# Optica Advanced Photonics Congress
# Session Guide

**Disclaimer**: this guide is limited to technical program with abstracts and author blocks as of 8 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: Stéphane Collin; C2N-CNRS, France*

**JM1A.1 • 09:00 (Plenary)**
**Light Emissions by Solids: A Unified Model,** Jean-Jacques Greffet[1]; [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 Balakier[1]; [1]*European Space Agency, United Kingdom.* 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; University of Arizona, United States*

**IM2A.1 • 11:00 (Invited)**
**Counterpropagating Interactions in Thin Film Lithium Niobate Waveguides,** Katia Gallo[1], Tiantong Li[1], Halvor Fergestad[1], Daiheng Fu[1]; [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 Bianconi[1], Anat Siddharth[1], Zheru Qiu[1], Rui Ning Wang[1], Mohammad Bereyhi[1], Johann Riemensberger[2], tobias kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Norwegian*

*Technical University, 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. Cantatore[1], Giansergio Menduni[1], Andrea Zifarelli[1,2], Mariagrazia Olivieri[1], Vincenzo Spagnolo[1,2], Angelo Sampaolo[1,2]; *[1]Polysense Lab, Dipartimento Interateneo di Fisica, University 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 $H_2O$ 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 Wang[1]; *[1]City University 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 processers, 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, United States*

**IM2B.1 • 11:00 (Invited)**
**Continuous Real-Time Monitoring of Microphysiological Systems With Photonic Sensors,** Benjamin Miller[1]; *[1]University 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.

**IM2B.2 • 11:30**
**Design of Multimode Hybrid Plasmonic Waveguide for Refractometry,** Mohamad Syahadi[1,2], Olivier BERNAL[1,2], Frederic Surre[3], Christophe CAUCHETEUR[4], Han-cheng SEAT[1,2]; *[1]Toulouse INP - ENSEEIHT, France; [2]LAAS-CNRS, France; [3]University of Glasgow, United Kingdom; [4]University of Mons, Belgium.* We investigate a multimode Si3N4-based hybrid plasmonic waveguide measuring less than 2 µm 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.3 • 11:45**
**InP-Based Laser Diode for Plasmonic Biosensing,** Shayan Saeidi[1], Pavel Cheben[2], Jens H. Schmid[2], Pierre Berini[1]; *[1]University 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.4 • 12:00**
**Inverse-Designed Silicon Nitride Arbitrary Mode Splitters for Interferometric Optical Sensors,** Narges Dalvand[1], Julian Leonel Pita Ruiz[1], Michael Menard[1]; *[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 designated high-order output mode, specified at the design stage, for interferometric sensing applications.

**IM2B.5 • 12:15**
**Optical Single-Pixel Sensing for Nonlinear Ising Machines,** Luana Olivieri[1], Andrew Cooper[1], Luke Peters[1], Vittorio Cecconi[1], Alessia Pasquazi[1], Marco Peccianti[1], Juan S. Totero Gongora[1]; *[1]Emergent Photonics Research Centre, Loughborough University, United Kingdom.* 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.

## 11:00 -- 13:00
## Room: Sormiou
## NeM2C • AI and ML in Optical Networks
*Presider: Carlos Natalino; Chalmers University of Technology, Sweden*

**NeM2C.1 • 11:00 (Invited)**
**LLM-Assisted Network Automation Based on Agentic AI Architectures,** Pooyan Safari[1], Behnam Shariati[1], Hussein Zaid[1], Aydin Jafari[1], Johannes Karl Fischer[1]; *[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 Xue[1]; *[1]Beijing University of Posts & Telecom, China.* Abstract not available.

**NeM2C.3 • 12:00 (Invited)**
**Optical Testbed Dataspace: International Testbed Data Sharing Framework for Network AI,** Yuki Yoshida[1], Yusule Hirota[1], Angela Mitrovska[2], Sugang Xu[1], Taiga Suzuki[1], Behnam Shariati[2], Pooyan Safari[2], Johannes Karl Fischer[2], Ronald Freund[2], Hideaki Furukawa[1], Kouichi Akahane[1], Yoshidnari Awaji[1]; *[1]National Inst of Information & Comm Tech, Japan; [2]Fraunhofer Heinrich Hertz Institute, 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.

**NeM2C.4 • 12:30 (Invited)**
**Transfer Learning for QoT Estimation in Time-Varying Optical Networks,** Piotr Lechowicz[1], Carlos Natalino[1], Paolo Monti[1]; *[1]Department of Electrical Engineering, Chalmers University 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 Applicatoins
*Presider: Lynda Busse; US Naval Research Laboratory, USA*

**NoM2D.1 • 11:00 Tutorial Submission**
**When Metasurfaces Meet With 2D Materials,** Cheng-Wei Qiu[1]; *[1]National University 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 Zhang[2], Oisin McCormack[2,1], Na Jia[2,3], Hodjat Hajian[2,3], Jack Dobie[2,1], Xia Zhang[4], A. Louise Bradley[2,1]; *[1]IPIC, Tyndall National Institute, Ireland; [2]School of Physics, Trinity College Dublin, Ireland; [3]Advanced Materials and BioEngineering Research, Trinity College Dublin, Ireland; [4]College of Sciences, Northeastern University, 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**
**Efficient Second Harmonic Generation in Room-Temperature Ferroelectric Nematic Liquid Crystals,** Ishika Das[1,2], Rajalaxmi Sahoo[3], Charles Smith[1], Helen Gleeson[3], Patrick Parkinson[1,2]; *[1]Photon Science Institute, University of Manchester, United Kingdom; [2]Department of Physics and Astronomy, University of Manchester, United Kingdom; [3]School of Physics and Astronomy, University of Leeds, United Kingdom.* 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.

**NoM2D.4 • 12:15 (Invited)**
**Energy-Efficient Photonic Neural Networks With Waveguides,** Ugur Tegin[1]; *[1]Koç Universitesi, 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.5 • 12:45**
**Innovative Inverse Design Deep Learning Methodology for Large-Scale Metalenses,** Arthur Clini de Souza[1,2], Stéphane Lanteri[1], Marco Abbarchi[2], Badre Kerzabi[2],

Hugo Enrique Hernandéz-Figueroa[3], Mahmoud Elsawy[1]; *[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.

**11:00 -- 12:30**
**Room: Morgiou**
**SM2E • Radiative Cooling I**
*Presider: Jorge Dolado; Centro de F´ısica 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 Meggers[1]; *[1]Princeton University, 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 Malik[1], Urooj Gul[1], Zhong Tao[1], Md Abdul Alim[1]; *[1]School of Engineering, Design and Built Environment, Western Sydney University, 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 Degeorges[1], Jyotirmoy Mandal[1,2]; *[1]Civil and Environmental Engineering, Princeton University, USA; [2]Princeton Materials Institute, Princeton University, 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 Huang[1]; *[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.

**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 García[1], Mario A. González[1], Ivana Gasulla Mestre[1]; *[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 heterogenous multicore fiber.

**SpM2F.2 • 11:30 (Invited)**
**Crosstalk Analysis in MBoSDM Optical Networks With Programmable Transceiver and Switching Solutions,** Laia Nadal Reixats[1], Farhad Arpanaei[2], Jose Alberto Hernández[2], JOSE M. Rivas Moscoso[3], Josep Maria Fàbrega[1], Michela Svaluto Moreolo[1], Ramon Casellas[1]; *[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**
**Intelligent Tailoring of High-Dimensional Orbital Angular Momentum Combs,** Shiyao Fu[1], Shiyun Zhou[1], Lang Li[1], Chunqing Gao[1]; *[1]Beijing Institute of Technology, China.* A deep neural network-based intelligent scheme is proposed for on-demand tailoring of high-dimensional orbital angular momentum (OAM) combs. Fast computational speed, high modulation precision and high manipulation dimensionality, with an OAM mode range of -75 to +75, are achieved.

**14:00 -- 16:00**
**Room: Les Goudes 1**
**IM3A • Microcombs**
*Presider: Vittorio Cecconi; Loughborough University, UK*

**IM3A.1 • 14:00 (Invited)**
**Integrated Microcomb for Ultra-High Coherence Photonics,** Lin Chang[1]; *[1]Peking University, China.* Abstract not available.

**IM3A.2 • 14:30**
**Bistable Quadratic and Kerr Dissipative Coupled Soliton Microcombs,** Francesco Rinaldo Talenti[1,2], Stefan Wabnitz[3,4], Yifan Sun[5], Tobias Hansson[6], luca Lovisolo[2,1], Andrea Gerini[2], Giuseppe Leo[2,9], Laurent Vivien[1], Christian Koos[8], Huanfa Peng[8], Pedro Parra-Rivas[7]; *[1]CNRS, France; [2]Laboratoire Matériaux et Phénomènes Quantiques, Université Paris Cité, France; [3]DIET, Sapienza University of Rome, Italy; [4]CNR, Italy; [5]Université libre de Bruxelles, Belgium; [6]Linköping University, Sweden; [7]University of Almeria, Spain; [8]Karlsruhe institute 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.3 • 14:45**
**AlGaAs on Insulator Microcomb and Frequency Doubling,** Luca Lovisolo[1,2], Francesco Rinaldo Talenti[1,2], Andrea Gerini[1], Stefan Wabnitz[3,4], Martina Morassi[2], Aristide Lemaitre[2], Abdelmounaim Harouri[2], Christian Koos[5], Huanfa Peng[5], Carlos Alonso-Ramos[2], Laurent Vivien[2], Giuseppe Leo[1,6]; *[1]université paris cite, France; [2]C2N, France; [3]Sapienza University of Rome, Italy; [4]Istituto Nazionale di Ottica, Italy; [5]Karlsruhe Institute 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 χ(2) + χ(3) functionality.

