London, UK*. In this talk, we present a low-cost and scalable fabrication technique for plasmonic metamaterials that are used both as photocatalysts in reduction reactions and as optical sensors for detecting hydrogen gas.

NoW2D.3 • 11:45

Two-Wavelength Optical Parametric Oscillator for Time Resolved Coherent Anti-Stokes Raman Spectroscopy, Dinusha Senarathna¹, HELANI ACHINTHA SINGHAPURA

SINGHAPURAGE¹, Feruz Ganikhanov¹; ¹*Univesrsity of Rhode Island, USA*. Periodically polled lithium niobate (PPLN) based femtosecond optical parametric oscillator (OPO) generates dual-wavelength output at 1064 nm and 1111 nm in the signal arm providing excitation fields for time-resolved coherent anti-Stokes Raman spectroscopy (CARS).

NoW2D.4 • 12:00

Effective Medium Flat Optics, Mohamed ElKabbash¹, Pritam Bengal¹, Abrar Liaf¹; ¹*Univ. of Arizona, USA*. We introduce Effective Medium Optics for large-area efficient optics where deeply subwavelength features control the optical phase such that the homogenized field is robust to phase errors arising from near-field coupling between adjacent unit cells.

NoW2D.5 • 12:15 (Invited)

Single Crystal Fiber Growth and Applications, Brandon Shaw¹; ¹*US Naval Research Laboratory, USA*. Abstract not available.

NoW2D.6 • 12:45

Withdrawn

11:00 -- 12:30

Room: Morgiou

SW2E • Modelling

Presider: Klaus Jaeger; Helmholtz-Zentrum Berlin, Germany

SW2E.1 • 11:00 (Invited)

Optica Advanced Photonics Congress

Session Guide

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

Towards a Fully Differentiable Digital Twin for Solar Cells, Carsten Rockstuhl^{1,4}, Marie Louise Schubert¹, Houssam Metni^{1,5}, Jan David Fischbach¹, Benedikt Zerulla¹, Marjan Krstić⁴, Ulrich W. Paetzold^{6,7}, Seyedamir Orooji^{6,7}, Olivier J. J. Ronsin², Kai Segadlo^{2,10}, Yasin Ameslon^{2,10}, Jens Harting^{2,8}, Thomas Kirchartz^{3,9}, Sandheep Ravishankar³, Christian Sprau⁷, Mohamed Hussein⁷, Alexander Colsmann⁷, Karen Forberich², Pascal Friederich^{1,5}; ¹*Inst. of Nanotechnology, Karlsruher Institut für Technologie, Germany*; ²*Helmholtz-Inst. Erlangen-Nürnberg for Renewable Energy, Forschungszentrum Jülich, Germany*; ³*IEK-5 Photovoltaik, Forschungszentrum Jülich, Germany*; ⁴*Inst. of Theoretical Solid State Physics, Karlsruhe Inst. of Technology, Germany*; ⁵*Inst. of Theoretical Informatics, Karlsruhe Inst. of Technology, Germany*; ⁶*Inst. of Microstructure Technology, Karlsruhe Inst. of Technology, Germany*; ⁷*Light Technology Inst., Karlsruhe Inst. of Technology, Germany*; ⁸*Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*; ⁹*Faculty of Electrical Engineering and Information Technology, Univ. of Duisburg-Essen, Germany*; ¹⁰*Department of Chemical and Biological Engineering, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*. Digital twins are comprehensive digital representations of real-world devices. We present a fully differentiable digital twin for a solar cell, capturing thin-film formation, optical and electrical properties, and energy yield prediction, enabling gradient-based inverse design.

SW2E.2 • 11:30 (Invited)

Monte Carlo ray Tracing Applications to Decarbonised Energy Production and Utilisation, Charles-Alexis ASSELINEAU^{1,2}; ¹*Universidad Politecnica de Madrid, Australia*; ²*School of Engineering, Australian National Univ., Australia*. This presentation introduces a perspective of the advantages of Monte-Carlo methods for component energy balance problems involving significant radiation, followed by examples of applications in solar energy (CST/P and PV), high-temperature materials development and thermophotovoltaics.

SW2E.3 • 12:00 (Invited)

The PVMD Toolbox: a Flexible Modelling Framework for Future PV Systems, Rudi Santbergen¹, Youri Blom¹; ¹*Technische Universiteit Delft, Netherlands*. This study presents a flexible modelling framework, suitable for simulating different types of innovative PV systems. By separating different simulation steps, the software can be used in various ways to accurately simulate different solar technologies.

11:00 -- 12:30

Room: Callelonge Hall Flat

SpW2F • Passive Optical Networks

Presider: Paola Parolari; Politecnico di Milano, Italy

SpW2F.1 • 11:00 (Invited)

Reliable Monitoring of Passive Optical Networks Using Standard Optical Time Domain Reflectometer, Patryk Urban¹; ¹*Telecommunications and Photonics Department, West Pomeranian Univ. of Technology in Szczecin, Poland*. An efficient method for supervision of point-to-multipoint fiber-optic access networks is presented. It is based on an upgraded passive remote node, which realizes reflectometry trace serialization using standard optical time-domain reflectometer

SpW2F.2 • 11:30 (Invited)

Optica Advanced Photonics Congress

Session Guide

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

Towards 100G and 200G PON – Has the Time for Coherent Come?, Christoph Füllner¹, Vincent Houtsma¹, Md Mosaddek Hossain Adib¹, Jochen Maes¹; ¹*Nokia Bell Labs, Germany*. Various technology candidates for 100G and 200G PON are analyzed from a techno-economic perspective and the specific challenges of future PON generations are discussed. The talk addresses the question whether the time for coherent PON has finally come or whether IM/DD solutions will remain the preferred choice for future very high-speed PON.

SpW2F.3 • 12:00

Robust and Low-Complexity Burst-Mode Frequency Offset Estimation for Coherent PON, Muhammad Ahmed Leghari^{1,2}, Gabriele D. Rosa¹, Ognjen Jovanovic¹, Norbert Hanik²; ¹*Adtran Networks SE, Germany*; ²*TUM School of Computation, Information and Technology, Technische Universität München, Germany*. State of polarization fluctuations cause conventional frequency offset estimation algorithms to fail before polarization demultiplexing. We analyze the failure conditions in a coherent PON scenario and validate the effectiveness of a modified lowcomplexity implementation.

SpW2F.4 • 12:15

Preamble Length Optimization for XGS-PON Upstream, Philippe Chanclou¹, Stephane Le Huerou¹, Fabienne Saliou¹, Gaël Simon¹, Jérémy Potet¹, Joseph Zandueti¹, Georges Gaillard¹, Dylan Chevalier¹; ¹*Orange, France*. This paper proposes a method to improve PON throughput performances in optimizing the *burst* preamble in upstream. Up to 9% throughput is gained.

14:00 -- 15:30

Room: Les Goudes 1

IW3A • Integration Platforms

Presider: Christian Grillet; Ecole Centrale de Lyon, France

IW3A.1 • 14:00 (Invited)

200-mm SiN Platform for Photonic Quantum Computing, Emanuel Peinke¹, Quentin Wilmart¹, Jonathan FAUGIER-TOVAR¹, Sylvain GUERBER¹, Valentin Brisson¹, Fabien Laulagnet¹, Elisa Vermande¹, Elisa Colin¹, Stéphane Brision¹, Nicolas Dunoyer¹, Laura Boutafa¹, Olivier Castany¹, Kévin Roux¹, Yohan Désières¹, Clément Ben Braham¹, Pierre Perreau¹, Joël Bleuse², Jean-Michel Gérard², Ségolène Olivier¹; ¹*Univ. Grenoble Alpes, CEA, LETI, France*; ²*Univ. Grenoble Alpes, CEA, IRIG, France*. We present our low-loss 200-mm SiN platform for quantum photonic applications. Optimized for quantum computing, the platform includes efficient waveguide-integrated SNSPD and is designed for 920-nm operation, making QD single photon sources compatible.

IW3A.2 • 14:30

Multilayer Integration Platform With low Propagation and Transition Losses for Dense Optical Phased Arrays, Sarra Salhi¹, Jean-René Coudeville¹, Francois Maillard¹, Etienne Herth¹, Xavier Lafosse¹, Teo Baptiste¹, Abdelmounaim Harouri¹, Ali Madouri¹, Christophe Dupuis¹, Frederic Mahut¹, Alan Durnez¹, Samson Edmond¹, David Bouville¹, Eric Cassan¹, Carlos Alonso-Ramos¹, Daniele Melati¹; ¹*Centre de Nanosciences et de Nanotechnologies, Université Paris-Saclay, CNRS, France*. We present a multi-layer silicon and silicon nitride platform for dense optical phased arrays, achieving low propagation losses of 1.3 dB/cm (Si)

Optica Advanced Photonics Congress

Session Guide

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

and 2.55 dB/cm (SiN), with 0.4 dB losses for layer transitions.

IW3A.3 • 14:45

Photonic Integrated Components Based on Aluminum Oxide for the Blue and Near-UV Spectral Range, Ronan Kervazo¹, Stéphane Trebaol¹, Loïc Bodiou¹, Joël Charrier¹; ¹*Univ Rennes, CNRS, Institut FOTON, France*. The development of Al₂O₃-based integrated components in the blue/near-UV range is reported. An MMI splitting ratio of 3.20±0.34 dB/port at 405 nm and microring resonators quality factors of 2.1*10⁵ measured at 460 nm are demonstrated.

IW3A.4 • 15:00

Low Losses Optical Devices on GaP/GaAs Platform, Lise Morice^{1,2}, Brieg Le Corre^{3,1}, Antoine Lemoine¹, Abdelmounaim Harouri³, gregoire beaudoin³, Luc Le Gratiet³, Tony Rohel¹, Julie Le Pouliquen¹, Rozenn Bernard¹, Charles Cornet¹, Christian Grillet², Isabelle Sagnes³, Konstantinos Pantzas³, Christelle Monat², Yoan Léger¹; ¹*Univ. Rennes, INSA de Rennes, CNRS, Institut FOTON, UMR 6082, F-35000 Rennes, France, France*; ²*Institut des Nanotechnologies de Lyon, UMR CNRS 5270, Ecole Centrale de Lyon, Ecully, France, France*; ³*Centre de Nanotechnologies et de Nanosciences, CNRS, Univ. Paris-Saclay, Palaiseau, France, France*. Here we study Gallium Phosphide-based devices made from GaP/GaAs epilayers in the framework of non-linear photonic integration. We demonstrate state-of-the-art propagation losses in the near infrared and discuss this value in terms of roughness and crystal defects.

