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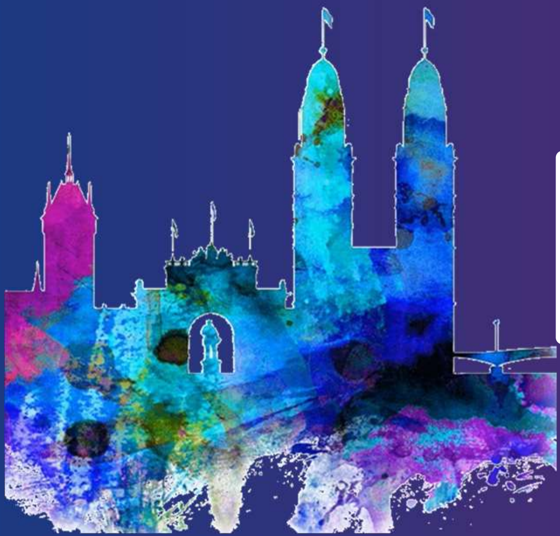

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27th European Conference on Integrated Optics

15th -17th June, 2026

Zurich, Switzerland

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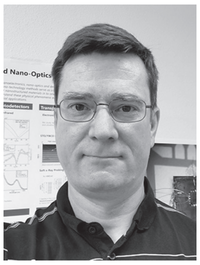

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Plenary Speakers

Prof. Dr. Mona Jarrahi
Univ. of California Los Angeles, USA

A Monolithically Integrated Terahertz Optoelectronics Platform based on Quantum Well Structures

Terahertz waves hold immense potential across diverse fields, including healthcare monitoring, biomedical imaging, precision navigation, high-speed communication, security screening, industrial quality control, and space exploration. However, the widespread adoption of terahertz technology has been hindered by the bulky, complex, and costly nature of existing systems. In this talk, I will introduce gain-enhanced interband photomixing in quantum well (QW) PIN photodiodes as an efficient mechanism for frequency-tunable terahertz generation and detection, achieving significant improvements in power efficiency and sensitivity over the state-of-the-art. QWs embedded in PIN photodiodes—key elements of commercially available photonic integrated circuits—enable monolithic integration of lasers, semiconductor optical amplifiers, modulators, filters, demultiplexers, and other passive optical components. Establishing QW PIN photodiodes as the foundation of a Monolithically Integrated Terahertz Optoelectronic platform could pave the way for compact, scalable terahertz optoelectronic systems with applications in high-speed data transfer, spectroscopy, and hyperspectral imaging.

Mona Jarrahi is a professor of electrical and computer engineering at UCLA and the director of the Terahertz Electronics Laboratory. Prof. Jarrahi has made significant contributions to the development of ultrafast electronic and optoelectronic devices and integrated systems for terahertz, infrared, and millimeter-wave sensing, imaging, computing, and communication by utilizing novel materials, plasmonic nanostructures, and quantum structures. The outcomes of her research have appeared in more than 400 publications and 250 invited talks. Prof. Jarrahi is a Fellow of the American Association for the Advancement of Science (AAAS), Institute of Electrical and Electronics Engineers (IEEE), Optical Society (OPTICA), International Society for Optics and Photonics (SPIE), American Physical Society (APS), and Institute of Physics (IoP).

Prof. Dr. Peter Seitz
EPFL, Switzerland

Do We Really Understand Quantum Mechanics?

There is no doubt – we really master quantum theory and quantum technologies. But do we really understand them? In a narrative spanning a complete century, key moments and insights in the development of quantum theory are recalled:

How Albert Einstein and Erwin Schrödinger conspired to kill a cat. Why von Neumann chains cleared the issue. What the famous Einstein-Podolsky-Rosen paper really questioned. Why Richard Feynman threw John Clauser out of his office. How John Bell was inspired to come up with the Bell inequality through the socks of his colleague Reinhold Bertlman. Why the 2022 Nobel Prize in Physics was not awarded to Chien-Shiung Wu but rather to Alain Aspect, John Clauser and Anton Zeilinger. And where do we stand now? These insights allow us very easily to understand fundamental properties of ultra-secure quantum communication/key distribution and of quantum computing. But the jury is still out whether we should be content with today's "almost infinite number of nuances" of interpreting quantum mechanics, or whether we should hope for "real" understanding.

Peter Seitz is professor emeritus of Optoelectronics at EPFL, he is Vice President of the Swiss Academy of Engineering Sciences, he is a member of the Scientific Advisory Board of the Werner Siemens Foundation, and he is co-founder of a dozen startups in the domains of photonics, microelectronics and optical metrology. He is the author or co-author of more than 200 scientific articles, inventor or co-inventor of about 80 patents, and recipient or co-recipient of two dozen international awards and distinctions.

Agenda of Sessions and Explanation of Session Codes

M2B.4

Day of the Week
M = Monday
T = Tuesday
W = Wednesday

Series
1 = 1st of series
2 = 2nd of series
3 = 3rd of series
4 = 4th of series
5 = 5th of series

Session Designation
A = 1st Parallel Session
B = 2nd Parallel Session
C = 3rd Parallel Session

Number
Presentation order within session

The first letter of the code designates the meeting. The second element denotes the day of the **week**. The third element indicates the session series in that day (for instance, 1 would denote the first sessions in that day). Each day begins with the letter A in the fourth element and continues alphabetically through the parallel session. The lettering then restarts with each new series. The number on the end of the code (separated from the session code with a period) **signals** the position of the talk within the session (first, second, third, etc.). For example, a presentation coded M2B.4 indicates that this paper is being presented on Monday (M) in the second series of sessions (2), and is the second parallel session (B) in that series and the fourth paper (4) presented in **that** session.

Sunday, 14 June	
13:00 —16:30	**Registration,** *Front desk at Main Building Entrance*
13:30—15:30	**Student Workshop,** *HG F30 (Plenary Auditorium)*
15:30—16:30	**Bench to Business Symposium,** *HG F30 (Plenary Auditorium)*
17:00—19:30	**Networking Pizza Dinner,** *Location to be Announced*

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Agenda of Sessions

Monday, 15 June			
	Room HG F1	Room HG E1.1	Room HG E1.2
08:00—18:00	**Registration**, *Front desk at Main Building Entrance*		
08:00—08:15	**Opening Ceremony**, HG F30 (*Plenary Auditorium)*		
08:30—10:15	M1A • Electro-Optic Modulators	M1B • Light Emitters	M1C • Photonic Devices for Quantum I
10:15—10:45	**Coffee Break**, *Foyers in front of Session Rooms*		
10:45—12:30	M2A • Lasers I (Light Emitters)	M2B • Programmable Photonics for Information Processing	M2C • Photonic Devices for Quantum II
12:30—13:30	**Lunch**, *Foyers in front of Session Rooms*		
13:30—15:15	M3A • Lasers II	M3B • Scalable Integrated Photonics for Communications and AI Systems	M3C • Photonic Devices for Quantum III
15:25—15:55	P11 • Poster Blitz 1.1	P12 • Poster Blitz 1.2	
15:55—16:55	**P1 • Poster Session I and Coffee Break**, *Foyers in front of Plenary Auditorium*		
16:55—17:55	M4A • Industry Talks 1: Devices	M4B • Industry Talks 2: Photonic Platforms	M4C • Industry Talks 3: Modelling, Design and Systems
18:05—18:50	**Plenary Session I**, *HG F30 (Plenary Auditorium)*		
18:50—20:30	**Welcome Reception**, *ETH Uhrenhalle*		

Agenda of Sessions

Tuesday, 16 June			
	Room HG F1	Room HG E1.1	Room HG E1.2
08:00—18:00	**Registration,** *Front desk at Main Building Entrance/Foyer in front of Plenary Room*		
08:30—10:15	T1A • Advanced Photonics	T1B • Next-Generation Integrated Non-Linear Photonics	T1C • Bio-Photonics and Sensing
10:15—10:45	**Coffee Break,** *Foyers in front of Session Rooms*		
10:45—12:30	T2A • Detectors	T2B • Nonlinear Optics	T2C • Memristive Photonics and Neuromorphic Photonics
12:30—13:30	**Lunch,** *Foyers in front of Session Rooms*		
13:30—15:20	T3A • WORKSHOP 1 • Electronic–Photonic Integration: Which Technology Will Lead the Way?	T3B • WORKSHOP 2 • Which Quantum Technology—Photonic or RF—Has the Potential to Build a Quantum Computer?	
15:30—16:00	P21 • Poster Blitz 2.1	P22 • Poster Blitz 2.2	
16:00—17:00	**P2 • Poster Session II and Coffee Break,** *Foyers in front of Plenary Auditorium*		
17:00—17:45	**T4A • Plenary Session II,** *HG F30 (Plenary Auditorium)*		
18:00—19:00	**Zurich City Tour**		
19:00—23:00	**Gala Dinner,** *MS Panta Rhei*		

Wednesday, 17 June			
	Room HG F1	Room HG E1.1	Room HG E1.2
08:00—14:00	**Registration,** *Foyer in front of Plenary Room*		
08:30—10:15	W1A • Waveguides and Gratings	W1B • Integrated THz Generation and Detection	
10:15—10:45	**Coffee Break,** *Foyers in front of Session Rooms*		
10:45—12:45	W2A • Fabrication Platforms	W2B • Frequency Combs for THz	W2C • Emerging Platforms for Advanced Control of Light
12:30—13:30	**Lunch,** *Foyers in front of Session Rooms*		
13:30—15:15	W3A • Frequency Combs	W3B • On-chip Thz Signal Processing	
15:25—15:40	**Closing Ceremony,** *HG F1*		
15:40—16:10	**Coffee Break,** *Foyers in front of Session Rooms*		
16:45—18:00	**Lab Tours**		

Room HG F1

08:30–10:15
M1A • Electro-Optic Modulators
Presider: Remus Nicolaesou, Point Cloud Inc., Switzerland

M1A.1 • 08:30
A Monolithically Integrated Reconfigurable Silicon Photonic Electro-Optic Modulator for Versatile, High-Speed Optical Communication, Youngin Kim[1], Laurenz Kulmer[1], Maiko Fukui[1], Chenrui Xu[1], Samuel Hess[1], Jong-Bum You[2], Juerg Leuthold[1], Hua Wang[1]; [1]*ETH Zurich, Switzerland;* [2]*National Nanofab Center, Korea (the Republic of).* This paper presents a monolithically integrated reconfigurable electro-optic modulator, which can generate four different modulation formats by a single chip. It achieves 49/50/40/20Gbps data rate of PAM2/PAM4/BPSK/QPSK modulation, while consuming 159/318/384/417 mW at the driver.

M1A.2 • 08:45
A 1.6 Tbit/s IMDD WDM Transmitter on Thin-Film Lithium Tantalate, Shivaprasad Umesh Hulyal[1,3], Dengyang Fang[2], Jiachen Cai[1,4], Alexander Kotz[2], Xin Ou[4], Christian Koos[2], Tobias Kippenberg[1,3]; [1]*Inst. of Physics, École polytechnique fédérale de Lausanne, Switzerland;* [2]*Inst. of Photonics and Quantum Electronics (IPQ), Karlsruhe Inst. of Technology (KIT), Germany;* [3]*Inst. of Electrical and Micro engineering, École polytechnique fédérale de Lausanne, Switzerland;* [4]*State Key Laboratory of Materials for Integrated Circuits, Shanghai Inst. of Microsystem and Information Technology,, Chinese Academy of Sciences, China.* We demonstrate a monolithically integrated photonic IMDD transmitter on thin-film lithium tantalate, achieving an aggregate net data rate of 1.6 Tbit/s through wavelength-division multiplexing (WDM) with PAM-4 and PAM-8 signaling formats.

M1A.3 • 09:00
High-Performance Mach-Zehnder Modulator Using Hybrid Integration of Indium Phosphide on Silicon, Bart Bas[1], Rui Santos[2], Xaveer Leijtens[1,2]; [1]*Electrical Engineering, Eindhoven Univ. of Technology, Netherlands;* [2]*Photon Bridge, Netherlands.* We report a hybrid InP on SOI Mach-Zehnder modulator, achieving ~30 dB extinction and <5 Vmm efficiency. A method to characterize the phase modulator before hybrid integration and a compact model predicting performance is presented.

M1A.4 • 09:15
High-Speed Bulk InP Phase Modulators with Low Voltage Length Product of 0.26 v.cm, Ali Kaan Sunnetcioglu[1], Duarte Fernandes da Silva[1], James A. Hillier[1], Floris Pronk[1], Yi Wang[1], Weiming Yao[1], Kevin Williams[1], Yuqing Jiao[1]; [1]*Technische Universiteit Eindhoven, Netherlands.* We demonstrate bulk Kerr-effect InP electro-optic phase modulators with low V_pi.L = 0.26 V.cm and high EO response of −1.24 dB at 40 GHz, enabling compact modulators for high-speed photonic integrated circuits.

M1A.5 • 09:30
Monolithic Electro-Optic Modulator Based on Solution-Derived BaTiO3 Enabled by Nanoimprinting Lithography, Virginia Falcone[1], Eleni Prountzou[1], Jost Kellner[1], Ulle-Linda Talts[1], Rachel Grange[1]; [1]*ETH Zurich, Switzerland.* We demonstrate a monolithic electro-optic modulator based on solution-derived $BaTiO_3$ fabricated via nanoimprinting. Optimized processing parameters yield a two orders of magnitude reduction in propagation losses and efficient π-phase modulation in a partial poled waveguide with $V\pi L$= 35 Vcm.

Room HG E1.1

08:30–10:15
M1B • Light Emitters
Presider: Raphael Butte; École Polytechnique Fédérale de Lausanne, Switzerland

M1B.1 • 08:30
O-Band Mode-Locked Laser on SiN via Micro-Transfer Printing, Dongbo Wang[1], Tom Reep[1], Lam Thi Ngoc Tran[1], Stijn Poelman[1], Jose Carreira[2], Camiel Op de Beeck[2], Stijn Cuyvers[2], Michael Geiselmann[2], Jing Zhang[1], Gunther Roelkens[1], Bart Kuyken[1]; [1]*Ghent Univ. - imec, Belgium;* [2]*Ligentec SA, Switzerland.* We demonstrate an O-band mode-locked laser through heterogeneous integration of a GaAs amplifier on a commercial SiN platform using micro-transfer printing. The device exhibits a threshold current of 80 mA and a repetition rate of 10.6 GHz.

M1B.2 • 08:45
Continuously Tunable 2.7 μm GaSb/Si_3N_4 Hybrid Laser Using a Post-Based DBR Microring Resonator, Redwan Islam[1], Samu-Pekka Ojanen[3,1], Jukka Viheriälä[2], Heidi Tuorila[1], Helmer Piirilä[1], Joonas Hilska[1], Markus Peil[1], Mircea Guina[1]; [1]*Physics, Tampere Univ., Finland;* [2]*Electrical Engineering, Tampere Univ., Finland;* [3]*InterUniv. Microelectronics Centre, Netherlands.* A tunable GaSb/Si_3N_4 hybrid laser with a maximum output power of ~17 mW at 2.7 μm is demonstrated. The performance is enabled by a novel post-based distributed Bragg reflector microring resonator employed for wavelength selection.

M1B.3 • 09:00 Invited
Mid-IR Frequency Comb: on-Chip Pulse Generation at 8 μm Wavelength Using SiGe Photonics Platform, Annabelle Bricout[1], Mathieu Bertrand[2], Davide Pinto[3], Mattias Beck[2], Diego Piciocchi[2], Victor Turpaud[1], Stefano Calcaterra[3], Davide Impelluso[3], Marco Faverzani[3], Samson Edmond[1], Carlos Ramos[1], Laurent Vivien[1], Jacopo Frigerio[3], Giovanni Isella[3], Jerome Faist[2], Delphine Marris-Morini[1]; [1]*Universite Paris-Saclay, France;* [2]*ETH, Switzerland;* [3]*Politecnico Di Milano, Italy.* Mid-IR frequency combs can be obtained using QCL. However, due to short carrier lifetime, the output signal is quasi continuous. Here we exploit dispersion engineering in SiGe photonics circuits to compensate for the linear chirp of frequency comb sources. Pulses as short as 1.39 ps are obtained.

M1B.4 • 09:30 Invited
Integrated Reconfigurable, Bright, Broadband Mid-IR Nonlinear Sources, Christian Grillet[1]; [1]*École Centrale de Lyon, France.* We report on our latest progress on Ge-based photonics for broadband MIR sources. We demonstrate reconfigurable MIR supercontinuum generation exploiting PCM and the high potential of Ge-based microresonators for MIR nonlinear photonics.

Room HG E1.2

08:30–10:15
M1C • Photonic Devices for Quantum I
Presider: Maksym Yarema; ETH Zurich, Switzerland

M1C.1 • 08:30 Invited
Erbium-Doped Silicon Nanophotonics, Andreas Reiserer[1,2]; [1]*TUM School of Natural Sciences, Technical Univ. of Munich, Germany;* [2]*TUM Center for Quantum Engineering, Technical Univ. of Munich, Germany.* Integrating erbium dopants into nanophotonic silicon devices enables efficient and coherent spin-photon interfaces and is thus a promising platform for distributed quantum information processing. I will summarize recent achievements and open challenges towards scalability.

M1C.2 • 09:00
Investigating High Photon Count Rates in Waveguide-Integrated SNSPDs, Dominik Bisang[1], Shadi Nashashibi[1], Stefan M. Koepfli[1], Luka Guzenko[1], Boris Vukovic[1], Killian Keller[1], Loïc Chérix[1], Marco Dober[1], Marina Homs[1], Daniel Rieben[1], Stephan Steinhauer[2], Val Zwiller[2,3], Yuriy Fedoryshyn[1], Juerg Leuthold[1]; [1]*Inst. of Electromagnetic Fields (IEF), ETH Zurich, Switzerland;* [2]*Department of Applied Physics, KTH Royal Inst. of Technology, Sweden;* [3]*RISE Research Inst. of Sweden, Sweden.* We compare photon count rates of SNSPDs with different nanowire lengths. We achieve 430 Mcps with a single detector, limited by readout bandwidth and device heating. Measured decay times of 260 ps promise faster counting.

M1C.3 • 09:15
Integrated Photonic Technologies for Large-Scale Ion Traps, Sophie Cavallini[1], Gillenhaal J. Beck[1], Alexander Ferk[1], Yuto Motohashi[1], Qingxin Ji[1], Henrik Hirzler[1], Daniel Kienzler[1], Jonathan P. Home[1]; [1]*ETH Zurich, Switzerland.* We present integration of all Ca^+ wavelengths into a trapped-ion chip using both silicon nitride and aluminium oxide waveguides. We further pursue the use of aluminium-oxide ring resonators to realize compact UV diode-laser locking.

M1C.4 • 09:30
An Integrated, Narrowband, Decorrelated Photon Pair Source for Efficient Quantum Communication at Telecom Wavelengths, Jasmin Sommer[1,2], Michelle Kirsch[1,2], Kai Hong Luo[1,2], Sebastian Lengeling[1,2], Christof Eigner[2], Harald Herrmann[1,2], Christine Silberhorn[1,2]; [1]*Integrated Quantum Optics, Paderborn Univ., Germany;* [2]*Inst. for Photonic Quantum Systems, Germany.* We demonstrate the implementation of a lithium niobate waveguide cavity source that generates photon pairs with a narrow bandwidth of Δv = (160.2 ± 0.2) MHz and a brightness of B = 13.5 pairs/(s mW MHz).

Room HG F1

M1A • Electro-Optic Modulators—Continued

M1A.6 • 09:45

Ultra-Compact Efficient Electro-Optic Modulator Using Fiber-Textured Pb(Zr,Ti)O_3 for Integrated Photonics, Kobe De Geest[1,2], Tom Vanmaele[1,2], Enes Lievens[1], Ewout Picavet[1], Andreas Laemont[1], Dries Van Thourhout[2,3], Jeroen Beeckman[1]; [1]*Electronics and Information Systems, Universiteit Gent, Belgium;* [2]*Information Technology, Universiteit Gent, Belgium;* [3]*IMEC, Belgium.* We present an ultra-compact electro-optic modulator based on fiber-textured Pb(Zr,Ti)O_3. A folded Mach-Zehnder design enhances interaction length, enabling sub-mm^2 footprint and low V_π. Isotropic response allows efficient modulation in bends, improving scalability for integrated photonics.

M1A.7 • 10:00

High-Speed O-Band InP Mach-Zehnder-Modulator, Johannes F. Eppli[1], Sebastian Lauck[1], Gerrit Fiol[1], Patrick Runge[1]; [1]*Fraunhofer HHI, Germany.* We present an InP-based Mach–Zehnder modulator (MZM) operating in O-band, with 84.5 GHz 3dB electro-optical bandwidth and 3 V half-wave voltage. The p-i-n device employs an optimized design that enables a new state-of-the-art performance.

Room HG E1.1

M1B • Light Emitters—Continued

M1B.5 • 10:00

Broadband Raman Lasers Based on High-Q Silicon Nitride Microresonators, Yi Zheng[1], Haoyang Tan[1], Andreas Jacobsen[1], Yang Liu[1], Chaochao Ye[1], Yanjing Zhao[1], Kresten Yvind[1], Minhao Pu[1]; [1]*Danmarks Tekniske Universitet, Denmark.* We demonstrate efficient Raman lasing and broadband tunability of the Raman shift in thin-film SiN microresonators by harnessing the high-quality factor (> 10^7) and engineering the optical mode to overlap with the Raman-active silica cladding.

Room HG E1.2

M1C • Photonic Devices for Quantum I—Continued

M1C.5 • 09:45

Generation of Frequency Entanglement With an Effective Quantum dot-Waveguide two-Photon Quadratic Interaction, Mohamed Meguebel[1], Maxime Federico[2], Simone Felicetti[3,4], Nadia Belabas[5], Nicolas Fabre[1]; [1]*Telecom Paris, Institut Polytechnique de Paris, 19 Place Marguerite Perey, France;* [2]*Laboratoire Interdisciplinaire Carnot de Bourgogne, 9 avenue Alain Savary, France;* [3]*Inst. for Complex Systems, National Research Council (ISC-CNR), Via dei Taurini 19, Italy;* [4]*Physics Department, Sapienza Univ., P.le A. Moro 2, Italy;* [5]*Centre for Nanosciences and Nanotechnology, CNRS, Universite Paris-Saclay, UMR 9001, 10 Boulevard Thomas Gobert, France.* We theoretically propose the use of a quantum dot embedded into a waveguide for generating frequency entanglement of two single photons, exploiting a four-level atomic structure for suppressing single-photon processes while enhancing two-photon transitions, further revealing entanglement trade-offs.

M1C.6 • 10:00

(M)IR Photonic Integrated Circuits Based on InP: Chip-Scale Liquid Sensing and Quantum Applications, Borislav Hinkov[1], Felix Jaeschke[1,2], Mauro David[3], Georg Marschick[3], Florian Dubois[1], Delia Fugger-Schafhauser[1], Florian Pilat[3], Axel Evirgen[4], Salvatore Pes[4], Martin Achleitner[5], Florian Prawits[5], Axel Schönau[6], Jo A. Heibach[6], Moritz Kleinert[6], Benedikt Schwarz[3], Bernhard Lendl[3], Andreas Poppe[7], Hannes Hübel[5], Gottfried Strasser[3]; [1]*Silicon Austria Labs GmbH, Austria;* [2]*Tampere Univ., Finland;* [3]*TU Wien, Austria;* [4]*III-V Lab, France;* [5]*Austrian Inst. of Technology, Austria;* [6]*Fraunhofer HHI, Germany;* [7]*Celare Quantum Communication, Denmark.* InP is a unique material-system for IR photonic integrated circuits (PICs). We present development and realization of InP-based monolithic NIR and MIR PICs. Diode-laser and quantum-cascade technology enable on-chip liquid sensing and QKD applications, respectively.