**IM3A.4 • 15:00**
***Broadband MmWave Comb Generation via Laser-Cavity Soliton Microcombs*,** Luke Peters[1,2], Andrew Cooper[1], Luana Olivieri[1,2], Antonio Cutrona[1,2], Fedor Getman[1], Vittorio Cecconi[1,2], Nitish Paul[1], Debayan Das[1,2], Maxwell Rowley[2], Sai T. Chu[3], Brent E. Little[4], Roberto Morandotti[5], David Moss[6], Juan S. Totero Gongora[1,2], Alessia Pasquazi[1,2], Marco Peccianti[1,2]; *[1]Loughborough University, United Kingdom; [2]University of Sussex, United Kingdom; [3]University of Hong Kong, China; [4]Xi'an Institute of Optics and Precision Mechanics, China; [5]INRS-EMT, Canada; [6]Swinburne University 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.5 • 15:15**
**Soliton Microcomb at 2 Micron Wavelength With Tuning Flexibility in Time and Frequency,** Xukun Lin[1], Zhiming Shi[1], Siyang Li[1], Suwan Sun[1], Junqiu Liu[2,3], Hairun Guo[1,3]; *[1]Shanghai University, China; [2]International Quantum Academy, China; [3]University 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.6 • 15:30 (Invited)**
**Efficient Chip-Scale Microcombs,** Victor Torres Company[1]; *[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.

## 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 Tartakovskii[1]; [1]*University of Sheffield, United Kingdom.* 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 xiao[1], Francesco Rinaldo Talenti[1], Carlos Alonso-Ramos[1], Delphine Marris-Morini[1], Daniele Melati[1], Eric Cassan[1], Nicolas Dubreuil[3], Arianna Filoramo[2], Laurent Vivien[1]; [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 Pellegrini[1], Francisco T. Orlandini[1], Silvia V. G. Nista[1], Stéphane Lanteri[2], Hugo Enrique Hernandéz-Figueroa[3], Stanislav Moshkalev[1]; [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 Beeckman[2], Kobe De Geest[2,1], Enes Lievens[2,1], Ewout Picavet[2], Jiayi Liu[2], Klaartje De Buysser[3], Dries Van Thourhout[1]; [1]*Ghent University, INTEC, Belgium;* [2]*Electronics and Information Systems, Ghent University, Belgium;* [3]*Chemistry, Ghent University, 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 Schmiedeke[1], Cem Doganlar[1], Tobias Schreitmüller[1], Steffen Meder[1], Benjamin Haubmann[1], Sebastian

Werner[1,2], Markus Döblinger[3], Hyowon W. Jeong[1], Jonathan J. Finley[1], Gregor Koblmüller[1,2]; *[1]Technische Universität Munchen, Germany; [2]Technische Universität Berlin, Germany; [3]Ludwig Maximilians University, 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 Lievens[1], Ewout Picavet[1], Kobe De Geest[1], Klaartje De Buysser[1], Dries Van Thourhout[1], Peter Bienstman[1], Jeroen Beeckman[1]; *[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 Silva[1], Antonio Z. Khoury[2], Rafael F. Barros[3], Braian P. da Silva[1], Marcos G. de Oliveira[2], Christiano M. Nascimento[1], Anderson A. Tomkelski[1]; *[1]QuIIN, SENAI CIMATEC University, 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 Stan[1], Dominique Verchere[2], Juan José Vegas Olmos[3], Idelfonso Tafur Monroy[1], Simon Rommel[1]; *[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 Derkach[1], Olena Kovalenko[1], Vladyslav Usenko[1]; *[1]Univerzita Palackeho 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 Duijn[1], Sebastian Verschoor[2], Simon Rommel[1]; *[1]Eindhoven University of Technology,*

*Netherlands; [2]University of Amsterdam, Netherlands.* Quantum Key Distribution Networks (QKDNs) enable information-theoretically secure key exchange but require synchronization to guarantee their security and 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 Wang[1]; *[1]University of Bristol, United Kingdom.* 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 University, Australia*

**NoM3D.1 • 14:00 Tutorial Submission**
**Optical Properties and Applications of a Large Family of Metallic 2D Nanosheets – MXenes,** Changhoon Park[1], Yury Gogotsi[1]; *[1]A.J. Drexel Nanomaterials Institute, Drexel University, 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 Chen[1]; *[1]Xiamen University, China.* Abstract not available.

**NoM3D.3 • 15:30**
**Anisotropic Photonic Crystals for Extraordinary Chiral Mirror Functionality,** Andrea Alessandrini[1], Leone Di Mauro Villari[1], Luca Assogna[1], Matteo Silvestri[1], Matteo Venturi[1], Carino Ferrante[2], Paola Benassi[1,2], Davide Tedeschi[1], Andrea Marini[1,2]; *[1]University 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 Pal[1], Ambaresh Sahoo[1], Raju Adhikary[1], Matteo Venturi[1], Giovanna Salvitti[1], Carino Ferrante[2], Davide Tedeschi[1], Paola Benassi[1,2], Massimiliano Aschi[1], Andrea Marini[1,2]; *[1]University 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.

**14:00 -- 16:00**
**Room: Morgiou**
**SM3E • Thermophotovoltaics**
*Presider: Jyotirmoy Mandal; Princeton University, USA*

**SM3E.1 • 14:00 (Invited)**
**Thermophotovoltaics: Photonics and Thermal Management,** Rodolphe Vaillon[1], Bhrigu Rishi Mishra[1], Oriol Teixidó[2], Haolin Wang[3], Alexis Vossier[4], Ines Revol[1], Guilhem Almuneau[1], Makoto Shimizu[3], Daniel Chemisana[2]; *[1]LAAS-CNRS, France; [2]Applied Physics Section of the Environmental Science Department, University of Lleida, Spain; [3]Department of Mechanical Systems Engineering, Tohoku University, Japan; [4]PROMES-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 Giteau[1], Alexis Vossier[1]; *[1]PROMES-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 HANOUF[1], Jérémie Drevillon[1], Franck Enguehard[2]; *[1]Pprime, 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,** Bhrigu Rishi Mishra[1], Alexis Vossier[2], Ines Revol[1], Guilhem Almuneau[1], Rodolphe Vaillon[1]; *[1]LAAS-CNRS, France; [2]PROMES-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 Chatelet[1], Julien Legendre[1], Olivier Merchiers[1], Pierre-Olivier Chapuis[1]; *[1]CETHIL, 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.

**SM3E.6 • 15:30 (Invited)**
**Title to be Announced,** Jennifer Selvidge[1]; *[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 Venkatasubramani[1], Ahmed Galib Reza[1], Liam P. Barry[1]; *[1]Dublin City University, 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 Zhou[1], Zhixin Liu[1]; *[1]University College London, United Kingdom.* 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 Scalart[2], Gaël Simon[1], Laurent Bramerie[3], Michel Joindot[3], Jérémy Potet[1], Mathilde Gay[3], Philippe Chanclou[1], Monique Thual[1]; *[1]Orange Labs, France; [2]IRISA, France; [3]FOTON Institute, 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 Saliou[1], Théo Huguenin[1], Mael Bideau[1], Philippe Chanclou[1], Gaël Simon[1], Jérémy Potet[1]; *[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 Igarashi[1], Ryo Koma[1], Kazutaka Hara[1], Jun-ichi Kani[1], Tomoaki Yoshida[1]; *[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**
**Generalised Partial Response Signaling via IMDD Towards Addressing HS-PON,** Michael McCarthy[1], Liam P. Barry[1]; *[1]Engineering, Dublin City University, 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/$Sb_2S_3$/SiGe Waveguide for Tunable Mid-IR Supercontinuum Generation,** Adam Bieganski[1,2], Rémi Armand[1], Marko Perestjuk[1,2], Lamine Ferhat[1], Vincent Reboud[3], jean-michel hartmann[3], Thach Nguyen[2], arnan mitchell[2], Christelle Monat[1], Sébastien Cueff[1], Christian Grillet[1]; *[1]Institut des Nanotechnologies de Lyon, France; [2]RMIT University, Australia; [3]CEA-Leti, France.* We demonstrate supercontinuum generation in the mid-IR using a hybrid Ge/$Sb_2S_3$/SiGe-on-Si waveguide. By changing the $Sb_2S_3$ 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 BousT[1], Quentin Wilmart[3], Jonathan Faugier-Tovar[3], Sylvain Guerber[3], Michel Lecomte[1], olivier Parillaud[1], Eva Izquierdo[1], Guillaume Daccord[1], Michel Garcia[1], Michel Krakowski[1], Olivier Gauthierlafaye[2], François Duport[1]; *[1]III V Lab, GIE between Thales Research and Technology, Nokia and CEA LETI, France; [2]LAAS-CNRS, University 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. Bufi[1], Pascual Muñoz[1], Daniel Pastor[1]; *[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. Statie[1], Alicia Ruid-Caridad[2], Christine Lafforgue[1], Pablo Bedoya-Rios[1], zijun xiao[1], Nathaniel Findling[1], Davide Cammilleri[1], Ludovic Largeau[1], Stefano Pirota[1], Alan Durnez[1], Francois Maillard[1], Daniele Melati[1], Samson Edmond[1], Eric Cassan[1], Guillaume

Agnus[1], Delphine Marris-Morini[1], Philippe Lecoeur[1], Carlos Alonso-Ramos[1], Thomas Maroutian[1], Sylvia Matzen[1], Laurent Vivien[1]; *[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 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 Kodigala[1]; *[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 heterogenous 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 University, UK*

**IM4B.1 • 16:30 (Invited)**
**All-Dielectric Magneto-Optical Metasurfaces Exhibiting Giant Faraday Rotation Utilizing Bound States in the Continuum,** Siyuan Gao[1], Kota Taniguchi[1], Takeru Yambe[1], Satoshi Iwamoto[2,3], Yasutomo Ota[1]; *[1]Department of Applied Physics and Physico-Informatics, Keio University, Japan; [2]Research Center for Advanced Science and Technology, The University of Tokyo, Japan; [3]Institute of Industrial Science, The University 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**
**Bridging Between Plasmonic and Dielectric Metasurfaces by the Nonlocality,** Amitrajit Nag[1], Jaydeep K. Basu[1]; *[1]Indian Institute of Science, India.* We capture the nonlocal behavior of the in-plane field propagation through the plasmonic and dielectric metasurfaces that can bridge these two otherwise differently behaving elements of the flat optics family by carefully investigating the numerical electric and magnetic field propagations.