IW3A.5 • 15:15

Double Deposition: a Method to Reduce Sidewall Roughness, Pravin Rawat¹, Shankar k. selvaraja¹; ¹*IISc, India*. We propose and demonstrate a new method (Double Deposition) to minimize the side wall roughness and obtain a propagation loss of 0.3 dB/cm in silicon nitride waveguide.

14:00 -- 15:30

Room: Sormiou

NeW3B • Network Resilience

Presider: Elaine Wong; Univ. of Melbourne, Australia

NeW3B.1 • 14:00 (Invited)

How to Achieve 50-ms Restoration in the Optical Layer With Shared Protection Capacity?, Gangxiang Shen¹; ¹*Soochow Univ., China*. Achieving 50-ms optical-layer recovery with shared protection remains challenging. This talk explores the feasibility of leveraging fast-switching WSSs and SDN-based centralized control while examining the tradeoff between wavelength tunability and spare capacity efficiency.

NeW3B.2 • 14:30 (Invited)

Digital Twins for Resilient Optical Networks, Camille Delezoide¹; ¹*Nokia Bell Labs, France*. We will review how the most recent advances in optical monitoring and machine learning can be leveraged within digital twins to prevent failures, or at least to effectively react when they occur.

Optica Advanced Photonics Congress

Session Guide

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

NeW3B.3 • 15:00

A Novel ML-Based Approach to Anomaly Detection in Optical Networks, Claudio Crognale¹, Antonino Maria Rizzo², Michelangelo Olmo Nogara Notarianni², Giacomo Boracchi², Luca Magri², Cesare Alippi², Pietro Invernizzi¹, Giovanni Martinelli¹, Roberto Manzotti¹, Stefano Binetti¹; ¹*Cisco Photonics Italy Srl, Italy*; ²*DEIB, Politecnico di Milano, Italy*. We experimentally demonstrate the effectiveness of a new Machine Learning-based monitoring algorithm to detect in real time anomalies occurring in DWDM coherent optical networks, allowing the user to be notified before the occurrence of faults.

14:00 -- 15:30

Room: Les Goudes 2

NoW3C • Multispectral Imaging

Presider: Sedat Nizamoglu; Koç Universitesi, Turkey

NoW3C.1 • 14:00 (Invited)

III-v Semiconductor Nanowire Array-Based Photodetectors for Multispectral Imaging, Ziyuan Li¹; ¹*Beijing Univ. of Technology, China*. Highly compact, filter-free multispectral photodetectors have important applications in biological imaging, face recognition, and remote sensing. In this work, III-V semiconductor nanowire arrays were successfully synthesized and demonstrated as high-performance infrared photodetectors for multispectral imaging.

NoW3C.2 • 14:30

Sensitive Imaging Using Graphene Photodetector Arrays With Passive Crosstalk Reduction Techniques, Marina C. Homs¹, Shadi Nashashibi¹, Eike Himstedt¹, Stefan M. Koepfli¹, Killian Keller¹, Daniel Rieben¹, Yuriy Fedoryshyn¹, Wadood Haq², Eberhart Zrenner², Juerg Leuthold¹; ¹*Inst. of Electromagnetic Fields (IEF), ETH Zurich, Switzerland*; ²*Inst. for Ophthalmic Research, Univ. of Tuebingen, Germany*. We demonstrate imaging with sensitive 5x5 pixel arrays consisting of biomimetic graphene phototransistors for use as retinal implants. Crosstalk is reduced by isolation trenches which is essential for high dynamic range imaging mimicking photoreceptors.

NoW3C.3 • 14:45 (Invited)

Phase-Change Materials-Based Electrically-Reconfigurable IR Metasurface, K. Kay Son¹, Jeong-sun Moon¹, Ryan Quarfoth¹, Hwa-Chang Seo¹, Chuong Dao¹, Hanseung Lee¹, Aaron Bluestone¹, Stan Culaclii¹, Yuri Owechko¹, Kangmu Lee¹, David Chow¹; ¹*HRL Laboratories, LLC, USA*. We present novel solid-state, reconfigurable multispectral metasurface filters that incorporate phase change materials (PCMs) for infrared operation. These electrically reconfigurable PCM filters show great potential for adaptive remote sensing and imaging.

NoW3C.4 • 15:15

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

14:00 -- 15:30

Room: Morgiou

SW3D • Agriculture and Ellipsometry

Presider: Carsten Rockstuhl; Karlsruher Institut für Technologie, Germany

SW3D.1 • 14:00 (Invited)

Light and Temperature Management in Agrivoltaic Systems, Gaël Nardin¹; ¹*Insolight SA, Switzerland*. In agrivoltaics (combination of agricultural and solar energy productions on the same land), sunlight needs to be wisely shared between crops and solar cells. I will discuss the influence of solar panels on micro-climatic parameters under agrivoltaic installations, and the tools used to design optimal agrivoltaic systems.

SW3D.2 • 14:30

Enhanced Photon Extraction Using Spherical Micro-Dome Spectral Conversion Layers for Next-Generation Greenhouses, Juvet N. Fru¹; ¹*KIT, Germany*. Spherical micro-dome luminescent down-shifting (LDS) thin foils achieve over 80% intrinsically trapped photon extraction in the forward direction, significantly outperforming planar and thick-slab designs. This robust approach enhances photosynthetically active radiation essential for plant growth.

SW3D.3 • 14:45 (Invited)

Advanced Spectroscopic Ellipsometry in Cutting-Edge Photonics Applied to Solar Cells and Other Devices., Christophe Defranoux¹, Ferenc Korsos¹, Tamas Brigancz¹; ¹*Semilab Zrt, Hungary*. "Advanced spectroscopic ellipsometry enhances cutting-edge photonics, optimizing solar cells and devices. Insights into material properties and performance drive innovation, pushing boundaries in photonic research and development."

SW3D.4 • 15:15

Greenhouse 2.0 – Realised via Broadband Spectral Conversion and Light Management, Bryce S. Richards¹; ¹*Karlsruher Institut für Technologie, Germany*. Greenhouse 2.0 brings together technological advances to address the food-energy-water nexus while optimizing four key factors – light (the key focus of this paper), temperature, CO₂ levels, and water availability – that interact to shape plant productivity.

14:00 -- 15:30

Room: Callelonge Hall Flat

SpW3E • Spatial Division Multiplexing Transmission II

Presider: Gaël Simon; Orange, France

SpW3E.1 • 14:00 (Invited)

Advanced SDM MIMO Processing Towards Over-10-Tb/s Transceivers, Akira Kawai¹, Kohki Shibahara¹, Masanori Nakamura¹, Megumi Hoshi¹, Takayuki Kobayashi¹, Yutaka Miyamoto¹; ¹*NTT Network Innovation Laboratories, Japan*. The recent progress in high-symbol-rate transmission technologies has enabled transmissions exceeding 10 Tb/s/wavelength when combined with SDM. We discuss advanced MIMO processing techniques, which are key

Optica Advanced Photonics Congress

Session Guide

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

enablers for realizing such extremely high bitrates.

SpW3E.2 • 14:30

Two-Stage MIMO Equalization for Long Haul Coupled Multi-Core Fiber Systems, Jamal Darweesh¹, akram Abouseif¹, Ghaya Rekaya¹, Yves Jaouën², Rami Kalimi¹; ¹*MIMOPT Technology, France*; ²*Telecom Paris, France*. We propose a two-stage MIMO equalizer for crosstalk mitigation in long-haul coupled multi-core fiber. We show 66% complexity reduction compared to conventional joint equalization, achieving lower singularity probability.

SpW3E.3 • 14:45 (Invited)

Blind MIMO Equalization for Space-Division Multiplexed Transmission, Aymeric Arnould¹, Pamir Oezsuna^{1,2}, Ruben S. Luis³, Nicolas Braig-Christophersen¹, Robert Emmerich¹, Carsten Schmidt-Langhorst¹, Colja Schubert¹, Ronald Freund^{1,4}, Georg Rademacher^{1,2}; ¹*Fraunhofer Inst. for Telecommunications, Heinrich-Hertz-Institut, HHI, Germany*; ²*INT, Univ. of Stuttgart, Germany*; ³*NICT, Japan*; ⁴*Technical Univ. of Berlin, Germany*. We experimentally demonstrate the transmission of 32 GBd QPSK, 16QAM and 64QAM dual-polarization three-mode signals over a 54-km few-mode fiber with blind MIMO equalization using the correlation-avoidance constant modulus algorithm (CA-CMA) for singularity-free equalizer pre-convergence.

16:00 -- 18:00

Room: Les Goudes 1

IW4A • Dispersion-engineered Systems

Presider: Myoung-Gyun Suh; NTT Research Inc., USA

IW4A.1 • 16:00 (Invited)

Soliton Physics Meets Dispersion Engineering, Andrea Blanco-Redondo¹; ¹*Univ. of Central Florida, CREOL, USA*. We review the journey that began by applying dispersion engineering to enhance soliton functionality in silicon waveguides and culminated in unveiling an infinite hierarchy of solitons arising from nonlinearity and even orders of dispersion.

IW4A.2 • 16:30

One Million Quality Factor CMOS-Based Integrated Ring Resonators in the Mid-Infrared, Marko Perestjuk¹, Rémi Armand^{2,3}, Miguel Sandoval Campos¹, ujjal chettri¹, Lamine Ferhat², Vincent Reboud³, Nicolas BRESSON³, jean-michel hartmann³, vincent mathieu³, guanghai ren⁴, Andreas Boes⁵, arnan mitchell⁴, Christelle Monat¹, Christian Grillet²; ¹*Ecole Centrale de Lyon, France*; ²*CNRS, France*; ³*CEA-LETI, France*; ⁴*RMIT, Australia*; ⁵*Adelaide Univ., Australia*. We report Silicon Germanium (SiGe) Ring Resonators with quality factors reaching up to one million in the Mid-Infrared (MIR) wavelength range between 3.5 - 4.6 μm . Optical bistability is observed.