Room HG F1

10:45–12:30
M2A • Lasers I (Light Emitters)
Presider: Borislav Hinkov; Silicon Austria Labs GmbH, Austria

M2A.1 • 10:45 Invited
Rare-Earth Ion Doped Amplifiers in the Al2O3 Platform, B. Jongbloed[1], K. Wang[1], C.E. Osornio-Martinez[2], A. Mashlah[1], M. Dijkstra[1], Sonia M. Garcia Blanco[1,2]; *[1]Aluvia Photonics B.V., Netherland; [2]ALUVIA Photonics, the Netherlands.* Reactive sputtering of rare-earth ion doped Al2O3 enables scalable on-chip light amplification across multiple wavelength bands. The deposition technique allows for seamless monolithic integration with existing passive waveguide platforms, underlining its broad applicability.

M2A.2 • 11:15
A Compact, Low-Noise 10 GHz Laser Enabling the Next Generation of Photonic Systems, Sarah R. Hutter[1], Sandro Camenzind[1], Oguzhan Kara[1], Andrea Pertoldi[1], Benjamin Rudin[1], Florian Emaury[1]; *[1]Menhir Photonics, Switzerland.* We demonstrate a 10-GHz mode-locked femtosecond laser with miniaturized quasi-monolithic design, ultra-low amplitude and phase noise, and robust thermal performance. Fully integrated into a compact platform, the system is deployable for scientific and industrial applications.

M2A.3 • 11:30
Wafer-Scale Manufacturing of Ultra-Broadband, High-Power Erbium-Doped Integrated Lasers, Xinru Ji[1], Xuan Yang[1], Yang Liu[1], Zheru Qiu[1], Grigory Lihachev[1], Simone Bianconi[1], Jiale Sun[1], Andrey Voloshin[1], Taegon Kim[2], Joseph C. Olson[2], Tobias Kippenberg[1]; *[1]École Polytechnique Fédérale de Lausanne, Switzerland; [2]Varian Semiconductor, Applied Materials, USA.* We demonstrate an integrated erbium-based tunable laser using wafer-scale fabrication and ion implantation of silicon nitride photonic integrated circuits, achieving single-frequency lasing tunable from 1530 nm to 1621 nm covering nearly the entire optical C- and L-band.

M2A.4 • 11:45
Silicon–Organic Hybrid Electro-Optic External Cavity Lasers, Zahra Basiri[1,2], Alessandro Tomasino[1,2], Gabriel Jülg[1,2], Ileana-Cristina Benea-Chelmus[1,2]; *[1]Hybrid Photonics Laboratory, École Polytechnique Fédérale de Lausanne, Switzerland; [2]Center for Quantum Science and Engineering (QSE), Switzerland.* Compact high-speed tunable lasers are essential for free-space communication and sensing systems. We demonstrate a silicon–organic hybrid electro-optic metasurface external cavity laser enabling mode-hop-free tuning up to 180 THz/s with 90 MHz excursions at 10V radio frequency amplitude.

Room HG E1.1

10:45–12:30
M2B • Programmable Photonics for Information Processing
Presider: Nikos Pleros; Aristoteleio Panepistimio Thessalonikis, Greece

M2B.1 • 10:45
Programmable Silicon Photonic MEMS-Based Simultaneous Multi-Point Beam Projection With Precise Independent per-Channel Power Control, Taeyeon Kim[1], Dong Uk Kim[1], Jae Hyeon Kim[1], Kyoungsik Yu[2], Sangyoon Han[1]; *[1]Daegu Gyeongbuk Inst. of Science and Technology, Korea (the Republic of); [2]Korea Advanced Inst. of Science and Technology, Korea (the Republic of).* We demonstrate a programmable multi-beam projection system using 16 cascaded silicon photonic MEMS tunable couplers, enabling arbitrary beam pattern generation and independent per-channel power control with ±0.72 dB output uniformity.

M2B.2 • 11:00
Time-Domain Integrated Photonics Convolutional Accelerator, Anna Fischer[1], Wooseok Choi[1], Matthew J. Filipovich[1,2], Aymeric Frerejean[1], Folkert Horst[1], Bert Offrein[1]; *[1]IBM Research, Switzerland; [2]Clarendon Laboratory, Univ. of Oxford, UK.* We present an integrated photonic convolution accelerator using cascaded tunable couplers and delay lines with $BaTiO_3$ electro-optic phase shifters. It enables time-domain processing at tens of GSps and supports complex data and kernels in a scalable platform.

M2B.3 • 11:15 Invited
Active Integrated Photonics for Information Processing and Quantum Networking, Liang Feng[1]; *[1]Univ. of Pennsylvania, USA.* We develop reconfigurable integrated photonic processors, performing linear and nonlinear operations on-chip as well as facilitating quantum networking in a deployed fiber-optic network. These actively controlled photonic chips enable in-situ task reconfiguration, bridging classical, neuromorphic, and quantum photonic information processing.

M2B.4 • 11:45
Programmable Silicon Photonic Meshes Utilizing Germanium Ion Implantation and Electrical Annealing, April M. Logan[1], Xingzhao Yan[1], Bharat Pant[1], Xingshi Yu[1], Goran Mashanovich[1], Graham Reed[1], David Thomson[1]; *[1]Optoelectronics Research Centre, UK.* This work demonstrates the potential of using Ge ion implantation and annealing as a method of tuning large-scale programmable photonic circuits. Proof of concept component replication was demonstrated on small-scale programmable meshes.

Room HG E1.2

10:45–12:30
M2C • Photonic Devices for Quantum II
Presider: Raino Gabriele, ETH Zurich, Switzerland

M2C.1 • 10:45
A Mmwave-to-Optics Transducer in the Ultrahigh Q/v Regime, André G. Primo[1], Jiawen Liu[1], Amit Vankayala[1], Gabriel Jülg[1], Yazan Lampert[1], Aleksei Gaier[1], Ileana-Cristina Benea-Chelmus[1]; *[1]EPFL, Switzerland.* We present a mmwave-to-optics electro-optic transducer with an order-of-magnitude improvement in coupling rate over the current state-of-the-art. Our scheme enables direct optical readout of thermal noise at mmwave frequencies.

M2C.2 • 11:00
Photonic Links for Control and Readout of Superconducting Qubits: Toward Scalable, Low Heat Load Architectures, Reza Hajitashakkori Kenari[1]; *[1]QphoX, Netherlands.* We present a scalable framework for control and readout of superconducting qubits via photonic links using cryogenic operation of photodiodes and microwave-to-optics transducers. Our results reveal a tenfold scale-up with respect to conventional microwave approaches.

M2C.3 • 11:15
Recent Progress on Thin-Film Strontium Titanate for Quantum Applications, Christian Haffner[1,2], Anja Ulrich[1,2], Ahmed Khalil[1,3], Andries Boelen[1,3]; *[1]InterUniv. Microelectronics Center, Belgium; [2]Gent Univ., Belgium; [3]Ku Leuven, Belgium.* We present recent advances in thin-film strontium titanate for cryogenic quantum applications, including enhanced Pockels coefficients, reduced waveguide losses, GHz electro-optic response, and record piezoelectric performance

M2C.4 • 11:30
Efficient, Stable, Electro-Optic Optical-Microwave Transduction in Thin Film Lithium Tantalate, Christopher Axline[1], Phoebe Tengdin[1], Moritz Businger[1], Stephan Gamper[1], Guilhem Alma[2], Nicola Brusadin[1], Aleksandr Tusnin[1], Marina Arqué Roquet[2], Robin Giroud[1], Daniel Brau[1]; *[1]Miraex SA, Switzerland; [2]Ecole Polytechnique Fédèrale de Lausanne, Switzerland.* We demonstrate the first direct microwave–optical conversion in thin-film lithium tantalate with efficiencies above 10^-4, showing stable transduction, sub-photon pump-induced noise, and a robust low-temperature Pockels coefficient

M2C.5 • 11:45 Invited
Integrated Photonics and Optical Packaging for Fault Tolerant Quantum Computing, Marco Eppenberger[1]; *[1]PsiQuantum, USA.* Fault tolerant, useful photonic quantum computing relies on extremely low photon-world-line losses. We show progress in developing passive photonics, BTO phase shifters, NbN single photon detectors, and optical packaging in our custom integrated photonics platform.

Room HG F1

M2A • Lasers I (Light Emitters)—Continued

M2A.5 • 12:00

High-Power, Narrow-Linewidth 3-5/Si_3N_4 Laser for High-Capacity Optical Coherent Transmission, Yilin Wu[1], Yan Ma[2], Deqi Li[1], Qiyin Xue[1], Sigang Yang[1], Hongwei Chen[1], Hui Wang[3], Zhenming Yu[2], Minghua Chen[1]; [1]*Tsinghua Univ., China;* [2]*Beijing Univ. of Posts and Telecommunications, China;* [3]*Changzhou Smartcore Optoelectronic Limited, China.* We demonstrate a hybrid 3-5/Si_3N_4 laser achieving an intrinsic linewidth of 26.1 Hz @ 120 mW and 53.4 nm wavelength tunability. Its performance is validated in a 50 Gbaud DP-16QAM coherent system.

M2A.6 • 12:15

Turn-key Photonic Integrated Mode-Locked Lasers Based on a Mamyshev Oscillator, Zheru Qiu[1], Xuan Yang[1], Xurong Li[1], Jianqi Hu[1], Zhongshu Liu[1], Yichi Zhang[1], Xinru Ji[1], Jiale Sun[1], Grigory Lihachev[1], Zihan Li[1], Ulrich Kentsch[2], Tobias Kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany.* We present a photonic integrated Mamyshev-oscillator mode-locked laser implemented on an erbium-doped silicon nitride platform, delivering >1 nJ on-chip pulse energy and supporting fully turn-key self-starting without any external seed pulses.

Room HG E1.1

M2B • Programmable Photonics for Information Processing—Continued

M2B.5 • 12:00

Large-Scale Dual-Polarization Programmable Photonic Processor Enabling Smart Transceiver Functions in C+L Bands, Alejandro Santomé-Valverde[1,2], Juan Fernández-Vicente[1], María Manglano-Bermejo[1], Erica Sánchez-Gomariz[1], Natalia Balbastre Benavent[1], Rocío Baños-López[1], Cristina Gómez-Hidalgo[1,2], Luis Torrijos-Morán[1], Daniel Pérez-López[1]; [1]*iPRONICS Programmable Photonics S.L., Spain;* [2]*Universitat Politècnica de València, Spain.* We report a 1020-cell SOI programmable processor for dual-polarization routing, fiber interrogation, and dispersion compensation. Featuring 332 monitors, four lattice filters, and two 35-channel AWGs, it demonstrates high-density spectral processing for C+L band smart transceivers.

M2B.6 • 12:15

Laser Frequency Modulation Characterization Using a Programmable Photonic Processor, Georgios Lymperakis[1,2], Torben Onselaere[3], Joris Van Kerrebrouck[3], Bruno Govaerts[3], Yu Zhang[1,2], Xiangfeng Chen[1,2], Lukas Van Iseghem[1,2], Iman Zand[1,2], Hasan Salmanian[1,2], Antonio Ribeiro[1,2], Wim Bogaerts[1,2], Nishant Singh[3], Guy Torfs[3]; [1]*Photonic Research Group, Department of Information Technology, Ghent Univ. - imec, Belgium;* [2]*Center for Nano- and Biophotonics (NBPhotonics), Ghent Univ., Belgium;* [3]*IDLab, Department of Information Technology, Ghent Univ. - imec, Belgium.* We demonstrate the capability of programmable photonic circuits to function as a characterization platform for optical devices. As proof of concept, we characterize a laser's frequency modulation response and explore its bias current dependence.

Room HG E1.2

M2C • Photonic Devices for Quantum II—Continued

M2C.6 • 12:15

Chip-to-Chip Entanglement-Based Quantum Key Distribution Over 80km Two-Core Fiber Spool, Giulia Guarda[1], Damien Roux[2], Mujtaba Zahidy[2], Yunhong Ding[2,3], Siyan Zhou[3], Domenico Ribezzo[1], Francesco Da Ros[2], Davide Bacco[1], Caterina Vigliar[2]; [1]*Universita degli Studi di Firenze, Italy;* [2]*Department of Electrical and Photonics Engineering, Technical Univ. of Denmark, Denmark;* [3]*SiPhotonIC ApS, Denmark.* We demonstrate chip-to-chip entanglement-based quantum key distribution using fully integrated silicon photonic transmitter and receiver circuits with path encoding, achieving secure key generation over an 80 km two-core fiber spool, advancing scalable integrated quantum communication networks.

Room HG F1

13:30–15:15
M3A • Lasers II
Presider: Borislav Hinkov; Silicon Austria Labs GmbH, Austria

M3A.1 • 13:30
Synchronously Tuned Integrated 3-5/LNOI Laser, Qiyin Xue[1], Yilin Wu[1], Sigang Yang[1], Hongwei Chen[1], Hui Wang[2], Minghua Chen[1]; [1]*Tsinghua Univ., China;* [2]*Changzhou Smartcore Optoelectronic Limited, China.* We demonstrate an integrated 3-5/LNOI self-injection locked laser with an intrinsic linewidth of 356.3 Hz. By employing synchronous tuning strategy, the laser achieves 10.1 GHz linear frequency chirp at a tuning speed of 1 MHz and electro-optic locking.

M3A.2 • 13:45
Intrinsic 13 GHz Linear Chirp in a Wavelength-Tunable Laser for FMCW LiDAR, Yu Han[1], Limeng Zhang[1,2], Victor Dolores Calzadilla[1]; [1]*Department of Electrical Engineering, Technical Univ. Eindhoven, Casmir Inst., Netherlands;* [2]*A*STAR, Singapore.* We present a monolithically InP-integrated tunable laser incorporating an optimized PIC design (cavity length, phase shifter, and AMZIs), achieving a chirping range approaching 13 GHz at 100 kHz modulation speed with a residual nonlinearity (1-r^2) below 8.8×10^{-4} without using predistortion.

M3A.3 • 14:00
A Photonic Integrated Dispersion-Managed Femtosecond Mode-Locked Laser, Xurong Li[1], Zheru Qiu[1], Xuan Yang[1], Xinru Ji[1], Jiale Sun[1], Jianqi Hu[1], Grigory Lihachev[1], Ulrich Kentsch[2], Tobias Kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany.* We demonstrate the first self-starting, photonic integrated femtosecond mode-locked laser, using a dispersion-managed mode-locking architecture. The laser has a 1.2-GHz repetition rate with an ultra-low mode-locking threshold, and generates a passively stable optical frequency comb.

M3A.4 • 14:15
Sub-kHz Linewidth Integrated Extended-DBR Pockels Laser Using Lithium Tantalate, Hugo Larocque[1], Zhuoya Yuan[1], Zihan Li[1], Anat Siddharth[2], Simone Bianconi[1], Tobias Kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Deeplight SA, Switzerland.* We demonstrate integrated extended-DBR lasers implemented in thin-film lithium tantalate. Our lasers achieve fiber-coupled mW-level output powers, <kHz intrinsic linewidths, and >GHz tuning ranges.

M3A.5 • 14:30
High-Power, Narrow-Linewidth Brillouin Laser in a Foundry-Scalable Silicon Nitride Platform, Akshay Keloth[1], Job Noordkamp[1], Yvan Klaver[1], Riley t. Morsche[1], Akhileshwar Mishra[1], Kaixuan Ye[1], Arjan Meijerink[2], Edwin Klein[2], David Marpaung[1]; [1]*Nonlinear Nanophotonics Group, MESA+ Inst. of Nanotechnology, Univ. of Twente, Netherlands;* [2]*LioniX International, Netherlands.* We report an on-chip Brillouin laser exhibiting highest output power of 100 mW, narrow linewidth, and >25 nm wavelength tunability. The device has a footprint over 1000x smaller than prior implementations, enabling compact and scalable integration on a foundry platform.

Room HG E1.1

13:30–15:15
M3B • Scalable Integrated Photonics for Communications and AI Systems
Presider: Francesco Zanetto, Politecnico di Milano, Italy

M3B.1 • 13:30 Invited
Scaling Energy-Efficient AI Systems Performance With Integrated Photonic Connectivity, Keren Bergman[1]; [1]*Columbia Univ., USA.* This talk addresses data-movement bottlenecks in high-performance systems, highlighting integrated silicon photonics for Petabit/s chip-escape bandwidth at sub-pJ/bit, and presents co-integrated, reconfigurable architectures enabling scalable, energy-efficient connectivity for distributed AI/ML workloads.

M3B.2 • 14:00
Phase-Controlled Optical Parametric Oscillators in Lithium Niobate-on-Insulator, Keanu Gleixner[1], Jost Kellner[1], Alessandra Sabatti[1], Rachel Grange[1]; [1]*ETH Zurich, Switzerland.* We demonstrate deterministic phase-biasing of on-chip optical parametric oscillators, enabling a fully integrated approach to optical computing based on phase-encoded states. The system operates at repetition rates exceeding 500 MHz.

M3B.3 • 14:15
Polarization- and Phase-Insensitive Coherent Combiner Using Monolithically-Integrated Electronic-Photonic Chip, Seyedmohammad Seyedinnavadeh[1], Samuele De Gaetano[1], Monica Crico[1], Andrea Melloni[1], Francesco Zanetto[1], Francesco Morichetti[1]; [1]*Politecnico di Milano, Italy.* A reconfigurable integrated MZI mesh with four inputs, each supporting two polarizations, coherently recombines a 25-Gbps signal dynamically distributed across its inputs. The monolithically integrated electronic-photonic chip uses time-multiplexed electronic control for optical coherent combining.

M3B.4 • 14:30
Fidelity-Aware Optimisation and Wafer-Scale Validation of a Silicon Waveguide Crossing, Cristina Gómez-Hidalgo[1,2], Natalia Balbastre Benavent[1], Juan Fernández-Vicente[1], Marios Papadovasilakis[1], María Manglano-Bermejo[1], Tsjerk Hoekstra[1], Daniel Pérez-López[1], Luis Torrijos-Morán[1]; [1]*iPRONICS Programmable Photonics S.L., Spain;* [2]*Universitat Politecnica de Valencia, Spain.* Electromagnetic optimisation of silicon photonic components using fixed high accuracy simulations is computationally inefficient. A staged workflow with progressively increasing numerical accuracy is proposed and validated through wafer-scale measurements of a full-etch silicon waveguide crossing.

Room HG E1.2

13:30–15:15
M3C • Photonic Devices for Quantum III
Presider: To be Announced

M3C.1 • 13:30
Heralded Photon Pair Generation in a low Footprint Q-InP Waveguide, Muneeb Farooq[1,2], Vikash Kumar[3], Francisco Soares[2], Jack Browne[1], Daniel Kilper[3], John Donegan[3], Liam Barry[4], Francisco Diaz[2]; [1]*Mbryonics Ltd. Galway Ireland, Ireland;* [2]*School of Telecommunications, Univ. of Vigo, Spain;* [3]*Trinity College Dublin, Ireland;* [4]*Dublin City Univ., Ireland.* We report, for the first time, single photon generation on a Q-InP waveguide through spontaneous four wave mixing. We characterise the spectral correlations between combinations of frequency modes spanning 24.4 nm with a 10 × 10 matrix. The CAR > 3 is measured at an on-chip pump power of 15 mW.

M3C.2 • 13:45
Monolithic SU(1,1) Interferometer Using Two Microring Resonators, Chenfei Cui[2], Yuhang Lei[1], Yue Li[1,3], ZheYu Ou[1], Hon Ki Tsang[2]; [1]*Department of Physics, City Univ. of Hong Kong, Hong Kong;* [2]*Department of Electronic Engineering, The Chinese Univ. of Hong Kong, Hong Kong;* [3]*Department of Electrical Engineering, City Univ. of Hong Kong, Hong Kong.* We demonstrate the first monolithically integrated SU(1,1) interferometer using two microring resonators as optical parametric amplifiers. A 4 dB quantum noise reduction is achieved despite around 5 dB chip-to-fiber coupling losses.

M3C.3 • 14:00
Directional Photon Pair Sources With sub-400 nm Periodic Poling of Lithium Niobate, Alessandra Sabatti[1], Jost Kellner[1], Robert J. Chapman[1], Rachel Grange[1]; [1]*ETH Zurich, Switzerland.* We demonstrate nanodomain periodic poling in thin-film lithium niobate enabling counter and backward propagating nonlinear generation. Sub-400 nm periods allow directional photon-pair generation, achieving high efficiencies and first on-chip backward down-conversion, advancing quantum photonics.

M3C.4 • 14:15 Invited
Quantum Criticality as a Resource for Photonic Sensing, Yannick Salamin[1]; [1]*Univ. of Central Florida, CREOL, USA.* Optical parametric oscillators exhibit sharp phase transitions near threshold. By weakly biasing a degenerate OPO, we map intracavity field statistics onto macroscopic phase probabilities. This enables a quantum critical sensing platform with ultrasensitive detection and exponential precision scaling.

Room HG F1

M3A • Lasers II—Continued

M3A.6 • 14:45
Universally Self-Injection Locked Photonic Integrated Laser with Efficient and Highly Linear Piezoelectric Actuation, Simone Bianconi[1], Mikael Reichler[1], Yichi Zhang[1], Anat Siddharth[1], Marco Liffredo[1], Luis Guillermo Villanueva[1], tobias kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland*. We demonstrate a photonic integrated self-injection locked laser with universal narrow-linewidth operation enabled by engineered feedback-phase dispersion, ensuring locking across all operating points. Efficient frequency tuning is achieved with a disaggregated AlScN piezoelectric actuator design.

M3A.7 • 15:00
Backside-Emitting VCSEL Arrays for Co-Packaged Optics in Scale-Up Network, Manuel Kohli[1], Jean Teissier[1], Marc Ganzhorn[1], Wilfried Maineult[1], Franz Eberhard[1], Rokhaya Mueller[1], Philipp Taeschler[1], Christian M. Schaefer[1], Donato Bonfrate[1], Martin Spieser[1], Stefano Tirelli[1], Evgeny Zibik[1]; [1]*Coherent Corp. Zürich, Switzerland.* The scale-up AI network imposes stringent energy efficiency and bandwidth-density targets. An optics-first wide-and-slow architecture offers best-in-class performance. Here, we analyze CPO for scale-up and demonstrate 18x32 Gbit/s VCSEL array on a silicon interposer.

Room HG E1.1

M3B • Scalable Integrated Photonics for Communications and AI Systems—Continued

M3B.5 • 14:45 Invited
Photonics in Computing, Nikos Pleros[1]; [1]*Aristoteleio Panepistimio Thessalonikis, Greece.* We demonstrate how progress in linear optics allowed the architectural convergence of time-, space- and wavelength-multiplexing, triggering significant advances in optical memories, in on-chip relational operators, in optical MIMO and in powerful photonic AI processors.

Room HG E1.2

M3C • Photonic Devices for Quantum III—Continued

M3C.5 • 14:45
Single-Photon Frequency Conversion of Quantum Dot Luminescence Using Photonic-Crystal Fibre, Michael T. Woodley[1], Alfie Broughton[2], Harry E. Dyte[2], Miguel A. Perez[2], Leah R. Murphy[1], Mateusz J. Olszewski[1], Alex O. Davis[1], Anthony J. Bennett[2]; [1]*Univ. of Bath, UK;* [2]*Cardiff Univ., UK.* We present coherent frequency conversion of single-photon emissions from an indium arsenide quantum dot, via Bragg-scattering four-wave mixing in a micro-structured optical fibre, which is shown to preserve non-classical second-order coherence.