**IM4B.3 • 17:15**
**Topology Optimization of Blazed Metasurfaces for High-Efficiency Spectrographs,** Simon Ans[1,2], Guillaume Demésy[2], Frédéric Zamkotsian[1], Quentin Tanguy[3], Roland Salut[3], Andrei Mursa[3], Nicolas Passilly[3]; *[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. S[1], Mondher Besbes[1], Henri Benisty[1]; [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 spectrum and angle determination.

**IM4B.5 • 17:45**
**Dispersion Correction in Wide Field of View Metalens for Broadband Operation,** Jian Cao[1], Sarra Salhi[1], Jonathan Peltier[1], Jean-René Coudevylle[1], Samson Edmond[1], Sandeep-Yadav Golla[1], Etienne Herth[1], Cédric Villebasse[1], Laurent Vivien[1], Carlos Alonso-Ramos[1], Daniele Melati[1]; [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. Neshev[1]; [1]*Australian National University, 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 Teixeira[1]; [1]*PICadvanced, Portugal.* Abstract not available.

**NeM4C.2 • 17:00 (Invited)**
**Coexistence in Future Optical Access Networks,** Gaël Simon[1], Jérémy Potet[1], Fabienne Saliou[1], Dylan Chevalier[1], Georges Gaillard[1], Joseph Zandueta[1], Philippe Chanclou[1]; [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 Das[1], Md Mosaddek Hossain Adib[1], Michael Straub[1], rene bonk[1]; [1]*Nokia Solutions and Networks, Germany.* We demonstrate a novel scheme and configuration that allows commercial TDM-PON systems to support 802.1CCB-FRER for enhanced reliability in TSN. We experimentally evaluate and compare the performance of 802.1CB-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 MONDAL[1], Elaine Wong[1]; [1]*University 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.

**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 Ronning[1]; [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 Ganguly[1], Qiong Xie[1], Pol Sopeña[1], David Grojo[1]; [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 Yang[1], Wen Hsin Chang[1], Wei Hsuan Kung[1], Hsuen-Li Chen[1,2]; [1]*National Taiwan University, Taiwan;* [2]*Center of Atomic Initiative for New Materials, National Taiwan University, 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 $SmNiO^3$ Thin Film,** Pierre-Antoine Tostivint[1], Simon Hurand[2], Jérémie Drevillon[2], Fabien Capon[1]; [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 $SmNiO_3$, 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 Uluturk[3], Jin Ho Kim[3], Richard M. Osgood[3]; *[1]NanoScience Technology Center, University of Central Florida, USA; [2]Department of Physics, University 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 resonance wavelengths.

**NoM4D.6 • 18:15**
**Copper-Doped InP/ZnSe/ZnS Quantum Dots for High-Performance Luminescent Solar Concentrators,** Tarik S. Kaya[1], Ugur B. Caliskan[2], Parsa Kaviani[2], Asim Onal[3], Eren Tekinay[1], Guncem Ozgun Eren[3], Mehmet Silme[4], Kadriye Kutlay[4], Ugur Unal[5], Sedat Nizamoglu[2]; *[1]Department of Material Science and Engineering, Koç University, Turkey; [2]Department of Electrical and Electronics Engineering, Koç University, Turkey; [3]Department of Biomedical Science and Engineering, Koç University, Turkey; [4]Berteks Tekstil Sanayi ve Ticaret A.S., Turkey; [5]Department of Chemistry, Koç University, 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, Linkoping University, Sweden; [2]Wallenberg Wood Science Centere, 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 Mandal[3], Forrest Meggers[3], Barry P. Rand[3], Christiane Becker[1,4]; *[1]Helmholtz-Zentrum Berlin, Germany; [2]Zuse Institute Berlin, Germany; [3]Princeton University, 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, University 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**
**Oxygen Deficiency-Induced Enhanced Photo-Thermal Conversion Capability in Tungsten Oxide Photonic Crystals,** Silpa S[1], Ann Eliza Joseph[1], Vinayak Kamble[1]; *[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 Sarkar[1], Michael Enders[1], Evgenia Klironomou,[1], Julien Legendre[1], Georgia Papadakis[1]; *[1]ICFO -Institut de Ciencies 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-$MoO_3$ flakes, as well as chiral thermal emission using twisted bilayers of α-$MoO_3$.

**SM4E.6 • 18:15**
**A Ceramic Radiative Cooler With Near-Ideal Solar Reflectance and Intrinsic Selective Emittance,** Nithin J. Varghese[1], Jyotirmoy Mandal[1]; *[1]Princeton University, 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 Submission**
**Advances and Future Relevance of Photonic Machine Learning,** Daniel Brunner[1]; *[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 Hernandez[1], Søren F. Nielsen[2], Christophe Peucheret[3], Francesco Da Ros[1], Mikkel Schmidt[1], Darko Zibar[1]; *[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, University of Science and Technology of China, China; [2]Suzhou Institute of Biomedical Engineering and Technology, Chinese Academy of Sciences, China.* We propose a physics-informed deep learning framework for efficient wavelength-multiplexed image 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 Rana[2], Abdullah N. Khan[1], Mohammed Zahed M. Khan[4], Usman Younis[2], Mudassir Masood[1,3]; *[1]Interdisciplinary Research Center for Communication Systems and Sensing, King Fahd University of Petroleum and Minerals, Saudi Arabia; [2]Department of Computer and Software Engineering, Information Technology University, Lahore, Pakistan; [3]Electrical Engineering Department, King Fahd University of Petroleum and Minerals, Saudi Arabia; [4]Electrical and Electronics Engineering, School of Engineering and Built Environment, Anglia Ruskin University, United Kingdom.* 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.

## Tuesday, 15 July

**09:00 -- 10:30**
**Room: Les Goudes 1**
**ITu1A • Computational Methods**
*Presider: Cheng Wang; City University of Hong Kong, Hong Kong*

**ITu1A.1 • 09:00 (Invited)**
**Hyperspectral Information Processing and Dimensionality Reduction,** Myoung-Gyun Suh[1]; *[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 Rodt[3], Stephan Reitzenstein[3], Sven Burger[1,2]; *[1]JCMwave GmbH, Germany; [2]Zuse Institue Berlin, Germany; [3]Institute 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 Agarwal[1], Jacob M. Hiesener[1], Michael J. Probst[1], Arjun Khurana[1], Stephen E. Ralph[1]; *[1]Georgia Institute 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 Lipan[1], Aldo De Sabata[2]; *[1]Physics, University of Richmond, USA; [2]Department of Measurements and Optical Electronics, Politehnica University 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 Grinberg[1], Dusan Gostimirovic[2], Martin Vachon[3], Odile Liboiron-Ladouceur[2], Dan-Xia Xu[1]; *[1]Digital Technologies Research Center, National Research Council Canada, Canada; [2]Department of Electrical and Computer Engineering, McGill University, Canada; [3]Quantum and Nanotechnologies Research Center, National Research Council Canada, Canada.* We propose topology optimized compact 3 μm × 10 μm binary bandpass

filters featuring ultra-flat 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; University of Central Florida, CREOL, USA*

**ITu1B.1 • 09:00 (Invited)**
**Bright Multipartite Quantum States From Silicon-Based Microresonators,** Virginia D'Auria[1]; [1]*Université Côte d'Azur, France.* Abstract not available.

**ITu1B.2 • 09:30**
**Quantum Squeezing in an Integrated $Si_3N_4$ Microring Under Bichromatic Pumping: Detection and Optimization,** Andrei Danilin[1,3], Timur Yunusov[1,2], Alexey Dushanin[1,2], Dmitry Chermoshentsev[1,2], Anatoly Masalov[1], Igor Bilenko[1,3]; [1]*Russian Quantum Center, Russian Federation;* [2]*Moscow Institute of Physics and Technology, Russian Federation;* [3]*Faculty of Physics, Lomonosov Moscow State University, Russian Federation.* We report of the detailed characterization of quadrature squeezing in a sub-threshold degenerate optical parametric oscillator within a $Si_3N_4$ 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 Lemoine[1], Brieg Le Corre[1,2], Lise Morice[1], Abdelmounaim Harouri[2], Luc Le Gratiet[2], gregoire beaudoin[2], Julie Le Pouliquen[1], Karine Tavernier[1], Arnaud Grisard[3], Sylvain Combrié[3], Bruno Gérard[4], Charles Cornet[1], Christophe Levallois[1], Yannick Dumeige[1], Konstantinos Pantzas[2], Isabelle Sagnes[2], Yoan Léger[1]; [1]*Institut FOTON, France;* [2]*C2N, France;* [3]*Thales Research ans 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 Renema[1]; [1]*QuiX Quantum B.V., Netherlands.* Abstract not available.

**09:00 -- 10:30**
**Room: Sormiou**
**NeTu1C • Energy Efficient Networking**
*Presider: Carlos Natalino; Chalmers University of Technology, Sweden*

**NeTu1C.1 • 09:00 (Invited)**
**Optimization of Energy Consumption of Public Networks,** Andreas Gladisch[1]; [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 Castro[1], Pablo Torres-Ferrera[1], Mohammad Hosseini[1], Antonio Napoli[1]; [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)**
**Petascale Photonic Connectivity for Energy Efficient Scaling of AI Computing,** Keren Bergman[1]; [1]*Columbia University, USA.* High-performance systems are increasingly bottlenecked by the energy and communications costs of interconnecting numerous compute and memory resources. This talk will cover approaches for leveraging energy efficient photonic connectivity to accelerate distributed AI/ML applications.