IW4A.3 • 16:45

Highly Sensitive, Direct Dispersion Characterization of Short Silicon Nitride Waveguides and Their Couplers, Nathalie Vermeulen¹, Ryu Niigaki², Takashi Inoue², Hugo Thienpont¹, Koyo Watanabe²; ¹*Brussels Photonics, Vrije Universiteit Brussel, Belgium*; ²*Central Research Laboratory, Hamamatsu Photonics K. K., Japan*. We present a new direct dispersion characterization technique for compact on-chip components, and apply it to short silicon nitride waveguides and their couplers. It allows high-sensitivity measurements with dispersion-length

Optica Advanced Photonics Congress

Session Guide

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

products down to 5×10^{-5} ps/nm.

IW4A.4 • 17:00

Dispersion Tailored Linear Microresonator With Distributed Bragg Reflectors, Francesco Rinaldo Talenti^{1,2}, Luca Lovisolo^{2,1}, Stefan Wabnitz³, Zeina Saleh¹, Martina Morassi¹, Aristide Lemaitre¹, Abdelmounaim Harouri¹, Carlos Alonso-Ramos¹, Laurent Vivien¹, Giuseppe Leo²; ¹CNRS, France; ²Université Paris Cité, France; ³DIET, Sapienza Univ. of Rome, Italy. We propose an AlGaAs-on-insulator linear microresonator that enables a systematic dispersion engineering technique. The latter unlocks any accessible spectral distribution achievable by an appropriate photonic bandgap tuning of the distributed Bragg mirrors composing the cavity

IW4A.5 • 17:15

Optimization of Microresonator-Based Optical Parametric Oscillator via Dispersion Engineering, Nadezhda S. Tatarinova^{1,2}, Artem Shitikov¹, Anatoly Masalov^{1,3}, Igor Bilenko^{1,4}, Dmitry Chermoshentsev^{1,2}, Valery Lobanov¹; ¹Russian Quantum Center, Russian Federation; ²Moscow Inst. of Physics and Technology, Russian Federation; ³Lebedev Physical Inst., Russian Academy of Sciences, Russian Federation; ⁴Faculty of Physics, Lomonosov Moscow State Univ., Russian Federation. We numerically optimize the parameters of the degenerate optical parametric oscillator based on a dual-pumped microring resonator. We demonstrate that the targeted frequency shift of the resonator eigenmodes significantly reduces the threshold power.

IW4A.6 • 17:30 (Invited)

Integrated Nonlinear and/or Quantum Photonics With Computational Optimization, Kiyoul Yang¹; ¹Harvard Univ., USA. Abstract not available.

16:00 -- 18:00

Room: Sormiou

NeW4B • Network Transport

Presider: Lena Wosinska; Chalmers Tekniska Högskola, Sweden

NeW4B.1 • 16:00 (Invited)

Multi-Granularity-Routing Layered Optical Networks That Enable Flexible Optical Bypass, Hiroshi Hasegawa¹; ¹Nagoya Univ., Japan. A novel layered network architecture is presented wherein coarse granularity layers define direct connections between distant nodes. Reductions in hardware scale and transmission impairment are realized as well achieving optical bypass.

NeW4B.2 • 16:30 (Invited)

Edge Computing in Optical Transport for Future Wireless Networks, Markos Anastasopoulos¹; ¹National and Kapodistrian Univ. of, Greece. Abstract not available.

NeW4B.3 • 17:00 (Invited)

Spatial Channel Networks Enabled by Multicore Fiber-Based Optical Switching Technologies, Masahiko Jinno¹; ¹Kagawa Univ., Japan. This paper introduces the architecture and advantages of a spatial channel network (SCN), which enables per-core routing through a spatial cross-connect. The SCN leverages multicore fiber-based optical switching devices,

Optica Advanced Photonics Congress

Session Guide

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

including core selective switches and core/port selectors, to facilitate efficient and flexible optical signal routing.

NeW4B.4 • 17:30

On the Techno-Economic Viability of Coherent P2MP DSCM for Mobile Network

Fronthaul, Andrea Marotta^{1,2}, Carlo Centofanti^{1,2}, Fabio Graziosi¹, Marco Quagliotti³, Mauro Agus³; ¹*Universita degli Studi dell'Aquila, Italy*; ²*WEST Aquila srl, Italy*; ³*TIM - Telecom Italia, Italy*. We investigate the techno-economic feasibility of coherent Point-to-Multipoint (P2MP) fronthaul for future mobile networks. Results indicate up to 70% energy savings and limited cost differences relative to P2P, while surpassing WDM in cost and sustainability.

16:00 -- 18:00

Room: Les Goudes 2

NoW4C • Advances in Glass Additive Manufacturing

Presider: Francois Chenard; IRflex Corporation, USA and Edward Kinzel; Univ. of Notre Dame, USA

NoW4C.1 • 16:00 (Invited)

3D Printing of Complex Glass Structures and Gradient-Index Optics, Dudukovic

Nikola¹; ¹*Lawrence Livermore National Laboratory, USA*. Multimaterial direct ink writing of silica-based slurries enables the fabrication of glass optics with spatially controlled composition and architecture.

NoW4C.2 • 16:30 (Invited)

Silver-Chalcogenide Glass Homogeneous/Heterogeneous Coatings on Quartz by Laser Deposition of Nanoparticles, Yahya Bougdid⁵, Gunjan Kulkarni², Francois Chenard³,

Chandraika (John) Sugrim⁴, Ranganathan Kumar⁵, Aravinda Kar¹; ¹*Center for Research and Education in Optics and Lasers (CREOL), The College of Optics and Photonics, Univ. of Central Florida, USA*; ²*Department of Electrical and Computer Engineering, Univ. of Central Florida, USA*; ³*IRflex Corporation, USA*; ⁴*Naval Air Warfare Center, USA*; ⁵*Department of Mechanical and Aerospace Engineering, Univ. of Central Florida, USA*. We present a CO₂ laser-assisted method to deposit transparent Ag–As₄₀S₆₀ nanoparticle coatings with over 92% transmittance. Homogeneous single-layer films show better optical performance as uniform Ag–As₄₀S₆₀ distribution enhances light propagation through the film.

NoW4C.3 • 17:00

Constant Angle Printing of Freestanding Primitive Cubic Lattices Using Borosilicate

Glass, Md. Nadeem Azad¹, Nudrat Nawal¹, Nishan Khadka¹, Balark Tiwari¹, Robert Landers¹, Edward Kinzel¹; ¹*Univ. of Notre Dame, USA*. The low CTE, high temperature and strength of glass are appealing for structural applications in optical assemblies. We investigate depositing primitive cubic lattices using coordinated 4-axis motion using a CO₂ laser to spot fuse filaments.

NoW4C.4 • 17:15

Laser-Assisted Additive Manufacturing of Silica-Based Glasses for Photonic

Applications, Ayan Mondal¹, Halima El Aaad², Hicham El Hamzaoui¹, Marc Douay¹, Yves

Optica Advanced Photonics Congress

Session Guide

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

Quiquempois¹; ¹*Univ Lille Laboratoire PhLAM, France*; ²*CNRS, France*. We present our results on high resolution additive manufacturing of silica-based glasses using two-photon polymerization (2PP) and new hybrid resins. This approach was extended to fabricate Fabry-Perot (FP) sensors on optical fiber tips.

NoW4C.5 • 17:30 (Invited)

Withdrawn

16:00 -- 18:00

Room: Morgiou

SW4D • Photovoltaics

Presider: Bryce Richards; Karlsruher Institut für Technologie, Germany

SW4D.1 • 16:00 (Invited)

Kesterite Innovations in Photovoltaics and Photocatalysis, Vanira Trifiletti¹; ¹*Università degli studi di Milano-Bicocca, Italy*. The kesterite family comprises versatile chalcogenides with tunable chemical and optoelectronic properties. Thin films and nanoparticles can be easily produced, and their syntheses and technological applications will be explored here.

SW4D.2 • 16:30

Multifunctional and Low-Cost Bonding Layer for III-v//Si Tandem Solar Cells, Elise Salmon¹, Jeronimo Buencuerpo², Jérémie Schuhmann³, Thomas Bidaud³, Oleh Ivashtenko³, Oliver Hoehn⁴, David Lackner⁴, Franck Dimroth⁴, Amaury Delamarre³, Andrea Cattoni⁵, Stéphane Collin³; ¹*Institut Photovoltaïque d'Ile-de-France (IPVF), France*; ²*Inst. of Micro and Nanotechnology (IMN-CSIC), Spain*; ³*Centre de Nanosciences et Nanotechnologies (C2N), France*; ⁴*Fraunhofer Inst. for Solar Energy Systems (ISE), Germany*; ⁵*Politecnico di Milano, Italy*. Our multifunctional bonding layer for III-V//Si tandem solar cells uses an innovative architecture boasting high transparency, conductivity, and Si surface roughness accommodation, eliminating costly polishing requirements. An optical loss analysis demonstrated the feasibility of current-matching.

SW4D.3 • 16:45

Upper Bounds for Absorption Enhancement in Thin Solar Cells, Maxime Giteau¹, Stéphane Collin²; ¹*PROMES-CNRS, France*; ²*C2N, France*. We have developed a general framework for multi-resonant absorption: we provide light-trapping upper bounds in solar cells, resolving a tension between numerical results and theoretical limits. We also discuss the implications for optimal light-trapping strategies.

SW4D.4 • 17:00

Reflective Coating to Improve Performance of Building Integrated Photovoltaic Systems, Md Abdul Alim¹, Zhong Tao¹; ¹*Western Sydney Univ., Australia*. The efficiency of BIPV systems degrades with system temperature rise beyond 25 °C. Existing cooling methods require additional infrastructure and are often expensive. We propose reflective coating as the cooling approach that addresses both of the issues without compromising the efficiency achieved by other methods.

Optica Advanced Photonics Congress

Session Guide

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

SW4D.5 • 17:30 (Invited)

Light Scattering Control With Correlated Disorder Enabling New Solar Cell

Designs, Esther Alarcon-Llado^{1,2}; ¹AMOLF, Center of Nanophotonics, Netherlands; ²Univ. of Amsterdam, Netherlands. Abstract not available.