M3C.6 • 15:00
Simultaneous Frequency Conversion and Spectral-Temporal Shaping of Single Photons in a Lithium Niobate Waveguide Chip, Michal J. Mikolajczyk[1], Ali Golestani[1,2], Rex H. Bannerman[3], James Gates[3], Peter G. Smith[3], Michal Karpinski[1]; [1]*Uniwersytet Warszawski, Poland;* [2]*Univ. of Calgary, Canada;* [3]*Univ. of Southampton, UK.* We demonstrate conversion of the single-photon-level pulse's wavelength,bandwidth, and duration from 798 nm, 5 GHz, 150 ps (quantum dot-like) to 1300 nm, 35 GHz, < 25 ps with a LiNbO3 waveguide chip quantum interface.

15:25–15:55
P11 • Poster Blitz 1.1 (Room F1)
P12 • Poster Blitz 1.2 (Room E1.1)

P1
Poster Session and Coffee Break (Foyer and Gallery Outside the Plenary Auditorium)
The poster presenters below will give a one-minute presentation during either Poster Blitz 1.1 or Poster Blitz 1.2. The presenters will then present a poser during the poster session immediately following the Blitz sessions.

P11.1
Hybrid Integrated Self-Injection Locked Laser Achieving 25 GHz Mode-Hop-Free Dynamic Tuning, Tieshi Wei[1], Yilin Wu[1], Qiyin Xue[1], Sihan Deng[1], Deqi Li[1], Hongfei Zhang[1], Yuandong Huo[1], Bo Du[1], Sigang Yang[1], hongwei chen[1], Hui Wang[2], Minghua Chen[1]; [1]*Tsinghua Univ., China;* [2]*Changzhou Smartcore Optoelectronic Limited, China.* We report a hybrid integrated frequency-modulated continuous-wave (FMCW) laser via self-injection locking to a strongly overcoupled microring resonator with high quality factor. It presents a static locking range of 37.84 GHz and stable 25.42 GHz FMCW generation for high-precision applications.

P11.2
Continuous-Wave InAs/GaAs Quantum Dot Laser Monolithically Grown on v-Grooved Si(001) Substrates, Lifeng Bao[1], Chong Chen[2], Makhayeni Mtunzi[2], Yaonan Hou[1,3], Michele Paparella[1], Ilias Skandalos[1], Elliot Sandell[1], Glenn Churchill[1], Alwyn Seeds[2], Huiyun Liu[2], Frederic Gardes[1]; [1]*Univ. of Southampton, UK;* [2]*Univ. College London, UK;* [3]*Swansea Univ., UK.* We successfully demonstrated a continuous-wave InAs/GaAs quantum dot laser directly grown on the on-axis Si(001) substrate that is patterned with (111)-faceted V-grooves by using standard complementary metal-oxide-semiconductor processing on 8-inch wafers.

P11.3
Low Repetition Rate III/v-on-SiN Mode-Locked Lasers Through Micro-Transfer Printing, Stijn Poelman[1], Tom Reep[1], Maximilien Billet[1], Bart Kuyken[1]; [1]*Ghent Univ. - imec, Belgium.* We demonstrate heterogeneously integrated mode-locked lasers using a two-step micro-transfer printing approach on a commercial SiN platform. We report stable mode-locked lasers operating with repetition rates of 1, 2.6 and 8.5 GHz.

P11.4
Early-Life Failure Prediction of Integrated InP Fabry-Pérot Lasers Using Machine Learning Models, Lea Chaccour[1,2], Ben Hasenson[1,2], Dzmitry Pustakhod[1,2], Sylwester Latkowski[1,2]; [1]*Electrical engineering, Technische Universiteit Eindhoven, Netherlands;* [2]*Electrical engineering, PITC Eindhoven Univ. of Technology (TU/e), Netherlands.* In this paper, we develop a Machine Learning model that can predict the failure of Integrated InP Fabry-Pérot lasers using only 24-hour early-life data. A Random Forest model achieves strong accuracy, enabling fast and cost-effective reliability screening.

P11.5
External Cavity Diode Laser at 515 nm With > 80 mW Output Power in Hermetically Sealed 14-Pin Butterfly, Nikolas Sandig[1,2], Franz Roeder[1], Hendrick Thiem[1], Markus Schütz[1], Dennis Krug[1], Björn Globisch[1]; [1]*Toptica Eagleyard, Germany;* [2]*Photonik und Terahertztechnologie, Ruhr Universität Bochum, Germany.* Lasers operating in the green spectral range mainly use frequency doubling, leading to cost-intensive and bulky lasers. Here, we present a miniaturized external cavity diode laser in a hermetically sealed 14-pin butterfly at 515 nm with more than 80 mW output power and >15 GHz mode-hop free tuning.

P11.6
Monolithically Integrated Mutual-Injection-Locked DFB-SRL System on an InP Photonic Platform, Xiao Li[1], Kevin Williams[1], Yuqing Jiao[1]; [1]*Technische Universiteit Eindhoven, Netherlands.* A monolithically integrated mutual-injection-locked semiconductor ring laser (SRL) with a DFB laser is experimentally demonstrated on an indium phosphide (InP) photonic platform, exhibiting single-mode operation over 5.25 GHz with a minimum linewidth of 519 kHz.

P11.7
Multi-Wavelength Self-Injection Locked Quantum-Dot Lasers Enabled by Micro-Transfer Printing, Diego Domínguez Castillejo[1], Risov Das[1], Samir Ghosh[1], Owen Moynihan[1], Ali Uzun[1], Brian Corbett[1], Fatih Atar[1]; [1]*Tyndall National Inst., Ireland.* This paper presents the simultaneous self-injection locking of multiple lasing frequencies in a quantum-dot laser heterogeneously integrated on a silicon platform. Feedback is formed via an integrated extended cavity.

P11.8
780 nm Single-Frequency Laser with All-Fiber Structure, Cong Yi[1], Yuxuan An[1], Guangshu Yu[1], Wen Luo[1], Ying Liu[1], Yueyang Zhai[1,2]; [1]*Beihang Univ., China;* [2]*Hefei National Laboratory, China.* We demonstrate a 780 nm all-fiber laser with excellent stability, wide tuning range and the relative intensity noise (RIN) of -160 dBc/Hz@200 kHz. This laser potentially applies to compact quantum instruments.

P11.9
Simulation of an on-Chip Coupled Cavity Mode-Locked Laser, Venkatesh Chakravartula[1], Lalitha Ponnampalam[1]; [1]*Univ. College London, UK.* We present, for the first time, simulation of an on-chip coupled cavity laser, comprising a colliding pulse Mode-Locked Laser (MLL) and an active MLL, demonstrating a uniform optical spectrum exceeding 40 nm, covering full C-band.

P11.10
Simulation of Tunable O-Band Narrow Far Field and Narrow Linewidth InAs/GaInAs Dot-in-a-Well Lasers With Surface Gratings, Ada L. Dumitrescu[1], Valdas Pasiskevicius[1]; [1]*Kungliga Tekniska Hogskolan, Sweden.* AlGaAs-based O-band tunable InAs/GaInAs dot-in-a-well lasers with surface gratings are designed and simulated, showing a narrow far field and reflectivity-limited narrow emission linewidth.

P11.11
Multi-Tbit/s Parallel Optical Interconnects Using an Integrated ECL-SOA Source, Leidy J. Quintero Rodríguez[1], Ahmed Galib Reza[1], Lakshmi Narayanan Venkatasubramani[1], Sidi Aboujja[2], Daniel Chu[2], Liam Barry[1]; [1]*Dublin City Univ., Ireland;* [2]*SemiNex Corporation, USA.* We demonstrate 100 Gbit/s OOK and 200 Gbit/s PAM4 transmission over 1km with an integrated ECL-SOA. The source can potentially enable multi-Tbit/s intra-DC transmission with efficiency $<$0.5pJ/bit for the optical source in a parallel architecture.

P11.12
Impact of SOA Placement on Frequency Noise in Injection-Locked Photonic Integrated Circuits, Arbnor Berisha[1,2], Hendrik Boerma[1], Mikhal Camjalli[1], Gerrit Fiol[1], Patrick Runge[1]; [1]*Fraunhofer HHI, Germany;* [2]*Technische Universität Berlin, Germany.* The additional frequency noise introduced by SOAs in PICs is investigated. Positioning the SOA before the slave laser, reduces the intrinsic linewidth by up to 60% compared to after the slave laser.

P11.13
Electro-Optical Properties of III-v Waveguides in Sight of Hybrid Silicon Photonics Integration, Xavier Champagne de Labriolle[3], Corentin Jouanneau[3], Jérémy Da Fonseca[3], Mattéo Chobé[3], Toufiq Bria[3], Nicolas Dunoyer[3], Claire Besancon[1], Alessandro Aimone[2], Joan Manel-Ramirez[1], Sylvain Guerber[3], José-Luis Gonzalez-Jimenez[3]; [1]*III-V Lab, France;* [2]*Nokia Bell Labs, Germany;* [3]*CEA Leti, France.* InP waveguides with AlGaInAs quantum wells have been fabricated, resembling hybrid III-V/Si photonic integration. QCSE-induced absorption and index modulations have been measured in Mach-Zehnder interferometers. The modulation efficiency is 0.9 V.cm at 1550 nm and 0.5 V.cm at 1500 nm.

P11.14
Electrical and Optical Characterization of Pb(Zr,Ti)O\Textsubscript{3}-on-Insulator Waveguides for the Next Generation of Optical Phase Modulators, Enes Lievens[1], Kobe De Geest[1], Tom Vanmaele[1], Andreas Laemont[1], Ewout Picavet[1], Jeroen Beeckman[1]; [1]*Universiteit Gent, Belgium.* Ferroelectric materials enable next-generation high-speed modulators, as demonstrated by widespread adoption of lithium niobate thin films. In this work, we present the development of a Pb(Zr,Ti)O3-on-insulator platform as a promising alternative to lithium niobate.

P11.15
Automatic Bias Control for Optical IQ Modulators Using FPGA-Based Dither-Correlation Detection, Samatha Kancharla[1]; [1]*Indian Inst. of Technology Bombay, India.* A low-latency FPGA-based automatic bias control scheme for coherent optical IQ modulators. Leveraging dither-correlation, the design enables real-time bias stabilization and surpasses conventional microcontroller-based methods in terms of speed, power, efficiency, and sensitivity.

P11.16
Coupled Bloch-Mode Modeling of Slow-Light Silicon Modulators for Data Center Applications, Salvatore Salpietro[1], Louise-Eugenie Bataille[2], Frederic Boeuf[2], Mariangela Gioannini[1]; [1]*Politecnico di Torino, Italy;* [2]*STMicroelectronics, France.* This paper presents a coupled Bloch-mode framework capable of extracting modal losses and modulation efficiency in slow-light silicon modulators with non-uniform doping, enabling realistic modelling and rapid optimization of device geometry for target applications.

P11.17
Demonstration of a Micro-Transfer Printed Lead Zirconate Titanate Thin-Film Microring Modulator on Silicon Nitride at 950 nm, JIAYI LIU[1], Kobe De Geest[1,2], Ewout Picavet[1,3], Andreas Laemont[1,3], Dries Van Thourhout[2], Jeroen Beeckman[1]; [1]*ELIS, Universiteit Gent, Belgium;* [2]*INTEC, Universiteit Gent, Belgium;* [3]*Department of Chemistry, Universiteit Gent, Belgium.* We demonstrate the first lead zirconate titanate thin-film modulator integrated on silicon nitride via micro-transfer printing, achieving a VπL of 1.08 V.cm at 950 nm, enabling efficient near-infrared modulation.

P11.18
High-Speed Thin-Film Lithium Niobate Modulator With Bandwidth Exceeding 110 GHz and High Modulation Efficiency, Mario Mejias Figueiras[1], Mario Bolea[1], Tigers Jonuzi[1]; [1]*VLC Photonics S.L., Spain.* We experimentally demonstrate a travelling-wave Mach–Zehnder modulator achieving > 110 GHz bandwidth with ~2.5 dB electro-optic roll-off at 110 GHz and VπL = 2.66 Vcm, highlighting its potential for next-generation optical transceivers.

P11.19
Active Bias Trimming of High-Speed SiN Mach–Zehnder Interferometers Using Thin-Film Ferroelectrics, Tom Vanmaele[1,2], Enes Lievens[1,2], Kobe De Geest[1,2], Ewout Picavet[1,3], Andreas Laemont[1,3], Dries Van Thourhout[2], Peter Bienstman[2], Jeroen Beeckman[1]; [1]*Electronics and Information Systems, Universiteit Gent, Belgium;* [2]*Information Technology, Universiteit Gent, Belgium;* [3]*Chemistry, Universiteit Gent, Belgium.* Active trimming of SiN Mach-Zehnder interferometers with a PZT cladding is demonstrated. Applying a DC bias enables precise tuning to the quadrature point while preserving high-speed performance, providing a low-cost and fabrication-compatible alternative to post-processing or thermal stabilization.

P11 • Poster Blitz 1.1 (Room F1)
P12 • Poster Blitz 1.2 (Room E1.1)
Continued

P11.20
Accuracy Scaling Analysis of an Integrated Mach-Zehnder Interferometer-Based Wavemeter, Tunahan Gök[1,2], Jashanpreet Kaur[2], Piotr Cegielski[3], Avinash Kumar[1,2], Alexander Eras[4], Christian Nölleke[4], Stefan Verse[5], Jürgen Martini[5], Max C. Lemme[1,2], Stephan Suckow[2]; [1]*Chair of Electronic Devices, RWTH Aachen Univ., Germany; [2]AMO GmbH, Germany; [3]Now with: Infineon Technologies AG, Germany; [4]TOPTICA Photonics AG, Germany; [5]AMOtronics UG, Germany.* Wavelength determination accuracy of an integrated Mach-Zehnder interferometer (MZI) based wavemeter is investigated by varying the number of MZIs. Increasing the MZI number improves accuracy to sub-picometer levels, revealing a performance limit beyond six MZIs.

P11.21
Heterogeneous $LiNbO_3$ / Si_3N_4 Mach-Zehnder Modulators Fabricated Using Direct Bonding on a 200mm Platform, Clément Ben Braham[1,3], Jonathan Faugier-Tovar[1], Karen Ribaud[1], Nicolas Dunoyer[1], Pierre Perreau[1], Grégory Enyedi[1], Jean Guerrero[1], Cyril Le Bohec[1], Thomas Magis[1], Baptiste Routier[1], Quentin Wilmart[1], Stéphane Brision[1], Laurence Gabette[1], Régis Orobtchouk[2], Laurent Vivien[3], Yohan Desieres[1]; [1]*Université Grenoble Alpes, CEA-LETI, Minatec, France; [2]Université de Lyon, Institut des Nanotechnologies de Lyon, INSA Lyon, CNRS, UMR 5270, France; [3]Centre de Nanosciences et de Nanotechnologies, Université Paris-Saclay, CNRS, France.* Si_3N_4/$LiNbO_3$ modulators were fabricated on a 200mm ultra-low loss Si_3N_4 platform combining efficient Kerr frequency comb generation. VπLπ from 3.5V.cm to 8.1V.cm, bandwidths from 35GHz to beyond 67GHz, and limited DC-drift at hour-scale are reported.

P11.22
Epitaxial Ferroelectric ZrO2 Thin Films for Electro-Optic Modulation, Pablo Bedoya[1], Nihal Benabdelkader[1], Ana-Maria Statie[1], Davide Cammilleri[1], Nathaniel Findling[1], Ludovic Largeau[1], Samson Edmond[1], David Bouville[1], Jean-René Coudevylle[1], Daniele Melati[1], Delphine Marris-Morini[1], Eric Cassan[1], Philippe Lecoeur[1], Guillaume Agnus[1], Sylvia Matzen[1], Carlos A. Alonso Ramos[1], Thomas Maroutian[1], Laurent Vivien[1]; [1]*Centre de Nanosciences et de Nanotechnol, Colombia.* In this work, we studied epitaxial growth of ferroelectric ZrO2 thin films for electro-optic (Pockels) modulation. Pulsed laser deposition and metal-organic molecular beam epitaxy were used. In addition, integration onto silicon photonics was explored.

P11.23
Fabrication-Aware Design of Adiabatic Coupling for Heterogeneous Integration of GaAs on SiN, Milos Ljubotina[1], Jasper De Witte[2,3], Zhe Liu[4,5], Andraz Debevc[1], Leonardo Midolo[4], Gunther Roelkens[2,3], Bart Kuyken[2,3], Dries Van Thourhout[2,3], Marko Topic[1], Janez Krc[1]; [1]*Faculty of Electrical Engineering, Univ. of Ljubljana, Slovenia; [2]Photonics Research Group, Ghent Univ. - imec, Belgium; [3]Center for Nano- and Biophotonics (NB-Photonics), Ghent Univ., Belgium; [4]Center for Hybrid Quantum Networks, Niels Bohr Inst., Univ. of Copenhagen, Denmark; [5]Sparrow Quantum ApS, Denmark.* Reliable low-loss adiabatic couplers are essential for advanced applications leveraging heterogeneous integration of photonic platforms. We present a novel fabrication-aware coupler design and optimisation strategy and experimental results showing substantially improved SiN/GaAs coupling efficiency.

P11.24
Thin-Film Lithium Niobate Platform and Validated Process Design Kit for Scalable Photonics, Alberto Della Torre[1], Homa Zarebidaki[1], Florian Dubois[1], Jacopo Leo[1], Dorian Herle[1], Arno Mettraux[1], Mattia Orvietani[1], Micol Previde Massara[1], Ivan Prieto[1], Olivier Dubochet[1], Andrea Volpini[1], Olivia Hefti[1,2], Charles Caër[2], Davide Grassani[1], Hamed Sattari[1], Sylvain Nicolay[1]; [1]*Centre Suisse d'Electronique et de Micro, Switzerland; [2]EPFL, Switzerland.* We present a wafer-scale TFLN photonic integrated circuit platform and its validated process design kit (PDK), highlighting key building blocks and demonstrating reliable device manufacturing and performance, underlining scalability of the platform for various applications.

P11.25
Wafer-Scalable Fabrication Process of Spot Size Converters on Silicon Nitride, Klara Mihov[1], Martin Kresse[1], Oussama Zahir[1], Ralf Gerdes[1], Kristijan Posilovic[1], Jakob Reck[1], Tianwen Qian[1], Bartu Yaman[1], David de Felipe Mesquida[1], Laurids von Emden[1], Nils F. Fuchs[1], Marcel Amberg[1], Philipp Winklhofer[1], Csongor Keuer[1], Ben Schuler[1], Markus Struckmann[1], Francesco Villasmunta[1], Crispin Zawadzki[1], Moritz Kleinert[1], Norbert Keil[1]; [1]*Fraunhofer HHI, Germany.* We present a wafer-scalable fabrication of Si_3N_4 spot-size converters using vertical and lateral tapering. The devices expand modes to 3.8 µm and reduce coupling loss to 0.6 dB/facet for 3.5 µm mode-field diameter lensed fibers.

P11.26
200-mm Lithium Niobate Integrated Photonics: Design, Fabrication, and Testing, Asif Mirza[1], Maksim Savchenko[1], Sara Ghomi[1], Littin Varghese[1], Munir Azeem[1], Mingqing Nie[1], Jasmin Spettel[1], Nikolai Andrianov[1], Tommaso Cassese[1]; [1]*Silicon Austria Labs GmbH, Austria.* Lithium niobate photonics demands wafer-scale fabrication for commercial viability. We demonstrate photonic components on 200-mm lithium niobate wafers with propagation losses below 1.2 dB/cm, establishing a scalable platform for high-volume integrated photonic manufacturing.

P11.27
Chemical Mechanical Polishing Characterization of Heterogeneous Patterned Wafers for Hybrid Integration., Valentina M. Díaz Palacios[1], Adrián Fernández[1], Giuseppe L. Bufi[1], Daniel Pastor[1], Pascual Munoz[1]; [1]*UPVfab - Photonics Research Labs - iTEAM Research Inst., Universitat Politècnica de València, Spain.* CMP characterization on patterned heterogeneous structures reveals strong pattern dependent polishing behavior. A stepwise polishing methodology enabled controlled planarization, achieving a uniform surface suitable for hybrid integration, enabling effective thermal dissipation and vertical coupling.

P11.28
Broadband Adiabatic Couplers in Thin-Film Lithium Niobate, Shivani Sharma[1,2], Sebastian Lengeling[1,2], Harald Herrmann[1,2], Laura Padberg[1,2], Christine Silberhorn[1,2]; [1]*Integrated Quantum Optics, Universität Paderborn, Germany; [2]Inst. for Photonic Quantum Systems (PhoQS), Germany.* Robust adiabatic couplers with ~ 95% coupling efficiency across a wavelength range exceeding 100 nm around 1550 nm are experimentally demonstrated on thin-film lithium niobate, possessing strong potential as dichroic filters in quantum photonic networks.

P11.29
Heterogeneous Integration of pre-Patterned Lithium Niobate on Silicon Photonics Through Micro-Transfer Printing, Margot Niels[1], Ewoud Vissers[1], Xiujun Zheng[1], Arno Moerman[1], Patrick Nenezic[1], Athina Papadopoulou[1], Simone Atzeni[1], Suzanne Bisschop[1], Elif Özçeri Iyikanat[1], Ye Chen[1], Philip Ekkels[1], Tiernan McCaughery[1], Tom Vanackere[1], Nishant Singh[1], Sofie Janssen[2], Peter Verheyen[2], Neha Singh[2], Dieter Bode[2], Martin Davi[2], Filippo Ferraro[2], Philippe Absil[2], Sadhishkumar Balakrishnan[2], Joris Van Campenhout[2], Gunther Roelkens[1], Sarah Uvin[1], Maximilien Billet[1], Bart Kuyken[1]; [1]*Ghent Univ. - imec, Belgium; [2]imec, Belgium.* In the pursuit of more performant heterogeneously integrated LN on SiPh, pre-patterned devices of LN are micro-transfer printed on a commercial SiPh platform. Using a wafer-scale micro-transfer printing technique, a few statistics will be discussed on alignment accuracy and general performance.

P11.30
Heat Sink Dissipators in Hybrid Photonic Integrated Circuits, Ruben Alemany Server[1], Daniel Pastor[1], Pascual Munoz[1]; [1]*UPV, Spain.* Thermal management strategies must be incorporated during the integration of active photonic devices into passive ones. The proposed heat sinks double the power required to achieve a π phase shift in a thermo-optic phase shifter device efficiently and reliably.

P11.31
Thermal Characterization of Silicon Pillar Heat Shunts for Hybrid Photonic Integrated Circuits, Giuseppe L. Bufi[1], Valentina M. Díaz Palacios[1], Pascual Munoz[1], Daniel Pastor[1]; [1]*UPVfab - Photonics Research Labs - iTEAM Research Inst., Universitàt Politècnica de València, Spain.* Efficient heat extraction remains challenging in hybrid photonic integrated circuits. We experimentally characterize silicon pillar heat shunts via electrical and thermographic methods, demonstrating reduced thermal resistance and validating their effectiveness for improved heat dissipation.

