Track 1: Optical Fibers and Fiber-based Devices

13:30-15:30 · November 6, 2025 · Thursday
Design and applictaions of Special optical fibers
Presider: Shifeng Zhou, South China University of Technology, China

13:30-14:15 · ACP2025-0718-1 **Tutorial**
Multimode Fibers for High-capacity Short-reach Communications
Ming-Jun Li
Corning Incorporated, United States
This tutorial provides an overview of multimode fibers for high-speed short-reach transmission. We discuss key design considerations for MMF attributes and review recent progress on new multimode fiber designs to increase the transmission capability.

14:15-14:45 · ACP2025-0725-9 **Invited**
Anti-Resonant Hollow-Core Fiber for Mode Controlling
Xiaobei Zhang
Shanghai University, China
In this paper, recent results and progress in mode control of anti-resonant hollow-core fiber are reviewed and summarized, including single-mode, multi-mode, and polarization-maintaining realized via cladding structure optimization, gas filling, and introduction of symmetry breaking.

14:45-15:00 · ACP2025-0717-1
A Novel Multicore Fiber by Drawing and Attaching Multiple Fibers Together
Ming-Jun Li, Seth Griffin, Brett Knowlton, Joseph McCarthy, Yunfeng Gu, Hector de Pedro, Aramais Zakharian
Corning Incorporated, United States
We propose a new multicore fiber design by drawing multiple preforms simultaneously into fibersand attache them together. A 4-core fiber has been demonstrated using this design. Fiber geometric and optical characterizations are reported.

15:00-15:15 · ACP2025-0815-145
Femtosecond laser-induced fiber microstructure arrays for distributed high-temperature sensing
Baijie Xu, Jun He*, Bin Du, Xizhen Xu, Yiping Wang
Shenzhen University, China
We report a method for fabricating variousfiber microstructure arrays using femtosecond laser direct writing technology. Distributed high-temperature sensing up to 700°C was achieved by usingfiber microstructure arrays and OFDR demodulation technique.

15:15-15:30 · ACP2025-0801-13
Standard Single-Mode Fiber with High Modal Bandwidth at 980 nm for High Speed VCSEL Transmission
Adrian Juarez[1*], Xin Chen[1], Jochen Hellmig[2], Jason Hurley[1], Rashid Safaisini[3], Snigdharaj Mishra[1], Gunter Larisch[3], Roman Koerner[4], **Ming-Jun Li[1]**
1.Corning Incorporated, United States;2.Trumpf Photonic Components B.V., Netherlands;
*3.TRUMPF Photonic Components Gmb*H, Germany;4.TRUMPF Photonic Components B.V, Netherlands
We successfully transmitted a 40 Gbit/s PAM4 signal over 300 m at 980 nm using a two-mode VCSEL and standard single-mode fiber, exhibiting bi-modal behavior and high modal bandwidth at this wavelength.
Keywords：VCSEL, single-mode fiber, bandwidth, PAM4, data center

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Physical Mechanisms in optical fibers
Presider: Yongmin Jung, Optoelectronics Research Centre, University of Southampton, United Kingdom

16:00-16:30 · ACP2025-0605-1 **Invited**
Chiral photon–phonon Brillouin interaction: in twisted photonic crystal fiber and beyond
Xinglin Zeng
Shanghai Institute of Optics and Fine Mechanics, China
Some recent findings on multi-dimensional Brillouin interaction in chiral PCF will be shared, including the study of topology-selective SBS and angular momentum-transferring SBS. Both nonlinear effects lead to many novel applications, which will be reviewed.

16:30-17:00 · ACP2025-0620-2 **Invited**
Impact of Stress Distribution on Birefringence and Polarization-Mode Dispersion in Multi-Core Fibers
Gustavo Ocampo*, Kunimasa Saitoh
Hokkaido University, Japan
We explore the fundamental role of stress distribution on defining birefringence characteristics in multi-core fibers. Our numerical analysis shows how different design parameters dictate stress patterns, directly influencing the fiber's overall polarization-mode dispersion performance.

17:00-17:15 · ACP2025-0730-46
Distributed Characterization of LP_{11} Modes in Solid- and Hollow-Core Few-Mode Fibers Using Optical Side Scattering/Leakage Radiometry
Zijie Yang, Yizhi Sun, Yinghui Zhang, Hao Chen, Shoufei Gao, Yingying Wang, Wei Ding*
Jinan University, China
We present distributed OSSLR characterization of low-loss LP_{11} modes in G654 solid-core (2 dB/km) and NANF hollow-core fibers (15 dB/km), achieving high-purity excitation, centimeter resolution, and much improved measurement accuracy for advanced fiber quality monitoring.

17:15-17:30 · ACP2025-0801-105
Application of phonon-assisted energy relaxation for management of laser properties of bismuth active centers associated with silicon
Alexander Elopov[1*], Konstantin Riumkin[1], Denis Lipatov[2], Mikhail Yashkov[2], Sergei Firstov[1], Mikhail Melkumov[1]
1.Prokhorov General Physics Institute of the Russian Academy of Sciences, Dianov Fiber Optics Research Center, Russia;2.G.G. Devyatykh Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences, Russia
Application of multi-phonon-assisted energy relaxation for adjustment properties of laser media is demonstrated. A novel approach of laser active media luminescence properties improvement by co-doping of germanosilicate bismuth-doped optical fiber with boron is investigated.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Optical Fiber based devices
Presider: Liang Wang, Huazhong University of Science and Technology, China

08:30-09:15 · ACP2025-0729-26 **Keynote**
Gain fiber for broadband fiber amplifier
Shifeng Zhou
South China University of Technology, China
In this talk, the recent progress in designs, fabrications and applications of selected materials for multicomponent gainfibers is introduced. The results about the relation between the material microstructure and its optical properties are introduced. The glasses and fibers with for broadband fiber amplifier are highlighted.

09:15-09:30 · ACP2025-0716-2
S+C+L Band Spatial Mode Multiplexer for Single Mode Fibers to a 7-Core, 3-Mode Multicore Fiber
Jun Li, Di Lin*, Ying Zheng, Jianping Li, Songnian Fu, Yuwen Qin
Guangdong University of Technology, China
We propose a few-mode multicore fiber spatial mode multiplexer based on multi-plane light conversion that enables S+C+L band operation with 0.95 dB insertion loss, 1.14 dB mode-dependent loss and -35.21 dB average crosstalk.

09:30-09:45 · ACP2025-0731-59
Broadband and multi-channel higher-order mode converter based on cascaded preset-twist long-period fiber grating
Wenzhe Chang, Lipeng Feng*, Anxu Zhang, Xishuo Wang, Xiaoli Huo, Chengliang Zhang
China Telecom Research Institute, China
We demonstrate a multi-channel broadband mode converter based on a preset-twist long-period fiber grating. By optimizing the difference and number of periods, the converter can generate first- to third-order modes within bandwidths exceeding 80 nm.

09:45-10:00 · ACP2025-0815-42
Multi-wavelength chaotic pulses parallel laser ranging
Long Lu[1], Yixiang Sun[2], Haoguang Liu[2], Yu An[1], Xuanzhe Zhang[1], Linpin Zhang[1], Ziwen Li[1], Yiyang Luo[1*], Jindong Wang[1], Qizhen Sun[2], PerryPing Shum[3]
1.Chongqing University, China;2.Huazhong University of Science and Technology, China;3.Southern University of Science and Technology, China
We propose a multi-wavelength chaotic pulse generation system and perform parallel ranging of three channels. Multi-wavelength chaotic pulses with natural orthogonality are generated in a passive-mode-locked fiber laser. This experimental result demonstrates that the parallel ranging system with triple-wavelengths has achieved millimeter-level distance resolution and ranging precision.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Hollow-Core Optical Fibers and Applications
Presider: Xin Chen, Principal Scientist with Corning Incorporated, Corning, United States

10:30-11:00 · ACP2025-0801-4 **Invited**
Optical trapping and metrologies in hollow-core optical fibers
Shangran Xie
Beijing Institute of Technology, China
In this talk I will present the latest progress on the technique of optical trapping in hollow-core fibers, including the basic princeple and its applications on flying particle sensors and single particle characterization.

11:00-11:30 · ACP2025-0915-3 **Invited**
HCF-based air-core waveguide devices
Limin Xiao
Fudan University, China
TBD

11:30-11:45 · ACP2025-0801-22
Feedback control of optical propulsion velocity of microparticles in hollow-core fibers
Chenjie Liang, Rui Wang, Shangran Xie
Beijing Institute of Technology, China
Hollow-core optical fibers provide an ideal solution for long-distance object guidance and delivery. We report a real-time monitoring and feedback control on the propulsion velocity of flying microparticles in hollow-core fibers. Doppler velocimetry is employed to acquire the instantaneous velocity of the particle, and PID algorithm is exploited to adjust the laser power through an acousto-optic modulator based on the measured particle velocity. The technique can guide particles over the fiber with controlled speed, benefiting the application of targeted object deliveries.