SW4D.6 • 17:45

Wafer-Scale Correlated Morphology and Optoelectronic Properties in GaAs/AlGaAs

Core-Shell Nanowires, Ishika Das¹, Keisuke Minehisa², Fumitaro Ishikawa², Patrick Parkinson¹, Stephen Church¹; ¹Department of Physics and Astronomy and the Photon Science Inst., Univ. of Manchester, UK; ²Research Center for Integrated Quantum Electronics, Hokkaido Univ., Japan. We investigate wafer-scale correlations between morphology and optoelectronic properties in GaAs/AlGaAs nanowires. Despite structural inhomogeneities, carrier lifetime remains stable, highlighting uniform material quality and potential for scalable III-V semiconductor integration in photonic and optoelectronic applications.

16:00 -- 18:00

Room: Callelonge Hall Flat

SpW4E • Sensing

Presider: Patryk Urban; West Pomeranian Univ. of Technology, Poland

SpW4E.1 • 16:00 (Invited)

Understanding the Oceans Using Submarine Optical Fibers, Miguel Gonzalez-Herraez¹, Sonia Martin Lopez¹; ¹Universidad de Alcalá, Spain. We show that submarine optical fibers can offer new and valuable insights on different physical processes in the ocean, including surface waves, currents, and the mechanisms underpinning water mixing which are key in climate regulation.

SpW4E.2 • 16:30

Vibration Detection and Localization with Coherent Optical Transponders Operating at

200GBd-1.6Tb/s, Brandon Buscaino¹, Doug Charlton¹, Charles Laperle¹, Maurice O'Sullivan¹, Mohammad Pasandi¹; ¹Ciena Corporation, Canada. We report vibration detection and localization over a 482km bidirectional coherent optical transmission system operating error-free at 200GBd-1.6Tb/s and 200GBd-1.2Tb/s. Localization is achieved with mean offset and standard deviation of 11m and 10m, respectively.

SpW4E.3 • 17:00 (Invited)

Correlation-Enhanced Distributed Fiber Optic Sensing, André Sandmann¹, Florian Azendorf¹; ¹Adtran Networks SE, Germany. An extension of phase-sensitive optical time domain reflectometry utilizing the transmission of code sequences and correlation is presented. This method enhances the spatial resolution while maintaining the same sensing reach. Different application examples are presented.

SpW4E.4 • 17:30

Optica Advanced Photonics Congress

Session Guide

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

Signal Fading Management in Interferometric Sensors for PON Monitoring, Marco Fasano¹, Andrea Madaschi¹, Marco Brunero², Paolo Martelli¹, Pierpaolo Boffi¹; ¹*Politecnico di Milano, Italy*; ²*Cohaerentia s.r.l., Italy*. We propose a fully integrated interferometric approach for monitoring a pair of drop fibers in Passive Optical Networks. To mitigate signal fading, the scheme employs Phase Generated Carrier demodulation, and experimental results confirm its feasibility.

SpW4E.5 • 17:45

A Low-Bandwidth FFT-Based Approach to Brillouin Scattering Signal Analysis in BOTDR Signals, volkan türker¹, Tolga Kartaloglu^{1,3}, Faruk Uyar^{1,3}, Ekmel Ozbay^{1,3}, Ibrahim T. Ozdur²; ¹*Nanotechnology Research Center, Turkey*; ²*Department of Electrical and Electronics Engineering, TOBB Univ. of Economics and Technology, Turkey*; ³*Department of Electrical and Electronics Engineering, Bilkent Univ., Turkey*. We propose a BOTDR frequency detection technique for Stokes and anti-Stokes Brillouin signals in the 10 – 11.5 GHz range using frequency scanning and an FFT-based approach. Mitigating bandwidth limitations, it enhances detection sensitivity beyond conventional methods.

Optica Advanced Photonics Congress

Session Guide

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

Thursday, 17 July

09:00 -- 10:30

Room: Les Goudes 1

ITh1A • Nonlinear Photonics I

Presider: Myoung-Gyun Suh; NTT Research Inc., USA

ITh1A.1 • 09:00

Quasi-Phase-Matched Supercontinuum Generation Pumped in Normal Dispersion in a Si₃N₄ Waveguide, Yijun YANG¹, Victor Turpaud¹, Daniele Melati¹, Quentin Wilmart², Samson Edmond¹, Eric Cassan¹, Delphine Marris-Morini¹, Carlos Alonso-Ramos¹, Laurent Vivien¹; ¹*Université Paris-Saclay, France*; ²*Université Grenoble Alpes, France*. We demonstrated a supercontinuum generation with multiple dispersive waves introduced by quasi-phase-matching through dispersion modulation in a Si₃N₄ waveguide when the pump is in the normal dispersion region.

ITh1A.2 • 09:15

Soliton Generation Switching by Two Diode Lasers in Self-Injection Locking Regime, Artem Shitikov¹, Daria M. Sokol^{1,2}, Anatoly Masalov³, Valery Lobanov¹, Igor Bilenko^{1,4}, Dmitry A. Chermoshentsev^{1,2}; ¹*Russian Quantum Center, Russian Federation*; ²*Moscow Inst. of Physics and Technology (MIPT), Russian Federation*; ³*Lebedev Physical Inst., Russian Academy of Sciences, Russian Federation*; ⁴*Faculty of Physics, M.V. Lomonosov Moscow State Univ., Russian Federation*. We study soliton microcombs in bichromatically pumped microring resonators with self-injection-locked laser diodes, enabling enhanced control over frequency comb properties and generation regime switching through laser interactions within the microresonator.

ITh1A.3 • 09:30

Exceptional Points and Spontaneous Symmetry Breaking in Single Kerr Resonators: New Insights for Integrated Photonics, Juan D. Mazo^{1,2}, Julius Gohsrich^{1,2}, Flore Kunst^{1,2}, Lewis Hill¹; ¹*Max Planck Inst. for the Science of Light, Germany*; ²*Friedrich Alexander Univ., Germany*. We reveal that exceptional points fundamentally govern optical bistability and spontaneous symmetry breaking in Kerr resonators. This insight enables new approaches for controlling nonlinear photonic devices, integrated photonics, optical computing, and frequency comb generation.

ITh1A.4 • 09:45

Enhanced Nonlinear Optics in Epsilon-Near-Zero Media, Matteo Silvestri¹, Ambaresh Sahoo¹, Luca Assogna¹, Matteo Venturi¹, Raju Adhikary¹, Paola Benassi^{1,2}, Carino Ferrante², Davide Tedeschi¹, Alessandro Ciattoni², Andrea Marini^{1,2}; ¹*Univ. of LAquila, Italy*; ²*CNR-SPIN, Italy*. We theoretically model nonlinear optics in epsilon-near-zero media (sodium and aluminum) arising from collision-driven nonlinear electron dynamics. We find that the high-harmonic generation process becomes resonant, suggesting potential for the development of integrated UV sources.

ITh1A.4 • 10:00

Optica Advanced Photonics Congress

Session Guide

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

Integration of Lasers with Silicon Photonics by Flip Chip and Heteroepitaxy, David Harnme¹; ¹ AIM Photonics COO, AVP NY CREATES – EPDA, Process Development, and Test Assembly and Packaging, Albany, NY, United States. Abstract not available.

09:00 -- 10:30

Room: Callelonge Hall Tier

ITh1B • Photonic Computing

Presider: Emanuel Peinke; CEA-LETI, France

ITh1B.1 • 09:00 (Invited)

Retinomorph Machine Vision in a Nonlinear Photonic Network, Jack Gartside¹; ¹Imperial College London, UK. We present a bio-inspired 'retinomorph' network where coupled lasing modes strong machine vision including few-shot learning, including hard biomedical cancer diagnosis. This scheme addresses key challenges in photonic computing: physical nonlinearity and spatial footprint.

ITh1B.2 • 09:30

Neurophotonic Silicon Chip, Chu-En Lin², Ya-Fan Chen¹, Ching-Pao Sun¹, Chii-Chang Chen¹; ¹National Central Univ., Taiwan; ²National Chin-Yi Univ. of Technology, Taiwan. We demonstrate experimentally a neurophotonic silicon chip which can distinguish the optical triangular and square wave packets. The input signals are modulated at 3GHz. The time consumption for recognizing the input signals is around 121ps.

ITh1B.3 • 09:45

Error Correction for Photonic Matrix-Vector Multiplication Processors Through Offsetting Optical en-/Decoder Calibrations, Adam Carstensen¹, Søren Stobbe^{1,2}, Babak Vosoughi Lahijani¹; ¹DTU Electro, Denmark; ²NanoPhoton, Technical Univ. of Denmark, Denmark. We propose a method for correcting errors in photonic matrix-vector multiplication processors by introducing a correction offset to the optical en-/decoders and show a significant reduction in matrix-vector multiplication error for the Reck mesh.

ITh1B.4 • 10:00

Extreme Learning Machine Using III-v Artificial Sensory Oscillator Photonic

Neurons, Juan Silva¹, Bejoys Jacob¹, Jana B. Nieder¹, Antonio Hurtado³, José M. Figueiredo², Bruno Romeira¹; ¹International Iberian Nanotechnology Lab, Portugal; ²Universidade de Lisboa, Portugal; ³Univ. of Strathclyde, UK. We present an artificial sensory oscillator photonic neuron using negative differential resistance GaAs-based resonant tunneling diodes with photosensitive layers. We evaluate extreme learning machine approach through nonlinear circuit modeling and perform regression and image classification tasks.

Optica Advanced Photonics Congress

Session Guide

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

09:00 -- 10:30

Room: Sormiou

NeTh1C • Optical Wireless Communications

Presider: Piotr Lechowicz; Chalmers Tekniska Högskola, Sweden

NeTh1C.1 • 09:00 (Invited)

Optical Wireless Communications: Applications for Future Connectivity, Iman Tavakkolnia¹; ¹*Electrical Engineering Division, Univ. of Cambridge, UK*. Optical wireless technologies represent a growing field leveraging light spectra to enable high-speed secure communication. Beyond wireless communication, use-cases include space connectivity, cm-level indoor positioning, and self-powered connected devices utilising photovoltaics. The presentation showcases how these innovations could enhance future smart connectivity.