P11.32
Heterogeneous Integration of Amorphous Silicon Carbide Photonics, Zizheng Li[1], Naresh Sharma[1,2], Bruno Lopez-Rodriguez[1], Thomas Scholte[1], Iman Esmaeil Zadeh[1]; [1]*Imaging Physics, TU Delft, Netherlands; [2]Department of Electronics Engineering, Indian Inst. of Technology, India.* Amorphous silicon carbide (a-SiC) photonics is attractive for its distinct advantages. Heterogeneously integrating a-SiC with SiN and LiNbO3 equips a-SiC with ultra-low loss and electro-optical tunability, for scalable and reconfigurable photonic integration.

P12.1
A Fabrication Method for Improving Wafer-Scale Uniformity of Polarization Converters on InP Membrane, Dong Liang[1], Sander Reniers[1], Kevin Williams[1], Yuqing Jiao[1]; [1]*Technische Universiteit Eindhoven, Netherlands.* We propose a fabrication method for InP membrane polarization converters that reduces etch-induced variation and enables more uniform polarization conversion performance across the wafer.

P12.2
Characterization and Modeling of Monolithic CMOS Devices in Silicon Photonics for Integrated Electronic-Photonic co-Simulations, Monica Crico[1], Francesco Morichetti[1], Andrea Melloni[1], Giorgio Ferrari[1], Marco Sampietro[1], Francesco Zanetto[1]; [1]*Politecnico di Milano, Italy.* We report on the characterization and compact modeling of CMOS transistors integrated into a pure silicon photonic foundry, opening the way to seamless co-simulation of monolithic circuits combining both photonic and electronic functionalities.

P12.3
High-Extinction-Ratio Broadband Operation of Silicon Photonic Switch via Adaptive Control, Samuele De Gaetano[1], SeyedMohammad SeyedinNavadeh[1], Emanuela Gubello[1], Alessandro di Tria[1], Francesco Zanetto[1], Francesco Morichetti[1], Andrea Melloni[1]; [1]*Politecnico di Milano, Italy.* We demonstrate adaptive control of a silicon photonic Mach–Zehnder interferometer-based switch, achieving > 30 dB extinction ratio over a bandwidth of 100 nm compensating for the wavelength-dependent phase dispersion of the thermo-optic actuator.

P12.4
Semi-Classical Simulations of Squeezing Generation in Integrated Kerr Microresonators, Sara Persia[1], Fuchuan Lei[3], Vaishali Adya[2], Victor Torres Company[1]; [1]*Chalmers Univ. of Technology, Sweden; [2]Applied Physics, KTH Royal Inst. of Technology, Sweden; [3]State Key Laboratory of Integrated Optoelectronics, Northeast Normal Univ., China.* We demonstrate that a semi-classical approach based on the Ikeda map enables the simulation of two-mode quadrature squeezing in quantum frequency combs generated in integrated Kerr microring resonators.

P11 • Poster Blitz 1.1 (Room F1)
P12 • Poster Blitz 1.2 (Room E1.1)
Continued

P12.5
Compact Spectral Routing Between Two Integrated Silicon Arrayed Waveguide Gratings, Leila Vatandoustsardroud[1], Jae Hyeon Kim[2], Shashank Gupta[1], Munirul Tusher[1], Hyung-Myung Moon[3], Sangyoon Han[2], Moritz Merklein[1], Niels Quack[1]; [1]*Univ. of Sydney, Australia;* [2]*Daegu Gyeongbuk Inst. of Science & Technology, Korea (the Republic of);* [3]*Korea Advanced Materials Co., Ltd, Korea (the Republic of).* We demonstrate compact spectral routing between two integrated 12-channel silicon Arrayed Waveguide Gratings using a thermally actuated Mach–Zehnder interferometer, enabling an effective 24-channel demultiplexer with ~40% reduced footprint compared to a conventional monolithic design.

P12.6
Demonstration of Fast Characterization Algorithm for Integrated Asymmetric Multi-Arm Interferometers, Anton Budarin[1], Stefano Tondini[1], Martijn J. Heck[1]; [1]*Technische Universiteit Eindhoven, Netherlands.* There are currently no fast reliable characterization methods for multi-arm asymmetric interferometer spectral filters. Here we experimentally verify a novel characterization approach which can potentially be applicable in optical coherence tomography, spectroscopic sensing and LiDAR.

P12.7
Experimental Demonstration of GNMI-Controlled Silicon Photonic Optical Circuits Switching for Software-Defined Networks, Zhenyun Xie[1], Lluís Ginés Rivas[1], Carlos Pascual Izarra[1], Daniel Pérez-López[1]; [1]*iPRONICS Programmable Photonics S.L., Spain.* We propose gNMI-controlled 32x32 silicon photonic optical circuit switching with a custom YANG model, achieving efficient control, near 0 dB loss, and crosstalk below -50 dB for scalable datacenter networks.

P12.8
Exploring on Chip Evanescent Coupling for UV Homogeneous Illumination With the Wide AlO_x Grating, Shiqi Fan[1,2], Pol Van Dorpe[2], Nicolas Le Thomas[1,3]; [1]*Gent Univ., Belgium;* [2]*Photonics Research Group (UGent - IMEC), Belgium;* [3]*Center for Nano and Biophotonics, Ghent Univ., Belgium.* We demonstrate a homogeneous UV illumination system with a field of view of 500 μm×100 μm. This is achieved by generating a flat-top slab mode through a waveguide-to-slab evanescent coupler, which then propagates into a large, shallow-etched AlOx grating.

P12.9
Towards Polarization-Tolerant Silicon Photonic Systems for Direct-Detection Applications, João Santos[1,2], Carla Rodrigues[1], Patricia Carvalho[1], Francisco Rodrigues[1], Mário Lima[2], António Teixeira[1,2]; [1]*PICAdvanced, S.A., Portugal;* [2]*Universidade de Aveiro, Portugal.* Waveguide birefringence in integrated photonics limits scalability for direct-detection systems. We revisit classical polarization-control methods and evaluate a polarization-tracking structure, highlighting trade-offs in loss, power, and footprint for scalable, polarization-tolerant integration.

P12.10
Compact Dual-Band Optical Switch Based on the Low-Loss SiN Plasmoinc Waveguide, Shuqi Xiao[1], Liang Zhang[1], Hon Ki Tsang[1]; [1]*Chinese Univ. of Hong Kong, Hong Kong.* We propose an ultra-compact optical switch on a SiN plasmonic platform, featuring a footprint of only 150 μm and supporting simultaneous C-band and O-band operation.

P12.11
Electro-Optic Address Decoder Based on Photonic NAND ROM Architecture Using Microring Resonators, Ankur Singh[1], Subhradip Chakraborty[1], Akhilesh Jaiswal[1]; [1]*Univ. of Wisconsin Madison, USA.* Silicon photonic electro-optic NAND decoders based on microring resonators, PN-junction phase shifters, and inverter-assisted control are proposed for 2-to-4 and 3-to-8 decoding, enabling selective optical routing for high-speed photonic computing, switching, and interconnect systems.

P12.12
Polarization Converter Enabled by InP Suspended Waveguide and Fast Quasi Adiabatic Design Method, Anaël Sedilot[1], Duarte Fernandes da Silva[1], Kevin Williams[1], Victor Dolores Calzadilla[1]; [1]*Technical Univ. of Eindhoven, Netherlands.* We use the fast quasi adiabatic method to design a 416 μm long polarization converter in a suspended InP waveguide, converting TM0 to TE1 with 98% efficiency in the C-band, making it short and efficient.

P12.13
Intermodal Lattice Filters With Inverse-Designed Intermodal Couplers Using Dataset-Reused Eigenmode Expansion, Jaesung Song[1], Young-Ik Sohn[1]; [1]*Korea Advanced Inst of Science & Tech, Korea (the Republic of).* We demonstrate intermodal lattice filters using inverse-designed intermodal couplers enabled by dataset-reused eigenmode expansion. Simulation results demonstrate a flat-top response with 30 dB extinction and more than 20 dB over an 80 nm bandwidth.

P12.14
Coupled Mode Theory Equivalent Circuit Model for Distributed Bragg Reflectors, Anjana James[1], Yash Raj[1], Arnab Goswami[1], Pranjal S. Tomar[1], Deleep Nair[1], Bijoy Krishna Das[1], Anjan Chakravorty[1]; [1]*Indian Inst. of Technology Madras, India.* An electrical equivalent circuit model that accurately captures the magnitude and phase of silicon photonic distributed Bragg reflectors based on coupled mode theory is proposed, implemented in SPICE, and validated against experimental data.

P12.15
Spectral Photonic Encoder for Computational Tasks via Optoelectronic Recurrence, Ujal Rzayev[1], Aras Arslan[1], Can Dimici[1], Aycan D. Vit[2], Arda T. Vit[3], Emir S. Magden[1]; [1]*Koç Universitesi, Turkey;* [2]*Ghent Univ., Belgium;* [3]*Yeditepe Univ., Turkey.* We demonstrate convolutional neural networks with wavelength-multiplexed optoelectronic core, enabling high-dimensional feature mixing. For PDE solving in fluid dynamics, we achieve 99.53% SSIM, 2.57 × 10−4 MSE, and 35.93 dB PSNR on the test set.

P12.16
Assessing the Scalability of Waveguide to Free-Space Grating Coupling in Trapped Ion Quantum Computing, Tereza Viskova[2,3], Flavia Timpu[2], Gillen Beck[3], Dominique Zehnder[2], Karan Mehta[1], Jonathan P. Home[3], Cornelius Hempel[2], Julian Schmidt[2]; [1]*School of Electrical and Computer Engineering, Cornell Univ., USA;* [2]*Paul Scherrer Institut, Switzerland;* [3]*ETH, Switzerland.* Scalable trapped-ion quantum computing in two-dimensional trap architectures requires replacing free-space with integrated light delivery. We experimentally analyze beam pointing variations for $^{40}Ca^+$ addressing in multi-zone array devices to assess uniformity of qubit operations.

P12.17
50-km Continuous-Variable Quantum Key Distribution Using an Integrated Silicon Photonic Receiver, Xuesong Xu[1], Lu Fan[1], Yan Pan[2], Dan Li[1], Heng Wang[2], Yang Li[2], Wei Huang[2], Hao Gao[1], Song Yu[1], Lei Zhang[3], Bingjie Xu[2], Yichen Zhang[1]; [1]*State Key Laboratory of Information Photonics and Optical Communications, Beijing Univ. of Posts & Telecom, China;* [2]*National Key Laboratory of Security Communication, Inst. of Southwestern Communication, China;* [3]*School of Integrated Circuits, Beijing Univ. of Posts and Telecommunications, China.* We demonstrate a continuous-variable quantum key distribution system with an integrated silicon photonic receiver, achieving a 2.78 Mbps asymptotic secret key rate over 50 km, enabling metropolitan-area chip-based quantum secure communications.

P12.18
Photon Pair Source Based on Polymer/AlGaAs Hybrid Integration for Generation in the C Band, Csongor Keuer[1], Laurids von Emden[1], Bartu Yaman[1], Ben Schuler[1], Vivienne Leidel[2], Quankui Yang[2], Klara Mihov[1], Felix Ganzer[1], Tianwen Qian[1], Marcel Amberg[1], Francesco Villasmunta[1], Martin Kresse[1], Markus Struckmann[1], Philipp Winklhofer[1], Jakob Reck[1], Crispin Zawadzki[1], Thorsten Passow[2], Marko Härtelt[2], David de Felipe Mesquida[1], Moritz Kleinert[1], Norbert Keil[1]; [1]*Fraunhofer HHI, Germany;* [2]*Fraunhofer IAF, Germany.* We demonstrate a hybrid photon-pair source combining an AlGaAs Bragg-reflection waveguide with a polymer photonic integrated circuit. The fiber-coupled module generates telecom C band photon pairs at room temperature, enabling scalable quantum photonic integration.

P12.19
Impact of Resonance Splitting on Photon-Pair Correlations in a Si_3N_4 Microring Resonator, Vikash Kumar[1,2], Mugahid Ali[1], Edward H. Krock[1], Haizhong Weng[1], Chao Li[2], Devika Dass[1], Syed T. Ahmad[1], Muneeb Farooq[3], Liam Barry[4], Daniel Kilper[1], John Donegan[1]; [1]*Univ. of Dublin Trinity College, Ireland;* [2]*Massachusetts Inst. of Technology, USA;* [3]*Univ. of Vigo, Spain;* [4]*Dublin City Univ., Ireland.* We compare unsplit and split resonances in a Si_3N_4 microring to study branch-dependent photon-pair correlations. The unsplit mode shows the highest coincidence rate and visibility, while the split high-Q and low-Q branches exhibit degraded performance.

P12.20
Nonlinear Cascaded Electro-Optic Pulse Shaping on Thin-Film Lithium Niobate for Integrated Quantum Photonic Sources, Noel Heinen[1,2], Michelle Kirsch[1,2], Christian Kress[3,2], Martin Miroslavov Mihaylov[3,2], Sebastian Langeling[1,2], Sattibabu Romala[1,2], Christian Golla[2], Laura Padberg[1,2], Harald Herrmann[1,2], Christoph Scheytt[3,2], Christine Silberhorn[1,2]; [1]*Integrated Quantum Optics, Paderborn Univ., Germany;* [2]*Inst. for Photonic Quantum Systems, Germany;* [3]*Heinz Nixdorf Inst., Germany.* We report on a cascaded Mach-Zehnder modulator with integrated second harmonic generation on thin-film lithium niobate, generating picosecond $sinc^2$-shaped pulses at 775 nm.

P12.21
Experimentally Mapping the Design Space of Integrated Nonlinear Photon-Pair Sources, Juan J. Arango[2,1], Alfonso Roldan-Otero[2,1], Sabine Häußler[2,1], Ana M. Torres[3,2], Gia Quyet Ngo[1], Hossein Esfandiar[2], Sebastian Ritter[2,1], Dennis Arslan[2], Fabian Steinlechner[2,1], Falk Eilenberger[2,1], Meritxell Cabrejo-Ponce[2,1], Sebastian Schmitt[2,1]; [1]*Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Germany;* [2]*Fraunhofer Inst. for Applied Optics and Precision Engineering IOF, Germany;* [3]*Heriot-Watt Univ. Edinburgh Campus, UK.* Resonant nonlinear photon-pair generation is fundamentally bound by strong compromises involving multiple design parameters. A comprehensive experimental exploration of such design space allows the examination of common modelling approaches for realistic on-chip source engineering.

P12.22
Monolithic Silicon Die-Level Receiver With Phase Controller and 3 dB Mixer for Squeezed Light Detection, Emmily Zaiser[1], Hannes Hübel[1], Alessandro Trenti[1], Florian Honz[1], Dinka Milovancev[1]; [1]*AIT Austrian Inst. of Technology, Austria.* We report a monolithic silicon photonic receiver, featuring active phase control and a 3 db mixer. Experimental characterization demonstrates 18 dB peak clearance and 25 dB CMRR. Simulations evaluate its potential for squeezed light detection.

P11 • Poster Blitz 1.1 (Room F1)
P12 • Poster Blitz 1.2 (Room E1.1)
Continued

P12.23
Noise Characterization of an Integrated Variable Optical Attenuator at the Single Photon Level, Julian Konig[1], Job Perey[1], Xaveer Leijtens[1]; [1]*Technische Universiteit Eindhoven, Netherlands.* We demonstrate an on-chip variable optical attenuator for the weak-coherent-state regime. Noise at the single-photon level follows Bernoulli scaling and shows only a small difference relative to a bulk reference (< 3.2% vs < 2.75%).

P12.24
Hybrid Quantum Neural Networks for Efficient Optical Mode Decoding, Gokul Manavalan[1], Shlomi Arnon[1]; [1]*Ben-Gurion Univ. of the Negev, Israel.* Hybrid quantum neural networks enable parameter-efficient decoding of distorted optical modes, achieving 8.25× model compression and ~3× higher robustness under noise compared to classical CNNs, supporting resource-constrained optical communication systems.

P12.25
Geometric Phase Transfer From Classical to Quantum Regime for non-Interferometric Measurement and Controlling the Quantum State., Vimlesh Kumar[1], Chahat Kaushik[1,2], M. Ebrahim Zadeh[3,4], C. M. Chandrashekar[5], Goutam K. Samanta[1]; [1]*Physical Research Laboratory, India;* [2]*Physics, Indian Inst. of Technology, Gandhinagar, India;* [3]*Institucio Catalana de Recercai Estudis Avancats (ICREA), Passeig Lluis Companys 23, Spain;* [4]*ICFO-Institut de Ciencies Fotoniques, The Barcelona Inst. of Science and Technology, Spain;* [5]*Indian Inst. of Science, India.* The geometric phase from cyclic polarization evolution is measured using a non-interferometric photon-correlation method, transferring pump phase to entangled photons, enabling Bell parameter control, fidelity, and state transitions, demonstrating tunable geometric-phase-based quantum manipulation.

P12.26
Transfer Matrix Method for Squeezed Light From Kerr Microresonators Driven by Strong Pulses, Youngbin Kim[1], Seongjin Jeon[1], Young-Ik Sohn[1]; [1]*Korea Advanced Inst of Science & Tech, Korea (the Republic of).* We develop a transfer matrix simulator for pulsed squeezing in Kerr micro-resonators. It reveals nonlinear phase modulation induces nontrivial temporal-mode structure and identifies optimal pump detuning for simultaneously enhanced squeezing and near single temporal-mode operation.

Room HG F1

16:55–17:55
M4A • Industry Talk Session 1: Devices

M4A.1 • 16:55
Advances in Electro-Optical Components for Data Communication, Jean Teissier[1]; [1]*Coherent Corp, USA.*

M4A.2 • 17:05
Glass Micro-Components for Fiber Connectivity in Integrated and Quantum Photonics, Rolando Ferrini[1]; [1]*FEMTOPRINT SA, Switzerland.*

M4A.3 • 17:15
High-Repetition-Rate Ultrafast Lasers for Integrated Photonics, Florian Emaury[1]; [1]*Menhir Photonics AG, Switzerland.*

M4A.4 • 7:25
Advancing Photonic Integrated Circuits with Plasmonic Modulators, Milana Lalovic, *Marvell Technologies (formerly Polariton Technologies AG),*

M4A.5 • 17:35
High-Speed InP- and GaAs-Based Photodiodes and Avalanche Photodiode, Maria Haemmerli[1]; [1]*Albis Optoelectronics, Switzerland.*

M4A.6 • 17:45
Si PIC Technology with Local-Backside Accessible Avalanche Photodiodes for Sensing Application, Andreas Mai[1]; [1]*IHP, Germany.*

Room HG E1.1

16:55–17:55
M4B • Industry Talk Session 2: Photonic Platforms

M4B.1 • 16:55
Title to be Announced, Frederic Loizeau[1]; [1]*Lightium AG, Switzerland.*

M4B.2 • 17:05
Silicon Nitride Photonics for the AI Era- From Foundry Platform to Scalable Heterogeneous Integration, Can Yao, *LIGENETEC SA, Switerland.*

M4B.3 • 17:15
Ltoi300: the First Lithium Tantalate PDK for Ultrafast Electro-Optic PICs, Andrei Kiselev[1]; [1]*Luxtelligence SA, Switzerland.*

M4B.4 • 17:25
Europe's First Independent TFLN PIC Foundry, Hernán Furci[1]; [1]*CCRAFT, Switzerland.*

M4B.5 • 17:35
Scalable Semiconductor Laser FM Comb Engines for AI Datacenters and Beyond, Dmitry Kazakov[1], Lucius Miller[2], Alexander Dikopoltsev[2], Robert M. Gray[2], Giacomo Scalari[2], Jerome Faist[2], Bahareh Marzban[1,2]; [1]*Aylight, Switzerland;* [2]*ETH Zurich, Switzerland.*

M4B.6 • 17:45
Breaking the Copper Wall: Embedded Optical Interconnects for Scalable Baseboards and PCIe Links, Nikolaus Flöry[1]; [1]*Vario-Optics AG, Switzerland.*

Room HG E1.2

16:55–17:55
M4C · Industry Talks Session 3: Modelling, Design and Systems

M4C.1 • 16.55
GPU Accelerated Photonic Circuit Simulations, Justus Bohn[1], [1]COMSOL Multiphysics GmbH.

M4C.2 • 17:05
From Noise to signal with the Right Measurement Technique, Heidi Potts[1], [1]*Zurich Instruments.*

M4C.3 • 17:15
How Luceda Empowers the PIC Value Chain, Ana Filipa Carvalho[1], [1]*Luceda Photonics.*

M4C.4 • 17:25
Photonic Layer Security, Dan Sadot[1], [1]*CyberRidge.*

M4C.5 • 17:35
Photonic Integrated Circuits for 4D Imaging, [1]Remus Nicolaescu, [1]*Point Cloud.*

Room HG F30 (Plenary Auditorium)

18:05–18:50
M5A • Plenary Session I

M5A.1 • 18:05 Plenary
Do We Really Understand Quantum Mechanics?, Peter Seitz[1]; [1]*EPFL, Switzerland.* There is no doubt – we really master quantum theory and quantum technologies. But do we really understand them? In a narrative spanning a complete century, key moments and insights in the development of quantum theory are recalled:

How Albert Einstein and Erwin Schrödinger conspired to kill a cat. Why von Neumann chains cleared the issue. What the famous Einstein-Podolsky-Rosen paper really questioned. Why Richard Feynman threw John Clauser out of his office. How John Bell was inspired to come up with the Bell inequality through the socks of his colleague Reinhold Bertlman. Why the 2022 Nobel Prize in Physics was not awarded to Chien-Shiung Wu but rather to Alain Aspect, John Clauser and Anton Zeilinger. And where do we stand now? These insights allow us very easily to understand fundamental properties of ultra-secure quantum communication/key distribution and of quantum computing. But the jury is still out whether we should be content with today's "almost infinite number of nuances" of interpreting quantum mechanics, or whether we should hope for "real" understanding.

Room HG F1

08:30–10:15
T1A • Advanced Photonics
Presider: Kang Tan, QuEra Computing Inc., USA

T1A.1 • 08:30 Invited
Integrated Optomechanics for Quantum Transduction, Samuel Gyger[1,2]; *[1]Stanford Univ., USA; [2]Physics, Saarland Univ., Germany.* Piezo-optomechanical crystals, linking microwave and optical domains, provide a platform for scalable quantum information processing. We will present results in transduction, two-dimensional optomechanical crystal for improved thermal behavior, and our work on repeatable nano-fabrication.

T1A.2 • 09:00
Fast Mid-Infrared Devices on III-v Semiconductor Platform, Luca Lucia[1], Gia Long Ngo[1], Mathilde Urbain[1], Simone Cassandra[1], Javier Huertas-Pedroche[1], Delphine Marris-Morini[1], Konstantinos Pantzas[1], Grégoire Beaudoin[1], Isabelle Sagnes[1], Stefano Barbieri[2], Jean-Michel Manceau[1], Raffaele Colombelli[1], Adel Bousseksou[1]; *[1]Centre de Nanosciences et de Nanotechnologies, France; [2]Institut d'Electronique, Microélectronique et Nanotechnologie, France.* Fast mid-infrared integrated devices are lacking on III-V semiconductor platforms. We report for the first time an electro-absorption modulator based on intersubband transitions in coupled quantum wells integrated on InP platform operating in the 8-11 µm window and modulating up to 10 GHz at 8.5 µm.