11:45-12:00 · ACP2025-0801-25
Co-Transmission of Power and Optical Data Using a Hollow-core Fiber
Yi Chen[1], Xuechun Wang[2], Ying Qiu[1*], Xiang Li[3*], Hongguang Sun[1], Chao Yang[1], Ming Luo[1], Pengfei Ma[4], Yunlong Bai[4]
1.State Key Laboratory of Optical Communication Technologies and Networks, China;2.China University of Geosciences(Wuhan), China;3.China University of Geosciences (Wuhan), China;4.Ruiguang ICT Technology Co., LTD., China
We designed an AR-HCF for PON and demonstrate the co-transmission of 120 Gbit/s PAM4 signals and the 9 dBm lightover the fiber, with a received power penalty of less than 0.1 dB.

12:00-13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday
Optical Fiber Sensing Technology
Presider: Changyuan Yu, The Hong Kong Polytechnic University, Hong Kong, China

13:30-14:00 · ACP2025-0730-45 **Invited**
High-performance optical frequency domain reflectometer and its applications
Liang Wang
Huazhong University of Science and Technology, China
A SEFR method is developed to simultaneously compensate both the random laser frequency sweep range and sweep nonlinearity in OFDR. Then shape sensing is demonstrated using right-angle core configuration. Its medical applications are also discussed.

14:00-14:15 · ACP2025-0725-10
Symmetric Four-State Modulation in Fiber-Optic Gyroscopes for Simultaneous Measurement of Angular Velocity and Temperature
Xinyu Cao[1], Wenbo Wang[1], Haoyan Liu[1], Fangshuo Shi[1], Yanjun Chen[2], Zhengbin Li[1]
1.Peking University, China;2.Central South University, China
A symmetric four-state square-wave modulation scheme is proposed for IFOGs, enabling simultaneous measurement of angular velocity and temperature. Without additional sensors, the method achieves high precision and thermal stability, as demonstrated through theoretical analysis and experimental validation under varying thermal conditions.

14:15-14:30 · ACP2025-0814-11
Fiber-Optic Force Sensor based on Cascaded Fiber Tapers and Optical Vernier Effect for Enhanced Sensitivity
Yangjun Zheng, Zihang Ji, Liang Wang*, Ming Tang
Huazhong University of Science and Technology, China
We present afiber-optic force sensor based on optical Vernier effect (OVE) via two cascaded tapers with closely matched diameters, which achieves a high sensitivity of −17.51 nm/N within a measurement range of 0~1.4 N.

14:30-14:45 · ACP2025-0729-53
Field Trial of Manhole Detection from DAS Ambient Noise Waveform Correlation
Pedro Tovar*, Zhiping Jiang, Yan Zhao, Linjian Hao, Wei Sun, Changbin Hu
Huawei, Canada
This work proposes and validates through field trials a novel DAS-based method for manhole detection in optical networks. Leveraging ambient acoustic noise waveform correlation, it eliminates the need for manual excitation or strong vibration events.

14:45-15:00 · ACP2025-0731-81
Energy-Efficient Embedded Architecture for Distributed Optical Fiber Sensing
Jiajun Ji, Mingyi Gao, Jiajia Shen, Juanjuan Li
Soochow University, China
This paper proposes an STM32-based distributed optical fiber sensing system integrating Zoom FFT and RMS algorithms, achieving 87.5% energy reduction and 0.2 mJ consumption for efficient vibration detection and localization.

15:00-15:15 · ACP2025-0729-32
A Highly Robust Wearable Respiration Monitoring System for Clinical Application
Yulin Qiu[1], Xi Chen[1], Tianyu Chen[1], Yunfei Chai[2], Weimin Lyu[1*], Changyuan Yu[1]
1.The Hong Kong Polytechnic University, Hong Kong, China;2.Guangdong Provincial People's Hospital, China
This study develops a wearable fiber optic respiration monitoring system using ellipse fitting and Arctan algorithms for accurate, robust, long-term tracking of breathing states, supporting clinical applications and patient monitoring in hospitals.

15:15-15:30 · ACP2025-0729-44
Identification of Plastic Microspheres In Liquid-Filled Hollow-Core Optical Fibers
Yuxuan Lang, Shangran Xie
Beijing Institute of Technology, China
A rapid microplastics identification technique is proposed based on particle trapping and propulsion in liquid-filled hollow-core optical fibers. Theoretical analysis and measurement results confirm that different types of plastic microspheres exhibit distinct propulsion velocities when driven by optical scattering forces in the hollow core, enabling label-free and on-line identification of microplastic types.

15:30-16:00 Coffee Break
15:30-17:30 Poster Sessiom
18:30-20:30 Banquet & Awards Ceremony

08:30-10:00 · November 8, 2025 · Saturday
Optical Fiber Lasers
Presider: Chengbo Mou, Shanghai University, China

08:30-09:00 · ACP2025-0618-1 **Invited**
Research on Dynamics of Fiber Random Lasers and Magneto-Optical Effects
Zhijia Hu
Anhui University, China
Random lasers are stimulated emissions caused by disordered scattering, which contain rich physical phenomena such as complex dynamics and turbulence. However, there are challenges such as unclear dynamic processes, high thresholds, and non-directionality. Meanwhile, external disturbances strongly affect the emission of random lasers. The physical mechanism of how disordered changes affect the properties of random lasers has not been systematically studied. The main difficulty lies in how to precisely control the disorder degree of the random laser system and enhance the photon scattering intensity. To explore the physical process of the dynamic evolution of random lasers, we precisely control the disorder degree of the random system through the magneto-optical effect and construct a dynamic model of the disordered scattering system regulated by the magnetic field, revealing the photon Hall effect and the photon magnetoresistance effect of random lasers, providing theoretical support for the application of random lasers. We confine the random scattering system by using a fiber structure and enhance the photon scattering through plasmon resonance energy transfer to strengthen the interaction between light and matter, achieving a reduction in the threshold of random lasers, improving the directionality and emission intensity of random lasers.

09:00-09:15 · ACP2025-0711-1
All-optical multiplication of ultrastable lasers using Kerr microcomb chip
Yanlan Xiao, Heng Zhou
University of Electronic Science and Technology of China, China
We produced 100Kerr microcomb teeth, possessing integrated linewidth significantly below 1 Hz, therebymanufacturing 100state-of-the-art USLs. Our method holds potential to proliferate the use of ultrastable lasers in a wide range of applications.

09:15-09:30 · ACP2025-0724-4
Integrated Simulation Framework for Random-Fiber-Laser-Based Seed Source for ICF
Runnan Guan[1], Jing Zhang[1], Mengqiu Fan[2], Ke Yao[2], Yifei Qi[1], Zinan Wang[1*]
1.Key Lab of Optical Fiber Sensing and Communications University of Electronic Science and Technology of China, China;2.Laser Fusion Research Center China Academy of Engineering Physics, China
This work demonstrates RFL's potential to improve ICF driver performance and provides a reliable tool for optimizing future high-power laser systems.

09:30-09:45 · ACP2025-0816-3
Watt-level linearly polarized single-frequency fiber laser with unit-length high-concentration Yb-doped silica fiber
Yuxia Zheng, Zhaoyu Chen, Jianxiang Wen
Shanghai University, China
We prepared high-concentration Yb-doped silica fibers with high-gain coefficients for ultrashort-cavity single-frequency fiber lasers. A linearly polarized single-frequency fiber laser with watt-level output power per unit-length was achieved.

09:45-10:00 · ACP2025-0801-67
A Simple Narrow-Linewidth Brillouin Random Fiber Laser with a Rayleigh-Scattering-Assisted Linear Cavity
Jinyang Hu, Pei Zhou*, Kun Liu, Wenxin Chen, Nianqiang Li
Soochow University, China
A compact Brillouin random fiber laser using a single SMF and mirror achieves 514.98 Hz linewidth via combined Brillouin gain and Rayleigh feedback, offering a low-cost solution for coherent light sources.

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Optical Fiber Lasers
Presider: Sze Yun SET, Tokyo Univeristy, Japan

10:30-11:00 · ACP2025-0801-102 **Invited**
Ultra-wideband Raman-amplified Coherent Transmissions
Dini Pratiwi[1], **Mingming Tan[1*]**, Wladek Forysiak[2]
1.Aston University, United Kingdom;2.University of Bristol, United Kingdom
We review recent Raman amplifiers technologies for ultra-wideband coherent transmission and compare Raman amplifiers and doped-fibre amplifiers for unconventional bands.