NeTh1C.2 • 09:30 (Invited)

Evolution of LiFi Networks, Volker Jungnickel¹; ¹*Fraunhofer Inst Nachricht Henrich-Hertz, Germany*. Abstract not available.

NeTh1C.3 • 10:00

Withdrawn

09:00 -- 10:00

Room: Les Goudes 2

NoTh1D • Novel Nanophotonic Materials and Applications

Presider: Lynda Busse; US Naval Research Laboratory, USA

NoTh1D.1 • 09:00 (Invited)

High Contrast Nanoscale Chirality Imaging, Yang Zhao¹; ¹*Univ of Illinois at Urbana-Champaign, USA*. Near-field optical force imaging reveals nanoscale light-matter interactions but suffers from overlapping effects. I will present Dofn, a technique that isolates optical forces to enable high-contrast, nanometer-resolution imaging of nanoscale chirality in complex systems.

NoTh1D.2 • 09:30

Optically Rectified Electrical Currents With Spin-Momentum-Locking and Extraordinary Transmission in Plasmonic Metasurfaces, Richard M. Osgood², Michael Leuenberger¹, K. C. Fong³, Jimmy Xu⁴; ¹*Univ. of Central Florida, USA*; ²*DEVCOM SC, USA*; ³*Northeastern Univ., USA*; ⁴*Brown Univ., USA*. We show how Fano coupling of two oscillators on surfaces of a plasmonic gold metasurface creates non-reciprocal transmission, and model plasmon propagation including spin-momentum locking and optical rectification currents from the second-order nonlinear response.

NoTh1D.3 • 09:45

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

09:00 -- 10:30

Room: Morgiou

JTh1E • Joint NOMA and SOLITH: Perovskites I

Presider: Dawei Di; Zhejiang Univ., China

JTh1E.1 • 09:00 (Invited)

Conformal Deposition of Perovskite Material for the Elaboration of Highly Efficient and Stable Perovskite/Silicon Tandem Solar Cells, Solenn Berson¹, Kristell Carreric¹, polyxeni tsoulka¹; ¹*CEA Grenoble, France*. Tandem solar cells based on perovskite materials have shown promising results, surpassing the theoretical limits of single junction Silicon solar cells. Nevertheless many challenges are still remaining for the upscale of the technology. With that perspective, vapor deposition seems promising in order to elaborate a conformal perovskite layer on top of textured Si wafers.

JTh1E.2 • 09:30

Molecular Passivator for High-Efficiency Near-Infrared Perovskite Light-Emitting Diodes, yaxin wang¹, Baodan Zhao¹, Dawei Di¹; ¹*Zhejiang Univ., China*. A molecular passivator, 4-aminobenzoic acid (PABA), is demonstrated to be able to enhance the crystallinity and PLQYs of FA_{0.95}Cs_{0.05}PbI₃ perovskites. The resultant PeLEDs emit near-infrared light at 791 nm, exhibiting a peak EQE of 19.6%.

JTh1E.3 • 09:45

Decouple Enhancement in Light Extraction Efficiency of Multi-Color Light Emitting Perovskite Quantum Dots, Wen Hsin Chang¹, Shan-Chiao Yang¹, Wei Hsuan Kung¹, Kavya Nair Jayakumaran¹, Ming-Chung Liu², Hsiao-Wen Tu², Hsuen-Li Chen¹; ¹*National Taiwan Univ., Taiwan*; ²*Green Energy and Environment Research Laboratories, Industrial Technology Research Inst., Taiwan*. We developed stable multi-color perovskite quantum dots (green, amber, and deep red). This study enhances the light extraction efficiency of quantum dots over 10 times, overcoming the efficiency limitations of perovskite quantum dot light-emitting diodes.

JTh1E.4 • 10:00

Charge Trapping in Light Mediated Phase Segregations of Mixed Halide Perovskites, Krishna B. Balasubramanian¹, Harshita Durgapal¹, Apurva Yadav¹, Rupali Srivatsava¹; ¹*Indian Inst. of Technology Delhi, India*. Phase segregation in mixed halide perovskites is commonly observed. Using bi-directional swept charge transport measurement, we show electrical evidence of segregated iodine phases. A marginal reduction in iodine fraction largely can influence the phase segregation.

JTh1E.5 • 10:15

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

09:00 -- 10:30

Room: Callelonge Hall Flat

SpTh1F • Machine Learning (ML) in Optical Communication II

Presider: Gaël Simon; Orange, France

SpTh1F.1 • 09:00 (Invited)

AI-Driven Fault Management in Optical Networks: Anomaly Detection, Event

Classification, and Beyond, Khoulood Abdelli¹, Patricia Layec¹; ¹*Nokia Bell Lab, Germany*. AI-driven solutions enhance optical network reliability by enabling real-time anomaly detection, precise event classification and localization, and predictive maintenance. This paper explores ML applications, challenges, and future directions toward self-healing networks with proactive fault management.

SpTh1F.2 • 09:30

Experimental Demonstration of Convolutional Neural Network Equalization for BPAM in IM-DD Systems, Ramin Solaimani^{2,3}, Asfand Nizamani², Stella Civelli^{4,1}, Pantea Nadimi Goki^{1,2}, Fabio Cavaliere⁵, Luca Poti^{2,3}; ¹*Scuola Superiore Sant'Anna, Italy*; ²*CNIT, Italy*; ³*Universitas Mercatorum, Italy*; ⁴*CNR-IEIT, Italy*; ⁵*Ericsson, Italy*. We propose and demonstrate a convolutional neural network (CNN)-based equalizer for bipolar PAM signals in IM-DD systems. Experimental results show that the CNN achieves a gain of about 5 dB, effectively compensating for transceiver impairments

SpTh1F.3 • 09:45

Noise Characterisation of a High-Power Quantum Dot Laser Under Optical

Feedback, Leidy J. Quintero Rodríguez¹, Sean O'Duill¹, Lakshmi Narayanan

Venkatasubramani¹, Liam P. Barry¹; ¹*School of Electronic Engineering, Dublin City Univ., Ireland*. We present the spectral characterization of a 1.3 μm quantum-dot laser without an integrated isolator, under both free-running and optical feedback conditions. Gain compression and spectral hole burning impact performance, but moderate feedback effectively reduces spectral linewidth.

SpTh1F.4 • 10:00

Phi-OTDR Event Detection via Contrastive Language-Image Pre-Training, Weixuan Lin¹, Di

Wu¹, Benoit Boulet¹; ¹*McGill Univ., Canada*. We present the first contrastive language-image pre-training (CLIP) model for phase-sensitive optical time domain reflectometry (phi-OTDR). CLIP shows 35% accuracy improvement and flexibility in classifying hierarchical phi-OTDR datasets compared to the supervised learning baseline.

11:00 -- 12:30

Room: Les Goudes 1

ITh2A • Nonlinear Photonics II

Presider: Yuan Yuan; Northeastern Univ., USA

ITh2A.1 • 11:00 (Invited)

Nonlinear and Quantum Integrated Photonics on the Thin-Film Lithium Niobate

Platform, Qiang Lin¹; ¹*Univ. of Rochester, USA*. In this talk, I will present our recent progress in

Optica Advanced Photonics Congress

Session Guide

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

developing nonlinear and quantum photonic functionalities on thin-film lithium niobate (TFLN) photonic integrated circuits (PICs).

ITh2A.2 • 11:30

Four-Wave Mixing Dynamics in the Laser Gain Medium Considering Microresonator

Nonlinearity, Daria M. Sokol^{1,2}, Dmitrii Chermoshentsev^{1,2}, Artem Shitikov¹, Nikita Dmitriev¹, Valery Lobanov¹, Anatoly Masalov^{1,4}, Igor Bilenko^{1,3}; ¹*Russian Quantum Centre, Russian Federation*; ²*Moscow Inst. of Physics and Technology (MIPT), Russian Federation*; ³*Faculty of Physics, M.V. Lomonosov Moscow State Univ., Russian Federation*; ⁴*Lebedev Physical Inst., Russian Academy of Sciences, Russian Federation*. This study examines the nonlinear dynamics of a diode laser coupled to a high-Q microresonator, highlighting oscillations, soliton formation, and frequency locking. The findings aid in optimizing microwave generation for applications in photonics, spectroscopy, and Radio-over-Fiber systems.

ITh2A.3 • 11:45

Exploration of Pulse Compression Schemes in Silicon Nitride Waveguides

Maria Camila Diaz Sanchez¹, Victor Turpaud¹, Hamza Dely¹, Laurent Vivien¹, Yijun Yang¹, Arnaud Mussot², Benjamin Wetzel³, Carlos Alonso-Ramos¹, Eric Cassan¹; ¹*Centre des Nanosciences et des Nanotechnologies, France*; ²*Laboratoire PhLAM-Universite de Lille, France*; ³*Laboratoire XLIM-Universite de Limoges, France*. We report on the development of free-form silicon nitride waveguides for pulse compression of ps pJ optical pulses. A genetic algorithm is used to determine the best waveguide profiles, e.g. a 15cm length pathway ensuring a compression factor of 20 giving rise to 44fs wide output pulses. Experiments are being conducted to confirm these trends.

ITh2A.4 • 12:00 (Invited)

Heterogeneously Integrated Lasers and Amplifiers Systems on Chip

Jelena Vuckovic¹; ¹*Stanford Univ., USA*. Abstract not available.

11:00 -- 12:30

Room: Callelonge Hall Tier

ITh2B • Out-of-chip Coupling

Presider: Michael Menard; École de technologie supérieure, Canada

ITh2B.1 • 11:00 (Invited)

Withdrawn

ITh2B.2 • 11:30

a 90-Degree Beam Deflector for Extremely Low-Index-Contrast Waveguide

Chung-Kai Tseng¹, Tang-Chun Liu¹, Chao-Yi Tai¹; ¹*National Central Univ., Taiwan*. A grating structure atop a metallic surface is designed for 90-degree beam deflection for extremely low-index-contrast waveguide. This facile structure design achieves a coupling efficiency of 25% targeting off-plane interconnection with ion-exchanged waveguides.