**09:00 -- 10:30**
**Room: Les Goudes 2**
**NoTu1D • THz Sensing and Communication**
*Presider: Sedat Nizamoglu; Koç Universitesi, Turkey*

**NoTu1D.1 • 09:00**
**Enhanced THz Emission from Spintronics Using Plasmonic Core-Shell Nanostructures,** Vittorio Cecconi[1,2], Akash Dominic Thomas[1], Jitong Wang[1], Cheng-Han Lin[1], Anoop Dhoot[1], Antonio Cutrona[1,2], Abhishek Paul[1], Yi Tian[2], Luke Peters[1,2], Luana Olivieri[1,2], Elchin Isgandarov[1], Juan S. Totero Gongora[1,2], Alessia Pasquazi[1,2], Marco Peccianti[1,2]; [1]*Loughborough University, United Kingdom;* [2]*Physics, University of Sussex, United Kingdom.* We demonstrate enhanced spintronic terahertz (THz) emission through ultrafast plasmonic-mediated heating. Placing $SiO_2$-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 Chen[1]; [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**
**Metamaterial Filters for Terahertz Cancer Therapy,** Joo-Hiuk Son[1]; [1]*University 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)**
**Terahertz Sensing and Communications Enabled by Substrateless Integrated Platform,** Withawat Withayachumnankul[1]; [1]*University of Adelaide, Australia.* This work introduces a novel substrateless integrated platform designed for the terahertz band. Using effective medium design in intrinsic silicon, we achieve exceptional broadband functionality and efficiency, enabling transformative terahertz devices.

**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 Papakonstantinou[1]; [1]*University College London, United Kingdom.* 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 Hwang[1]; [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 BENAIT[2], Aotmane En naciri[1], Jean-Francois Pierson[2], Fabien Capon[2]; [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, $HfO_2$, $SiO_2$, and $Si_3N_4$ 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 Dolado[1]; *[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**
**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 Koashi[1]; *[1]The University 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 Gagliano[1], Marco Fasano[1], Andrea Madaschi[1], Alberto Gatto[1], Pierpaolo Boffi[1], Paolo Martelli[1], Paola Parolari[1]; *[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 George[1], Monika Monika[1,2], Farzam Nosrati[1,3], Stefania Sciara[1], Riza Fazili[1], Andre Luiz Muniz[1,2], Arstan Bisianov[1,2], Nicola Montaut[1], Rosario Lo Franco[3], Wiiliam J Munro[4], Mario Chemnitz[5,1], Ulf Peschel[2], Roberto Morandotti[1]; *[1]INRS, Canada; [2]Institute of Solid State Theory and Optics, Germany; [3]Dipartimento di Ingegneria, Università di Palermo, Italy; [4]Okinawa Institute of Science and Technology Graduate University, Japan; [5]Leibniz Institute 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 Torre[1], Homa Zarebidaki[1], Arno Mettraux[1], Florian Dubois[1], Jacopo Leo[1], Dorian Herle[1], Ivan Prieto[1], Olivier Dubochet[1], Michel Despont[1], Hamed Sattari[1]; *[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, $V_{\pi}$.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 Chelladurai[1], Manuel Kohli[1], Joel Winiger[1], David Moor[1], Andreas Messner[2], Yuriy Fedoryshyn[1], Mohamed Eleraky[1], Yuqi Liu[1], Hua Wang[1], Juerg Leuthold[1]; *[1]ETH Zurich, Switzerland; [2]Zurich Instruments, Switzerland.* Barium titanate's (BTO) 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 Lemoine[1], Lise Morice[1], Brieg Le Corre[1,2], Antoine Létoublon[1], Alex Naïm[1], Thomas Batte[1], Mathieu Perrin[1], Julie Le Pouliquen[1], Karine Tavernier[1], Charles Cornet[1], Christophe Levallois[1], Yannick Dumeige[1], Yoan Léger[1]; *[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. Wiederhecker[1]; *[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. Ye[1]; *[1]Carleton University, 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 Wang[3], Norman Israel[3], Dan-Xia Xu[1], Yuri Grinberg[2], Lora Ramunno[3]; *[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 Institute, University 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 University, 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 digital approach: direct laser machining.

**ITu2B.4 • 12:00 (Invited)**
**Active Meta-Components for Future Dense Integration of Photonic ICs,** Tingyi Gu[1]; *[1]University of Delaware, USA.* Subwavelength engineering on SOI slab waveguides enables compact designs for photonic integrated circuits to demonstrate multi-mode conversion, non-Hermicity, non-reciprocity, mathematical convolution, hyperspectral image classification, and spectrometry.

**11:00 -- 12:45**
**Room: Sormiou**
**NeTu2C • Optical Transmission**
*Presider: Oskars Ozolins; RISE Research Institutes 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 Wantee[3], Darja Cirjulina[2], Armands Ostrovskis[2], Hao Liu[3], Kyle Bottrill[3], Gregory T. Jasion[3], Hesham Sakr[3], John R. Hayes[3], Vjaceslavs Bobrovs[2], Francesco Poletti[3], Xiaodan Pang[2], Periklis Petropoulos[3], Oskars Ozolins[2,1]; *[1]RISE Research Institutes of Sweden AB, Latvia; [2]Riga Technical University, Latvia; [3]University of Southampton, United Kingdom.* 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 Ietro[1], Emanuele E. Virgillito[1], Antonio Napoli[2], Sai K. Bhyri[2], Gabriele Galimberti[2], Walid Wakim[2], Vittorio Curri[1]; *[1]Politecnico di Torino, Italy; [2]Nokia,*

*Germany.* Coherent accumulation of non-linearity on QAM modulated signals can be severe in dipsersion-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 Ghazisaeidi[1], 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 Costas[1], Lakshmi Narayanan Venkatasubramani[1], Prajwal Lakshmijayasimha[2], Richard Phelan[2], Diarmuid Byrne[2], Brian kelly[2], Liam P. Barry[1]; *[1]Dublin City University, 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)**
**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 Matsuhisa[1]; *[1]The University 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. Kaya[1], Andrea Corna[2], Hümeyra Nur Kaleli[3], Ridvan Balamur[4], Asim Onal[5], Ugur B. Caliskan[4], Roya Mohajeri[4], Günther Zeck[2], Sedat Nizamoglu[4]; *[1]Department of Material Science and Engineering, Koç University, Turkey; [2]Institute of Biomedical Electronics, TU Wien, Austria; [3]Research Center for Translational Medicine, Koç University, Turkey; [4]Department of Electrical and Electronics Engineering, Koç University, Turkey; [5]Department of Biomedical Science and Engineering, Koç University, Turkey.* An optoelectronic biointerface incorporating $AgBiS_2$ 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**
**$AgBiS_2$ Quantum Dots as Pseudocapacitive Optoelectronic Nanocrystals for Neurostimulation,** Tarik S. Kaya[1], Ridvan Balamur[2], Selin Sariyer[3], Hümeyra Nur Kaleli[4], Asim Onal[5], Ugur B. Caliskan[2], Murat Hasanreisoglu[6,4], Rezan Demir-Cakan[3], Sedat Nizamoglu[2]; *[1]Department of Material Science and Engineering, Koç University, Turkey; [2]Department of Electrical and Electronics Engineering, Koç University, Turkey; [3]Department of Chemical Engineering, Gebze Technical University, Turkey; [4]Research Center for Translational Medicine, Koç University, Turkey; [5]Department of Biomedical Science and Engineering, Koç University, Turkey; [6]Department of Ophthalmology, Medical School, Koç University, Turkey.* This study presents a bioelectronic design using $AgBiS_2$ 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

**11:00 -- 12:30**
**Room: Morgiou**
**STu2E • Thermal Photonics II**
*Presider: Ioannis Papakonstantinou; University College London, UK*

**STu2E.1 • 11:00 (Invited)**
**Radiative Transfer in Dense Media: Theory and Applications,** Refet A. Yalcin[1]; *[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 Kung[1], Pei-Chi Hsieh[1], Shan-Chiao Yang[1], Wen Hsin Chang[1], Hsuen-Li Chen[1,2]; *[1]National Taiwan University, Taiwan; [2]Center of Atomic Initiative for New Materials, National Taiwan University, 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 Tsang[1], Jyotirmoy Mandal[1,2]; *[1]Civil and Environmental Engineering, Princeton University, USA; [2]Princeton Materials Institute, Princeton University, 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 Kontou[1], Olivier Merchiers[1], Azeddine Tellal[2], Taha Benyattou[2], Jean-Louis Leclerc[2], Pierre-Olivier Chapuis[1]; *[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**
**Modulation-Format Transparent Carrier Phase Recovery Based on Multilayer Perceptron,** Chenrui Xu[1], Tobias Blatter[1], Serge Kaufmann[1], Laurenz Kulmer[1], Juerg Leuthold[1]; *[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 Deakin[1]; *[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 Ramirez[1], Delphine Neel[1], Claire Besancon[1], nicolas vaissiere[1]; *[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 Shetewy[1], Weizhong Zhang[1], Menglong He[1], Kambiz Jamshidi[1]; *[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 kim[1], Jun-Hwan Shin[1], Miran Park[1], Jonghwa Shin[2], O-Kyun Kwon[1]; [1]*Electronics and Telecommunications Research Institute, Korea (the Republic of);* [2]*Department of Material Science and Engineering, Korea Advanced Institute 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 Kim[1], Jang-Uk Shin[1], Sang-Ho Park[1], Young-Tak Han[1], Dong-Hoon Lee[1]; [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 over C + L band

**JTu3A.4**
**Continuous-Variable Quantum Key Distribution With Silicon Photonics Modulator and Detector,** Yiming Bian[1], Xuesong Xu[1], Xin Hua[2], Lu Fan[1], Song Yu[1], Lei Zhang[1], Xi Xiao[2], Yichen Zhang[1]; [1]*Beijing University 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. Kumar[1], Rajarshi Guchhait[1], Devendra Chack[1]; [1]*Indian Institute 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 MAURYA[1], Devendra Chack[1], Ravi R. Kumar[1]; [1]*Electronics, Indian Institute 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 J[1], Nithyanandan Kanagaraj[1]; [1]*Indian Institute 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 Rawat[1], Siddharth Nambiar[1], Shankar k. selvaraja[1]; *[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 Chen[2], Andrea Fiore[1], Shuo-Yen Tseng[2], René van Veldhoven[1]; *[1]Technologic University of Eindhoven, Netherlands; [2]National Cheng Kung University, 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**
**PCS Direct Communication for Low-Latency Optical Memory Interconnection,** Chanho Park[1], Hun-Sik Kang[1]; *[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**
**Next-Generation Spectral-Splitting Agri-Photovoltaics,** Yu Tian[1], Bryce S. Richards[1], Gan Huang[1]; *[1]Karlsruher Institut für Technologie, Germany.* This study presents a spectral-splitting agri-photovoltaic system integrating Bragg mirrors and silicon solar cells, achieving 9.1% electricity efficiency while maintaining nearly full PAR transmission and uniform PAR distribution, ensuring optimal light conditions for plant growth.