11:00-11:30 · ACP2025-0915-2 **Invited**
Applications of carbon nanotube mode-locked fiber lasers
Chengbo Mou
Shanghai University, China
TBD

11:30-11:45 · ACP2025-0729-35
Noise Suppression in a Passively Harmonic Mode-locked Er-doped Fiber Laser with Carbon Nanotubes Film
Kailin Jiang[1], Qianqian Huang[1], Jiaxin Xu[1], Kai Wang[1], Lilong Dai[1], Haochen Tian[2], Youjian Song[3], Hairun Guo[1], Chengbo Mou[1*]
1.Shanghai University, China;2.National Institute of Metrology, China;3.Tianjin University, China
We report the reduction of relative intensity noise and timing jitter in a passively harmonic mode-locked Er-doped fiber laser based on a single-walled carbon nanotube film saturable absorber by employing a pump current feedback scheme.

11:45-12:00 · ACP2025-0801-82
Improving Beam Quality of Yb-doped Fiber Laser near 980 nm via Gain Filtering
Shangde Zhou, Jiufeng Li, Jianqiu Cao*, Maoni Chen, Aimin Liu, Zefeng Wang, Lei Si*, Jinbao Chen
College of Advanced Interdisciplinary Studies, National University of Defense Technology, China
Beam quality improvement of confined Yb-doped fiber amplifier operating near 980 nm is demonstrated experimentally. Because of gain filtering of higher-order modes, the M^2 factor of signal light is lowered from 2.05 to 1.51.

12:00-13:30 Coffee Break

13:30-15:30 · November 8, 2025 · Saturday
Optical Fiber Amplifiers and applictaions
Presider: TBD

13:30-14:00 · ACP2025-0728-15 **Invited**

Multicore Fiber Amplifier with Energy-efficient Pump Integration

Sijing Liang[1], John Downie[2], Jason Hurley[2], Lidia Galdino[3], Periklis Petropoulos[1], Yongmin Jung[1]
1.University of Southampton, United Kingdom;2.Corning Research and Development Corp., United States;3.Corning Incorporated, United States

We review recent progress in developing energy-efficient multicore fiber (MCF) amplifiers for future submarine systems. A novel MCF amplifier integrated with a pump light distributor was developed and characterized for transoceanic transmission over 4-core fiber.

14:00-14:30 · ACP2025-0728-20 **Invited**

Energy efficient multi core optical amplifiers

Haoshuo Chen
Nokia Bell Labs, United States

TBD

14:30-14:45 · ACP2025-0815-29

High-power polarization-maintaining single-frequency Brillouin fiber laser in the 1.5 μm band with ultra-high optical signal-to-noise ratio

Minhao Lu, Liyang Wang, Bolun Pan, Xiaojie Guo*
Jinan University, China

We demonstrate a watt-level single-frequency Brillouin fiber laser by employing polarization-maintaining fiber in a short ring cavity, achieving ultra-high optical signal-to-noise ratio (no less than 81 dB), 38-fold linewidth narrowing and 1535~1560-nm tuning range.

14:45-15:00 · ACP2025-0815-103

Widely-tunable Mode-locked Tm-doped Fiber Laser based on Nonlinear Polarization Rotation

Jianwei Zhou, Feng Tian*, Jing Zhang, Jue Wang, Chengda Huo, Qi Zhang, Qinghua Tian, Fu Wang
Beijing University of Posts and Telecommunications, China

A widely tunable Tm-doped mode-locked fiber laser based on nonlinear polarization rotation is demonstrated, which can operate at wavelengths ranging from 1932 nm to 1978 nm and the tuning range is up to 46 nm.

15:00-15:15 · ACP2025-0731-109

400G-BASE-LR4 transmission over 25 km SSMF using O-band distributed Raman amplifier

Dini Pratiwi[1*], Aleksandr Donodin[1], Vladimir Gordienko[1], Mohammed Patel[1], Ruben S. Luis[2], Andrew Ellis[1], Sergei Turitsyn[1], Wladek Forysiak[3], **Mingming Tan**[1]
1.Aston University, United Kingdom;2.NICT, Japan;3.University of Bristol, United Kingdom

We experimentally investigate 400GBASE-LR4 transceiver performance over an extended reach of 25km SSMF. Using a single wavelength (1195nm), low power Raman amplifier, a decade improvement in BER was measured from 1273nm to 1315nm

15:15-15:30 · ACP2025-0801-29 **Industry Innovation Nomination**

Investigation of Weakly-coupled Multi-core EDFAs With Core and Cladding Pump Schemes

Yuanpeng Ding[1*], Baolong Zhu[2], Lei Shen[1*], Junjie Qi[1], Xin Huang[1], Zhaolong Liao[1], Shiqi Zhou[1], Lei Zhang[1], Jie Luo[1]
1.Yangtze Optical Fibre and Cable Joint Stock Limited Company, China;2.Peking University, China

Weconstructedcore-pumped and cladding-pumped 4-core EDF amplifiers. With multi-wavelength channel signals, both exhibited gain around 25 dB, while the core-pumped demonstrated a maximum CGD of 1.299 dB and NF below 6 dB.

15:30-16:00 Coffee Break

16:00-17:30 · November 8, 2025 · Saturday

Optical Fiber Applications

Presider: Sijing Liang, University of Southampton, United Kingdom

16:00-16:30 · ACP2025-0915-1 **Invited**

TBD

Kevin Chen

University of Pittsburgh, United States

TBD

16:30-16:45 · ACP2025-0820-4

Non-Monotonic Variation of Water Vapor Absorption in Sealed-End Hollow-Core Fibers over 20-240°C

Nuo Li[1], Caoyuan Wang[1], Yu Qin[1], Jie Zhu[1], Dahao Xu[1], Yichun Shen[2], Limin Xiao[1*]

1. Fudan University, China;2.R&D Department Zhongtian Technology Advanced Materials Co., Ltd. China

We demonstrated the temperature-dependent variation of water vapor absorption in hollow-core fibers (HCFs) with sealed splicing ends over a temperature range of 20–240°C. Two main trends were identified: an increase in water vapor absorption was observed below approximately 170°C, whereas a gradual decrease occurred as the temperature increased up to 240°C. The absorption behavior suggests that the initial increase is primarily due to the removal of physically adsorbed water.

Keywords：water vapor, absorption, hollow-core fibers

16:45-17:00 · ACP2025-0731-8

Modal Bandwidth and VCSEL Transmission Capability of Multimode Fibers at Long Wavelengths Including 980 nm and 1060 nm

Xin Chen[1*], Hao Dong[1], Hao Chen[2], Simit Patel[1], David Meagan[1], Ming-Jun Li[1]

1.Corning Incorporated, United States Minor Outlying Islands;2.Corning Optical Communications China, China

Through Monte Carlo simulation, we obtained the modal bandwidth of common types of multimode fibers at long wavelengths from 950-1090 nm. The VCSEL transmission reaches for 25/50/100G are calculated to provide guidance for relevant applications.

Track 2: Optical Transmission Systems, Subsystems and Technologies

13:30-15:45 · November 6, 2025 · Thursday
AI-assited optical communications
Presider: Jingchi Li, Shanghai Jiao Tong Univerisity, China

13:30-14:15·ACP2025-0707-3 **Tutorial**
Advancing the next generation of photonic systems using machine learning
Darko Zibar*
Technical University of Denmark, Denmark
The 2024 Nobel Prize in Physics underscores the growing influence of machine learning in diverse areas of physical science. In this talk, the application of machine leanirng for end-to-end-learning for fiber-optic communication will be adressed

14:15-14:45·ACP2025-0707-2 **Invited**
Recent advances and future challenges in machine learning-aided fiber-optic communication systems
Faisal Nadeem Khan*
Tsinghua Shenzhen International Graduate School, Tsinghua University, China
We discuss recent developments in ML-assisted methods for various key network functionalities including QoT-estimation, channels power-optimization, failures prediction/localization, etc. Moreover, we highlight several technical/non-technical challenges of ML-based approaches in real-world networks and suggest potential solutions.

14:45-15:15·ACP2025-0731-87 **Invited**
Digital and Neuromorphic Optical Signal Processing for AI Intra-Datacenter Networks
Stephan Pachnicke[1*], Sebastian Kuehl[1], Mohammad Seifi Laleh[1], Silas Oettinghaus[1], Annika Dochhan[1], Robert Killey[2], Polina Bayvel[2]
1.Kiel University, Germany; 2.UCL, United Kingdom
DSP-based and optical reservoir computing (RC)-based signal processing are compared for application in short-reach 112 Gbaud PAM transmission. A photonic integrated circuit is presented for multi WDM-channel signal equalization using a parallel micro-ring resonator RC.