T1A.3 • 09:15
Nano-Ridges Assisted Liquid Crystal Phase Shifter for Reconfigurable Photonic Integrated Circuits, Devansh Srivastava[1], Shankar K. Selvaraja[1]; *[1]Indian Inst. of Science, India.* Efficient phase shifter is essentially required for reconfigurable PICs. We have demonstrated an LC loaded phase shifter device comprising nano-ridges. Using *300nm* Si_3N_4 platform, the device showcases very low $V_\pi L$=0.035 Vcm at ~1550nm.

T1A.4 • 09:30
Deterministic Soliton Microcombs Enabled by Copper-Free Photonic Integrated Circuits, Xinru Ji[1], Xurong Li[1], Zheru Qiu[1], Rui Ning Wang[2], Marta Divall[1], Andrey Gelash[1], Grigory Lihachev[1], Tobias Kippenberg[1]; *[1]École Polytechnique Fédérale de Lausanne, Switzerland; [2]Luxtelligence SA, Switzerland.* We trace thermal effects in Si_3N_4 microresonators to Cu impurities diffusing from Si substrates. By developing Cu gettering techniques, we achieve deterministic soliton microcomb generation via slow laser scanning.

Room HG E1.1

08:30–10:15
T1B • Next-Generation Integrated Non-Linear Photonics
Presider: Jean Berney; CSEM Landquart, Switzerland

T1B.1 • 08:30
Hyper-Wideband Cascaded Optical Parametric Amplification in Periodically Poled Lithium Tantalate Waveguides, Nikolai Kuznetsov[1], Zihan Li[1], Tobias Kippenberg[1]; *[1]École Polytechnique Fédérale de Lausanne, Switzerland.* Using cascaded second-order nonlinear processes in periodically poled thin-film lithium tantalate waveguides, we demonstrate continuous-wave parametric gain up to xx dB, covering an extreme bandwidth of more than 800 nm around the optical C-band.

T1B.2 • 08:45
Nanophotonic Microresonators for Flattop Microcombs, Alexa R. Carollo[1], Sarang Yeola[1,2], Yan Jin[1,2], Jizhao Zang[1,2], Scott B. Papp[1,2]; *[1]NIST Boulder, USA; [2]Physics, Univ. of Colorado Boulder, USA.* We explore generation of spectrally flattop soliton microcombs, using photonic-crystal bandgaps in microresonators to control Kerr-mediated modal interactions. By suppressing cross-mode coupling, we achieve uniform comb envelopes, enabling efficient optical computing and data communications.

T1B.3 • 09:00
Voltage-Controllable Second-Order Susceptibility in Silicon-Rich Oxides and Silicon-Rich Nitrides, Laurids Wardenberg[1], André Kühling[1], Jörg Schilling[1]; *[1]MLU Halle-Wittenberg, Germany.* Optical second- and third-order nonlinearities in silicon-rich oxides and silicon-rich nitrides are investigated via electric field-induced second-harmonic generation. Maximizing this effect leads to a field-induced second-order susceptibility of chi(2)=110 pm/V.

T1B.4 • 09:15 Invited
Van der Waals Metasurfaces From Strong Coupling to Topologically Controlled Polaritonic Flatbands, Andreas Tittl[1]; *[1]Ludwig-Maximillians-Universität Munchen, Germany.* Van der Waals metasurfaces merge atomic-layer assembly with photonic design. Exploiting quasi-bound states in the continuum, we demonstrate intrinsic strong light-matter coupling, ultralow-power nonlinearities in vertical heterostructures, and topologically controlled polaritonic flatbands via material anisotropy.

Room HG E1.2

08:30–10:15
T1C • Bio-Photonics and Sensing
Presider: Jana Jagerska; UiT The Arctic Univ. of Norway, Norway

T1C.2 • 08:45
Digital Fingerprint Extraction for an Integrated Photonic Physical Unclonable Function, Hitaisini H. Sahoo[1], R. Bevers[1], D. J. de Ruiter[1], D. Stellinga[1], M. C. Velsink[1], P. W. Pinkse[1]; *[1]Universiteit Twente, Netherlands.* Integrated photonic PUFs exploit fabrication disorder for authentication. We present a Gray-code framework for extracting digital fingerprints from passive ring-based spectral responses, linking spectral complexity to Hamming distance and entropy for robust challenge-response design.

T1C.3 • 09:00 Invited
Bacteria-Virus Interaction Monitoring at the Single-Cell Level by Optical Trapping on Chip, Emmanuel Hadji, Simon Glicenstein[1], Louis Givelet[2]; *[1]CEA Grenoble, Univ. Grenoble Alpes, France; [2]CNRS, CEA/LETI Minatec,, Univ. Grenoble Alpes, France.* We will show how gradient optical force generated by a photonic crystal allows nondestructive trapping of bacteria and virus as well as the monitoring of their interaction's trough bacterium residual nanomouvements within the optical trap.

T1C.4 • 09:30
Thermoelastic Surface Acoustic Waves in Low-Loss Silicon Nitride Integrated Circuits, Zheng Zheng[1], Ahmet Tarik Isik[1], Akshay Keloth[1], Kaixuan Ye[1], Peter van der Slot[1], David Marpaung[1]; *[1]Faculty of Science and Technology, Univ. of Twente, Netherlands.* Thermally-driven surface acoustic waves are incorporated in a low-loss silicon nitride integrated circuits. We demonstrate a multi-pass phase modulation, and an intensity modulation with a ring resonator.

Room HG F1	Room HG E1.1	Room HG E1.2

T1A • Advanced Photonics—Continued

T1A.5 • 09:45 Invited
The Role of Photonic and Electronic Integrated Technologies in Neuromorphic Computing, Bert Offrein[1]; [1]*IBM Research Europe - Zurich, Switzerland.* The artificial intelligence (AI) explosion demands new hardware solutions for enhancing the performance and power-efficiency of computing systems. Optical and electrical communication and computing approaches will be presented and discussed.

T1B • Next-Generation Integrated Non-Linear Photonics—Continued

T1B.5 • 09:45
Thin Film Lithium Niobate Racetrack Resonator With a Tunable Coupler Enabling Enhanced Broadband Second Harmonic Generation, Olivia Hefti[1,2], Jean-Etienne Tremblay[3], Andrea Volpini[1], Jannis Holzer[1], Alberto Della Torre[1], Homa Zarebidaki[1], Charles Caër[1], Hamed Sattari[1,4], Camille-Sophie Brès[2], Davide Grassani[1]; [1]*Centre Suisse d'Electronique et de Micro, Switzerland;* [2]*Photonic Systems Laboratory, École Polytechnique Fédérale de Lausanne, Switzerland;* [3]*Enlightra, Switzerland;* [4]*CCRAFT Thin-Film Lithium Niobate Photonic Chip Foundry, Switzerland.* Second harmonic generation in thin film periodically poled lithium niobate (PPLN) is constrained by an efficiency–bandwidth trade-off. We demonstrate a tunable, singly resonant racetrack resonator achieving 35x efficiency enhancement, compared to an identical single-pass PPLN, over ~7 nm bandwidth.

T1B.6 • 10:00
Switchable Dominant Nonlinearity in Coupled Nonlinear Silicon Micro-Ring Resonators, Ruqi Shi[1,2], Thomas Van Vaerenbergh[3], Peter Bienstman[1,2]; [1]*Gent Univ., Belgium;* [2]*imec, Belgium;* [3]*HPE, Belgium.* We theoretically demonstrate spontaneous symmetry breaking in coupled silicon micro-rings, where flipping the inter-ring coupling sign enables changing the dominant nonlinearity between thermally-driven (μs-scale) or free-carrier-driven (ns-scale). When both coexist, self-pulsing emerges.

T1C • Bio-Photonics and Sensing—Continued

T1C.5 • 09:45
Adsorbed Water as a Critical Loss Mechanism in Mid-IR Photonics, Antonia Torres-Cubillo[1,2], Martin Feiler[1,3], Roman Zakoldaev[1], Jehona Salaj[1], Noémie Mestre[1], Sebastián Alberti[1], Henock D. Yallew[1], Jana Jagerska[1]; [1]*UiT The Arctic Univ. of Norway, Norway;* [2]*Univ. of Málaga, Spain;* [3]*Slovak Univ. of Technology in Bratislava, Slovakia.* Humidity-induced loss in different air-clad MIR waveguide designs is quantified experimentally and reproduced in simulations, revealing excess attenuation >10 dB/cm at 3.27 μm. Its dependence on waveguide geometry, material platform, and operating wavelength is analysed.

T1C.6 • 10:00
On-Chip UV-C Raman Spectroscopy of Water-Cladded Silica Waveguides via Gratings and Fourier Imaging, Chenming SU[1,2], Roel Baets[1,2], Nicolas Le Thomas[1,2]; [1]*Ghent Univ. - imec, Belgium;* [2]*Center for Nano-and Bioohotonics, Belgium.* Ultraviolet on-chip Raman sensing is demonstrated using water-cladded silica waveguides at 266 nm. Using grating out-couplers and Fourier imaging, we show that the silica Raman signal originating from the waveguide dominates over the water autofluorescence.

Room HG F1

10:45–12:30
T2A • Detectors
Presider: Jean Teissier; Coherent Corp, USA

T2A.2 • 11:15
A 45-GHz Waveguide-Coupled Ge-Si Avalanche Photodetector for 2-µm Waveband, Linyan LYU[1], Zelu Wang[1], Hon Ki Tsang[1]; [1]*Chinese Univ. of Hong Kong, Hong Kong.* We demonstrate a waveguide-coupled Ge-Si avalanche photodetector for the 2-µm waveband. Photon-assisted tunneling and a distributed Bragg reflector enhance absorption, achieving 1.55A/W responsivity and a maximum bandwidth of 45 GHz.

T2A.3 • 11:30
Tailored Transimpedance Amplifier for Optical Amplification-Free 360 Gb/s Plasmonic Direct-Detection Link, Loic Cherix[1], Samuel Hess[1], Boris Vukovic[1], Benedikt Baeuerle[2], Daniel Rieben[1], David Moor[1], Tobias Blatter[1], Laurenz Kulmer[1], Mohammed Eleraky[1], Stefan M. Koepfli[1], Juerg Leuthold[1]; [1]*ETH Zurich, Switzerland;* [2]*Polariton Technologies AG, Switzerland.* An EDFA-free IM/DD link using a custom, 153 GHz bandwidth TIA with 50 dBΩ transimpedance gain is demonstrated. The TIA improves the SNR by >10dB and enables 180 GBd PAM-4 with optical power below -2dBm.

T2A.4 • 11:45
Low Dark Current, 80 GHz Ge/Si Avalanche Photodiode With 1.3 a/W C-Band Responsivity, Amir K. Shaheen[2,1], Conor Coughlan[2], Hakim Kobbi[2], Roger Loo[2], Ozan Aktas[2], Filippo Ferraro[2], Dries Van Thourhout[1], Joris Van Campenhout[2]; [1]*UGent, IMEC, Belgium;* [2]*imec, Belgium.* We present a waveguide Ge/Si avalanche photodiode achieving 80 GHz and 60 GHz bandwidths at 1.3 A/W and 2.0 A/W C-band responsivities, operating under -7 V with a low sub-50 nA dark current.

Room HG E1.1

10:45–12:30
T2B • Nonlinear Optics
Presider: Victor Torres Company; Chalmers Tekniska Högskola, Sweden

T2B.1 • 10:45
Integrated Achromatic High-Power Second-Harmonic Green Light Generation, Gang Wang[1], Ji Zhou[1], Marco Clementi[2], Paula Nuño Ruano[1], Camille-Sophie Brès[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Università di Pavia, Italy.* We achieve the highest-power (11.6 mW) deterministically tunable second-harmonic green light source on a silicon nitride chip, leveraging decoupled realization of doubly resonant conditions and increased $\chi^{(2)}$ grating distribution.

T2B.2 • 11:00
Second Harmonic Microcomb Transfer in Dispersion-Engineered Concentric Ring Resonators, Jibaek Song[1], Hyejin Yoon[2], Seungyup Baek[1], Sangsik Kim[1,2]; [1]*School of Electrical Engineering, Korea Advanced Inst. of Science and Technology, Korea (the Republic of);* [2]*Graduate School of Quantum Science and Technology, Korea Advanced Inst. of Science and Technology, Korea (the Republic of).* We demonstrate second-harmonic microcomb transfer in a dispersion-engineered silicon nitride concentric ring resonator, enabling frequency conversion from 1060 nm to the green light regime with a phase-matching bandwidth exceeding 25 THz.

T2B.3 • 11:15 Invited
Broadband Frequency Conversion in SiN Microring Through Multimode Nonlinear Coupling, Camille Bres[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland.* We reveal broadband frequency conversion in SiN microrings enabled by multimode coupling between dynamically induced $\chi^{(2)}$ and intrinsic $\chi^{(3)}$ nonlinearities. All-optical poling unlocks flexible cascaded processes and coherent light generation from UV to mid IR in a single device.

T2B.4 • 11:45
Telecom-Band Soliton Crystal Generation in Silicon Micro-Ring Resonators, Yue Qin[1], Keyi Zhong[1], Yaojing Zhang[2], Hon Ki Tsang[1]; [1]*Department of Electronics Engineering, the Chinese Univ. of Hong Kong], Hong Kong;* [2]*School of Science and Engineering, The Chinese Univ. of Hong Kong (Shenzhen), China.* Telecom-band solitons in silicon have long been hindered by two-photon absorption and free-carrier absorption. Here, we report the first observation of soliton crystals in a dispersion-engineered silicon microring resonator with optimized p–i–n design.

Room HG E1.2

10:45–12:30
T2C • Memristive Photonics and Neuromorphic Photonics
Presider: Alexandros Emboras; ETH Zurich, Switzerland

T2C.1 • 10:45
Filamentary Memristors for Potential Applications in Optoelectronic Neuromorphic Networks, Markus Fischer[1]; [1]*ETH Zurich, Switzerland.* Filamentary Ag memristors with a chemically tuneable non-linear response are proposed as platforms for high-density, multi-modal optoelectronic neuromorphic networks. Potential optical gating strategies are discussed.

T2C.2 • 11:00
Integrated Photonic Computing for Electroencephalography Signal Forecasting, Can Dimici[1], Ujal Rzayev[1], Zeynep I. Yanmaz[1], Bahrem S. Danis[1], Arda T. Vit[2], Aycan D. Vit[3], Enes Akcakoca[1], Demet B. Desdemir[1], Gulzade Polat[1], Emir S. Magden[1,4]; [1]*Koç Universitesi, Turkey;* [2]*Physics, Yeditepe Univ., Turkey;* [3]*Photonics Research Group, INTEC, Ghent Univ.-imec, Belgium;* [4]*Koc Univ., KUIS AI, Turkey.* We present the first photonic EEG forecasting system using Mach–Zehnder interferometer meshes on silicon-on-insulator. Integrating wavelength-multiplexed feature expansion with optoelectronic feedback, we achieve five-fold error reduction over digital baselines and an R^2 of 0.8979.

T2C.3 • 11:15
Asynchronous Pump-Probe Spike Dynamics in an on-Chip Gain-Doped Waveguide for Neuromorphic Photonics, Robert Otupiri[1], Carlos E. Osornio-Martinez[2,3], Sonia M. Garcia Blanco[2,3], Rapalta Stabile[1]; [1]*Technische Universiteit Eindhoven, Netherlands;* [2]*Univ. of Twente, Netherlands;* [3]*ALUVIA Photonics, Netherlands.* We characterise the pump-probe dynamics of a gain-doped waveguide synapse as an all-optical spiking unit for scalable photonic neuromorphic networks. The device exhibits intrinsic gain dynamics and a 13ms short-term memory window, highlighting its potential for brain-inspired computing on chip.

T2C.4 • 11:30
Photonic Quantized Neural Network With Integrated Lithium Niobate Photonics, Fengkai Han[1,2], Xuankun Li[1,2], Xiaoyun Xu[1,2], Xianmin Jin[1,2]; [1]*Shanghai Jiao Tong Univ., China;* [2]*Hefei National Laboratory, China.* We demonstrate a photonic quantized neural network using a high-speed lithium niobate on insulator electro-optic engine. It achieves 97% accuracy in MNIST dataset classification and 96% model compression under 100 Gbaud modulation speed.

T2C.5 • 11:45 Invited
Electrochemical Ohmic Memristors, Ilia Valov[1]; [1]*Forschungszentrum Jülich GmbH, Germany.* In this presentation, a new resistance change mechanism (FCM) in oxide memristors will be shown, allowing for significant improvement of the device characteristics and stability. Different ways to control and tune memristive behaviour will be discussed as well as new aspects on materials design and its influence on the physicochemical processes and resulting functionalities of ReRAM devices. The magnitude of the applied voltage, materials and thicknesses of the layers appear of special importance and as well the combination combination of thicknesses of all involved layers. The selection of different materials is changing the electrochemical nanoionics processes and as well the performance of the memristors. For reliable operation conditions and performance of the device stack should be considered as a whole, and materials used in the stack and their thicknesses should be coordinated and harmonised.

T2A • Detectors—Continued

T2A.5 • 12:00
Cryogenic RF Characterization of GaInAsSb/InP Uni-Traveling Carrier Photodiodes (UTC-PDs) With New One-Port Calibration Technique, Amirmohammad Miran Zadeh[1], Dominik Bisang[1], Fran Kostelac[1], Olivier Ostinelli[1], Juerg Leuthold[1], Colombo Bolognesi[1]; [1]*D-Itet, Eidgenössische Technische Hochschule Zür, Switzerland.* We present cryogenic RF characterization of a GaInAsSb/InP UTC-PD down to 4~K using a new one-port Short-Open-Load (SOL) RF calibration. The precise S_{21} and S_{22} measurements demonstrate temperature-stable frequency responses exceeding 40~GHz.

T2A.6 • 12:15
20-Gb/s Dual-Polarization Coherent PIC Receiver Using LO-SOP Tuning, Natalia Herguedas[1], David Izquierdo[1], Pascual Sevillano[1], Ramón Cajal-Pérez[1], Ignacio Garcés[1]; [1]*Instituto de Investigación en Ingeniería de Aragón (I3A), Universidad de Zaragoza, Spain.* We demonstrate a 20-Gb/s dual-polarization coherent InP PIC receiver for PONs. LO-SOP tuning compensates polarization-dependent losses and imperfect PBS separation, reducing EVM/BER variability across SOPs and enabling fabrication-tolerant operation without additional hardware tuning or DSP.

T2B • Nonlinear Optics—Continued

T2B.5 • 12:00
Reconfigurable Multimode Nonlinear Conversion in Silicon Nitride Microring Resonators, Samantha Sbarra[1], Ji Zhou[1], Junqiu Liu[1,3], Boris Zabelich[1], Marco Clementi[1,2], Christian Lafforgue[1], Ozan Yakar[1], Tobias Kippenberg[1], Camille-Sophie Brès[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Dipartimento di Fisica "A. Volta", Università di Pavia, Italy;* [3]*Hefei National Laboratory, Univ. of Science and Technology of China, China.* SiN microresonators enable UV to near-IR wavelength generation leveraging photo-induced second-order nonlinearity and multimode nonlinear coupling. Reconfigurable phase matching for second-harmonic generation allows tunable optical parametric oscillation, offering versatile on-chip coherent sources.

T2B.6 • 12:15
Near-2 µm Backward-Wave Second-Harmonic Generation in Strongly Confined X-Cut Thin-Film Lithium Niobate, Yesim Koyaz[1], Ozan Yakar[1], Furkan Ayhan[2], Victor Brasch[3], Guillermo Villanueva[2], Camille-Sophie Brès[1]; [1]*Photonic Systems Laboratory (PHOSL), École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Advanced Nanoelectromechanical Systems Laboratory (ANEMS), École Polytechnique Fédérale de Lausanne, Switzerland;* [3]*Q.ANT GmbH, Germany.* We demonstrate fabrication-tolerant backward-wave second-harmonic generation in 2 µm band in periodically poled x-cut thin-film lithium niobate, starting from 800 nm thick films for strong optical confinement and achieving poling periods as small as 1.425 µm.

T2C • Memristive Photonics and Neuromorphic Photonics

T2C.6 • 12:15
Integrated Mach-Zehnder Modulators as Nonlinear Attention Functions in Transformers, Luis Mickeler[1], Kai Lion[1], Alfonso Nardi[2], Jost Kellner[1], Pierre Didier[1], Bhavin Shastri[3], Niao He[1], Rachel Grange[1]; [1]*ETH Zurich, Switzerland;* [2]*Polytechnico di Milano, Italy;* [3]*Queen's Univ., Canada.* Attention mechanisms in Transformers underpin modern vision and language models but are constrained by latency in digital nonlinear units. We simulate and experimentally evaluate integrated Mach–Zehnder modulator configurations to accelerate nonlinear optical computations.

Room HG F1

13:30–15:20
Tu3A • Workshop I: Electronic-Photonic Integration: Which Technology Will Lead the Way?
Presider: Marco Sampietro, Politecnico de Milano, Italy

Tu3A.1 • 13:30
Si-Ge Heterostructure Bipolar Transistors in Silicon Photonics Platform, Pawan K. Pandit[1], Kumar Piyush[1], Ram Mohan Rao Boyabati[1], Yusman Bin Mohd. Yusof[2], Hor Chee Hoong[2], Ng Chew Yan[2], Bijoy Krishna Das[1]; [1]*Indian Inst. of Technology Madras, India;* [2]*Silterra, Malaysia, Malaysia.* A Si-Ge heterostructure transistor is demonstrated in a silicon photonics platform. Using such transistors, an integrated current-mirror circuit is implemented to drive a thermo-optic phase shifter integrated in the MZI of a programmable photonic circuit.

Tu3A.2 • 13:45
Title to be Announced, Lars Zimermann[1]; [1]*IHP, Germany.* Abstract not available.

Tu3A.3 • 14:00
Zero-Change Electronics in Conventional Silicon Photonics, Francesco Zanetto[1]; [1]*Politecnico di Milano, Italy.* The integration of CMOS electronic circuits into conventional silicon photonics technologies is presented, showing how this approach can seamlessly add useful functionalities to technological platforms that normally lack this possibility, at zero added cost.

Room HG E1.1

13:30–15:20
Tu3B • Workshop II: Which Quantum Technology - Photonic or RF - Has the Potential to Build a Quantum Computer?
Presider: To be Announced

Tu3B.1 • 13:30
Photonic Integrated Circuits for Neutral-Atom Quantum Computing, Kang Tan[1]; Quantum computing promises breakthroughs across AI, drug discovery, and beyond. We present how QuEra is leveraging photonic integrated circuits to build scalable, high-performance quantum systems, inviting the photonics community to help shape this transformation

Tu3B.2 • 13:45
Pervoskite Quantum Dots as Quantum Light Sources, Gabriele Raino[1]; [1]*ETH Zurich, Switzerland.* Besides conventional optoelectronic devices, perovskite quantum dots (QDs) are being explored as non-classical light sources (i.e., single-photon emitters) that may play a pivotal role in future quantum technologies, such as quantum imaging and quantum

Tu3B.3 • 14:00
Superconducting Qubit Interconnects, Johannes Fink[1]; [1]*IST Austria, Austria.* Microwave photonics bridges GHz circuits and low-loss optics. We bring this field into the quantum domain using our low-noise electro-optic platform, enabling room-temperature, fiber-based interconnects for modular, networked, and possibly heterogeneous quantum processors.