**JTu3A.12**
**Linear and Nonlinear Optical Responses in QDs,** Xue Bai[1], Shenghao Wang[1], Wei Zhou[1], Lingzhi Wu[1], Xueli Dong[1], Yixuan Li[1], Waseem Yasin Muhammad[1], John James Magan[1], Gaozhong Wang[1]; *[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 Cho[1], Hyeok Kim[2], Do Hwan Kim[3], Jiwan Kim[1]; *[1]Department of Advanced Materials Engineering, Kyonggi University, Korea (the Republic of); [2]School of Electrical Engineering, University of Seoul, Korea (the Republic of); [3]Department of Chemical Engineering, Hanyang University, 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/m$^2$. 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 ALMEIDA[1], Inès REVOL[1], Jean-Baptiste Doucet[1], Mathieu Arribat[1], Guilhem Almuneau[1], 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. Kaya[1], Parsa Kaviani[2], Ridvan Balamur[2], Asim Onal[3], Sedat Nizamoglu[2]; *[1]Department of Material Science and Engineering, Koç University, Turkey; [2]Department of Electrical and Electronics Engineering, Koç University, Turkey; [3]Department of Biomedical Science and Engineering, Koç University, 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**
**Towards Accurate Determination of Optical Gaps in Layered Chalcogenides Using Universal Scaling Law,** Shahzad Ahmad[1], Muhammad Zubair[1], Usman Younis[1]; *[1]Information Technology University, 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 Janyani[1]; *[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 Gokbulut[1]; *[1]Department of Physics, Bogazici University, 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 Adhikary[1], Matteo Venturi[1], Giovanna Salvitti[1], Ambaresh Sahoo[1], Carino Ferrante[2], Paola Benassi[1,2], Francesco Di Stasio[3], Andrea Toma[3], Hatice Altug[4], Massimiliano Aschi[1], Andrea Marini[1,2]; *[1]University 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. PAUL[1], Matteo Venturi[1], Raju Adhikary[1], Giovanna Salvitti[1], Carino Ferrante[2], Davide Tedeschi[1], Francesco Di Stasio[3], Andrea Toma[3], Hatice Altug[4], Andrea Marini[1,2]; *[1]Department of Physical and Chemical Sciences, UNIVERSITY 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]Institute 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**
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 Tyszka-Zawadzka[2], Pawel Szczepanski[2,1]; *[1]National Institute of Communications, Poland; [2]Faculty of Electronics and Information Technology, Warsaw University 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. Arnaoutakis[1]; *[1]Hellenic Mediterranean University, 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.

**Disclaimer**: this guide is limited to technical program with abstracts and author blocks as of 8 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 Bayvel[1]; [1]*University College London, United Kingdom.* 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-Pedretti[1]; [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 Shoji[1]; [1]*Institute 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 Ghosh[1]; [1]*indian Institute 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.

**IW2A.3 • 11:45**
**Analysis and Synthesis of Silicon Based Optical (De)Multiplexer to Enable AO-OFDM,** Enzo G. da Cruz[1], Felipe da Silva[1], Mateus Coelho[1], Pablo Marciano[1], Luís da Silva[1], Maxwell Monteiro[2], Maria Pontes[1], Marcelo Segatto[1]; *[1]Federal University 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. Pedersen[1], Ali N. Babar[1,2], Bingrui Lu[1,2], Jesper L. Sand[1], Mathias L. Korsgaard[1], Nikolaj B. Hougs[1], Thor A. Weis[1,2], Søren Stobbe[1,2], Babak Vosoughi Lahijani[1]; *[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. Godoy[1], Lucas C. Ahler[1], Simon T. Thomsen[1], Emil Z. Ulsig[1], Nicolas Volet[1]; *[1]Department of Electrical and Computer Engineering, Aarhus University, 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. Hoon[1]; *[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 Martin[1], Aude Martin[1], Vincent Billault[1], Luc Leviandier[1], Jérôme Bourderionnet[1], Patrick Feneyrou[1], Loïc Morvan[1], Nicolas Berthou[2], Mohammadreza Saemian[3], Djamal Gacemi[3], Carlo Sirtori[3]; *[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

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 Saeed[1], Abdullah N. Khan[1,2], Usman Younis[1]; *[1]Information Technology University, Pakistan; [2]The Interdisciplinary Research Center for Communication Systems and Sensing, King Fahd University 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 $\sigma_I^2$ 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 Lin[1], Seyed Morteza Ahmadian[1], Chao Lei[1]; *[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 Roa[1], Catalina Stan[1], Simon Rommel[1], Sebastian Verschoor[2]; *[1]Technische Universiteit Eindhoven, Netherlands; [2]Informatics Institute, University 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 varios topologies and estimate the required TRNs.

**NeW2C.3 • 11:45 (Invited)**
**Practical Considerations for Adapting Optical Transport Networks for Quantum and Classical Communications,** Antonio Melgar[1], JOSE M. Rivas Moscoso[1], Michela Svaluto Moreolo[2], Masab Iqbal[2], Jeison Tabares[3], Pablo Armingol[1], Borja Villanueva[3], Sebastián Etcheverry[3], Rafael Cantó[1], Jesús Folgueira[1]; *[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.

**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 Crane[1], Getinet Woyessa[1], Jakob Janting[1], Ole Bang[1,2]; *[1]DTU Electro, Technical University 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 Zaleska[1]; *[1]King's College London, United Kingdom.* 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 Senarathna[1], HELANI ACHINTHA SINGHAPURA SINGHAPURAGE[1], Feruz Ganikhanov[1]; *[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 ElKabbash[1], Pritam Bengal[1], Abrar Liaf[1]; *[1]University 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 Shaw[1]; *[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)**

**Towards a Fully Differentiable Digital Twin for Solar Cells,** Carsten Rockstuhl[1,4], Marie Louise Schubert[1], Houssam Metni[1,5], Jan David Fischbach[1], Benedikt Zerulla[1], Marjan Krstić[4], Ulrich W. Paetzold[6,7], Seyedamir Orooji[6,7], Olivier J. J. Ronsin[2], Kai Segadlo[2,10], Yasin Ameslon[2,10], Jens Harting[2,8], Thomas Kirchartz[3,9], Sandheep Ravishankar[3], Christian Sprau[7], Mohamed Hussein[7], Alexander Colsmann[7], Karen Forberich[2], Pascal Friederich[1,5]; *[1]Institute of Nanotechnology, Karlsruher Institut für Technologie, Germany; [2]Helmholtz-Institute Erlangen-Nürnberg for Renewable Energy, Forschungszentrum Jülich, Germany; [3]IEK-5 Photovoltaik, Forschungszentrum Jülich, Germany; [4]Institute of Theoretical Solid State Physics, Karlsruhe Institute of Technology, Germany; [5]Institute of Theoretical Informatics, Karlsruhe Institute of Technology, Germany; [6]Institute of Microstructure Technology, Karlsruhe Institute of Technology, Germany; [7]Light Technology Institute, Karlsruhe Institute of Technology, Germany; [8]Department of Physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; [9]Faculty of Electrical Engineering and Information Technology, University 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 University, Australia.* This presentation introduces a perspective of the advantages of Monta-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 Santbergen[1], Youri Blom[1]; *[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 Urban[1]; *[1]Telecommunications and Photonics Department, West Pomeranian University 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)**
**Towards 100G and 200G PON – Has the Time for Coherent Come?,** Christoph Füllner[1], Vincent Houtsma[1], Md Mosaddek Hossain Adib[1], Jochen Maes[1]; [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. Rosa[1], Ognjen Jovanovic[1], Norbert Hanik[2]; [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 Chanclou[1], Stephane Le Huerou[1], Fabienne Saliou[1], Gaël Simon[1], Jérémy Potet[1], Joseph Zandueta[1], Georges Gaillard[1], Dylan Chevalier[1]; [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 Peinke[1], Quentin Wilmart[1], Jonathan FAUGIER-TOVAR[1], Sylvain GUERBER[1], Valentin Brisson[1], Fabien Laulagnet[1], Elisa Vermande[1], Elisa Colin[1], Stéphane Brision[1], Nicolas Dunoyer[1], Laura Boutafa[1], Olivier Castany[1], Kévin Roux[1], Yohan Désières[1], Clément Ben Braham[1], Pierre Perreau[1], Joël Bleuse[2], Jean-Michel Gérard[2], Ségolène Olivier[1]; [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 Salhi[1], Jean-René Coudevylle[1], Francois Maillard[1], Etienne Herth[1], Xavier Lafosse[1], Teo Baptiste[1], Abdelmounaim Harouri[1], Ali Madouri[1], Christophe Dupuis[1], Frederic Mahut[1], Alan Durnez[1], Samson Edmond[1], David Bouville[1], Eric Cassan[1], Carlos Alonso-Ramos[1], Daniele Melati[1]; [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) 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 Kervazo[1], Stéphane Trebaol[1], Loïc Bodiou[1], Joël Charrier[1]; *[1]Univ Rennes, CNRS, Institut FOTON, France.* The development of $Al_2O_3$-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 $2.1*10^5$ 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 Lemoine[1], Abdelmounaim Harouri[3], gregoire beaudoin[3], Luc Le Gratiet[3], Tony Rohel[1], Julie Le Pouliquen[1], Rozenn Bernard[1], Charles Cornet[1], Christian Grillet[2], Isabelle Sagnes[3], Konstantinos Pantzas[3], Christelle Monat[2], Yoan Léger[1]; *[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 Rawat[1], Shankar k. selvaraja[1]; *[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; University of Melbourne, Australia*

**NeW3B.1 • 14:00 (Invited)**
**How to Achieve 50-ms Restoration in the Optical Layer With Shared Protection Capacity?,** Gangxiang Shen[1]; *[1]Soochow University, 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 Delezoide[1]; *[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.