15:15-15:30·ACP2025-0507-1
Attentive Dual-Scale Residual Neural Network for Rogue ONU Identification in Low-Quality Data Scenarios
Handong He[1,2], **Xiatao Huang[1,2],** Li He[1,2*], Weiliang Zhang[1,2], Wei Duan[1,2*], Lei Tang[1,2], Xingang Huang[1,2], Bo Liu[1,2], Yifeng Xiong[1,2]
1.ZTE Corporation, China; 2.State Key Laboratory of Mobile Network and Mobile Multimedia Technology, China
We propose a novel rogue ONU identification method utilizing 2D feature mapping and attentive dual-scale residual connections, achieving average accuracies of 92.09% and 96.37% for 32 ONUs in limiting amplifier and 1 SPS scenarios.

15:30-15:45·ACP2025-0801-88
EDFA Operator: An Accurate and Generalized Neural Operator for Gain Modeling of EDFA
Xiaotian Jiang[1*], Xin Qin[1], Yadong Gong[1], Anxu Zhang[1], Xiaowei Lou[2], Yuqing Han[1], Zheqing Lv[1], Xiaoli Huo[1], Junjie Li[1]
1.China Telecom Research Institute, China; 2.China Telecom Intelligent Network Technology Co.Ltd., China
We propose a neural operator combining Deep operator network and Fourier neural operator for gain modeling of EDFAs. The operator shows low prediction and generalization errors of 0.0472dB and 0.0486dB in accuracy and extrapolation tests.

15:45-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Optical networks and transmissions
Presider: Chao Li, Pengcheng Laboratory, China

16:00-16:30·ACP2025-0927-1 **Invited**
Silicon Photonic Self-Coherent Detetion Receivers for Optical Interconnects
Jingchi Li, Yikai Su
Shanghai Jiao Tong University, China
The unprecedented surge in distributed training of large-scale AI models relies on massively parallel optical interconnects across data-centers, which demand high-capacity and low-cost integrated photonic interconnects. Here we demonstrate several SiP self-coherent receivers which support up to single-polarization 600 Gb/s transmission over 80-km single-mode fiber.

16:30-16:45·ACP2025-0710-1 **Industry Innovation Nomination**
First Real-time 62.1 Tb/s DWDM Data Center Interconnect Over a Seamless 87 nm Optical Spectrum Based on Unified Optics
Yuqian Zhang[1], Mingqing Zuo[1], Dongchen Zhang[2], Junjie Qi[3], Dawei Ge[1], Dong Wang[1], Baoluo Yan[2], Hu Shi[2], Zhaolong Liao[3], Lei Shen[3,4], Dechao Zhang[1*], Han Li[1]
1.Department of Fundamental Network Technology, China Mobile Research Institute, China; 2.WDM System Department of ZTE Corporation, China; 3.State Key Laboratory of Optical Fiber and Cable Manufacture Technology, YOFC, China; 4.Optical Valley Laboratory, China
The first real-time 62.1Tb/s transmission over a seamless 87nm spectrum across 80km G.652.D fiber is demonstrated using a unified C+L-band system. The prototype employs broadband EBDFA, simplifying dual-band optics for high-speed data center interconnect.

16:45-17:00·ACP2025-0801-101
Neural Network modified ISRS GN model for accurate QoT estimation in ultra-wideband optical transmission system
Huitong Yang[1], Mingqing Zuo[2], Chenyang Ma[1], Boxiong Cui[1], Zhengyang Xie[1*], Dong Wang[2*]
1.Beihang University, China; 2.China Mobile Research Institute, China
We construct a neural network thatcorrects closed-formISRS GN model. The result is shown thatsignal to noise ratio evaluation errors over ±0.5 dB are lower to 6.7% (training dataset) and 14.4% (verifying dataset).

17:00-17:15·ACP2025-0731-39
Non-Orthogonal Digital-Analog Hybrid Optical Transmission Using Fiber Dispersion in Multi-Distance Passive Optical Network
Jinwoo Park, Joungmoon Lee, Sang-Kook Han[*]
Yonsei University, Korea
Non-orthogonal digital-analogue hybrid optical transmission in multi-distance PON is proposed to increase spectral efficiency and demonstrated with proof-of-concept experiments. Dispersion-induced power fading (DIPF) of optical fiber is deliberately utilized to mitigate interference between heterogeneous signals.

17:15-17:30·ACP2025-0801-191
100-Gb/s Complex-valued Double-sideband Direct-detection PON with 42-dB Optical Power Budget
Xingfeng Li, Xu Zhang[*], Hui Chen, Yao Lu, Honglin Ji, Zhaopeng Xu, Peng Sun, Siyue Jin, Tonghui Ji, Shuchao Mi, Bo Wu, Chao Li, Qibing Wang, Zichen Liu, Zhixue He[*], Shaohua Yu
Pengcheng Laboratory, China
We propose a complex-valued double-sideband direct-detection PON architecture based on a deep-learning-enabled optimal direct-detection receiver. We demonstrate a record 42-dB optical power budget for 100-Gb/s direct-detection PON over 20-km standard single-mode fiber.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Short-reach optical communications
Presider: Junwei Zhang, Sun Yat-sen University, China

08:30-08:45·ACP2025-0723-2

High-speed, Low-complexity and Real-time FPGA Implementation of PAM-4 Lite-DSP Receiver for IM/DD Optical Data Links

Jianyu Wang[1,2], Jianwei Tang[1], Yaguang Hao[1], Xiuquan Cui[1], Linsheng Fan[1], Zhongliang Sun[1], Junpeng Liang[1], Zhaopeng Xu[1], Yanfu Yang[2*], Weisheng Hu[1], Jinlong Wei[1*]

1.Pengcheng Laboratory, China; 2.Harbin Institute of Technology, Shenzhen, China

We implement a low-complexity Lite-DSP based on FPGA for IM/DD optical data links, achieving real-time 29.4912 Gbps PAM4 transmission over 10 km SSMF with BER below the 7% HD-FEC threshold using a 1550 nm DML.

08:45-09:00·ACP2025-0724-16

Cost-Effective and Low-Power Dual Polarization 400-Gb/s 16-QAM Transmission with FSON-Based Coherent Data Centre Interconnects

Lei Liu, Liu Feng, Dayu Shi, William Shieh[*]

Westlake University, China

We propose and experimentally demonstrate the cost-effective and low-power dual-polarization coherent detection application for data center interconnects based on the FSON architecture. We achieve polarization and coherent demultiplexing of 400-Gb/s DP-16QAM signals by using PACL in optical domain with a single ECL and low-power AOM.

09:00-09:15·ACP2025-0729-43

Delay Interferometer-based Stokes Vector Receiver for Power Fading Mitigation of Dual-polarization IM/DD Systems

Puzhen Yuan[1], Yuhao Fang[1], Haojie zhang[1], Xue Cheng[2], Dayu Shi[1], Weiqi Lu[1], Zexu Liu[1], William Shieh[1,2]

1.Westlake University, China; 2.Westlake Institute for Optoelectronics, China

We propose a novel delay interferometer-based Stokes vector receiver architecture for mitigating CD-induced power fading in dual-polarization IM/DD Systems, verified by a 200-Gb/s DP-PAM4 transmission over 20-km SSMF, and 100-Gb/s DP-NRZ transmission over 50-km SSMF.

09:15-09:30·ACP2025-0801-134

Efficient Block-Wise Additive Powers-of-Two Quantization for CNN Equalizer in 135 Gb/s PAM-8 DML-Based IM/DD System

Cancan Chen[1,2], Zhaopeng Xu[1*], Qi Wu[3], Tonghui Ji[1], Honglin Ji[1], Hui Chen[1], Yingying Zhou[1], Jianwei Tang[1], Zhongliang Sun[1], Linsheng Fan[1], Junpeng Liang[1], Jinlong Wei[1], Yuan Jiang[2], Zhixue He[1], Weisheng Hu[1]

1.Pengcheng Laboratory, China; 2.Sun Yat-sen University, China; 3.The Hong Kong Polytechnic University, Hong Kong, China

We propose an efficient block-wise APoT quantization scheme for CNN equalizers in DML-based IM/DD systems. This block-wise strategy enables reliable 135 Gb/s transmission using only 7-bit parameter quantization, maintaining the BER below the 20% SD-FEC threshold while achieving a 78% reduction in memory usage.