Tu3B.4 • 14:20
Monolithic GKP Qubit Sources: a Path Toward Scalable Photonic Quantum Computing, Matteo Menotti[1]; [1]*Xanadu, Canada.* Xanadu is advancing utility-scale quantum computing (USQC) using continuous-variable Gottesman-Kitaev-Preskill (GKP) photonic states. Recent milestones include synthesizing GKP states with an ultra-low-loss integrated silicon nitride photonic circuit and high-efficiency photon-number-resolving detectors, validating a critical and scalable quantum resource.

15:30–17:00
P21 • Poster Blitz 2.1 (Room F1)
P22 • Poster Blitz 2.2 (Room E1.1)

P2 • Poster Session (Gallery in Front of Plenary Auditorium 16:00 – 17:00)

The poster presenters below will give a one-minute presentation during either Poster Blitz 2.1 or Poster Blitz 2.2. The presenters will then present a poster during the poster session immediately following the Blitz sessions.

P21.1
Towards Robust Multiparameter Biosensing: Stability in Coherent Dual-Polarization MZI Sensors, Ana Sánchez-Ramírez[1,2], J. Manuel Luque-González[1], Laura Pérez-Sánchez[1,3], Miguel Barrio-Segura[1], Érika López-Arroyo[1,2], Rafael Godoy-Rubio[1], Claudio J. Oton[4], J.Gonzalo Wangüemert-Pérez[1,2], Iñigo Molina-Fernández[1,2]; *[1]Photonics & RF Research Lab, Telecommunication Research Inst. (TELMA), Universidad de Málaga, Spain; [2]IBIMA plataforma BIONAND, Spain; [3]Bioherent S.L., Spain; [4]Inst. of Mechanical Intelligence, Scuola Superiore Sant'Anna, Italy.* We present a dual-polarization MZI photonic biosensor with coherent readout and experimentally demonstrate robust bulk-surface discrimination. The results show that the calibrated system is sufficiently well conditioned to ensure stable inversion under realistic sensing conditions.

P21.2
Near IR SWIFTS Lippmann Spectrometer in Lithium Niobate: Novel Results & on-Sky Observation, Noémie Mestre[2,1], Guillermo Martin[1], Roland Salut[3], Nadege Courjal[3], Gregory Grosa[4], Mohammed Irar[4], Alain Morand[4]; *[1]IPAG CNRS, France; [2]UiT The Arctic Univ. of Norway, Norway; [3]FEMTO-ST, France; [4]CROMA, France.* We report a compact (L = 4cm) SWIR lithium niobate Fourier transform spectrometer with a high resolution of R = 4000 and a spectral bandwidth enhanced by electro-optical modulation, devoted to gas monitoring and astronomical applications

P21.3
Photonic Chip-Based Optical Microscopy on a Borosilicate Platform, Jean-Claude Tinguely[1], Sirawit Boonsit[2], Glenn Churchill[2], Hong Mao[1], James Gates[2], Senthil Ganapathy[2], Balpreet S. Ahluwalia[1]; *[1]UiT The Arctic Univ. of Norway, Norway; [2]Univ. of Southampton, UK.* Optical waveguides on 170 µm borosilicate substrates fulfill bioimaging preferences for transparency and aberration correction. This work presents them as a viable alternative to other substrates discussing a high-throughput compatible fabrication and fluorescence imaging results

P21.4
Integrated Optical MZI-Based Evanescent Field Sensor With Fluidic Integration in Glass, Marco Roth[1], David Bischof[1], Markus Michler[1]; *[1]Inst. for Microtechnology and Photonics IMP, OST - Eastern Switzerland Univ. of Applied Sciences, Switzerland.* This work presents a fs-laser-written Mach-Zehnder interferometer evanescent field sensor in glass with integrated fluidic channels, enabling refractive index sensing of aqueous solutions with resolution Δn = 0.073 and good agreement with simulations.

P21.5
Evidence-Driven Design of a Silicon-Photonic Transceiver for an Interferometric Fiber-Optic Gyroscope, Teresa Natale[1], Katta Pradeep Nagarjun[2], Francesco Dell'Olio[1], Wim Bogaerts[2]; *[1]Politecnico di Bari - DEI, Italy; [2]UGent, Belgium.* We report on an experiment-driven design of a silicon-photonic gyroscope transceiver, deriving integration constraints from a characterized prototype. Measurements yield 0.048 °/h bias instability and 0.021 °/√h angle random walk, guiding on-chip implementation.

P21.6
Record-High Sensitivity on-Chip Refractive Index Sensor Using Twin-Plasmonic-Arm Silicon Photonic MZIs, Panagiotis Zdoupas[1], Lamprini Damakoudi[5], Stelios Simos[1], Dimosthenis Spasopoulos[1], Evangelia Chatzianagnostou[1], Dimitris Bellas[1,4], Jose Carreira[2], Gabriel Bunke[2], Michael Gieselmann[2], Juan Arocas[3], Jean-Claude Weeber[3], Eleftherios Lidorikis[4], Nikos Pleros[1], Konstantinos Vyrsokinos[5]; *[1]Deparment of Informatics, Center for Interdisciplinary Research and Innovation, Greece; [2]LIGENTEC SA., Swaziland; [3]CNRS, Universitie Bourgogne Europe, France; [4]Univ. of Ioannina, Greece; [5]Department of Physics, Center for Interdisciplinary Research And Innovation, Greece.* We present experimental results for an optimized noise-tolerant twin-plasmonic-arm MZI refractive index sensor on the Si3N4 platform, achieving a record-high sensitivity of 20,605 nm/RIU & limit of detection equal to 1.94 * 10^{-6} RIU^{-1}.

P21.7
High-Sensitivity Bimodal Plasmo-Photonic Biosensor for C-Reactive Protein Detection, Lamprini Damakoudi[1,2], Panagiotis Zdoupas[3,2], Stelios Simos[3,2], Dimosthenis Spasopoulos[3,2], Evangelia Chatzianagnostou[3,2], Dimitris Bellas[2,7], Juliana F. Giarola[4], M.-Carmen Estevez[4], Laura M. Lechuga[4], Jose Carreira[5], Gabriel Bunke[5], Michael Geiselmann[5], Juan Arocas[6], Jean-Claude Weeber[6], Santiago Cocana[8], Aitor Tejedor[8], Ikerne Etxebarria[8], Eleftherios Lidorikis[7], Nikos Pleros[3,2], Konstantinos Vyrsokinos[1,2]; *[1]Department of Physics - Aristoteleio Panepistimio Thessalonikis, Greece; [2]Center for Interdisciplinary Research and Innovation (CIRI), Greece; [3]Department of Informatics - Aristoteleio Panepistimio Thessalonikis, Greece; [4]Nanobiosensors and Bioanalytical Applications Group, Catalan Inst. of Nanoscience and Nanotechnology (ICN2), Spain; [5]LIGENTEC SA, Switzerland; [6]Université Bourgogne Europe, CNRS, Laboratoire Interdisciplinaire Carnot de Bourgogne ICB UMR, France; [7]Department of Materials Science and Engineering, Greece; [8]Microliquid, Spain.* We experimentally demonstrate a Si_3N_4-based single-arm plasmo-photonic bimodal interferometric sensor achieving a high sensitivity of 23478 nm/RIU and enabling CRP detection with a LoD of 1.2 ng mL^{-1}, highlighting its potential for sensitive biosensing applications.

P21.8
Non-Suspended Silicon Photonic Crystal Optical Cavity as a Mass Sensor for Nanoparticles Detection, Alberto Grau Martínez[1], Laura Mercade[1], Estefanía Gómez[1], María Isabel Gómez-Gómez[1], Elena Pinilla-Cienfuegos[1], Alejandro Martínez[1], Carlos Ramos[2]; *[1]Nanophotonics Technology Center (NTC), Universitat Politècnica de València (UPV), Spain; [2]Centre for Nanoscience and Nanotechnology (C2N), CNRS, Djibouti.* A novel platform for optical sensing is proposed, consisting of a non suspended Silicon Photonic Crystal Cavity. A method for accurately and non-intrusively deposit gold nanoparticles allows us to drop them on the cavities with a high success rate and study its optical response.

P21.9
Chip-Scale Brain Optical Sensing With Hybrid Quantum Networks, Gokul Manavalan[1], Shlomi Arnon[1]; *[1]Ben-Gurion Univ. of the Negev, Israel.* A chip-scale diffuse optical sensing platform combined with hybrid quantum learning distinguishes normal, edematous, and inflamed brain tissue from simulated measurements, achieving 93.3% accuracy for integrated bio-photonic intracranial monitoring.

P21.10
A Single-Beam Circularly Polarized Light SERF Atomic Magnetometer for Weak Three-Dimensional Magnetic Field Measurement Using ^{87}Rb Atoms, Guangshu Yu[2], Wen Luo[1], LIn Li[1], Cong Yi[1], Yuxuan An[1], Ziqi Yuan[1], Yueyang Zhai[2], Junjian Tang[1]; *[1]Beihang Univ., China; [2]Beihang Univ., China.* A miniaturized single-beam triaxial SERF atomic magnetometer (19 mm×18 mm×14 mm) for biomagnetic imaging respectively achieves the sensitivities of 15.0, 14.6 and 16.5 fT/$Hz^{1/2}$ on *x*, *y*, *z* axes in the 3~100 Hz.

P21.11
PICs for Wavefront Shaping in Deep Tissue Microscopy & Endoscopy, Filip Milojković[1], Frédéric Peyskens[1], Roelof Jansen[1], Xavier Rottenberg[1], Pol Van Dorpe[1,2], Niels Verellen[1]; *[1]imec, Belgium; [2]Dept. of Physics and Astronomy, KU Leuven, Belgium.* Photonic integrated circuits (PICs) are a promising tool for wavefront control in microscopy and endoscopy. We present optical phased arrays, fabricated on CMOS-compatible silicon photonics platforms, for scattering compensation microscopy and multimode-fiber endoscopy.

P21.12
Withdrawn.

P21.13
Nanoscale Mechanical Structuring of Oxide-Modified PVDF Nanocomposite Films for Enhanced Electroactive Phase and Flexible Spectroscopic Sensing, Aeshah Alotaibi[2,1]; *[1]Univ. College Dublin, Ireland; [2]Department of Physics, Department of Physics, College of Science and Humanities, Shaqra Univ., Shaqra, Kingdom of Saudi Arabia, Saudi Arabia.* Nanoscale mechanical structuring enhances the electroactive β-phase in oxide-modified PVDF films. Raman and fluorescence confirm improved and uniform spectroscopic response, enabling flexible optoelectronic and SERS-based sensing integration.

P21.14
Large-Angle and Low-Power Consumption Beam Steering by Broadband Resonance-Enhanced Optical Phased Array, Liang Zhang[1], Yue Qin[1], Gaolei Hu[1], Hongnan Xu[1], Jiapeng Luan[1], Shuqi Xiao[1], Hon Ki Tsang[1]; *[1]Chinese Univ. of Hong Kong, Hong Kong.* We propose broadband over-coupled microring resonators as resonance enhanced phase shifter, achieving 10 times smaller power consumption than non-resonance enhance phase shifters of only 3 mW/π, while enabling large-angle beam steering of 15° in vertical direction.

P21.15
Dynamic Spectral Shaping of Extendons via Thouless Driving, Francesco Fortuna[1], Diego Piciocchi[1], Davide Pinto[1], Markus Bestler[2], Oded Zilberberg[2], Alexander Dikopoltsev[1]; *[1]ETHZ, Switzerland; [2]Univ. of Konstanz, Germany.* Dynamic spectral shaping of frequency combs demands robust, high-speed reconfiguration. We apply a Thouless driving scheme to benchmark the deterministic switching speeds of extended states in fast-gain lasers, identifying the non-adiabatic breakdown threshold.

P21.16
Accessing a Chiral Exceptional Point via Phase-Controlled External Backscattering in a Silicon Resonator, Jongeon Lim[1], Seungyong Lee[1], Hwaseob Lee[2], Sangsik Kim[1]; *[1]School of Electrical Engineering, Korea Advanced Inst. of Science and Technology, Korea (the Republic of); [2]Republic of Korea Navy, Korea (the Republic of).* We dynamically access a chiral exceptional point in a silicon racetrack resonator via phase-controlled external backscattering. This leads to unidirectional backscattering cancellation, resulting in resonance coalescence with suppressed reflection and symmetric transmission.

P21.17
Neural Network–Enabled Optical Metrology for Retrieving SOI Device Geometries, Amir Hossein Masominia[1], Manaswinee Gupta[2], Dan-Xia Xu[2], Yuri Grinberg[3], Muhammad Al-Digeil[3], Martin Vachon[2], Daniele Melati[1]; *[1]Centre National Recherche Scientifique, France; [2]Quantum and Nanotechnologies Research Centre, National Research Council Canada, Canada; [3]Digital Technologies Research Centre, National Research Council Canada, Canada.* A differentiable neural-network framework is proposed for optical metrology of SOI grating couplers. Forward spectral prediction and gradient based inverse parameter retrieval enable reconstruction of multi-segment subwavelength geometries, with direct extensibility to inverse design applications.

15:30–17:00
P21 • Poster Blitz 2.1 (Room F1)
P22 • Poster Blitz 2.2 (Room E1.1)—Continued

P21.18
A Novel Prism-Pair Scheme for Dispersion Compensation of Single Mode Fiber at 1550 nm, Yazan Lampert[1], Xuhui Cao[1], Thea Boussion[1], Ileana-Cristina Benea-Chelmus[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland.* We demonstrate a novel prism pair configuration designed to achieve tunable positive chirp at 1550 nm wavelength. We compensate for the dispersion of single mode fiber and tune the chirp by moving a single prism.

P21.19
Design and Characterization of Tunable Cavity Resonator Integrated Guided-Mode Filters in GaAs/AlGaAs, Tanneguy Blandin[1], Mathieu Arribat[1], Federico Rivera-Couturier[1], Antoine Monmayrant[1], Aurélie Lescestre[1], Jean-Yves Duboz[2], Olivier Gauthier-Lafaye[1]; [1]*LAAS CNRS, France;* [2]*Métasurfaces, CRHEA, France.* We measure the reflectivity of a Cavity Resonator Integrated Guided-Mode Resonance Filter, fabricated on a multimodal waveguide. A good agreement with theory is demonstrated as well as the tunability of such structures with temperature.

P21.20
Dielectric Metasurfaces as Ultraviolet Polarizers for Intersatellite Quantum Communications, Soheila Kharratian[1], Yue Wang[1]; [1]*Univ. of York, UK.* We demonstrate a metasurface that can discriminate the polarization states based on distinct guided mode resonances. We show a 1D metasurface composed of SiN gratings on a fused silica substrate, with a period of 160 nm, grating height of 80 nm, and fill factor of 70% for an optimized performance.

P21.21
On-Chip Ultrabroadband Laser Emission From 900 GHz to 2.1 THz, Alessandro Biffani[1], Digiorgio Valerio[1], Marco Raffa[1], Mattias Beck[1], Jerome Faist[1], Giacomo Scalari[1]; [1]*ETH Zurich, Switzerland.* We demonstrate a GaAs/$Al_{0.25}Ga_{0.75}As$ QC-Laser architecture employing optically cascaded intersubband transitions for sub-2 THz ultrabroadband emission. Under pulsed operation, RF injection into double-metal ridge devices yields comb-like emission with spectral span exceeding one octave.

P21.22
Withdrawn.

P21.23
Active Rational Harmonic Locking of THz Quantum Walk Comb Lasers, Digiorgio Valerio[2], Marco Raffa[2], Robert M. Gray[2], Paolo Micheletti[2], Alexander Dikopoltsev[1], Mattias Beck[2], Jerome Faist[2], Giacomo Scalari[2]; [1]*ETH Zürich, Switzerland;* [2]*Insitute for Quantum Electronics, ETH Zürich, Switzerland.* We demonstrate advanced control of a monolithic THz frequency comb platform based on ring QCLs under external microwave modulation, enabling coherent quantum walk comb states, spectral broadening via subharmonic injection, and flexible spectral shaping through two-tone RF schemes.

P21.24
A Monolithically Integrated RF Termination for High-Speed Electro-Optic Modulators in TFLN Technology, Nathalie Künzle[1], Luca Berchialla[1], Sharareh Jalalvandi[1], Rimjhim Chaudhary[1], Tommaso Marcato[1], Amir Ghadimi[1], Jens Hofrichter[1]; [1]*Lightium AG, Switzerland.* We demonstrate integrated RF terminations using a CMOS-compatible high-resistive metal. The design balances RF reflections and power handling, achieving over 150 mW power handling and reflection coefficient S11 below –15 dB up to 110 GHz.

P21.25
Non-Interferometric Terahertz Computational Phase Imaging, Pitambar Mukherjee[1], Vivek Kumar[1,2], Frederic Fauquet[1], Kedar Khare[3], Sylvain Gigan[2], Patrick Mounaix[1]; [1]*Université de Bordeaux, France;* [2]*Laboratoire Kastler Brossel, France;* [3]*Indian Inst. of Technology Delhi, India.* In this work, we introduce an efficient computational phase retrieval scheme that addresses the slow convergence and stagnation issues of conventional multi-plane techniques, enabling rapid, accurate phase imaging using a compact and easily implementable optical setup.

P21.26
A Compact Design for on-Chip, Broadband Terahertz Emitters on Thin-Film Lithium Niobate, Saeed Hemayat[1], Shima Rajabali[1,2]; [1]*Quantum and Computer Engineering, Delft Univ. of technology, Netherlands;* [2]*John A. Paulson School of Engineering and Applied Sciences, Harvard Univ., USA.* We present an on-chip pulsed terahertz emitter on thin-film lithium niobate, pumped at 1030 nm, with at least 2× shorter lengths for a given terahertz amplitude, compared to a similar design optimized for 1550 nm.

P21.27
Accelerating Terahertz Hyperspectral Imaging via a Joint Spatio-Spectral Compressed Sensing Framework, Yasmin Boufidjline[1]; [1]*Ecole Militaire Polytechnique, Algeria.* We propose a joint spatio-spectral compressed sensing approach to accelerate terahertz hyperspectral imaging, where only a fraction of measurements is required when applying CS in both domains to reconstruct accurate hyperspectral signals, thus, the acquisition process can be accelerated by 94.8%.

P21.28
Simulations for a 300GHz-Class Heterogeneously Integrated Uni-Travelling Carrier Photodiode, Salim Abdi[1], Kevin Williams[1], Yuqing Jiao[1]; [1]*Technische Universiteit Eindhoven, Netherlands.* We present simulation results for compact (4.39×2μm²) waveguide-coupled and heterogeneously integrated UTC PDs, simultaneously achieving high responsivity (>0.83 A/W) and 300GHz 3dB-bandwidth via tight optical confinement and optimized epitaxy for low transit time and parasitics.

P21.29
Polarization Control of Thz Pulses With Dielectric Metamaterials, Rebeca Tudor[1]; [1]*IMT Bucharest, Romania.* This paper investigates the polarization and phase control of THz pulses with dielectric metamaterials. The subwavelength structures can generate vector pulses with phase singularities for potential applications in high-field THz fields with large bandwidths.

P21.30
Monolithically Integrated Photonic RF Phase Shifter, Gonzalo Soldevilla[1], Pablo L. Querol[1], Pawel Grzes[2,1], José Manuel García-Tijero[1], Ignacio Esquivias[1], Antonio Pérez-Serrano[1]; [1]*Universidad Politécnica de Madrid, Spain;* [2]*Inst. of Optoelectronics, Military Univ. of Technology, Poland.* We report a fully packaged monolithically integrated photonic-based microwave phase shifter in Indium Phosphide technology based on a dual parallel Mach-Zehnder modulator for operating in radar bands X and Ku.

P21.31
Hybrid Integrated TFLN- Si_3N_4 Microwave Photonic Filter for Frequency Down-Conversion Receiving, Yuandong Huo[1], Yilin Wu[1], Sigang Yang[1], Hongwei Chen[1], Minghua Chen[1]; [1]*Tsinghua Univ., China.* We present a hybrid integrated TFLN-Si_3N_4 microwave photonic filter. By employing it in a microwave photonic receiver, we down-convert a 27.5 GHz RF signal to IF signal with 5.5 dB RF gain.

P22.1
Tunable Optical Parametric Oscillation and Visible Light Generation on a 4H-SiC Microring Resonator, Yongsheng Wang[1], Shuangyou Zhang[1], Mingjun Chi[1], Haiyan Ou[1]; [1]*Danmarks Tekniske Universitet, Denmark.* We demonstrate tunable parametric oscillation spanning 1200-2200 nm in a 4H-SiC microring resonator with concurrent visible light generation via cascaded second-order and third-order nonlinear processes

P22.2
Microwave-Rate Octave-Spanning Soliton Kerr Microcomb in a Si_3N_4 Racetrack Resonator, Alisa Davydova[1], Miles H. Anderson[1], Zheru Qiu[1], Tobias Kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland.* We demonstrate a 15 GHz repetition-rate octave-spanning soliton microcomb in a Si3N4 racetrack resonator using picosecond pulse pumping. The spectrum contains 8800 comb lines with a 24.7 THz FWHM bandwidth.

P22.3
Polymer-Engineered Silicon Nitride Slot Waveguides for Enhanced on-Chip Stimulated Brillouin Scattering, Jyoti Bej[1], Deepanshu Yadav[1], Thomas Schneider[1]; [1]*THz-Photonics Group, Institut für Hochfrequenztechnik, Germany.* We report polymer-engineered silicon nitride slot waveguides for enhanced on-chip stimulated Brillouin gain. Numerical simulations predict gains up to 200 $m^{-1}W^{-1}$, demonstrating strong material dependence and the effect of waveguide design.

P22.4
Towards Suspension-Free Brillouin Scattering in Silicon Nitride, Maximilian Pixner[1,2], Dries Van Thourhout[2], Roman Noskov[1]; [1]*Silicon Austria Labs, Austria;* [2]*Photonics Research Group, Ghent Univ., Belgium.* We investigate suspension-free silicon nitride waveguides for Brillouin scattering. Simulations reveal gains exceeding 20,000 m-1 W-1 at 115 MHz. We further show fabrication steps towards realizing the structure with a high-selectivity aluminum oxide mask.

P22.5
Highly Tunable Difference Frequency Mid-Infrared Generation in Integrated Periodically Poled Lithium Niobate on Sapphire, Prakhar Jain[1], Pierre Didier[1], Alessandra Sabatti[1], Jost Kellner[1], Rachel Grange[1]; [1]*ETH Zurich, Switzerland.* We present periodically poled lithium niobate on sapphire waveguides enabling broadly tunable mid infrared generation from 3.02 to 3.92 μm via difference frequency generation, and demonstrate down conversion of a pulsed telecom frequency comb.

P22.6
Erbium Doping in Yttria-Stabilised Zirconia Multilayer Stacks for Heterogeneous Photonic Integration, Ana M. Statie[1], Alicia Ruiz-Caridad[2], Pablo Bedoya[1], Nathaniel Findling[1], Davide Cammilleri[1], Ludovic Largeau[1], Stefano Piratto[1], Alan Durnez[1], Daniele Melati[1], Francois Maillard[1], Guillaume Agnus[1], Philippe Lecoeur[1], Delphine Marris-Morini[1], Carlos Ramos[1], Thomas Maroutian[1], Sylvia Matzen[1], Laurent Vivien[1]; [1]*C2N-CNRS, France;* [2]*IREC, Spain.* On-chip light amplification is essential to compensate losses in complex photonic integrated circuits. We study Er-doped YSZ thin films grown by pulsed laser deposition and characterize them structurally, chemically, and optically. Results confirm high quality for silicon photonics integration.