ITh2B.3 • 11:45

Optica Advanced Photonics Congress

Session Guide

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

Loaded Silicon Grating Coupler for Asymmetric TriPleX Waveguide Platform, Pravin Rawat¹, Venkatachalam P¹, Daniel Yumnam¹, Shankar k. selvaraja¹; ¹*IISc, India*. We propose and experimentally demonstrate an efficient grating fiber-chip coupling into an asymmetric TriPleX waveguide. We obtained a peak efficiency -3.15 dB/coupler and a simulated optimal coupling of -1.67 dB/coupler.

ITh2B.4 • 12:00

High Efficient Grating Couplers for 300 nm Thick Silicon Nitride Platform, Pravin Rawat¹, Siddharth Nambiar¹, Shankar k. selvaraja¹; ¹*IISc, India*. We propose and experimentally demonstrate an efficient grating fiber-chip coupling into a 300 nm thick SiN waveguide. We demonstrate a peak efficiency -1.62 dB/coupler and a simulated optimal coupling of -0.45 dB/coupler.

11:00 -- 12:30

Room: Sormiou

NeTh2C • Multi-Band Networks

Presider: Lakshmi Narayanan Venkatasubramani; Dublin City Univ., Ireland

NeTh2C.1 • 11:00

Comprehensive Investigations of the Design for C+L-Band Multi-Pump Raman Amplifiers, Haojun Jiang¹, Xiaomin Liu¹, Yihao Zhang¹, Lilin Yi¹, Weisheng Hu¹, Qunbi Zhuge¹; ¹*Shanghai Jiao Tong Univ., China*. The influence of pump numbers on gain flatness and total power consumption of the RAs under different wavelength loading statuses is investigated through numerical simulations, providing useful insights for RA design in practical systems.

NeTh2C.2 • 11:15 (Invited)

Coherent DWDM Transmission in O-Band, Robert Killey¹; ¹*Univ. College London, UK*. Data-centre links operating in the O-band benefit from the low SSMF dispersion. While such links are typically CWDM and up to 10 km, we assess coherent O-band system performance with higher WDM channel counts and link lengths.

NeTh2C.3 • 11:45 (Invited)

On the Digital Signal Processing for SDM Transmission, Ruby S. Bravo Ospina¹; ¹*Nokia Bell Labs France, France*. The adoption of SDM technology in future optical networks will be fundamentally constrained by the MDL/MDG and MIMO equalizer complexity. We review different strategies for MDL/MDG and MIMO equalizer complexity reduction found in the literature.

NeTh2C.4 • 12:15

How HCF vs SSMF Benchmarking Depends on Fiber & Amplification Parameters in Transparent WDM Networks, Thierry Zami^{2,1}, Nicola Rossi^{2,1}, Annalisa morea¹, bruno lavigne^{2,1}; ¹*Nokia Corporation, France*; ²*ASN, France*. We highlight the importance of the baseline network parameters when comparing performance of WDM core networks equipped

Optica Advanced Photonics Congress

Session Guide

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

either with SSMF or HCF.

11:00 -- 12:30

Room: Les Goudes 2

NoTh2D • Biosensors and Diagnostics

Presider: Lynda Busse; US Naval Research Laboratory, USA

NoTh2D.1 • 11:00

Plasmonics for Enhanced Circular Dichroism of Chiral Drugs, Matteo Venturi¹, Raju Adhikary¹, Ambaresh Sahoo¹, Carino Ferrante², Matteo Silvestri¹, Giovanna Salvitti¹, Davide Tedeschi¹, Isabella Daidone¹, Francesco Di Stasio³, Andrea Toma³, Francesco Tani⁴, Hatice Altug⁵, Antonio Mecozzi¹, Massimiliano Aschi¹, Andrea Marini^{1,2}; ¹*Università degli studi dell'Aquila, Italy*; ²*CNR-SPIN, Italy*; ³*IIT, Italy*; ⁴*Max Planck, Germany*; ⁵*EPFL, Switzerland*. We focus on surface plasmon polaritons at noble metal interfaces for enhancing chiroptical sensing of dilute chiral drug solutions. Circular dichroism is amplified by plasmonic resonances in nano-scale drug volumes, showing relevant results for sensitive analysis of solvated reparixin, thus enabling advanced chiroptical sensor development.

NoTh2D.2 • 11:15

Topologically Dark Metamaterials for Optical Biosensing Applications, Gleb Tselikov¹, Georgy Ermolaev¹, Konstantin Shevchenko¹, Aleksey Arsenin¹, Andrei Kabashin², Valentyn Volkov¹; ¹*XPANCEO RESEARCH ON NATURAL SCIENCE LLC., United Arab Emirates*; ²*LP3, Aix Marseille Univ., CNRS, France*. Our research focuses on utilizing topologically dark metamaterials to achieve exceptionally high sensitivity in detecting biological binding events. This approach can provide a plenty of sensing modalities in wearable devices like multifunctional smart contact lenses.

NoTh2D.3 • 11:30

Quantitative Birefringence Imaging of DOEs on Chalcogenide Glasses by Polarization Digital Holographic Microscopy, Veronica Cazac¹, Elena Achimova¹, Vladimir Abashkin¹, Alexandr Prisakar¹, Muhammed Fatih Toy²; ¹*Inst. of Applied Physics, Moldova State Univ., Moldova (the Republic of)*; ²*Electrical and Electronics Engineering, Istanbul Medipol Univ., Turkey*. We employ polarization digital holographic microscopy to quantify birefringence in DOEs formed on chalcogenide glasses nanomultilayer structures. By extracting the Jones matrix, we investigate the optical properties of DOEs recorded through interferometry and EBL.

NoTh2D.4 • 11:45 (Invited)

Infrared Glass Optical Fibers for Sensing and Diagnosis, Catherine Boussard-Pledel^{2,1}, Simon Coudray^{2,1}, Xiang-Hua Zhang^{2,1}, Charlotte Gervillé³, Jean-Marie Tarascon³; ¹*ISCR - UMR CNRS 6226, France*; ²*Univ. of Rennes, France*; ³*College de France, France*. Optical sensors based on chalcogenide glass fibers transparent in the mid infrared (MIR) spectral range, from 2 to 15 μm , are developed in order to analyze chemical and biological samples by Fiber Evanescent Wave Spectroscopy (FEWS).

NoTh2D.5 • 12:15

Low-Cost Metamaterial Perfect Absorbers for Cancer Diagnostics, Serap Aksu¹; ¹*Koç Üniversitesi, Turkey*. I aim to tackle key challenges in commercializing metamaterials for cancer

Optica Advanced Photonics Congress

Session Guide

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

diagnostics by reducing nanofabrication costs and enhancing multiplexing capacity, thereby improving diagnostic specificity and facilitating industry adaptability.

11:00 -- 12:30

Room: Morgiou

JTh2E • Joint NOMA and SOLITH: Photon Conversion and Luminescent Concentrators

Presider: Solenn Berson; CEA Grenoble, France

JTh2E.1 • 11:00 (Invited)

Photovoltaic Conversion in non-Standard Conditions: an Overview, Alexis Vossier¹, Miguel Sainz-Mañas¹, Lucile Maréchal¹, Zacharie Ménard¹, Alain Dollet¹, Rodolphe Vaillon²; ¹CNRS-PROMES, France; ²LAAS-CNRS, France. Multiple solar energy conversion systems involve PV conversion in non-conventional conditions, with the aim of lowering costs, improving efficiency or increasing dispatchability. We propose to review them, and to discuss their advantages and their limitations.

JTh2E.2 • 11:30 (Invited)

Fundamentals and Applications of Free Space Diffuse Irradiance Collimation for Enhancing Photovoltaic Yield, Rebecca Saive¹, Jelle Westerhof¹; ¹Universiteit Twente, Netherlands. This work presents free-space luminescent solar concentrators (FSLSCs) as a novel solution to redirect sunlight onto PV panels without tracking. By combining down-shifting, photon recycling and angular filtering, FSLSCs generate collimated "cold photons," enhancing PV yield, especially in winter.

JTh2E.3 • 12:00 (Invited)

Down-Converting Luminescent Materials for Optoelectronics and Their Applications, Yue Wang¹, Chun Hong Kang¹, Omar Alkhazragi¹, Hang Lu¹, Tien Khee Ng¹, Boon S. Ooi¹; ¹King Abdullah Univ of Sci & Technology, Saudi Arabia. Recently, a plethora of down-converting luminescent material based optoelectronics have been extensively explored, facilitating emerging applications in optical-based communication, sensing, data processing, etc. This talk also discusses potential challenges and future perspectives in the field.

11:00 -- 12:30

Room: Callelonge Hall Flat

SpTh2F • Next Generation Transmission Systems II

Presider: Elie Awwad; Télécom Paris, France

SpTh2F.1 • 11:00 (Invited)

Dynamically Reconfigurable and Transparent Optical Crosshaul Network, Ampalavanapilla T. Nirmalathas¹, Yijie Tao¹, Chathurika Ranaweera², Sampath Edirisinghe¹, Lena Wosinska³, Tingting Song¹; ¹Univ. of Melbourne, Australia; ²Deakin Univ., Australia; ³Chalmers Univ. of Technology, Sweden. As we move to more open radio access networks, optical crosshaul networks will need to become dynamically reconfigurable with transparent optical interfaces to support a range of optical transport protocols. In this paper, we present an overview of our

Optica Advanced Photonics Congress

Session Guide

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

proposed reconfigurable optical crosshaul network and report on validation of our approaches.

SpTh2F.2 • 11:30 (Invited)

Withdrawn

SpTh2F.3 • 12:00 (Invited)

Estimating the Nonlinear Interference at the Receiver: Methods and Pitfalls, Dario Piloni¹, Lorenzo Andrenacci¹, Gabriella Bosco¹; ¹*Politecnico di Torino, Italy*. We review methods for separating ASE and nonlinear interference noise in coherent receivers, emphasizing techniques and potential pitfalls. Accuracy and practical challenges are evaluated, with a focus on the Longitudinal Power Monitoring-based approach.