09:30-09:45·ACP2025-0815-123

C-band 150Gbaud PAM-4 2.8km Transmission in a 60GHz Bandwidth-limited system enabled by AR-HCF and PF-MLSE

Shouchuan Ma[1,2], Qibing Wang[1], Chao Li[1], Xu Zhang[1], Wei Ding[3], Yingying Wang[3], Xinke Tang[1], Ke Li[1], Lei Wang[1], Zhixue He[1], Jian Song[2]

1.Pengcheng Laboratory, China; 2.Tsinghua University, China; 3.Jinan University, China

We demonstrate 150-Gbaud PAM-4 transmission over 2.8-km AR-HCF at C band using FFE-PF-MLSE equalization, achieving BER of 8.5×10^{-3}, well below the 15% SD-FEC threshold.

09:45-10:00·ACP2025-0815-69

Balanced Photodetection-Enabled Performance Improvements for Analog Mobile Fronthaul Transmissions Using FBG-Based PMDD

Mingliang Deng[*], Ke Li, Huachun Chen, Qiang Liu, Chunsun Deng, Ao Li

Chongqing University of Posts and Telecommunications, China

A BPD is proposed to improve the receiver sensitivity and relax the requirements of the laser wavelength stability for analog MFH links with FBG-enabled PMDD. Simulation results show thata transmission distance- and modulation format-independent receiver sensitivity improvement of ~1.6dB is obtained. Moreover, the minimum EVM merely increases by 1% over a laser frequency drift of 3.6GHz.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
SDM
Presider: Xiaodan Pang, Zhejiang University, China

10:30-11:00·ACP2025-0801-47 **Invited**

High-Capacity Optical Fibre Communications Using Orbital Angular Momentum Modes

Jie Liu

Sun Yat-sen University, China

The unique physical properties of OAM modes enable low-crosstalk, high-density, and large-capacity fiber-optic transmission, supporting simplified MIMO processing and scalable mode-channel multiplexing per fiber.

11:00-11:15·ACP2025-0731-97

Real-time 4-core Transmission over 125 μm cladding G.654.E-compatible MCF by C+L band FIFO-less MC-EDFA

Shuailuo Huang[1], Yanbiao Chang[1], Shikui Shen[1], Shuo Xu[2], Lei Shen[2], Lei Zhang[2], Jie Luo[2], He Zhang[1], Zelin Wang[1], Guangquan Wang[1], Xiongyan Tang[1*]

1.State Engineering Research Center of Next Generation Internet Broadband Service Applications, China Unicom Research Institute, China; 2.State Key Laboratory of Optical Fibre and Cable Manufacture Technology, YOFC, China

Real-time 115.2Tb/s and 230.4Tb/s transmission over 125 μm cladding G.654.E-compatible MCF is successfully demonstrated by C+L band FIFO-less MC-EDFA, in which the impact of inter-core crosstalk on transmission performance is investigated.

11:15-11:30·ACP2025-0801-15

956.94-Bit/s/Hz Spectral-Efficiency Transmission over 10-km 19-Core Ring Core Fiber with Low-Complexity 4 x 4 MIMO Equalization

Hualin Li[1], Junyi Liu[1], Jie Liu[1*], Haolin Zhou[1], Shuqi Mo[1], Yuming Huang[1], Yining Huang[1], Lei Shen[2], Shuo Xu[2], Lei Zhang[2], Jie Luo[2], Zhaohui LI[1*], Siyuan Yu[1*]

1.Sun Yat-sen University, China; 2.Yangtze Optical Fibre and Cable Joint Stock Limited Company State Key Laboratory of Optical Fibre and Cable Manufacture Technology, China

We achieved a GMI-estimated spectral efficiency of 956.94 bit/s/Hz over a 10-km, 19-core ring-core fiber by transmitting 266 OAM modes on five WDM channels with low-complexity 4 x 4 MIMO equalization.

11:30-11:45·ACP2025-0815-74

First Demonstration of Real-time 0.67Pb/s Transmission over 356-km 7-Core Fiber using 135-Gbaud C+L-band 1.2Tb/s OTN Transponders

Cheng Chang[1*], **Jian Cui**[1], Yuxiao Wang[2], Yating Zhang[3], Yu Deng[1], Zhuo Liu[1], Chao Wu[1], Zilin Fan[1], Bin Hao[1], Leimin Zhang[1], Yong Chen[2], Bin Wu[2], Shang Cao[3], Shenghui Hu[3], Haibin Liu[3], Lei Shen[4], Lei Zhang[4], Jie Luo[4], Yan Sun[1], Qi Wan[1], Bing Yan[2], Ninglun Gu[1]

1.Department of Networks, China Mobile Communications Group Co., Ltd., China; 2.Network Management Center, China Mobile Communications Group Shandong Co., Ltd., China; 3.Huawei Technologies Co.,Ltd., China; 4.State Key Laboratory of Optical Fibre and Cable Manufacture Technology, YOFC, China

Ultra-high-speed real-time 0.67Pb/s transmission over 356-km multi-core fiber is demonstrated, which is achieved by using length-optimized weakly-coupled 7-core fiber and 135-Gbaud C+L-band 1.2Tb/s OTN transponders with PCS-64QAM modulation format.

11:45-12:00·ACP2025-0801-89

Experimental Validation of 6-Mode Transmission with Neural Network-aided Soft Demapper

Chenxu Huang, Ziyang Lu, Can Zhao, Zhiwei Liang, Yi Lei, Qingqing Hu, Bin Chen[*]

Hefei University of Technology, China

We experimentally validate the NN-aided soft-decision demapper via a 6-mode SDM fiber transmission system. The results demonstrate that the proposed demapper outperforms the conventional demapperby up to a factor of 80 in terms of BER for 1Tbps/λ transmission over 73km.

12:00-13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday
Advanced fiber communication
Presider: Kangping Zhong, Hong Kong Polytechnic University, Hong Kong, China

13:30-14:00·ACP2025-0729-2 **Invited**
Optical and Terahertz Wireless Communications for 6G and Beyond
Chengwei Fang[1], Md Osman Ali[1], Safa Alghadi[1], Mariam Abdullah[2], Shuo Li[1], Sithamparanathan Kandeepan[1], Withawat Withayachumnankul[2], Cuiwei He[3], **Ke Wang**[1*]
1.Royal Mebourne Institute of Technology (RMIT University), Australia; 2.The University of Adelaide, Australia; 3.Japan Advanced Institute of Science and Technology (JAIST), Japan
This work explores emerging optical and terahertz wireless technologies driving 6G and beyond, highlighting breakthroughs in ultra-high-capacity transmission, integrated photonic/THz systems, and their potential to enable high-capacity and ubiquitous future wireless networks.

14:00-14:30·ACP2025-0915-4 Invited
TBD
Di Che
Nokia Bell Labs, United Sates
TBD

14:30-14:45·ACP2025-0801-197
68.90 Gbps Visible Light Communication System Based on Integrated Quintuple-laser and Iterative Nonlinear Algorithm
Zhiwu Chen[1], Wenting Ju[1], Yuhan Hu[1], Zengyi Xu[1], Xiaofan Xu[2,3,4], Nan Chi[1*]
1.College of Future Information Technology, Fudan University, China; 2.State Key Laboratory of Satellite Network, China; 3.Shanghai Key Laboratory of Satellite Network, China; 4.Shanghai Satellite Network Research Institute Co., Ltd., China
We propose a turbulence-resistant high-speed visible light communication system that employs polarization diversity and nonlinear iterative reconstruction algorithm. We design anintegrated quintuple-laser to achieve68.90 Gbps data transmission over a 2-meter free-space link.

14:45-15:00·ACP2025-0801-49
Turbulence-Resilient Visible Light Communication System Utilizing Polarization Diversity Reception and Dual-Branch Reservoir Computing Equalizer
Suning Guan[1], Zijian Zhou[1], Zhilan Lu[1], Zhe Feng[1], Guowei Jiang[2], Nan Chi[1*]
1.Fudan University, China; 2.Tongji University, China
This paper proposes a dual-branch reservoir computing equalizer for a visible light communication system with polarization diversity reception and NLTCP encoding, mitigating nonlinear distortion, achieving a10 Gbps data rate, and maintaining BER below 3.8E-3.

15:00-15:15·ACP2025-0815-115
Demonstration of 1.25Tbit/s Atmospheric Turbulence Transmission Based on a Dual-Aperture Spatio-Temporal Fusion Receiver
Fang Dong[1], Nan Chi[1*], Haoyu Zhang[1], Zhilan Lu[1], Zhe Feng[1], Yuan Wei[1], Guowei Jiang[2,3,4], Jianyang Shi[1], Junwen Zhang[1]
1.Fudan University, China; 2.State Key Laboratory of Satellite Network., China; 3.Shanghai Key Laboratory of Satellite Network., China; 4.Shanghai Satellite Network Research Institute Co., Ltd, China
We propose a dual-aperture spatio-temporal fusion network (STFN) receiver to mitigate atmospheric turbulence in free-space optical (FSO) communications. Compared with conventional diversity reception techniques, the 2D-STFN can reduce signal reconstruction loss caused by signal-to-noise ratio (SNR) estimation errors, enabling optimal fusion of multi-aperture signals. We demonstrate a 1.25-Tbit/s DWDM atmospheric turbulence transmission system based on a 2D-STFN, achieving up to a 2.5 dB Q-factor improvement per subcarrier.