15:30–17:00
P21 • Poster Blitz 2.1 (Room F1)
P22 • Poster Blitz 2.2 (Room E1.1)—Continued

P22.7

VO_2 Technology Integration OnSi_3N_4/BTO Photonic Platform, Bharathi Rajeswaran[1], Jorge Parra[1,2], Koen Schouteden[3], Jin Won Seo[3], Jean-Pierre Locquet[3], Jean Fompeyrine[4], Pablo Sanchis[1]; *[1]Nanophotonics Technology Center, Universidad Politécnica de Valencia, Valencia, Spain, Spain; [2]Universidad de Valencia, Valencia 46980, Spain, UMDO, Instituto de Ciencia de los Materiales, Spain; [3]Department of Physics and Astronomy, KU LeuveCelestijnenlaan 200D, 3001 Leuven, Belgium, Belgium; [4]Lumiphase AG, Laubisrütistrasse 44, 8712 Stäfa, Switzerland, Switzerland.* We demonstrate VO_2 integration on a Si_3N_4/$BaTiO_3$ photonic platform for micrometer-scale optical amplitude modulation. Experimental results reveal the impact of deposition shadowing on VO_2 phase formation on patterned waveguides, providing key guidelines for process optimization.

P22.8

Scalable Transfer Printing Approach of Magneto-Optic Thin-Film Integration for on-Chip Optical Isolator, Risov Das[1], Pang H. Liu[2], Brendan Roycroft[1], Brian Corbett[1], Bethanie Stadler[2], Samir Ghosh[1]; *[1]Tyndall National Inst., Ireland; [2]Univ. of Minnesota, USA.* An optical isolator is essential to protect lasers from spurious back-reflections. We present a XeF_2-based dry undercut and release approach towards heterogeneous integration of magneto-optic thin-films onto silicon-on-insulator waveguides employing micro-transfer printing technology.

P22.9

Wafer-Level Deposition of ITO Thin Films for Ion Trap and Electro-Optic PIC Applications, Venkata Raveendra Nallagatla[1], Anton Lagosh[1], Marco Deluca[1]; *[1]Silicon Austria Labs GmbH, Austria.* Wafer-scale ITO thin films on 200 mm substrates are deposited via industrial batch-processing sputtering and annealed at 230 °C. The films exhibit <1.7% thickness variation and <0.5 nm roughness on Si, SiN, and fused silica, enabling ion-trap applications and electro-optic modulation in PICs.

P22.10

Fiber-to-Chip Coupling in GaN/SiN Heterogeneous Platform for Visible Light, Tarni Aggarwal[1], Anaël Sedilot[1], Qiyuan Sheng[1], Martijn J. Heck[1], Humeyra Caglayan[1], Yuqing Jiao[1]; *[1]Technische Universiteit Eindhoven, Netherlands.* We propose efficient grating coupler design for proposed GaN on SiN platform for blue wavelength coupling. Two grating designs are optimized; an apodized SiN grating with 3.8 dB loss and 13 nm bandwidth, and a dual level GaN and SiN grating that reaches ~3 dB loss and 15 nm bandwidth.

P22.11

Subwavelength Polarization Beam Splitter in the Silicon Nitride Platform for the 950 nm Wavelength Range, Zindine Mokeddem[1], Martin Vachon[2], Laurent Vivien[1], Delphine Marris-Morini[1], Eric Cassan[1], Carlos A. Alonso Ramos[1], Dan-Xia Xu[1], Jianhao Zhang[2], Yuri Grinberg[2], Pavel Cheben[2], Jens H. Schmid[2], Daniele Melati[1]; *[1]Universite Paris-Saclay, France; [2]National Research Council, Canada.* We demonstrate a compact polarization beam splitter for the silicon nitride platform at 950 nm wavelength using a subwavelength grating directional coupler. The polarization beam splitter is 58-µm long, achieves high extinction ratio (>20 dB) and low insertion loss (<1 dB).

P22.12

Anomalous-Dispersion Fabry-Perot Resonators With Normally Dispersive Silicon Nitride Waveguides, Zeina Saleh[1], Francesco R. Talenti[1], Zindine Mokeddem[1], Delphine Marris-Morini[1], Daniele Melati[1], Eric Cassan[1], Laurent Vivien[1], Carlos A. Alonso Ramos[1]; *[1]C2N-CNRS, France.* We experimentally demonstrate anomalous dispersion in Fabry–Perot resonators based on 400-nm-thick silicon nitride waveguides with intrinsic normal dispersion. Chirped Bragg reflectors enable geometry-independent dispersion engineering, paving the way for solitons and frequency combs.

P22.13

Metaheuristic-Based Optimization of Freeform SiN Waveguides for Temporal Compression of Optical Pulses, Maria Camila Diaz Sanchez[1], Jeremy Saucourt[3], Yijun Yang[1], Ilyes Bekta[2], Victor Turpaud[1], Hamza Dely[1], Etienne Herth[1], David Bouville[1], Carlos Ramos[1], Daniele Melati[1], Delphine Marris-Morini[1], Arnaud Mussot[2], Benjamin Wetzel[3], Laurent Vivien[1], Eric Cassan[1]; *[1]Centre des Nanosciences et des Nanotechnologies, France; [2]Laboratoire PhLAM, France; [3]Laboratoire XLIM, France.* We present the use of metaheuristic algorithms to design of free form waveguides aimed to optimize optical pulse compression. A compression factor of over 50 is obtained with this method.

P22.14

Robust Design of a Low-Loss Vertical Coupler Between Single-Mode Si and SiN Waveguides, Sarad S. Bhakat[1], Anjana James[1], Riddhi Goswami[1], Kumar Piyush[1], Shamsul Hassan[1], Eloi M. Ferrer[2], Hor Chee Hoong[2], Ng Chew Yan[2], Bijoy Krishna Das[1]; *[1]Indian Inst. of Technology Madras, India; [2]Silterra Malaysia, Malaysia.* A compact and efficient coupler between single-mode Si and SiN waveguides is demonstrated with excellent wafer-level fabrication yields. It is further used for the demonstration of heterogeneously integrated 3-D MZI structures operating at λ ~ 1550nm.

P22.15

Design and Demonstration of a Reconfigurable Polarization Splitter-Rotator on Thin-Film Lithium Niobate Platform, Florian Dubois[1], Alberto Della Torre[1], Jacopo Leo[1], Dorian Herle[1], Arno Mettraux[1], Homa Zarebidaki[1], Hamed Sattari[1], Sylvain Nicolay[1]; *[1]Centre Suisse d'Electronique et de Micro, Switzerland.* We report the demonstration of a tunable polarization splitter-rotator (PSR) in a thin-film lithium niobate (TFLN) photonic platform operating in the C-Band based on a 45° PSR exhibiting a polarization extinction ratio of 29.2 dB and an insertion loss below 2.18 dB near 1550 nm.

P22.16

Broadband Second-Harmonic Generation in AlGaAs-on Insulator Waveguides Using Subwavelength Grating Metamaterials, Alejandro Sánchez-Sánchez[1], J. Manuel Luque-González[1], Robert Halir[1], Ksenia Dolgaleva[3], Jens H. Schmid[2], Pavel Cheben[2], J.Gonzalo Wangüemert-Pérez[1]; *[1]Universidad de Malaga, Spain; [2]National Research Council Canada, Canada; [3]School of Electrical Engineering and Computer Science, Canada.* We investigate how dispersion-engineered metamaterial waveguides in AlGaAs-on insulator enhance second-harmonic generation, achieving multi-wavelength phase matching over >150 nm bandwidth with 5–40 nm bands and efficiencies up to ~30 W cm, far surpassing bandwidth limits of strip waveguides.

P22.17

Inverse Design and Optical Characterization of Compact Y-Junction Splitter Based on Topology Optimization, Eva Kempf[1], Mickaël Boillaud[1], Benjamin Maison[1], Sebastien Berard-Bergery[1], Philippe Grosse[2], Sebastien Cremer[1], Pascal Urard[1], Frederic Boeuf[1]; *[1]STMicroelectronics, France; [2]CEA LETI, France.* We present the inverse design optimization, fabrication and characterization of a ultra-compact silicon Y-junction with a footprint of 3µmx3.6µm. Measured losses of 0.18dB at 1550nm show the potential of this methodology to develop compact splitters.

P22.18

Experimental OFDI Validation of 1-PSTD Test Structure for Waveguide-Loss Extraction in SiN Photonic Circuits, Christian C. Cano-Vásquez[1], Daniel Pastor[1], Pascual Munoz[1]; *[1]UPVfab, Spain.* We experimentally validate a 1-PSTD OFDI structure for coupling-independent waveguide-loss extraction in SiN. Complementary output measurements from the device, using a commercial OFDI system configured at 1565 nm, yield in a 1.3568 dB/cm loss, in reasonable agreement with the foundry estimate.

P22.19

1.8-Meter-Long Low-Loss Nonlinear Rib Waveguide for Integrated Optical Parametric Amplifiers, Vijay Shekhawat[1], Ping Zhao[2], Junda Chen[1], Zhirong Chen[1], Peter A. Andrekson[1], Victor Torres Company[1]; *[1]Department of Microtechnology and Nanoscience, Chalmers Univ. of Technology, Sweden; [2]College of Electronics and Information Engineering, Sichuan Univ., China.* We demonstrate a 1.8-m dispersion-engineered Si_3N_4 rib waveguide with a meandered architecture. The device exhibits losses down to 2 dB/m and anomalous dispersion near 1610 nm, potentially enabling compact low-noise integrated parametric amplifiers and receivers.

P22.20

Designing Compact and Low-Loss Optical Delay-Lines in Silicon Photonics Platform, Riddhi Goswami[1], Anushka Tiwari[1], Sarad Subhra Bhakat[1], Shamsul Hassan[1], Wee Ching Hwa[2], Hor Chee Hoong[2], Chew Yan Ng[2], Bijoy K. Das[1]; *[1]Indian Inst. of Technology Madras, India; [2]Silterra, Malaysia.* A suitably designed, adiabatically tapered multimode Si-waveguide is shown to be superior than a SiN-waveguide, fabricated in a silicon photonics platform for optical delay-lines, required in chip-scale LiDAR and photonic beam-forming applications.

P22.21

A Polarization-Independent, low-Loss Coupling Structure With High Misalignment Tolerance Using an Angled-cut Fiber and Silicon Waveguides, Hideaki Iwata[1], Hayato Sasazawa[1], Hiroyuki Tsuda[1]; *[1]Keio Univ., Japan.* Polarization independence with a coupling loss of approximately 1.5 dB using an angled-cut fiber and a forked waveguide, while also achieving 0.08 dB excess loss within a ±1 µm misalignment range was achieved.

P22.22

Directional Coupler Based Magneto-Optic Circulator, Sevag Abadian[1], David Hayrapetyan[1], Michail Symeonidis[2], Marian Bogdan Sirbu[2], Tolga Tekin[2]; *[1]Inst. of Chemical Physics, Armenia; [2]Fraunhofer IZM, Germany.* We demonstrate a novel TM-mode circulator in which magneto-optically coupled waveguides under a transverse magnetic field induce a non-reciprocal phase shift, enabling efficient circulation. The compact, reflectionless, low-loss device achieves >30 dB isolation across an 80 nm broadband range.

P22.23

Quantum-Level Stokes Photon Suppression in a Ge-Core Phoxonic Crystal Slot Waveguide on a SiGe-BOX Platform, Anurag Sharma[1], Jyoti Kedia[1], Neena Gupta[1]; *[1]ECE, Punjab Engineering College (Deemed to be Univ.), India.* A Lindblad master-equation model describes Stokes suppression in a Ge-core phoxonic crystal slot waveguide on SiGe. Dual photonic–phononic bandgap engineering reduces optomechanical back-action, enabling near-quantum phonon occupancy at room temperature for low-noise mid-IR PICs.

P22.24

Lasing From a Topological Photonic Disclination Cavity, Changyu Jeon[1], Cheonmyeong Park[1], Jiwon Lee[2], Jaeyu Kim[3], Gil Woo Lee[4], You Shin No[4], Min Kyo Seo[3], Kwang Yong Jeong[2], Jin Kyu Yang[1]; *[1]Kongju National Univ., Korea (the Republic of); [2]Chungnam National Univ., Korea (the Republic of); [3]Korea Advanced Inst. of Science and Technology, Korea (the Republic of); [4]Konkuk Univ., Korea (the Republic of).* We present a composite photonic disclination cavity that enables controlled mode selection by introducing nematic-inspired topological patterns into a C_5 geometry. Numerical and experimental results confirm the selective excitation of monopole and hexapole-like modes.

15:30–17:00
P21 • Poster Blitz 2.1 (Room F1)
P22 • Poster Blitz 2.2 (Room E1.1)—Continued

P22.25
Short-Wave Infrared Lasing From PbS Colloidal Quantum Dots Integrated on Silicon Photonics Platforms, Papa Seck[1], Shuaijun Liu[1], Jan Matthys[1], Ranjana Yadav[1], Nastaran Kazemi Tofighi[1], Alexander Arutunyan[1], Pieter Geiregat[1]; [1]*Department of Chemistry, Physics and Chemistry of Nanostructures, Belgium.* We report short-wave infrared colloidal quantum dot lasers enabled by photonic crystal cavities. Using solution-processable gain materials, this work advances compact infrared sources for silicon photonics, targeting sensing and communication applications.

P22.26
Monolithically Integrated III-v-on-Si Elliptical Nanoarray Photodetectors and Light-Emitters, João Azevedo[1,2], Jana B. Nieder[1], Bruno Romeira[1]; [1]*International Iberian Nanotech Lab, Portugal;* [2]*Physics, Univ. of Minho, Portugal.* We demonstrate III–V semiconductor elliptical nanopillar arrays on Si that combine broadband photoresponse with light emission for tunable and energy-efficient solutions. Our work enables commercial-level responsivity for static and dynamic operation using compact designs.

P22.27
Silk Fibroin-Integrated Porous Silicon Photodetectors With Enhanced UV Responsivity, Denice N. Feria[1], Xiang-Bin Yang[1], Hsi-Kai Wang[1], Jia-Chuan Lin[2], Tai-Yuan Lin[1]; [1]*Department of Optoelectronics and Materials Technology, National Taiwan Ocean Univ., Taiwan;* [2]*Department of Electrical Engineering, National Taipei Univ., Taiwan.* Silk fibroin-functionalized porous silicon photodetectors achieved responsivities of 1268 and 1547 mA/W (266 and 365 nm), 70–92× higher than planar Si devices, attributed by surface-state passivation and band alignment, advancing biocompatible integrated silicon UV photodetectors.

Room HG F30 (Plenary Auditorium)

17:00–17:45
T4A • Plenary Session II
Presider: To be Announced

T4A.1 • 17:00 Plenary
A Monolithically Integrated Terahertz Optoelectronics Platform Based on Quantum Well Structures, Mona Jarrahi[1]; [1]*Univ. of California Los Angeles, USA.* Terahertz waves hold immense potential across diverse fields, including healthcare monitoring, biomedical imaging, precision navigation, high-speed communication, security screening, industrial quality control, and space exploration. However, the widespread adoption of terahertz technology has been hindered by the bulky, complex, and costly nature of existing systems. In this talk, I will introduce gain-enhanced interband photomixing in quantum well (QW) PIN photodiodes as an efficient mechanism for frequency-tunable terahertz generation and detection, achieving significant improvements in power efficiency and sensitivity over the state-of-the-art. QWs embedded in PIN photodiodes—key elements of commercially available photonic integrated circuits—enable monolithic integration of lasers, semiconductor optical amplifiers, modulators, filters, demultiplexers, and other passive optical components. Establishing QW PIN photodiodes as the foundation of a Monolithically Integrated Terahertz Optoelectronic platform could pave the way for compact, scalable terahertz optoelectronic systems with applications in high-speed data transfer, spectroscopy, and hyperspectral imaging.

Room HG F1

08:30–10:15
W1A • Waveguides and Gratings
Presider: Carlos Ramos, Universite de Paris Saclay, France

W1A.1 • 08:30
Polarization-Dependent Brillouin Scattering and Net-Gain in Double-Stripe Silicon Nitride Waveguides, Riley te Morsche[1], Roel Botter[1], Yvan Klaver[1,2], Okky Daulay[1], Kaixuan Ye[1], Arjan Meijerink[3], Edwin Klein[3], David Marpaung[1]; [1]*Univ. of Twente, Netherlands;* [2]*Chalmers Univ. of Technology, Sweden;* [3]*LioniX International BV, Netherlands.* We study stimulated Brillouin scattering (SBS) in foundry double-stripe silicon nitride, featuring TM-polarized SBS gain up to 0.54 $W^{-1}m^{-1}$. Combining low optical loss and high power handling enables net off-chip amplification up to 3.4 dB.

W1A.2 • 08:45
Optically Written Photorefractive Grating for Intermodal Coupling in a Thin-Film Lithium Niobate Racetrack Resonator, Tianyi Zhang[1], André G. Primo[1], Jiawen Liu[1], Aleksei Gaier[1], Ileana-Cristina Benea-Chelmus[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland.* We demonstrate that resonant pumping in a thin-film lithium niobate racetrack induces a photorefractive grating via TE0–TM0 beating, leading to the formation of single-ring photonic molecules with controllable coupling strength and resonance splitting.

W1A.3 • 09:00
Mid-Infrared low-Loss Integrated Photonic Waveguides on a III-v Semiconductors Platform, Mathilde M. Urbain[1], Luca Lucia[1], Gia L. Ngo[1], Stefano Piratto[1], Konstantinos Pantzas[1], Grégoire Beaudoin[1], Jean-Michel Manceau[1], Isabelle Sagnes[1], Erwan Lucas[2], Christophe Finot[2], Bertrand Kibler[2], Raffaele Colombelli[1], Adel Bousseksou[1]; [1]*C2N, France;* [2]*LICB, France.* We demonstrate mid-IR integrated low-loss photonic waveguides on a III-V semiconductors platform. Low losses of 0.28 dB/cm were measured at 4.6 µm. We investigate nonlinear features by supercontinuum generation. These results are promising towards the development of Kerr combs frequency generation.

W1A.4 • 09:15
Control of Multimode Waveguide Transmission Eigenchannels on-Chip, Stefan Rothe[1], Ekin Bosdurmaz[1], Leonie M. van der Heide[1], Joeroen P. Korterik[1], P. W. Pinkse[1]; [1]*Universiteit Twente, Netherlands.* We experimentally demonstrate wavefront shaping in silicon nitride multimode waveguides by measuring and controlling transmission eigenchannels. Phase modulation enables tailored output fields, establishing a compact platform for robust multimode photonics and integrated quantum networks.

W1A.5 • 09:30
Photonic Passive Full-Devices Dimensional Characterization Enabling Accurate Components Optical Simulation, Camille Radelet[1,2], Sebastien Berard-Bergery[1], Jonathan Pradelles[2], Elodie Sungauer[1], Estelle Guyez[2], Christophe Martinez[2], Eric Gros d'Aillon[2]; [1]*STMicroelectronics, France;* [2]*Isère, CEA-Leti, France.* We detail a novel contour reconstruction based methodology for optical device morphological characterization, and demonstrate that full optical transmission profiles can be accurately simulated using exclusively real, CDSEM derived patterning data.

W1A.6 • 09:45
Large Area Grating for Free Space Interfaces on Silicon Nitride Loaded Thin-Film Lithium Niobate Platform, Lantian Wei[1,2], Sonya Palmer[1,2], Mei Xian Low[1,2], Guanghui Ren[1,2], Thach Nguyen[1,2], Arnan Mitchell[1,2]; [1]*Royal Melbourne Inst. of Technology Univ., Australia;* [2]*ARC Centre of Excellence in Optical Microcombs for Breakthrough Science, Australia.* We describe a large area grating in silicon nitride loaded on lithium niobate platform, operating at 780 nm wavelength. Our device is capable of producing a two-dimensional Gaussian beam, with a beam waist of 250 µm, suitable for free space interfaces.

W1A.7 • 10:00
Dynamic Optical Tuning via Photomechanical Azopolymer Gratings and Phase-Change Metasurfaces, Sara Moujdi[1]; [1]*Nottingham Trent Univ., UK.* Dynamic optical tuning remains an open challenge in photonics. We demonstrate two approaches: light-responsive azobenzene polymers and Sb_2S_3 phase-change materials, enabling precise, reversible, broadband modulation for sensing, imaging, and integrated photonic applications.

Room HG E1.1

08:30–10:15
W1B • Integrated THz Generation and Detection
Presider: Maurizio Burla; Technische Universität Berlin, Germany

W1B.1 • 08:30 Invited
Integrated Lithium Niobate Microwave and Terahertz Photonics, Cheng Wang[1]; [1]*City Univ. of Hong Kong, Hong Kong.* I will discuss our recent efforts on integrated lithium niobate photonics towards microwave and terahertz applications. We demonstrate chip-scale systems including high-speed microwave photonic signal processers, broadband real-time spectrum sensors, and low-noise terahertz receiving frontends.

W1B.2 • 09:00
Hz-Accurate Photonic Terahertz Spectrum Analyzer Based on Thin-Film Lithium Niobate, Aleksei Gaier[1,2], Gabriel Jülg[1,2], Jiawen Liu[1,2], Ileana-Cristina Benea-Chelmus[1,2]; [1]*Hybrid Photonics Laboratory, École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Center for Quantum Science and Engineering (QSE), École Polytechnique Fédérale de Lausanne, Switzerland.* We demonstrate a photonic spectrum analyzer using an antenna-coupled thin-film lithium niobate electro-optic receiver, enabling wide-span 80-400 GHz spectral analysis with sub-MHz resolution via optical frequency referencing and Hz-accurate spectrum analysis enabled by comb-referenced sampling.

W1B.3 • 09:15
Sub-Ambient-Noise Millimeter-Wave Photonic Receiver via Room-Temperature Cavity Electro-Optics, Junyin Zhang[1], Shuhang Zheng[1], Jiachen Cai[1,2], Connor Denney[3], Zihan Li[1], Yichi Zhang[1], Xin Ou[2], Gabriel Santamaria-Botello[3], Tobias Kippenberg[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*State Key Laboratory of Materials for Integrated Circuits, China Academy of Science, China;* [3]*Electrical Engineering, Colorado School of Mines, USA.* We demonstrate a photonic millimeter-wave receiver on thin-film lithium tantalate at 59.3 GHz with 2.7 dB noise figure, enabling low-noise E-O-E detection while maintaining inherent immunity to electromagnetic interference.

W1B.4 • 09:30
Ultra Compact Millimeter Wave Radiation Detector Based on on-Chip Plasmonic Modulator Antenna, Hande Ibili[1], Michael Baumann[1,2], Tobias Blatter[1], Ninad Chitnis[2], Sven Kühn[2], Myles Capstick[2], Niels Kuster[2,1], Marco Zahner[3], Wolfgang Heni[4], Benedikt Baeuerle[4], Jasmin Smajic[1], Juerg Leuthold[1]; [1]*ETH Zurich, Switzerland;* [2]*Foundation for Research on Information Technologies in Society (IT'IS), Switzerland;* [3]*Fields at Work GmbH, Switzerland;* [4]*Polariton Technologies AG, Switzerland.* Near and far millimeter wave detection is demonstrated with an ultra-compact on-chip plasmonic modulator antenna sensor at 50-220 GHz, offering optical fiber-based readout and high sensitivity.