14:00 -- 16:00

Room: Les Goudes 1

ITh3A • Passive Photonic Circuits

Presider: Emanuel Peinke; CEA-LETI, France

ITh3A.1 • 14:00 (Invited)

Visible Light Photonic Integrated Circuits for Quantum Computing and Sensing, Cheryl M. Sorace-Agaskar¹; ¹*MIT Lincoln Laboratory, USA*. This talk will cover our work on visible wavelength photonic integrated circuits as a pathway to miniaturization and increased scale and complexity of quantum computing and sensing systems, especially trapped-ion based systems.

ITh3A.2 • 14:30

Optimized CMT-Based Dual Fit for Reflectance and Transmittance of Bragg

Gratings, Yasmin Rahimof¹, Igor A. Nechepurenko¹, M. R. Mahani¹, Andreas Wicht¹; ¹*Ferdinand-Braun-Inst., Germany*. We present an optimized approach to model Bragg gratings in diode lasers. By fitting reflectance and transmittance spectra using CMT, we improve fit-parameter consistency, reducing reliance on costly simulations and enabling high-accuracy optical response predictions.

ITh3A.3 • 14:45

2D-Optical Phased Array With High Array Fill Factor Antennas for Free Space

Communications, Warren Kut King Kan², Sylvain GUERBER³, Stephanie Garcia³, Daivid Fowler³, Natnicha Koompai², Daniele Melati², Carlos Alonso-Ramos¹; ¹*université Paris-Saclay, France*; ²*Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, 91120 Palaiseau, France, France*; ³*CEA-Leti, Université Grenoble Alpes, F-38000 Grenoble, France, France*. A silicon photonics 2D-optical phased array with a large surface fraction used for light emission is demonstrated. It is designed to enhance the power in the main lobe for free space optical communications applications. (Opt. Express, Vol. 33, No. 2, 2025).

ITh3A.4 • 15:00

Optica Advanced Photonics Congress

Session Guide

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

High Density 3D Printed Waveguide Arrays for Integrated Snapshot Imaging

Spectrometers, Tomasz Tkaczyk¹, Haimu Cao¹, Roger McNichols¹, Brian Applegate²; ¹Rice Univ., USA; ²Univ. of Southern California, USA. A densely packed waveguide array fabricated via two-photon polymerization is presented (25,000+ cladded waveguides, 2.5µm core / 4µm pitch). The array's input is dense, while its output incorporates gaps enabling snapshot spectral imaging.

ITh3A.5 • 15:15

Large-Area Silicon Nitride Grating Antenna for Highly Directional Optical Phased Arrays, GERVASIO A. D'ANZIERI¹, Daniele Melati¹; ¹C2N, Université Paris Saclay, CNRS, France. We present here the design of a large-area grating coupler in the silicon nitride platform by means of a multi-objective genetic optimizer. The finally optimized grating has a length of 50µm, an efficiency of 69%, an emission angle of -0.17° and an angular dispersion of 1.94° .

ITh3A.6 • 15:30

Application of Non-Adiabatic Theory to the Control of Integrated Waveguides

Arrays, Anastasiia Sheveleva¹, Christophe Finot¹, Pierre Colman¹; ¹ICB Laboratory - UMRs CNRS 6303, Université Bourgogne-Europe, France. We show that the non-adiabatic theory allows full control of the flow of light in arrays of coupled waveguides. In particular, the coupling phase can be controlled, opening possibilities for the realization of topologic systems.

ITh3A.7 • 15:45 Postdeadline Submission

InP-Based High Index Contrast Platform for Optoelectronic Integration, Yuri Logvin¹, Kirill Pimenov¹, Shayan Saeidi¹; ¹Inpho, Canada. We propose an InP-based platform with a high index contrast between epitaxial layers for optoelectronic integration. The contrast is achieved by combination of dry and wet chemical etches which selectively remove material of particular composition.

14:00 -- 16:00

Room: Callelonge Hall Tier

ITh3B • Active Components and Lasers

Presider: Daniele Melati; C2N - CNRS, Université Paris-Saclay, France

ITh3B.1 • 14:00 (Invited)

Toward an All-Silicon Solution: Silicon Avalanche Photodiodes Beyond the Bandgap Limit, Yuan Yuan^{1,2}, Yiwei Peng², Wayne Sorin², Stanley Cheung^{2,3}, Zhihong Huang², Chaerin Hong², Di Liang^{2,4}, Marco Fiorentino², Raymond Beausoleil²; ¹Department of Electrical and Computer Engineering, Northeastern Univ., USA; ²Hewlett Packard Labs, Hewlett Packard Enterprise, USA; ³Department of Electrical and Computer Engineering, North Carolina State Univ., USA; ⁴Electrical Engineering and Computer Science Department, Univ. of Michigan, USA. Silicon avalanche photodiodes demonstrate exceptional O-band performance, enabling efficient detection without additional epitaxy. Their integration enhances all-silicon photonic circuits, offering a compact, cost-effective, and high-yield solution for diverse applications.

ITh3B.2 • 14:30 (Invited)

A Tentative Roadmap for Semiconductor Quantum Dots in Integrated Quantum Photonic Systems, Marcelo I. Davanco¹; ¹National Inst of Standards & Technology, USA. A tentative

Optica Advanced Photonics Congress

Session Guide

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

roadmap is outlined for the application of single epitaxial quantum dots as building blocks in integrated photonic quantum technologies.

ITh3B.3 • 15:00

Monolithic Integration of Tunable Short- to Mid-Wave Infrared Optoelectronic Devices on InP, Phuc Dinh Nguyen^{2,1}, Dongwan Kim², Jiyeon Jeon², Minkyong Kim², Jungwon Yoon³, Thi Thu Trang Bui^{2,1}, Byong Chun Sun², Sang Jun Lee²; ¹*Department of Nano Science, Univ. of Science & Technology, Korea (the Republic of);* ²*Strategic Technology Research Inst., Korea Research Inst. of Standards and Science, Korea (the Republic of);* ³*IRSPECTRA Co., LTD, Korea (the Republic of).* A lattice constant manipulated virtual substrate platform were developed on InP substrate. The operation wavelength of integrated optoelectronic devices from this can be tuned throughout the short- to mid-wave infrared spectrum.

ITh3B.4 • 15:15

Quantum Dot Lasers With Etched Facets and Waveguide Turns for Silicon Photonics Integration, Diya Hu¹, Chongxin Zhang¹, Thomas Meissner¹, Yuan Liu¹, Jonathan Klamkin¹; ¹*Univ. of California, Santa Barbara, USA.* Etched facet quantum dot lasers with waveguide turns are reported that are designed for silicon photonics integration through micro-transfer print technology. The laser cavity incorporates a waveguide turn to facilitate efficient light coupling.

ITh3B.5 • 15:30

Micro-Transfer-Printing Integration of Interband Cascade Lasers on Si, Yannis billiet^{1,2}, Huiru Ren², Céline Chevalier², Xavier Letartre², Jean-Louis Leclercq², Pierre Cremillieu², Radoslaw Mazurczyk², Marko Perestjuk², Lamine Ferhat², Christian Grillet², Maëva Fagot¹, Eric Tournié¹, Maxime Lepage³, Badhise Ben Bakir³, Rémi Armand³, Vincent Reboud³, Laurent Cerutti¹, Christian Seassal²; ¹*Institut d'Electronique et des Systèmes, Univ. of Montpellier, France;* ²*Institut des Nanotechnologies de Lyon, France;* ³*CEA-Leti, France.* This study presents the technological development for the integration of an Interband Cascade Laser (ICL) source emitting at 4 μm onto a silicon platform, achieved through the Micro-Transfer Printing (μTP) technique.

ITh3B.6 • 15:45

Development of Micro- and NanoLEDs for Optogenetic and Photothermal Multimodal Neurostimulation Applications, Nuaman M. Kuty¹, Bejoys Jacob¹, Jana B. Nieder¹, Bruno Romeira¹; ¹*International Iberian Nanotechnology Lab, Portugal.* We present the design, simulations and fabrication of highly efficient III-V semiconductor micro- and nanoLEDs emitting in the visible and near-infrared wavelengths for optogenetic and photothermal multimodal neurostimulation applications with spatiotemporal precision.

Optica Advanced Photonics Congress

Session Guide

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

14:00 -- 15:30

Room: Les Goudes 2

NoTh3C • Nanophotonic Characterisation

Presider: Lan Fu; Australian National Univ., Australia

NoTh3C.1 • 14:00 (Invited)

Seeing the Invisible with Nanomaterials, Chaohao Chen¹; ¹*Univ. of Technology Sydney, Australia*. This talk will primarily introduce our recent development of a novel imaging technique based on the nonlinear photo response of rare-earth upconversion nanoparticles.

NoTh3C.2 • 14:30

Design and Assembly of Nanophotonic Components Using Optical Tweezers, Euan McLeod¹, Natalie Shultz¹, Weilin Liu¹; ¹*Univ. of Arizona, USA*. Optical tweezers are used to assemble nanophotonic materials and devices from hundreds of building blocks. Structures are designed via a combination of finite difference time domain, finite element methods, and a custom discrete dipole approximation.

NoTh3C.3 • 14:45

Ferroelectric Zirconium Dioxide Thin Films for Electro-Optic Modulation, Pablo Bedoya¹, Ali El Boutaybi¹, Ana M. Statie¹, Alan Durnez¹, Sarra Salhi¹, Davide Cammilleri¹, Nathaniel Findling¹, Ludovic Largeau¹, Samson Edmond¹, Daniele Melati¹, Eric Cassan¹, Delphine Marris-Morini¹, Philippe Lecoeur¹, Guillaume Agnus¹, Sylvia Matzen¹, Carlos Alonso-Ramos¹, Thomas Maroutian¹, Laurent Vivien¹; ¹*Centre de Nanosciences et de Nanotechnologies (C2N), Université Paris-Saclay, CNRS, France*. Here, we exploit the Ferroelectric properties in Zirconium Dioxide (ZrO₂) thin films for electro-optic (Pockels) modulation. ZrO₂ was deposited using pulsed laser deposition technique and its integration in the integrated silicon photonic platform was studied

NoTh3C.4 • 15:00

a Superresolution Technique to Overcome the Diffraction Limit Using a Spatial Light Modulator-Controlled Nth Order Intensity Product, Byoung S. Ham¹; ¹*Gwangju Inst of Science & Technology, Korea (the Republic of)*. Practical quantum sensing has been significantly constrained by the entanglement order of N00N states. Here, a macroscopic superresolution is introduced to beat the classical counterpart using a spatial light modulator-based phase control of coherent light.