15:15-15:30·ACP2025-0815-153
Non-Line-of-Sight Full-Duplex Communication System Based on UV-LEDs
zhiyan Chen[1,2], Lihang Liu[1], Yuru Tang[1,2], Ru i Jiang[2], Xinke Tang[2], H.ongyan Fu[1]
1.Tsinghua Shenzhen International Graduate School Tsinghua University, China; 2.Pengcheng Laboratory, China;
We propose and experimentally demonstrate a reflective non-line-of-sight full-duplex communication system based on UV-LEDs and wavelength division duplexing. Highly sensitive SiPMs are employed for the signal detection and RRC filters are used to mitigate the ISI caused by multipath effects. This system can achieve full-duplex communication with a maximum data rate of about 50 Mbps at transmission distance longer than 2 m.

15:30-16:00 Coffee Break
15:30-17:30 Poster Session
18:30-20:30 Banquet & Awards Ceremony

08:30-10:00 · November 8, 2025 · Saturday
Hollow-core fiber transmisions
Presider: Lin Sun, Soochow University, China

08:30-09:00·ACP2025-0429-2 **Invited**
Ultra-High Capacity Optical Transmission over Anti-Resonate Hollow-Core-Fiber
Xumeng Liu, Zhixue He, Chao Li*
PengCheng Laboratory, China
Anti-resonant hollow-core fibre (AR-HCF) has witnessed rapid development both in fiber fabrication and system demonstrationin the last several years. In this talk, we propose and experimentally demonstrate breakthrough achievements for optical transmission in AR-HCF.

09:00-09:30·ACP2025-0915-26 **Invited**
High-Speed O-Band Ring Resonator Modulators for Short-Reach Optical Interconnects
Oskars Ozolins[1*], Armands Ostrovskis[2], Darja Cirjulina[2], Toms Salgals[2], Minkyu Kim[3], Peter De Heyn[3], Michael Koenigsmann[4], Benjamin Krueger[4], Fabio Pittalà[4], Hadrien Louchet[4], Lu Zhang[5], Xianbin Yu[5], Vjaceslavs Bobrovs[2], Xiaodan Pang[2, 5]
1.RIga Technical University, Latvia; 2.Riga Technical University, Latvia; 3.imec, Belgium; 4.Keysight Technologies Deutchland, Germany; 5.Zhejiang University, China
We compare recent O-band silicon photonics (SiP) ring resonator modulator (RRM) designs with lateral p-n junction (LPN)and vertical PN (VPN).We achievebetter sensitivity with VPN design for both 200 Gbaud OOK and 112Gbaud PAM4 at 6.25% overhead HD-FEC performance threshold (a BER of 4.5×10^{-3}) after transmission over 500 meters of single-mode fiber (SMF).

09:30-09:45·ACP2025-0731-56
WDM cyclic-prefix-free affine frequency division multiplexing transmission over DNANF
Jiajia Shen[1], Yu Qin[2], Suiyao Zhu[3], Mingyi Gao[1*], Limin Xiao[2], Yichun Shen[4], Jie Zhu[2], Gangxiang Shen[1]
1.Soochow University, China; 2.Fudan University, China; 3.Harbin Institute of Technology, China; 4.Zhongtian Technology Advanced Materials Co, China
In this work, we experimentally demonstrated a wavelength-division multiplexingcyclic-prefix-free affine frequency division multiplexing (AFDM) transmission over 5-km double-nested antiresonant nodeless fiber (DNANF), achieving 193.75 Gb/s data rates for high-speed industrial Internet of Things applications.

09:45-10:00·ACP2025-0801-132
10.7-Tb/s Unrepeatered WDM Transmission with > 1.2-Tb/s/λ signals over 217.1-km AR-HCF by EDFA-only Amplification
Siyuan Liu[1], Dawei Ge[2*], Qiang Qiu[3], Yiqi Li[3], Peng Li[4], Mingqing Zuo[2], Baoluo Yan[3], Dong Wang[2], Lei Zhang[4], Dechao Zhang[2], Jie Luo[4], Han Li[2], Zhangyuan Chen[1*]
1.State Key Laboratory of Photonics and Communications, Peking University, China; 2.Department of Fundamental Network Technology, China Mobile Research Institute, China; 3.WDM System Department of Wireline Product R&D Institute, ZTE Corporation, China; 4.State Key Laboratory of Optical Fiber and Cable Manufacture Technology, YOFC, China
A record unrepeatered 10.7-Tb/s (1.2-Tb/s/λ) 8λ-WDM transmission with EDFAs only over 217.1-km anti-resonant hollow-core fiber (AR-HCF) was experimentally demonstrated by leveraging AR-HCF's ultralow nonlinearity, in which high-spectral-efficiency single-carrier 148-GBd DP-144QAM-PCS signals were used.

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Transmission systems and devices
Presider: Wen Zhou, Fudan University, China

10:30-11:00·ACP2025-0701-1 **Invited**
400Gb/s and Beyond Transmission Systems: Exploring Future Directions and Design Trade-offs
Baoluo Yan[1, 2*], Cuifeng Sun[3], Qiang Qiu[1, 2], Wenbo Yu[1, 2], Zhenhua Feng[1, 2], Hu Shi[1, 2]
1.WDM System Department of Wireline Product R&D Institute, ZTE Corporation, China; 2.State Key Laboratory of Mobile Network and Mobile Multimedia Technology, China; 3.China Mobile Information Technology Co., Ltd., China
This paper explores design trade-offs in extending high-speed optical transmission beyond 400G towards multi-Terabit long-haul systems, with a focus on reach, spectral efficiency, and practical deployment limits, ect.

11:00-11:30·ACP2025-0721-6 **Invited**

Towards Energy-Efficient Coherent Transceivers via Optical Offload Architecture

Yohei Sobu[1,2*], Hanwei Chen[1,2], Shinsuke Tanaka[1,2]

1.PETRA, Japan; 2.1FINITY inc., Japan

Lower power consumption and higher integration density of coherent transceivers are expected to become key challenges in meeting future demands. We propose a compact, energy-efficient transceiver architecture through offloading key functions from electronics to photonics.

11:30-11:45·ACP2025-0815-14

Field demonstration of lossless RDMA over 50G PON

Feng Zhu, **Tao Zeng***, Xinran Huang, Ming Jiang, Dezhi Zhang

China Telecom Research Institute, China

For the first time, field demonstration of lossless RDMA over 50G-PONfor storage-compute disaggregation and data ingestion services is achieved.

11:45-12:00·ACP2025-0801-26

Experimental Coexistence of Quantum Key Distribution and L-band Classical Communication over Hollow-core Fiber

Weiwen Kong[1], Tianqi Dou[1*], Yuheng Xie[1], Lei Zhang[2], Peng Li[2], Song Gao[3], Lipeng Feng[1], Nan Lu[4], Yongmei Sun[5], Jianjun Tang[1*]

1.China Telecom Research Institute, China; 2.State Key Lab. of Opt. Fib. and Cab. Manuf. Tech. YOFC, China; 3.QuantumCTek Corporation Limited, China; 4.ZTE corporation, China; 5.State Key Lab. of Info. Photo. and Opt. Comm. Beijing Univ. of Posts and Telecom., China

We experimentally demonstrate the coexistence of L band classical communications and QKD over 101.6 km hollowcore fiber, with a classical capacity of 13.6 Tbps and a secure key rate maintained above 8 kbps.

12:00-13:30 Lunch Break

13:30-15:30 · November 8, 2025 · Saturday
Optical wireless and teraherz communications
Presider: Lu Zhang, Zhejiang University, China

13:30-14:00·ACP2025-0820-1 **Invited**

Demonstration of FSO emergency communication for UAVs and research on its security technology

Wu Tingwei*, Guo Lei

Chongqing University of Posts and Telecommunications, China

This report will introduce the team's latest demonstration of the Free Space Optical (FSO) system for unmanned aerial vehicles (UAVs). Together with Chongqing Telecom, the UAV FSO was tested for network access at the Chongqing Mobile Bureau. The performance of the UAV FSO communication system in emergency communication was verified by connecting the UAV FSO communication system relay to the carrier network through BBU/RRU. At the same time, the FSO communication transmission security and BER transmission performance were improved through chaotic encryption and coding modulation techniques.