**NeW3B.3 • 15:00**
**a Novel ML-Based Approach to Anomaly Detection in Optical Networks,** Claudio Crognale[1], Antonino Maria Rizzo[2], Michelangelo Olmo Nogara Notarianni[2], Giacomo Boracchi[2], Luca Magri[2], Cesare Alippi[2], Pietro Invernizzi[1], Giovanni Martinelli[1], Roberto Manzotti[1], Stefano Binetti[1]; *[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 Li[1]; *[1]Beijing University 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. Homs[1], Shadi Nashashibi[1], Eike Himstedt[1], Stefan M. Koepfli[1], Killian Keller[1], Daniel Rieben[1], Yuriy Fedoryshyn[1], Wadood Haq[2], Eberhart Zrenner[2], Juerg Leuthold[1]; *[1]Institute of Electromagnetic Fields (IEF), ETH Zurich, Switzerland; [2]Institute for Ophthalmic Research, University 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 Son[1], Jeong-sun Moon[1], Ryan Quarfoth[1], Hwa-Chang Seo[1], Chuong Dao[1], Hanseung Lee[1], Aaron Bluestone[1], Stan Culaclii[1], Yuri Owechko[1], Kangmu Lee[1], David Chow[1]; *[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

**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 Nardin[1]; [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. Fru[1]; [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 Defranoux[1], Ferenc Korsos[1], Tamas Brigancz[1]; [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. Richards[1]; [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 Kawai[1], Kohki Shibahara[1], Masanori Nakamura[1], Megumi Hoshi[1], Takayuki Kobayashi[1], Yutaka Miyamoto[1]; [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 enablers for realizing such extremely high bitrates.

**SpW3E.2 • 14:30**
**Two-Stage MIMO Equalization for Long Haul Coupled Multi-Core Fiber Systems,** Jamal Darweesh[1], akram Abouseif[1], Ghaya Rekaya[1], Yves Jaouën[2], Rami Kalimi[1]; *[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 Arnould[1], Pamir Oezsuna[1,2], Ruben S. Luis[3], Nicolas Braig-Christophersen[1], Robert Emmerich[1], Carsten Schmidt-Langhorst[1], Colja Schubert[1], Ronald Freund[1,4], Georg Rademacher[1,2]; *[1]Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut, HHI, Germany; [2]INT, University of Stuttgart, Germany; [3]NICT, Japan; [4]Technical University 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-Redondo[1]; *[1]University 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 Perestjuk[1], Rémi Armand[2,3], Miguel Sandoval Campos[1], ujjal chettri[1], Lamine Ferhat[2], Vincent Reboud[3], Nicolas BRESSON[3], jean-michel hartmann[3], vincent mathieu[3], guanghui ren[4], Andreas Boes[5], arnan mitchell[4], Christelle Monat[1], Christian Grillet[2]; *[1]Ecole Centrale de Lyon, France; [2]CNRS, France; [3]CEA-LETI, France; [4]RMIT, Australia; [5]Adelaide University, 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 Vermeulen[1], Ryu Niigaki[2], Takashi Inoue[2], Hugo Thienpont[1], Koyo Watanabe[2]; *[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 products down to $5\times10^{-5}$ ps/nm.

**IW4A.4 • 17:00**
**Dispersion Tailored Linear Microresonator With Distributed Bragg Reflectors,** Francesco Rinaldo Talenti[1,2], luca Lovisolo[2,1], Stefan Wabnitz[3], Zeina Saleh[1], Martina Morassi[1], Aristide Lemaitre[1], Abdelmounaim Harouri[1], Carlos Alonso-Ramos[1], Laurent Vivien[1], Giuseppe Leo[2]; *[1]CNRS, France; [2]Université Paris Cité, France; [3]DIET, Sapienza University 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 Shitikov[1], Anatoly Masalov[1,3], Igor Bilenko[1,4], Dmitry Chermoshentsev[1,2], Valery Lobanov[1]; *[1]Russian Quantum Center, Russian Federation; [2]Moscow Institute of Physics and Technology, Russian Federation; [3]Lebedev Physical Institute, Russian Academy of Sciences, Russian Federation; [4]Faculty of Physics, Lomonosov Moscow State University, 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 Yang[1]; *[1]Harvard University, 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 Hasegawa[1]; *[1]Nagoya University, 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 Optcal Transport for Future Wireless Networks,** Markos Anastasopoulos[1]; *[1]National and Kapodistrian University of, Greece.* Abstract not available.

**NeW4B.3 • 17:00 (Invited)**

**Spatial Channel Networks Enabled by Multicore Fiber-Based Optical Switching Technologies,** Masahiko Jinno[1]; [1]*Kagawa University, 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, 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 Graziosi[1], Marco Quagliotti[3], Mauro Agus[3]; [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; University of Notre Dame, USA*

**NoW4C.1 • 16:00 (Invited)**
**3D Printing of Complex Glass Structures and Gradient-Index Optics,** Dudukovic Nikola[1]; [1]*Lawrence Livermore National Laboratory, USA.* Abstract not available.

**NoW4C.2 • 16:30 (Invited)**
**Silver-Chalcogenide Glass Homogeneous/Heterogeneous Coatings on Quartz by Laser Deposition of Nanoparticles,** Yahya Bougdid[5], Gunjan Kulkarni[2], Francois Chenard[3], Chandraika (John) Sugrim[4], Ranganathan Kumar[5], Aravinda Kar[1]; [1]*Center for Research and Education in Optics and Lasers (CREOL), The College of Optics and Photonics, University of Central Florida, USA;* [2]*Department of Electrical and Computer Engineering, University of Central Florida, USA;* [3]*IRflex Corporation, USA;* [4]*Naval Air Warfare Center, USA;* [5]*Department of Mechanical and Aerospace Engineering, University 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 Azad[1], Nudrat Nawal[1], Nishan Khadka[1], Balark Tiwari[1], Robert Landers[1], Edward Kinzel[1]; [1]*University 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 Mondal[1], Halima El Aadad[2], Hicham El Hamzaoui[1], Marc Douay[1], Yves Quiquempois[1]; *[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 Trifiletti[1]; *[1]Universita 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**
**Wafer-Scale Correlated Morphology and Optoelectronic Properties in GaAs/AlGaAs Core-Shell Nanowires,** Ishika Das[1], Keisuke Minehisa[2], Fumitaro Ishikawa[2], Patrick Parkinson[1], Stephen Church[1]; *[1]Department of Physics and Astronomy and the Photon Science Institute, University of Manchester, United Kingdom; [2]Research Center for Integrated Quantum Electronics, Hokkaido University, 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.

**SW4D.3 • 16:45**
**Multifunctional and Low-Cost Bonding Layer for III-v//Si Tandem Solar Cells,** Elise Salmon[1], Jeronimo Buencuerpo[2], Jérémie Schuhmann[3], Thomas Bidaud[3], Oleh Ivashtenko[3], Oliver Hoehn[4], David Lackner[4], Franck Dimroth[4], Amaury Delamarre[3], Andrea Cattoni[5], Stéphane Collin[3]; *[1]Institut Photovoltaïque d'Ile-de-France (IPVF), France; [2]Institute of Micro and Nanotechnology (IMN-CSIC), Spain; [3]Centre de Nanosciences et Nanotechnologies (C2N), France; [4]Fraunhofer Institute 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.4 • 17:00**
**Upper Bounds for Absorption Enhancement in Thin Solar Cells,** Maxime Giteau[1], Stéphane Collin[2]; *[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.5 • 17:15**
**Reflective Coating to Improve Performance of Building Integrated Photovoltaic Systems,** Md Abdul Alim[1], Zhong Tao[1]; *[1]Western Sydney University, 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.

**SW4D.6 • 17:30 (Invited)**
**Light Scattering Control With Correlated Disorder Enabling New Solar Cell Designs,** Esther Alarcon-Llado[1,2]; *[1]AMOLF, Center of Nanophotonics, Netherlands; [2]University of Amsterdam, Netherlands.* Abstract not available.

**16:00 -- 18:00**
**Room: Callelonge Hall Flat**
**SpW4E • Sensing**
*Presider: Patryk Urban; West Pomeranian University of Technology, Poland*

**SpW4E.1 • 16:00 (Invited)**
**Understanding the Oceans Using Submarine Optical Fibers,** Miguel Gonzalez-Herraez[1], Sonia Martin Lopez[1]; *[1]Universidad de Alcala, 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 Buscaino[1], Doug Charlton[1], Charles Laperle[1], Maurice O'Sullivan[1], Mohammad Pasandi[1]; *[1]Ciena 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 Sandmann[1], Florian Azendorf[1]; *[1]Adtran 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**
**Signal Fading Management in Interferometric Sensors for PON Monitoring,** Marco Fasano[1], Andrea Madaschi[1], Marco Brunero[2], Paolo Martelli[1], Pierpaolo Boffi[1]; *[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 türker[1], Tolga Kartaloglu[1,3], Faruk Uyar[1,3], Ekmel Ozbay[1,3], Ibrahim T. Ozdur[2]; *[1]Nanotechnology Research Center, Turkey; [2]Department of Electrical and Electronics Engineering, TOBB University of Economics and Technology, Turkey; [3]Department of Electrical and Electronics Engineering, Bilkent University, 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.