NoTh3C.5 • 15:15

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

14:00 -- 16:00

Room: Morgiou

JTh3D • Joint NOMA and SOLITH: Perovskites II

Presider: Stéphane Collin; C2N-CNRS, France

JTh3D.1 • 14:00 (Invited)

Bright and Stable Perovskite Light-Emitting Diodes, Dawei Di¹; ¹*Zhejiang Univ., China*. Abstract not available.

JTh3D.2 • 14:30 (Invited)

Amplified Spontaneous Emission Without Photon Gain in MAPbBr₃ Planar

Waveguides, Angelica Simbula¹, Federico Pitzalis¹, Riccardo Pau^{1,2}, Emanuele D Cadeddu¹, Luyan Wu¹, Stefano Lai¹, Fang Liu³, Selene Matta¹, Valeria Demontis¹, Daniela Marongiu¹, Paolo Pintus¹, Michele Saba¹, Andrea Mura¹, Francesco Quochi¹, Giovanni Bongiovanni¹; ¹*Dipartimento di Fisica, Università degli Studi di Cagliari, Italy*; ²*Zernike Inst. for Advanced Materials, Univ. of Groningen, Netherlands*; ³*School of Environmental Science and Engineering, Shanghai Jiao Tong Univ., China*. We study amplified spontaneous emission (ASE) in MAPbBr₃ planar waveguides using femtosecond spectroscopy. We show that ASE happens without optical gain and involves exciton-polaritons at low excitations and new hybrid states at high excitations.

JTh3D.3 • 15:00

Advanced Optico-Electro-Thermal Modeling of Perovskite/Silicon Tandem Solar Cells

Under Real Operating Conditions., Marion Gonçalves¹, Emmanuel Drouard¹, Wilfried Favre², Mohamed Amara¹; ¹*CNRS INL, France*; ²*CEA-Liten INES, France*. Tandem solar cell is a promising technology with high efficiency (obtained under standard test conditions). In this work, a multiphysics model is developed to calculate the energy yield of a planar tandem cell under real operating conditions.

JTh3D.4 • 15:15

Multifunctional Interfacial Modifier for High-Performance Perovskite Solar Cells, Wenjing

Qi^{1,2}, Zhe Liu¹, Baodan Zhao¹, Meng Zhang¹, Bo Liu^{1,2}, Dawei Di¹; ¹*College of Optical Science and Engineering, Zhejiang Univ., China*; ²*Research Center for Novel Computing Sensing and Intelligent Processing, Zhejiang Lab, China*. A multifunctional interfacial modifier, cobalt hexammine sulfamate (CoHASF), is developed to improve the properties of tin oxide in perovskite solar cells. CoHASF reduces the interfacial defects and improves the perovskite crystallinity, resulting in high-performance devices.

JTh3D.5 • 15:30 (Invited)

Withdrawn

Optica Advanced Photonics Congress

Session Guide

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

14:00 -- 16:00

Room: Callelonge Hall Flat

SpTh3E • Coding and Modulation for Optical Communications

Presider: Aymeric Arnould; Fraunhofer HHI, Germany

SpTh3E.1 • 14:00 (Invited)

Status and Future of Coding and Modulation for Optical Communications, Ingmar Land¹; ¹*Nokia, France*. Fibre-optical communications cover a wide range of distances and requirements. Correspondingly, the coded modulation schemes differ largely in performance and complexity. We review recent technological developments and position them in this design space.

SpTh3E.2 • 14:30 (Invited)

Constellation Shaping: Opportunities and Challenges, Stella Civelli^{1,2}, Marco Secondini²; ¹*CNR-IEIT, Italy*; ²*Tecip Inst., Scuola Superiore Sant'Anna, Italy*. Constellation shaping is a widely adopted modulation technique for enhancing spectral efficiency and approaching Shannon capacity. This talk overviews common probabilistic constellation shaping techniques, highlighting their potential and possible use in nonlinearity mitigation.

SpTh3E.3 • 15:00 (Invited)

Advances in Modeling and Mitigating Equalization-Enhanced Phase Noise, Sebastian Jung¹, Tim Janz¹, Vahid Aref², Stephan ten Brink¹; ¹*Univ. of Stuttgart, Germany*; ²*Nokia, Germany*. We review recent models that describe equalization-enhanced phase noise (EEPN) focusing on one specific approximation that allows to investigate the timing error induced by EEPN. It provides insights into mitigation by conventional digital signal processing (DSP).

SpTh3E.4 • 15:30

Comparing PAM and DMT for VCSELs-Modulated Links Over MMF, Ann Margareth Rosa Brusin¹, Dario Pileri¹, Francesco Aquilino², Fabrizio Forghieri³, Andrea Carena¹; ¹*Department of Electronics and Telecommunications, Politecnico di Torino, Italy*; ²*LINKS Foundation, Italy*; ³*CISCO Photonics Italy S.r.l, Italy*. We present a comparison between PAM and DMT for links over Multi-Mode Fiber, using directly-modulated Vertical Cavity Surface Emitting Lasers. We found that the OMA plays a crucial role in finding the best modulation format.

SpTh3E.5 • 15:45

Optimal Subcarrier Weighting for Mitigation of Laser Phase Noise in Optical Constant Envelope OFDM, ZAHRA HOURZADEHGHARABOLAGH¹, Vincent CHOQUEUSE¹, Pascal Morel¹, Mihai Telescu², Noël Tanguy², Stéphane Azou¹; ¹*Ecole Nationale d'Ingenieurs de Brest, France*; ²*Université de Bretagne Occidentale, France*. We propose a novel strategy to mitigate the impact of laser phase noise in optical constant-envelope OFDM systems by optimizing the non-zero subcarrier weights, providing a closed-form expression for them

Optica Advanced Photonics Congress

Session Guide

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

JD1 • Joint On-Demand Session

JD1.1

Withdrawn

JD1.3

Finding Transmittance Spectrum Envelopes for Optical Characterization of Thin Solid Films, Manuel Ballester¹, Emilio Marquez², Florian Willomitzer³, Aggelos

Katsaggelos¹; ¹*Northwestern Univ., USA*; ²*Cadiz Univ., Spain*; ³*Wyant College of Optical Sciences, Univ. of Arizona, USA*. We propose a novel optimization approach for determining the envelopes of thin-film transmittance spectra. This method can be coupled with the Swanepoel algorithm to determine the optical properties of the thin films.

JD1.4

Simulation of Polarized Light Microscopy for Multiple Analyzer Angles, Manuel Ballester¹, Zoey Ho¹, Asami Odate¹, Marc Walton¹, Aggelos Katsaggelos¹; ¹*Northwestern Univ., USA*. We have developed an efficient simulator for polarized light microscopy experiments. It supports calculations for multiple analyzer angles across different channels of a polarized camera, enhancing imaging capabilities. Our model is publicly available here.

JD1.5

Withdrawn

JD1.6

Moved to posters

JD1.7

Design and Investigation of a Tunable Focusing Metalens Integrated With a Liquid Crystal-Based Fresnel Lens, Huddad Laeim¹, Thomas Zentgraf², Nattaporn

Chattham¹; ¹*Kasetsart Univ., Thailand*; ²*Physics, Paderborn Univ., Germany*. We have designed a compound lens that combines the advantages of electrical control of liquid crystal molecules with the nanophotonics of metalenses. This lens can select at least two focal lengths and is currently very thin

JD1.8

IQ Constellation Images and Deep Learning-Based Method for Estimating OSNR in

Gridless WDM Systems, Kevin D. Martinez Zapata¹, Stephen E. Ralph², Jhon J. Granada Torres¹; ¹*Universidad de Antioquia, Colombia*; ²*Georgia Inst. of Technology, USA*. We propose and experimentally validate a deep learning-based method for blindly estimating the optical signal-to-noise ratio from constellation diagrams in gridless 16-QAM Nyquist-WDM systems with overlapping channels (negative guard band), achieving errors below 2 dB.

JD1.9

Optical Signal-to-Noise Ratio Estimation in Optical Networks Enabled by Hybrid

Transformer-Long Short-Term Memory Architecture, Xin Qin¹, yuqing han¹, Qingzhao He¹, Xia Gao¹, Yadong Gong¹, Qian Hu¹, Xiankun Zhu¹, Fan Yang¹, Xiaowei Lou¹; ¹*China Telecom, China*. The hybrid Transformer-LSTM is first proposed for OSNR estimation with low cost. The field-trial results show that Transformer-LSTM reduces MAE of OSNR by over 49% and exhibits

Optica Advanced Photonics Congress

Session Guide

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

best generalization ability, compared with previous works.

JD1.10

Experimental Demonstration of a Graphene-Based USPL as a Multiwavelength Source for WDM-PON, César A. Montoya¹, Manuela Gutiérrez Rodríguez¹, Juan D. Zapata Caro¹, Jhon J. Granada Torres¹, Ana M. Cárdenas Soto¹; ¹*Universidad de Antioquia, Colombia*. We propose and experimentally demonstrate a graphene-based ultra-short-pulse laser that achieves a broad spectrum segmented into multiple channels. A 2.4 GHz QPSK-RF signal was successfully transmitted across C-band wavelengths, demonstrating its feasibility for WDM-PON applications.

JD1.11

Silicon Nitride Photonic Integrated Circuits on Glass Substrates for Next Generation Packaging, Drew M. Weninger¹, Luigi Ranno¹, Samuel Serna², Lionel Kimerling¹, Anuradha Agarwal³; ¹*Materials Science and Engineering Department, Massachusetts Inst. of Technology, USA*; ²*Department of Physics, Photonics, and Optical Engineering, Bridgewater State Univ., USA*; ³*Materials Research Laboratory, Massachusetts Inst. of Technology, USA*. Silicon nitride photonic integrated circuits were fabricated on glass substrates for the first time using reactive ion etched edge facets, demonstrating a minimum propagation loss of 2.4 ± 0.36 dB/cm and minimum edge coupling loss of 2.17 ± 0.79 dB.