14:00-14:30·ACP2025-0911-2 **Invited**

Long-range AI-aided 6G photonics THz transmission technology

Wen Zhou

Fudan University, China

Nonlinear effects mitigation is essential for 6G terahertz wireless communication. This article proposes model driven and complex neural network terahertz digital coherent receiver modules, respectively, which effectively improve long-range THz transmission capability.

14:30-14:45·ACP2025-0730-22

A Location-Aware Angular Diversity Scheme for MIMO Visible Light Communication Receivers

Xiaochuan Zhang[1], Haoqi Zhang[1], Xiaodi You[1*], Xinwei Du[2], Jian Chen[3], Changyuan Yu[4], Mingyi Gao[1], Gangxiang Shen[1]

1.Soochow University, China; 2.Beijing Normal-Hong Kong Baptist University, China; 3.Nanjing University of Posts and Telecommunications, China; 4.The Hong Kong Polytechnic University, Hong Kong, China

We propose a location-aware angular diversity scheme for multiple-input multiple-output visible light communication receivers. Using sequential number-theoretic optimization, it efficiently reduces channel correlation and expands the reliable communication area from 39.2% to 73.1%.

14:45-15:00·ACP2025-0731-130
Beyond Gbps Intra-Satellite Optical Wireless Communications Using Limiting Amplifier
Hewei Tian[1,2], Henghao Cheng[1,2], Jianhua He[1,2], Yongsheng Gong[1,2], Yifang Xie[1,3], Lu Lu[1,2*]
1.University of Chinese Academy of Sciences, China; 2.Technology and Engineering Center for Space Utilization, Chinese Academy of Sciences, China; 3.National Space Science Center, Chinese Academy of Sciences, China
OptiG is a Gbps optical dongle for intra-satellite wireless communications with compact design. It uses laser diode, PIN detector, and FPGA processor, achieving 1.2 Gbps data rate by extending link bandwidth from 246 MHz to 610 MHz through limiting amplifiers.

15:00-15:15·ACP2025-0731-76
Over 1 Gbps underwater non-line-of-sight visible light communication system utilizing integrated 2*2 MIMO receiver
Zhe Feng[1], Yuhan Hu[1], Xiangdong Zhang[1], Zengyi Xu[1], Guowei Jiang[2,3,4], Nan Chi[1]
1.Fudan University, China;2.State Key Laboratory of Satellite Network, China; 3.Shanghai Key Laboratory of Satellite Network, China; 4.Shanghai Satellite Network Research Institute Co., Ltd, China
This paper presents a high-speed LED-based underwater Non-Line-of-Sight (NLoS) visible light communication (UVLC) system that utilizes a 488 nm green LED for transmitting a 16QAM signal and an integrated 2*2 MIMO receiver for reception over a 1.23-meter distance. The system employs waveform-level and symbol-level equalization, along with adaptive Bit Error Rate (BER)-based fusion algorithm. The results demonstrate that the proposed system achieves a communication rate exceeding 1 Gbps within a 48 mm wide optical spot. The maximum achievable data rate reaches up to 1.4 Gbps, showcasing the system's potential for high-speed UVLC in NLoS links.

15:15-15:30·ACP2025-0731-80
Real-Time Doppler Shift Tracking Scheme for LEO Satellite-Ground Links
KeXiang Wang, Ao Li, Zhengjie Wang, Xinpei Tang, Yaning Sun, Shuai Wei, Jifang Qiu, Yan Li*, Jian Wu
State Key Laboratory of Information Photonics and Optical Communications Beijing University of Posts and Telecommunications, China
This paper presents a real-time coherent receiver using digital signal processing-assisted automatic frequency control to compensate for Doppler frequency shift in LEO Satellite-Ground Links.

15:30-16:00 Coffee Break

16:00-17:30 · November 8, 2025 · Saturday
WDM transmisisons
Presider: Lipeng Feng, China Telecom Research Institute, China

16:00-16:30·ACP2025-0816-5 **Invited**
Recent advances in high-speed simplified coherent passive optical network
Xiang Li*
China University of Geoscience (Wuhan), China
This paper reviews recent progress on coherent passive optical network at data rates of 200 Gb/s. It discusses the technologies to realize the low-cost passive optical network with improved performance and channel condition monitoring abilities.

16:30-16:45·ACP2025-0813-7
Compressed Sensing-based Low-cost Silicon Photonics WDM Channel Monitor with High Tolerance to Chip Process Variations
Dongxu Zhang*, Xiaoan Huang, Xiaofeng Hu, Xiaobo Yi, Kaibin Zhang
Nokia Shanghai Bell Co Ltd, China
We design and evaluate a low-cost channel monitoring module that employs photonic integrated circuits and compressed sensing techniques for loss-of-light event detection in WDM transmission systems.Simulation demonstrates the design's robustness against chip process variations.

16:45-17:00·ACP2025-0815-12
4x10-Gb/s SWDM Optical Interconnect over 100-m GI-POF Based on VCSEL-based TOSA/ROSA
Siyuan Liu[1], Chengbin Long[1], Wei Chen[1], Albert Huang[2], Yezi Guo[2], Quanfei Fu[2], Yong Yang[2], Kuan Zhang[2], Junbin Huang[2*], Zhangyuan Chen[1*]
1.State Key Laboratory of Photonics and Communications, Peking University, China;2.AFALIGHT CO.,Ltd, China
This work presents the prototype of a VCSEL-based SWDM system over GI-POF, enabling a 100-m optical interconnect for 4x10-Gb/s NRZ signals. Using commercial SWDM TOSA/ROSA modules, the effectiveness of extending the capacity of POF through parallel wavelength paths is validated.

17:00-17:15·ACP2025-0815-150

GPU-Accelerated Simulation Architecture for Optical WDM-SDM System

Mengsheng Zhai, Tianwai Bo*, Siying Li, Jun Dong, Yihao Zhou, Zhongwei Tan, Yi Dong
Beijing Institute of Technology, China

We propose a GPU-based simulation architecture for optical transmission system based on multicore fiber (MCF). By developing an efficient matrix multiplication algorithm, the acceleration ratio reaches 45 and 67 for 2-core and 4-core MCF systems.

17:15-17:30·ACP2025-0705-1

Photon-Level Pulse Amplitude Distribution molding for PMT-Based NLOS Ultraviolet Optical Communication

Fengyu Cao, Tao Yang*, Haizhao Li, Zhiguo Zhang
Beijing University of Posts and Telecommunications, China

A novel Weibull-based model for PMT pulse amplitudes in NLOS UV communication is validated via Monte Carlo simulation. Incorporating gain fluctuations and pulse superposition effects, the optimized dual-threshold algorithm achieves 100x BER reduction at 102.34 dB loss, enabling robust photon-level detection under low-SNR conditions.

Track 2: Optical Transmission Systems, Subsystems and Technologies (Parallel Session)

13:30-15:30 · November 6, 2025 · Thursday
Passive optical networks
Presider: Xian Zhou, University of Science and Technology Beijing, China

13:30-14:00·ACP2025-0731-103 **Invited**
Innovation and Evolution Trends of High-Speed and Large-Capacity Optical Interconnection Networks
Xia Sheng*, Hao Liu*, Anxu Zhang, Yuyang Liu, Kai Lv, Yadong Gong, Xishuo Wang, Lipeng Feng, Xiaoli Huo
China Telecom Research Institute, China
This paper systematically reviewed the innovation and evolution trends of high-speed and large-capacity optical interconnection networks in both data center and telecommunication scenarios.

14:00-14:30·ACP2025-0814-10 **Invited**
50G and B50G Optical Access Networks
Ji Zhou[1*], Haide Wang[2*], Liangchuan Li[1*], Changyuan Yu[3], Xiangjun Xin[4]
1.Beijing Institute of Technology, Zhuhai, China; 2.Guangdong Polytechnic Normal University, China; 3.The Hong Kong Polytechnic University, Hong Kong, China; 4.Beijing Institute of Technology, China
The telecom operator has already begun commercially deploying 50G passive optical networks (PONs) to enable 10G access for end-users. The standardization of Beyond 50G (B50G) PON will soon be prioritized on the agendas of the International Telecommunication Union Telecommunication Standardization Sector and European Telecommunication Standards Institute. This talk will present the 50G and B50G optical access networks, including the architectures and algorithms.

14:30-14:45·ACP2025-0709-1
Reflection-Tolerant and Flexible Coherent PON with 240-Gbps Peak Super-Rate Supporting Simplified Coherent and Full-coherent Transceivers Based on Single-laser
Xuyu Deng, An Yan, Junhao Zhao, Penghao Luo, Yongzhu Hu, Renle Zheng, Jianyang Shi, Nan Chi, Junwen Zhang*
Fudan University, China
We propose a reflection-tolerant and flexible coherent PON solution based on interleaved TFDM, enabling bi-directional transmission with transceivers using single-laser. It supports both simplified- and full-coherent ONUs with compatible OLT-setup, achieving peak 240-Gbps super-rate access.