W1B.5 • 09:45
Thermoelectrically Cooled Surface Emitting 3.8 THz QCL Sources Operating in a Compact HHL Housing, Sebastian Gloor[1], Adrian Weisenhorn[1], Léo Hetier[2], Urban Senica[3,1], Richard Maulini[2], Mattias Beck[1], Jérôme Faist[1], Giacomo Scalari[1]; [1]*ETH Zurich, Switzerland;* [2]*Alpes Lasers, Switzerland;* [3]*Harvard, USA.* We present thermoelectrically cooled surface emitting terahertz quantum cascade lasers (THz QCLs) mounted inside a compact high heat load (HHL) housing. Average powers of ~5 µW are demonstrated at 199K with ambient coolant resulting in spectral measurements with good signal-to-noise ratio.

W1B.6 • 10:00
Monolithic MmWave-THz Generation and Detection on Electro-Optic Photonic Chips, Jiawen Liu[1], Yazan Lampert[1], Aleksei Gaier[1], Tianyi Zhang[1], Chengli Wang[2], Xin Ou[2], Ileana-Cristina Benea-Chelmus[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland;* [2]*Chinese Academy of Sciences, National Key Laboratory of Materials for Integrated Circuits, Shanghai Inst. of Microsystem and Information Technology, China.* Integrated mmWave-THz functionalities are critical for next-generation quantum and communication technologies. We propose a cavity-enhanced lithium tantalate device for monolithic generation and detection of mmWave-THz signals from 100 GHz to 2.5 THz.

Room HG F1

10:45–12:30
W2A • Fabrication Platforms
Presider: Sangsik Kim; Korea Advanced Inst. of Science & Technology, South Korea

W2A.1 • 10:45
Monolithically Integrated Pseudo-Random Phase Modulation Coherent LiDAR Transceiver, Pablo L. Querol[1], Diego Domínguez-Castillejo[2], Clara Quevedo-Galán[1], Antonio Pérez-Serrano[1]; [1]*CEMDATIC-ETSI Telecomunicación, Universidad Politécnica de Madrid, Spain;* [2]*Tyndall National Inst., Univ. of Cork, Ireland.* We present a monolithically integrated coherent LiDAR transceiver on a generic indium phosphide platform, incorporating on-chip pseudo-random phase modulation and a 120° hybrid coherent receiver. Fiber-based distance measurements are demonstrated up to 500 m.

W2A.2 • 11:00
Micro-Transfer Printing of 1064 nm Lasers on Silicon Nitride Photonic Integrated Circuits, Fatih Atar[1], Nicola Maraviglia[2], Artem S. Vorobev[2], Samir Ghosh[1], Brendan Roycroft[1], Md Saiful Islam Sumon[3], Chiranjeevi Maddi[4], Robert Bowman[4], Liam O'Faolain[2], Shamsul Arafin[3], Brian Corbett[1]; [1]*Tyndall National Inst., Ireland;* [2]*Centre for Advanced Photonics and Process Analysis, Munster Technological Univ., Ireland;* [3]*Electrical and Computer Engineering, Ohio State Univ., USA;* [4]*Centre for Quantum Materials and Technology, Queen's Univ. Belfast, UK.* We heterogeneously integrate GaAs gain devices on silicon nitride photonic integrated circuits to achieve 1064 nm single frequency lasing. Such lasers are needed to achieve coherent green light on photonic chips through second harmonic generation.

W2A.3 • 11:15
Tunable Athermal Interferometers: Foundry-Compatible Robust Designs and Results, Javier Elaskar[1], Rana M. Armaghan Ayaz[1], Fabrizio Di Pasquale[1], Claudio J. Oton[1]; [1]*Scuola Superiore Sant'Anna, Italy.* We present two thermally tunable, athermal MZIs fabricated in a standard foundry: one in Si using different waveguide widths and one in Si+SiN exploiting thermo-optic differences, showing over 20× lower thermal sensitivity than non-athermal MZIs.

W2A.4 • 11:30
200 mm Dual-Layer SiN Heterogeneous Integration Platform for Visible and Near-Infrared Applications, Konstantinos Akritidis[1,2], Gaudhaman Jeevanandam[1], Manuel Reza[1], Maximilien Billet[2], Jeonghwan Song[1], Sandeep Seema Saseendran[1], Vittal Thanjavur Prakasam[1], Jan-Philipp Koester[3], Jörg Fricke[3], Gunther Roelkens[2], Markus Weyers[3], Roelof Jansen[1], Pol Van Dorpe[1], Bart Kuyken[2]; [1]*IMEC, Belgium;* [2]*INTEC Department, Photonics Research Group (UGent - IMEC), Belgium;* [3]*Ferdinand-Braun-Institut (FBH), Germany.* We present a 200 mm dual-layer SiN platform for visible and near-infrared applications. We report wafer-scale passive characterization together with performance evaluation of micro-transfer printed evanescently-coupled lasers emitting around 970 nm across selected dies.

W2A.5 • 11:45
Flip–Chip Integration of 1060 nm VCSELs and Photodiodes on Polymer PICs for Out–of–Plane Coupling, Tianwen Qian[1], Marcel Amberg[1], Martin Kresse[1], Salomon Eib[1], Ben Schuler[1], Klara Mihov[1], Jakob Reck[1], Philipp Winklhofer[1], Csongor Keuer[1], Laurids von Emden[1], Nils F. Fuchs[1], Bartu Yaman[1], Markus Struckmann[1], Oussama Zahir[1], Crispin Zawadzki[1], Francesco Villasmunta[1], David de Felipe Mesquida[1], Moritz Kleinert[1], Norbert Keil[1]; [1]*Fraunhofer HHI, Germany.* We demonstrate flip-chip integration of 1060 nm VCSEL and photodiode arrays on polymer PICs using diced 45° facets and wafer-level coining. This approach achieves out-of-plane coupling and validated loss budgets for potential co-packaged optical interconnects.

Room HG E1.1

10:45–12:30
W2B • Frequency Combs for THz
Presider: To be Announced

W2B.2 • 11:15
Power-Efficient Microcombs Beyond Octave Spectral Span Using Photonic Molecules, Kaiyi Wu[1], Vijay Shekhawat[1], Tim Fuhrmann[1], Victor Torres Company[1]; [1]*Chalmers Univ. of Technology, Sweden.* We utilize photonic molecules for power-efficient soliton microcomb generation on an integrated silicon nitride chip. Single soliton with a spectral span of up to two octaves is demonstrated.

W2B.3 • 11:30
Enhanced Comb Generation via Electrically and Optically Resonant Plasmonic Modulators, Laurenz Kulmer[1], Tobias Blatter[1], Boris Vukovic[1], David Moor[1], Yuriy Fedoryshyn[1], Juerg Leuthold[1]; [1]*ETH Zurich, Switzerland.* We demonstrated two novel electrically enhanced plasmonic ring modulators for electro-optic comb generation, achieving resonances at 50 and 140GHz with up to 20dB electro-optical enhancement. We showcase device architecture, simulations as well as characterizations.

W2B.4 • 11:45
Quantum Walk and Active Mode-Locked Comb Dynamics in a Dispersion-Engineered THz QC-VECSEL, Marco Raffa[1], Jordane Bloomfield[2], Sadhvikas Addamane[3], Alexander Dikopoltsev[1], Jérôme Faist[1], Benjamin Williams[2], Giacomo Scalari[1]; [1]*ETH Zurich, Switzerland;* [2]*UCLA, USA;* [3]*Sandia National Laboratories, USA.* We demonstrate coherent THz frequency comb generation in a QC-VECSEL via RF modulation, achieving quantum walk and active mode-locking regimes. Dispersion engineering enables broadband, stable emission, confirmed by SWIFT spectroscopy and phase-resolved measurements.

Room HG E1.2

10:45–12:30
W2C • Emerging Platforms for Advanced Control of Light
Presider: Frank Nueesch; EMPA, Switzerland

W2C.1 • 10:45
Fabrication and Characterization of Large Area Thin Film Diamond Photonic Integrated Circuits, Claudio A. Jaramillo Concha[1], Kexin Wu[1,2], Valentin Goblot[1,3], Yuchun Zhu[1], Niels Quack[4], Christophe Galland[1,3]; [1]*Inst. of Physics, EPFL, Switzerland;* [2]*PROUD SA, Switzerland;* [3]*Center of Quantum Science and Engineering, EPFL, Switzerland;* [4]*Inst. of Microelectronics, Univ. of Stuttgart, Germany.* We propose a millimeter-scale diamond-on-insulator platform fabricated using hybrid integration. A bonded diamond membrane is thinned to sub-micron thickness with ~ 1 nm roughness. The resulting photonic structures are measured using NV centers, and exhibit ca. 6 dB/mm loss.

W2C.2 • 11:00
Enhanced Spectral Broadening via Self-Phase Modulation in Silicon Nitride Waveguides Integrated With 2D MoS_2 Films, Shahaz S. Hameed[1,2], Di Jin[1], Aihao Zhao[1], Jiayang Wu[1], Irfan Abidi[3], Junkai Hu[1], Sebastien Cueff[2], Christian Grillet[2], Yuning Zhang[4], Houssein El Dirani[5], Corrado Sciancalepore[5], Sebastien Kerdiles[5], Quentin Wilmart[5], Sumeet Walia[3], Christelle Monat[2], David J Moss[1]; [1]*Swinburne Univ. of Technology, Australia;* [2]*Institut des Nanotechnologies de Lyon (INL), Ecole Centrale de Lyon, France;* [3]*School of Engineering, RMIT Univ., Australia;* [4]*School of Physics, Peking Univ., China;* [5]*CEA-LETI, France.* We report enhanced self-phase modulation in MoS_2-Si_3N_4 hybrid waveguides at 1550 nm, achieving about 2.4 times spectral broadening and a 27-fold increase in the nonlinear parameter compared to uncoated Si_3N_4 waveguides.

W2C.3 • 11:15 Invited
Integrated, Ultrafast All-Optical Transistors and Gates With Organic Exciton-Polariton Condensates, Pietro Tassan[1], Darius Urbonas[1], Rainer F. Mahrt[1], Thilo Stöferle[1]; [1]*IBM Research Europe - Zurich, Switzerland.* Using high-index contrast grating cavities filled with an organic pi-conjugated polymer, we realize exciton-polariton condensates on a chip. Coupling multiple cavities and exploiting seeding, we realize cascadable, all-optical transistors and logic gates with picosecond switching.

W2C.4 • 11:45
Withdrawn.

W2C.5 • 11:45
Adiabatic SiN–$LiNbO_3$ Transitions for Scalable Hybrid Photonic Integrated Circuits, Samir Ghosh[1], Md Saiful Islam Sumon[2], Artem S. Vorobev[1,3], Nicola Maraviglia[1,3], Rezwan Zakaria[2], Fatih Atar[1], Ganga C. Devarapu[1,2], Chiranjeevi Maddi[4], Robert Bowman[4], Liam O'Faolain[1,3], Shamsul Arafin[2], Brian Corbett[1]; [1]*Tyndall National Inst., Ireland;* [2]*Department of Electrical and Computer Engineering, The Ohio State Univ., USA;* [3]*Centre for Advanced Photonics and Process Analysis, Munster Technological Univ., Ireland;* [4]*School of Mathematics and Physics, Queen's Univ. Belfast, UK.* We present low-loss transitions for micro-transfer-printed SiN–$LiNbO_3$ hybrid photonic circuits. A dual-taper SiN–$LiNbO_3$ transition shows simulated coupling above 90%, better than SiN-only transition, enabling scalable high-performance hybrid nonlinear PICs.

Room HG F1

W2A • Fabrication Platforms—Continued

W2A.6 • 12:00
Monolithic Multilayer Integration in the Al_2O_3 Platform by Mix and Match Lithography., Abeer Mashlah[1], Bjorn Jongebloed[1], Nadia Chahir[1], Meindert Dijkstra[1], Sonia Garcia Blanco[1]; [1]*Twente Univ., Netherlands.* A fully monolithic multilayer integration process for active and passive Al_2O_3 layers within a single wafer level flow is enabled for the first time by a mix and match lithography approach that combines direct laser writing MLA150 with electron beam lithography in a negative e beam resist.

W2A.7 • 12:15
Low Intensity Noise Indium Phosphide – Lithium Niobate on Insulator Microwave Photonic Transmitter, Sara Bassil[1,2], Sylvain Boust[1], Fabrice Blache[1], Guillaume Daccord[1], Jean Decobert[1], Estelle Derouin[1], François Duport[1], Antoine Elias[1], Gilles Feugnet[3], Michel Garcia[1], Ivan Prieto Gonzalez[4], Alexandre Larrue[1], Jean-Pierre Le Goec[1], Olivier Parillaud[1], Hamed Sattari[4], Nicolas Vaissiere[1], Frederic Van Dijk[1], Homa Zarebidaki[4], Nadege Courjal[2]; [1]*III V Lab, France;* [2]*Femto-ST, France;* [3]*Thales Research and Technology, France;* [4]*CSEM, Switzerland.* A 1550 nm hybrid InP/LNOI transmitter integrated in an analog link is presented here. The output optical power of the transmitter reaches 37 mW and the measured link dynamic achieves 105 $dB.Hz^{2/3}$ record.

Room HG E1.1

W2B • Frequency Combs for THz—Continued

W2B.5 • 12:00 Invited
Broadband Integrated Photonics With Planarized Terahertz Quantum Cascade Lasers, Urban Senica[1,2]; [1]*Harvard Univ., USA;* [2]*ETH Zurich, Switzerland.* This novel integrated terahertz photonics platform combines active, passive and inverse-designed components for broadband frequency comb generation, dispersion compensation, enhanced nonlinear optics, microwave modulation with short pulses, beam-shaping antennas, and thermal dissipation structures.

Room HG E1.2

W2C • Emerging Platforms for Advanced Control of Light—Continued

W2C.6 • 12:00
Continuous-Time Photonic Leaky Integration in a $CuInP_2S_6$-Integrated Silicon Microring, Srinivasa Tamalampudi[1], Mahmoud Rasras[1]; [1]*New York Univ. Abu Dhabi, United Arab Emirates.* A $CuInP_2S_6$ (CIPS)-integrated silicon microring resonator exhibits illumination-induced resonance drift and passive relaxation, enabling photonic leaky integration with resonance shifts of $\Delta\lambda \approx 78$ pm and relaxation times of $\tau \approx 14$ min.

W2C.7 • 12:15
Simulating Time-Varying Hamiltonians on a Thin-Film Lithium Niobate Photonic Chip, Rui Ye[1,2], Guangzhen Li[2], Shuai Wan[3], Xiaotian Xue[2], Piyu Wang[3], Yuanlin Zheng[2], Chunhua Dong[3], Luqi Yuan[2], Xianfeng Chen[2]; [1]*Chongqing Univ., China;* [2]*Shanghai Jiao Tong Univ., China;* [3]*Univ. of Science and Technology of China, China.* We demonstrate diverse time-varying Hamiltonians in a synthetic frequency lattice using a thin-film lithium niobate microresonator. Applying bichromatic electro-optic modulation allows us to experimentally track the temporal evolution of dynamic band structures.

Room HG F1

13:30–15:15
W3A • Frequency Combs
Presider: To be Announced

W3A.1 • 13:30 Invited
Quantum Walk Combs and Their Applications in Spectroscopy, Ina Heckelmann[1]; [1]*ETH Zurich, Switzerland.* We present Quantum Walk Combs, a novel actively mode-locked state in fast-gain mid-infrared lasers. By electrically tuning a single comb, we perform compact, non-interferometric spectroscopy of molecular mixtures with 10-microsecond resolution for real-time chemical analysis.

W3A.2 • 14:00
Frequency Stabilization of a Microcomb With Integrated Piezoelectric Actuators, Jin-Yu Liu[1], Hao Tian[1], Qingxin Ji[1], Shuman Sun[1], Wei Zhang[2], Joel Guo[3], Warren Jin[3], John Bowers[3], Andrey Matsko[2], Mohammad Mirhosseini[1], Kerry Vahala[1]; [1]*Caltech, USA;* [2]*Jet Propulsion Laboratory, USA;* [3]*UCSB, USA.* Microcomb full frequency-stabilization is achieved using two integrated piezoelectric actuators. The locking control is enhanced by the Vernier tuning of a coupled ring resonator.

W3A.3 • 14:15
Universal Shaping of Fast-Gain Frequency Combs, Diego Piciocchi[1,2], Francesco Fortuna[1,2], Bahareh Marzban[1,2], Laurenz Kulmer[3], Giacomo Scalari[1,2], Juerg Leuthold[3], Jerome Faist[1,2], Alexander Dikopoltsev[1,2]; [1]*Inst. for Quantum Electronics, ETH Zurich, Switzerland;* [2]*Quantum Center, ETH Zurich, Switzerland;* [3]*Inst. for Electromagnetic Fields, ETH Zurich, Switzerland.* Frequency comb shaping is essential for applications ranging from spectroscopy to telecommunications and LIDAR. Here, we propose and demonstrate a universal scheme for electrically shaping frequency-modulated combs in fast-gain lasers.

W3A.4 • 14:30
Integrated mid-Infrared Electro-Optic Frequency Comb Generator Based on Nonlinear Frequency Conversion in Lithium Niobate, Pierre Didier[1], Prakhar Jain[1], Tristan Kuttner[1], Oliver Pitz[1], Jost Kellner[1], Rachel Grange[1]; [1]*ETH Zurich, Switzerland.* In this paper, we present a mid-infrared electro-optic comb source based on nonlinear conversion in lithium niobate on insulator. This approach enables straightforward tuning of the carrier offset and the comb free spectral range.

W3A.5 • 14:45
Sub-Femtosecond Level Synchronisation of Chip-Scale Frequency Combs, Alexander Ulanov[1], Bastian Ruhnke[1], Theia E. Sharkawy[2], Thibault Wildi[1], Kemal Shafak[2], Franz Kärtner[1,2], Tobias Herr[1,3]; [1]*Deutsches Elektronen-Synchrotron, Germany;* [2]*Cycle GmbH, Germany;* [3]*Physics Department, Univ. of Hamburg UHH, Germany.* We achieve passive, all-optical sub-femtosecond level synchronisation of chip-integrated microcombs located on separate photonic chips using two free-running continuous-wave lasers and Kerr-nonlinear injection locking. This approach enables scalable, high-precision timing networks.

W3A.6 • 15:00
Low-Repetition Rate Microcombs in Compact Normal-Dispersion Photonic Crystal Spiral Microresonators, Doan V. Le[1], Julien Fatome[1], Roseni Vences Robert[1], Erwan Lucas[1]; [1]*Laboratoire Interdisciplinaire Carnot de Bourgogne, France.* We demonstrate frequency comb generation in normal-dispersion thin silicon nitride spiral resonators via synchronized dual-pumping excitation or continuous pumping in an photonic crystal structure. These methods enable the realization of low-repetition-rate frequency combs in a compact footprint.

Room HG E1.1

13:30–15:15
W3B • On-Chip Thz Signal Processing
Presider: Giacomo Scalari; ETH Zurich, Switzerland

W3B.1 • 13:30
High-Q and Low-Loss Bragg Grating Bandpass Filters at 259 GHz on a Silicon Effective Medium Platform, Boris Vukovic[1], Daniel Rieben[1], Valentin Gassenmeier[1], Shadi Nashashibi[1], Dominik Bisang[1], Aditi Chaluvadi[1], Jasmin Smajic[1], Juerg Leuthold[1]; [1]*Inst. of Electromagnetic Fields (IEF), ETH Zurich, Switzerland.* Bragg grating filters on a silicon effective medium platform are demonstrated, achieving 0.9 dB loss and quality factor Q = 1188 at 259 GHz. A hybrid unit-cell simulation and transfer matrix approach enables rapid design.

W3B.2 • 13:45
Microwave Time Delay and Phase Shifter via Stimulated Brillouin Scattering in a Scalable Silicon Nitride Platform, Ahmet Tarik Isik[1], Yvan Klaver[1,3], Kaixuan Ye[1], Roel Botter[1,2], Okky Daulay[1], Arjan Meijerink[2], Edwin Klein[2], David Marpaung[1]; [1]*Univ. of Twente, Netherlands;* [2]*LioniX International, Netherlands;* [3]*Chalmers Univ. of Technology, Sweden.* Using Stimulated Brillouin Scattering (SBS) and a delay amplification technique in low-loss foundry silicon nitride waveguides, we demonstrate an extended 5 ns time delay and a 110° phase shift, over a broad 10 GHz bandwidth.

W3B.3 • 14:00
Freeform low-Loss Terahertz Structures Fabricated by Multi-Material Laser Printing, Sina Foroutan Barenji[1], Alexander Kotz[1], Artem Kuzmin[1], Klaus Bade[1], Wolfgang Freude[1], Christian Koos[1]; [1]*Karlsruher Institut für Technologie, Germany.* We report on additive fabrication of ultra-broadband millimeter-wave chip-chip interconnects. Our approach leverages multi-photon multi-material laser lithography to fabricate polymeric base structures along with conductive layers with highest resolution, supporting bandwidths beyond 120 GHz.

W3B.4 • 14:15
Resolution Enhancement in Terahertz Phase Imaging, Pitambar Mukherjee[1], Vivek Kumar[1,4], Frederic Fauquet[1], Amaury Badon[2], Damien Bigourd[1], Kedar Khare[3], Sylvain Gigan[4], Patrick Mounaix[1]; [1]*Université de Bordeaux, France;* [2]*Laboratoire Photonique Numérique et Nanosciences (LP2N), France;* [3]*Indian Inst. of Technology Delhi, India;* [4]*Laboratoire Kastler Brossel, France.* We experimentally demonstrate a multi-angle beam illumination-based terahertz (THz) phase imaging approach to overcome the diffraction-limited resolution of conventional THz imaging systems by synthetically increasing the effective numerical aperture (NA) of the imaging system.

W3B.5 • 14:30
A Photonic Integrated Metasurface for Terahertz Beam Focusing and Steering, Yazan Lampert[1], Jiawen Liu[1], Xuhui Cao[1], Ileana-Cristina Benea-Chelmus[1]; [1]*École Polytechnique Fédérale de Lausanne, Switzerland.* A metasurface integrated with photonic circuits on lithium niobate enables a focusing terahertz emitter with a 10 mm focal length and active beam steering over 45 degrees by sweeping the measured terahertz frequency.

W3B.6 • 14:45 Invited
Generation of Continuous-wave 1-12 THz Radiation with Intersubband Polaritonic Metasurfaces, J.H. Krakofsky[1], M. Rieder[1], S. Stitch[1], S. Schmid[1], I, Lubianskii[1], G. Böhm[1], A. Köninger[1], Mikhail Belkin[1]; [1]*Walter Schottky Inst., Technische Universität Munchen, Munich, Germany.* Tunable continuous-wave sources of coherent terahertz radiation are highly desired for a wide range of applications.While several suitable technologies exist for frequencies below 6 THz, the spectral range 6-12 THz is currently devoid ofsuch sources with reasonable (>0.1 uW) output powers. Here we demonstrate that nonlinear intersubband polaritonic metasurfaces [1] can provide efficient terahertz difference-frequency mixing in the 6-12 THz range and beyond. Due to their deeply subwavelength thickness, the metasurfaces are mostly free of both phase-matching and optical phononabsorption constraints of bulk nonlinear crystals. Continously-tunable continuous-wave terahertz radiation is generated by pumping the metasurfaces with two milliwatt-level continuous-wave mid-infrared lasers in a simple modular setup that superficially resembles that employed by THz photomixers. We demonstrate a metasurface-based difference-frequency generation terahertz source tunable in 1-12 THz spectral range with up to 14 uWof power output in the difficult-to-access 6-12 THz spectral range [2]

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