## 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 YANG[1], Victor Turpaud[1], Daniele Melati[1], Quentin Wilmart[2], Samson Edmond[1], Eric Cassan[1], Delphine Marris-Morini[1], Carlos Alonso-Ramos[1], Laurent Vivien[1]; *[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 $Si_3N_4$ 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 Shitikov[1], Daria M. Sokol[1,2], Anatoly Masalov[3], Valery Lobanov[1], Igor Bilenko[1,4], Dmitry A. Chermoshentsev[1,2]; *[1]Russian Quantum Center, Russian Federation; [2]Moscow Institute of Physics and Technology (MIPT), Russian Federation; [3]Lebedev Physical Institute, Russian Academy of Sciences, Russian Federation; [4]Faculty of Physics, M.V. Lomonosov Moscow State University, 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 Hill[1]; *[1]Max Planck Institute for the Science of Light, Germany; [2]Friedrich Alexander University, 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 Silvestri[1], Ambaresh Sahoo[1], Luca Assogna[1], Matteo Venturi[1], Raju Adhikary[1], Paola Benassi[1,2], Carino Ferrante[2], Davide Tedeschi[1], Alessandro Ciattoni[2], Andrea Marini[1,2]; *[1]University 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.

**09:00 -- 10:30**
**Room: Callelonge Hall Tier**
**ITh1B • Photonic Computing**
*Presider: Emanuel Peinke; CEA-LETI, France*

**ITh1B.1 • 09:00 (Invited)**
**Retinomorphic Machine Vision in a Nonlinear Photonic Network,** Jack Gartside[1]; [1]*Imperial College London, United Kingdom.* We present a bio-inspired 'retinomorphic' 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 Lin[2], Ya-Fan Chen[1], Ching-Pao Sun[1], Chii-Chang Chen[1]; [1]*National Central University, Taiwan;* [2]*National Chin-Yi University 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 Carstensen[1], Søren Stobbe[1,2], Babak Vosoughi Lahijani[1]; [1]*DTU Electro, Denmark;* [2]*NanoPhoton, Technical University 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 Silva[1], Bejoys Jacob[1], Jana B. Nieder[1], Antonio Hurtado[3], José M. Figueiredo[2], Bruno Romeira[1]; [1]*International Iberian Nanotechnology Lab, Portugal;* [2]*Universidade de Lisboa, Portugal;* [3]*University of Strathclyde, United Kingdom.* 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.

**09:00 -- 10:30**
**Room: Sormiou**
**NeTh1C • Optical Wireless Communications**
*Presider: To Be Announced*

**NeTh1C.1 • 09:00 (Invited)**
**Optical Wireless Communications: Applications for Future Connectivity,** Iman Tavakkolnia[1]; [1]*Electrical Engineering Division, University of Cambridge, United Kingdom.* 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 Jungnickel[1]; [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: Edward Kinzel; University of Notre Dame, USA*

**NoTh1D.1 • 09:00 (Invited)**
**High Contrast Nanoscale Chirality Imaging,** Yang Zhao[1]; [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. Osgood[2], Michael Leuenberger[1], K. C. Fong[3], Jimmy Xu[4]; [1]*University of Central Florida, USA;* [2]*DEVCOM SC, USA;* [3]*Northeastern University, USA;* [4]*Brown University, 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

**09:00 -- 10:30**
**Room: Morgiou**
**JTh1E • Joint NOMA and SOLITH: Perovskites I**
*Presider: Dawei Di; Zhejiang University, China*

**JTh1E.1 • 09:00 (Invited)**
**Conformal Depotision of Perovskite Material for the Elaboration of Highly Efficient and Stable Perovskite/Silicon Tandem Solar Cells,** Solenn Berson[1], Kristell Carreric[1], polyxeni tsoulka[1]; [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 wang[1], Baodan Zhao[1], Dawei Di[1]; [1]*Zhejiang University, China.* A molecular passivator, 4-aminobenzoic acid (PABA), is demonstrated to be able to enhance the crystallinity and PLQYs of $FA_{0.95}Cs_{0.05}PbI_3$ perovskites. The resultant PeLEDs emit near-infrared light at 791 nm, exhibiting a peak EQE of 19.6%.

**JTh1E.3 • 09:45**
**Decuple Enhancement in Light Extraction Efficiency of Multi-Color Light Emitting Perovskite Quantum Dots,** Wen Hsin Chang[1], Shan-Chiao Yang[1], Wei Hsuan Kung[1], Kavya Nair Jayakumaran[1], Ming-Chung Liu[2], Hsiao-Wen Tu[2], Hsuen-Li Chen[1]; [1]*National Taiwan University, Taiwan;* [2]*Green Energy and Environment Research Laboratories, Industrial Technology Research Institute, 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. Balasubramanian[1], Harshita Durgapal[1], Apurva Yadav[1], Rupali Srivatsava[1]; [1]*Indian Institute 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**
**Light Management of Sn-Pb Perovskites Based on Self-Assembled Monolayers for Efficient all-Perovskite Multijunction Solar Cells,** Yeonghun Yun[1], Kevin J. Prince[1], Sebastian Berwig[1], Isabella Taupitz[1], Bor Li[1], Philipp Tockhorn[1], Steve Albrecht[1]; [1]*Helmholtz-Zentrum Berlin für Materialien, Germany.* Here, we report on the effects of self-assembled monolayers (SAMs) on Sn-Pb perovskites. We highlight the advantages of SAMs in light management and film formation dynamics and demonstrate the performance of triple-junction all-perovskite solar cells.

## 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,** Khouloud Abdelli[1], patricia layec[1]; [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 Nizamani[2], Stella Civelli[4,1], Pantea Nadimi Goki[1,2], Fabio Cavaliere[5], Luca Potì[2,3]; *[1]Scuola Superiore Sant'Anna, Italy; [2]CNIT, Italy; [3]Universitas Mercatorum, Italy; [4]CNR-IEIIT, 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 Rodríguez[1], Sean O'Duill[1], Lakshmi Narayanan Venkatasubramani[1], Liam P. Barry[1]; *[1]School of Electronic Engineering, Dublin City University, 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 Lin[1], Di Wu[1], Benoit Boulet[1]; *[1]McGill University, 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 University, USA*

**ITh2A.1 • 11:00 (Invited)**
**Nonlinear and Quantum Integrated Photonics on the Thin-Film Lithium Niobate Platform,** Qiang Lin[1]; *[1]University of Rochester, USA.* In this talk, I will present our recent progress in 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 Shitikov[1], Nikita Dmitriev[1], Valery Lobanov[1], Anatoly Masalov[1,4], Igor Bilenko[1,3]; *[1]Russian Quantum Centre, Russian Federation; [2]Moscow Institute of Physics and Technology (MIPT), Russian Federation; [3]Faculty of Physics, M.V. Lomonosov Moscow State University, Russian Federation; [4]Lebedev Physical Institute, 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 Sanchez[1], Victor Turpaud[1], Hamza Dely[1], Laurent Vivien[1], Yijun Yang[1], Arnaud Mussot[2], Benjamin Wetzel[3], Carlos Alonso-Ramos[1], Eric Cassan[1]; *[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 Vuckovic[1]; *[1]Stanford University, 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)**
**Optical I/O Chiplets for Next-Gen AI Compute Systems,** Dries Vercruysse[1]; *[1]Ayar Labs, USA.* Abstract not available.

**ITh2B.2 • 11:30**
**a 90-Degree Beam Deflector for Extremely Low-Index-Contrast Waveguide,** Chung-Kai Tseng[1], Tang-Chun Liu[1], Chao-Yi Tai[1]; *[1]National Central University, 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**
**Loaded Silicon Grating Coupler for Asymmetric TriPleX Waveguide Platform,** Pravin Rawat[1], Venkatachalam P[1], Daniel Yumnam[1], Shankar k. selvaraja[1]; *[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 Rawat[1], Siddharth Nambiar[1], Shankar k. selvaraja[1]; *[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 University, Ireland*

**NeTh2C.1 • 11:00**
**Comprehensive Investigations of the Design for C+L-Band Multi-Pump Raman Amplifiers,** Haojun Jiang[1], Xiaomin Liu[1], Yihao Zhang[1], Lilin Yi[1], Weisheng Hu[1], Qunbi Zhuge[1]; [1]*Shanghai Jiao Tong University, 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 Killey[1]; [1]*University College London, United Kingdom.* 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 Ospina[1]; [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 morea[1], 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 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 if Chiral Drugs,** Matteo Venturi[1], Raju Adhikary[1], Ambaresh Sahoo[1], Carino Ferrante[2], Matteo Silvestri[1], Giovanna Salvitti[1], Davide

Tedeschi[1], Isabella Daidone[1], Francesco Di Stasio[3], Andrea Toma[3], Francesco Tani[4], Hatice Altug[5], Antonio Mecozzi[1], Massimiliano Aschi[1], 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 Tselikov[1], Georgy Ermolaev[1], Konstantin Shevchenko[1], Aleksey Arsenin[1], Andrei Kabashin[2], Valentyn Volkov[1]; *[1]XPANCEO RESEARCH ON NATURAL SCIENCE LLC., United Arab Emirates; [2]LP3, Aix Marseille University, 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 Cazac[1], Elena Achimova[1], Vladimir Abashkin[1], Alexandr Prisakar[1], Muhammed Fatih Toy[2]; *[1]Institute of Applied Physics, Moldova State University, Moldova (the Republic of); [2]Electrical and Electronics Engineering, Istanbul Medipol University, 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 Gervillié[3], Jean-Marie Tarascon[3]; *[1]ISCR - UMR CNRS 6226, France; [2]University 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 Aksu[1]; *[1]Koç Universitesi, Turkey.* I aim to tackle key challenges in commercializing metamaterials for cancer 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 Vossier[1], Miguel Sainz-Mañas[1], Lucile Maréchal[1], Zacharie Ménard[1], Alain Dollet[1], Rodolphe Vaillon[2]; *[1]CNRS-PROMES, France; [2]LAAS-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 Saive[1], Jelle Westerhof[1]; *[1]Universiteit 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 Wang[1], Chun Hong Kang[1], Omar Alkhazragi[1], Hang Lu[1], Tien Khee Ng[1], Boon S. Ooi[1]; *[1]King 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. Nirmalathas[1], Yijie Tao[1], Chathurika Ranaweera[2], Sampath Edirisinghe[1], Lena Wosinska[3], Tingting Song[1]; *[1]University of Melbourne, Australia; [2]Deakin University, Australia; [3]Charmes University 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 proposed reconfigurable optical crosshaul network and report on validation of our approaches.

**SpTh2F.2 • 11:30 (Invited)**
**Complex-Valued Kernels for Mitigation of Signal Distortions in Transmission Links With Fibre-Optical Parametric Devices,** Sonia Boscolo[1,2], Long H Nguyen[1], Stylianos Sygletos[1]; *[1]Aston University, United Kingdom; [2]INFN-LNS, Italy.* We present our recent advances in developing techniques that leverage complex-valued kernel adaptive filtering algorithms to mitigate amplitude and phase signal distortions in transmission links incorporating cascaded fibre-optical parametric amplifiers.

**SpTh2F.3 • 12:00 (Invited)**
**Estimating the Nonlinear Interference at the Receiver: Methods and Pitfalls,** Dario Pilori[1], Lorenzo Andrenacci[1], Gabriella Bosco[1]; *[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-Agaskar[1]; *[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 Rahimof[1], Igor A. Nechepurenko[1], M. R. Mahani[1], Andreas Wicht[1]; *[1]Ferdinand-Braun-Institute, 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 Kan[2], Sylvain GUERBER[3], Stephanie Garcia[3], Daivid Fowler[3], Natnicha Koompai[2], Daniele Melati[2], Carlos Alonso-Ramos[1]; *[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**
**High Density 3D Printed Waveguide Arrays for Integrated Snapshot Imaging Spectrometers,** Tomasz Tkaczyk[1], Haimu Cao[1], Roger McNichols[1], Brian Applegate[2]; *[1]Rice University, USA; [2]University 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'ANZIERI[1], Daniele Melati[1]; *[1]C2N, Universite 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 Sheveleva[1], Christophe Finot[1], Pierre Colman[1]; *[1]ICB 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,** Yury Logvin[1], Kirill Pimenov[1], Shayan Saeidi[1]; *[1]Inpho, 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 Peng[2], Wayne Sorin[2], Stanley Cheung[2,3], Zhihong Huang[2], Chaerin Hong[2], Di Liang[2,4], Marco Fiorentino[2], Raymond Beausoleil[2]; *[1]Department of Electrical and Computer Engineering, Northeastern University, USA; [2]Hewlett Packard Labs, Hewlett Packard Enterprise, USA; [3]Department of Electrical and Computer Engineering, North Carolina State University, USA; [4]Electrical Engineering and Computer Science Department, University 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. Davanco[1]; [1]*National Inst of Standards & Technology, USA.* A tentative 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 Kim[2], Jiyeon Jeon[2], Minkyeong Kim[2], Jungwon Yoon[3], Thi Thu Trang Bui[2,1], Byong Chun Sun[2], Sang Jun Lee[2]; [1]*Department of Nano Science, University of Science & Technology, Korea (the Republic of);* [2]*Strategic Technology Research Institute, Korea Research Institute 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 Hu[1], Chongxin Zhang[1], Thomas Meissner[1], Yuan Liu[1], Jonathan Klamkin[1]; [1]*University 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 Ren[2], Céline Chevalier[2], Xavier Letartre[2], Jean-Louis Leclercq[2], Pierre Cremillieu[2], Radoslaw Mazurczyk[2], Marko Perestjuk[2], Lamine Ferhat[2], Christian Grillet[2], Maëva Fagot[1], Eric Tournié[1], Maxime Lepage[3], Badhise Ben Bakir[3], Rémi Armand[3], Vincent Reboud[3], Laurent Cerutti[1], Christian Seassal[2]; [1]*Institut d'Electronique et des Systèmes, University 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. Kutty[1], Bejoys Jacob[1], Jana B. Nieder[1], Bruno Romeira[1]; [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.

**14:00 -- 15:30**
**Room: Les Goudes 2**
**NoTh3C • Nanophotonic Characterisation**
*Presider: Lan Fu; Australian National University, Australia*

**NoTh3C.1 • 14:00 (Invited)**
**Seeing the Invisible with Nanomaterials,** Chaohao Chen[1]; [1]*University of Technology Sydney, Australia.* Abstract not available.

**NoTh3C.2 • 14:30**
**Design and Assembly of Nanophotonic Components Using Optical Tweezers,** Euan McLeod[1], Natalie Shultz[1], Weilin Liu[1]; [1]*University 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 Bedoya[1], Ali El Boutaybi[1], Ana M. Statie[1], Alan Durnez[1], Sarra Salhi[1], Davide Cammilleri[1], Nathaniel Findling[1], Ludovic Largeau[1], Samson Edmond[1], Daniele Melati[1], Eric Cassan[1], Delphine Marris-Morini[1], Philippe Lecoeur[1], Guillaume Agnus[1], Sylvia Matzen[1], Carlos Alonso-Ramos[1], Thomas Maroutian[1], Laurent Vivien[1]; [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 Supreresolution Technique to Overcome the Diffraction Limit Using a Spatial Light Modulator-Controlled Nth Order Intensity Product,** Byoung S. Ham[1]; [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**
**Nontrivial Inner Robust Boundary Modes in Singular Flatband Lattices,** Limin Song[1], Shenyi Gao[1], Daohong Song[1], Daniel Leykam[2], Zhigang Chen[1]; [1]*Nankai University, China;* [2]*Singapore University of Technology and Design, Singapore.* We propose and demonstrate nontrivial inner-robust-boundary-modes (RBMs) in laser-written singular flatband lattices with multiple holes, establishing a universal “bulk-hole correspondence’’ between the numbers of flatband states and inner RBMs counted by the Betti numbers.

**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 Di[1]; *[1]Zhejiang University, China.* Abstract not available.

**JTh3D.2 • 14:30 (Invited)**
**Amplified Spontaneous Emission Without Photon Gain in $MAPbBr_3$ Planar Waveguides,** Angelica Simbula[1], Federico Pitzalis[1], Riccardo Pau[1,2], Emanuele D Cadeddu[1], Luyan Wu[1], Stefano Lai[1], Fang Liu[3], Selene Matta[1], Valeria Demontis[1], Daniela Marongiu[1], Paolo Pintus[1], Michele Saba[1], Andrea Mura[1], Francesco Quochi[1], Giovanni Bongiovanni[1]; *[1]Dipartimento di Fisica, Unversità degli Studi di Cagliari, Italy; [2]Zernike Institute for Advanced Materials, University of Groningen, Netherlands; [3]School of Environmental Science and Engineering, Shanghai Jiao Tong University, China.* We study amplified spontaneous emission (ASE) in $MAPbBr_3$ 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 Gonçalves[1], Emmanuel Drouard[1], Wilfried Favre[2], Mohamed Amara[1]; *[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 Liu[1], Baodan Zhao[1], Meng Zhang[1], Bo Liu[1,2], Dawei Di[1]; *[1]College of Optical Science and Engineering, Zhejiang university, 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

## 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 Land[1]; *[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 Secondini[2]; *[1]CNR-IEIIT, Italy; [2]Tecip institute, 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 Jung[1], Tim Janz[1], Vahid Aref[2], Stephan ten Brink[1]; *[1]University 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 Brusin[1], Dario Pilori[1], Francesco Aquilino[2], Fabrizio Forghieri[3], Andrea Carena[1]; *[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 HOURZADEHGHARABOLAGH[1], Vincent CHOQUEUSE[1], Pascal Morel[1], Mihai Telescu[2], Noël Tanguy[2], Stéphane Azou[1]; *[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

## JD1 • Joint On-Demand Session

**JD1.1**
Withdrawn

**JD1.3**
**Finding Transmittance Spectrum Envelopes for Optical Characterization of Thin Solid Films,** Manuel Ballester[1], Emilio Marquez[2], Florian Willomitzer[3], Aggelos Katsaggelos[1]; *[1]Northwestern University, USA; [2]Cadiz University, Spain; [3]Wyant College of Optical Sciences, University 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 Ballester[1], Zoey Ho[1], Asami Odate[1], Marc Walton[1], Aggelos Katsaggelos[1]; *[1]Northwestern University, 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 Laeim[1], Thomas Zentgraf[2], Nattaporn Chattham[1]; *[1]Kasetsart University, Thailand; [2]Physics, Paderborn University, 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 Zapata[1], Stephen E. Ralph[2], Jhon J. Granada Torres[1]; *[1]Universidad de Antioquia, Colombia; [2]Georgia Institute 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 Qin[1], yuqing han[1], Qingzhao He[1], Xia Gao[1], Yadong Gong[1], Qian Hu[1], Xiankun Zhu[1], Fan Yang[1], Xiaowei Lou[1]; *[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

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. Montoya[1], Manuela Gutiérrez Rodríguez[1], Juan D. Zapata Caro[1], Jhon J. Granada Torres[1], Ana M. Cárdenas Soto[1]; [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. Weninger[1], Luigi Ranno[1], Samuel Serna[2], Lionel Kimerling[1], Anuradha Agarwal[3]; [1]*Materials Science and Engineering Department, Massachusetts Institute of Technology, USA;* [2]*Department of Physics, Photonics, and Optical Engineering, Bridgewater State University, USA;* [3]*Materials Research Laboratory, Massachusetts Institute 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.