14:45-15:00·ACP2025-0721-5
Segment-level ODN Fault Localization based on Electrical Dispersion Compensator and APD ROSA in 50G-PON ONU Receiver
Han Hyub Lee*, Hwan Seok Chung
Electronics and Telecommunications Research Institute (ETRI), Korea
We present an ODN fault localization approach in 50G-PON using signal metrics from multiple ONUs. Eye height and APD current comparisons enable segment identification under loss and reflectance, without extra hardware.

15:00-15:15·ACP2025-0725-4
200Gb/s PON Upstream Demonstration with Class E2 Power Budget Employing Low-complexity Many-to-one Mapping Based DP-PS-PAM4
Xiaoshuo Jia[1*], Junwei Li[1], Jie Li[2], Yan Li[3], Ming Luo[2], Kailai Deng[2], Ning Wang[1], Zipiao Zhao[1], Jian Wu[3], Han Li[1], Dechao Zhang[1*]
1.China Mobile Research Institute, China; 2.China Information and Communication Technologies Group Corporation, China; 3.Beijing University of Posts and Telecommunications, China
A low-complexity distribution-matcher-free many-to-one mapping based double-polarization probabilistic shaped PAM4 (DP-PS-PAM4) operating at 200-Gb/s/λ is investigated over a 20-km passive optical network (PON) upstream, whose power budget reaches up to 36-dB (class E2) with the intensity-modulation and coherent-detection structure.

15:15-15:30·ACP2025-0801-90
Experimental Demonstration of Laser Sharing Simplified Coherent Receiver for 100Gbit/s Coherent PON Downstream
Wenyu Wang*, Haiqiang Wei, Changyuan Yu, Chao Lu, Alan Pak Tao Lau, Kangping Zhong
The Hong Kong Polytechnic University, Hong Kong, China
In this paper, we proposed a laser sharing simplified coherent passive optical network (PON) downstream architecture to reduce the cost and maintenance for ONUs. We successfully demonstrated 100Gbit/s per lambda downstream for 16 ONUs sharing only one laser. Power budget higher than 33dB is achieved for all ONUs.

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Advanced optical communications
Presider: Yanni Ou, Beijing University of Posts and Telecommunications, China

16:00-16:30·ACP2025-0630-1 **Invited**
HIC-OTN for intelligent computing center interconnections
Dechao Zhang*, Jiang Sun, Dong Wang, Yuqian Zhang, Shan Cao
Department of Fundamental Network Technology, China
This paper introduces the key technical featuresof thenovelHIC-OTN (hitless intelligent computing OTN) to meet the critical requirements for the interconnection of distributed intelligent computing centers, and also illustrates related field trials.

16:30-17:00·ACP2025-0915-5 **Invited**
Evolution of optical networking for AI factory
Jim Zou
Adtran Networks, US
Photonics are becoming essential to meet the performance, density and power-efficiency needs of modern data centers. As AI, cloud and high-throughput applications create ever-increasing demand, the industry is looking to scalable optical technologies to deliver the next leap in capacity. This talk will explore how optical transmission is reshaping the hyperscale landscape, sharing insights into industrialstandardization and advancements.

17:00-17:15·ACP2025-0801-72
A Novel IBT-Based Angle-Domain Frequency Offset Estimation Algorithm for Coherent Optical Communication
Xuefeng Zou, LiZuyu, LiuYuheng, XiongJinqi, GanHongyi, Lifan*
Sun Yat-Sen University, China
The paper proposes an improved angle domain-based frequency offset estimation algorithm (Ang-FOE) with inverted binary tree (IBT) architecture， which achieves the extension of the frequency offset estimation range while maintaining low complexity.

17:15-17:30·ACP2025-0813-22
Ultrafast High-Resolution Quantitative Phase Imaging LiDAR Using Synchrosqueezing Transform
Qingyang Zhu[1], Xuanyi Liu[1], Yi Hao[1], Shichen Zheng[1], Annan Xia[1], Hong Ye[1], Qian Li[2], Małgorzata Szczerska[3], H. Y. Fu[1*]
1.Tsinghua University, China; 2.Peking University, China; 3.Gdańsk University of Technology, Poland
We propose a quantitative phase imaging LiDAR using acustom-builtbroadband dissipative soliton fiber laser, encoding spatial information to spectrum via spectral scanning and time-stretching withSynchrosqueezingtransform, achieving 30.72-MHz detection and 140.31-μmlateralresolution.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
DSP for communication (I)
Presider: Tingwei Wu, Chongqing University of Posts and Telecommunications, China

08:30-08:45·ACP2025-0724-8
Kalman Filter-Based Adaptive Decision Threshold for PAM4 IM/DD Links with Multipath Interference
Yibin LI, Zixian Wei, Li Wang, Changyuan YU*
The Hong Kong Polytechnic University, Hong Kong, China
We have proposed a Kalman-ADT scheme for MPI-impaired PAM4 signals. By performing symbol-by-symbol threshold updates with Kalman filter, the proposed method improves noise tolerane over conventional block-based ADT, particularly under large laser linewidth scenarios.

08:45-09:00·ACP2025-0726-11
Noise-Aware Sequence Detection in Bandwidth-Limited Coherent Optical Communication Systems
Zeyu Feng, Zhongxing Tian, Ziang Chen , Huan Huang , Dongdong Zou , Yi Cai*
Soochow University, China
A noise-aware detection scheme employing covariance estimation and spectrum fitting is proposed for optical communication systems with bandwidth limitation. Experiments demonstrated up to 1 dB OSNR gain at 7% FEC threshold compared to conventional schemes.

09:00-09:15·ACP2025-0729-40
Spectrum Notch Coding Modulation for Pilot-Tone-Aided Phase Noise Estimation
Yuheng Liu[1,2], Wei Wang[1,2], Yifan Chen[1,2], Qi Sui[3], Fan Li[1,2*]
1.School of Electrical and Information Technology, Sun Yat-sen University, China; 2.Guangdong Provincial Key Laboratory of Opto-electronic Information Processing Chips and Systems, Sun Yat-Sen University, China; 3.Southern Marine Science and Engineering Guangdong Laboratory, China
A spectrum notch coding modulation scheme using guided scrambling is proposed, which enables flexible notch and pilot insertion for carrier-phase recovery. Simulation results show that the proposed scheme exhibits high tolerance to laser linewidth.

09:15-09:30·ACP2025-0730-18
Pilot-tone-based Baud-rate Timing Recovery Scheme Assisted by Spectrum Shaping Technique
Wei Wang[1], Dongdong Zou[2], Yuheng Liu[1], Yifan Chen[1], Fan Li[1*]
1.Sun Yat-sen University, China; 2.Soochow University, China;
A novel pilot-tone-based baud-rate timing recovery scheme is proposed in this paper, which is assisted by a symbol-level guided scrambling technique for spectrum shaping. The proposed scheme exhibits enhanced robustness to chromatic dispersion.

09:30-09:45·ACP2025-0730-25
Opto-electronic Collaborative Real-time Frequency Offset Compensation Scheme for Low-cost Coherent Optical Communication Systems
Hongxia Xing, **Zuyu Li,** Yuheng Liu, Fan Li*
Sun Yat-sen University, China
An opto-electronic collaborative real-time frequency offset (FO) compensation method for coherent optical communication system is proposed, which can reduce the system complexity while achieving similar BER performance as the traditional FO compensation scheme.

09:45-10:00·ACP2025-0731-104
Power Anomaly Localization and Chromatic Dispersion Coefficient Estimation for Non-uniform Dispersion Links using Power Profile Estimation
Xulong Yan[1], Rundong Xie[1], Zhudong Shi[1], Runzhe Fan[1], Yuyang Gao[1], Fei Liu[1], Jichun Ma[2], Xian Zhou[1*]
1.University of Science and Technology Beijing, China; 2.China Information Technology Design & Consulting Institute Co., Ltd., China
Thispaper proposes an EDFA-Aided Dual-Domain Mapping Correlation Method-based PowerProfileEstimation (EADDM-CM-PPE) method forsub-kilometer-level power anomaly localization in non-uniform chromatic dispersion links, with chromatic dispersion coefficient estimation error within 0.2 ps/(nm·km).

10:00-10:30 Coffee Break

10:30-12:15 · November 7, 2025 · Friday
DSP for communication (II)
Presider: Jim Zhou, Adtran Networks, United States

10:30-11:15·ACP2025-0911-1 **Tutorial**
Components, DSP, and subsystem design for ultra-high-speed optical transceivers
Vivian Xi Chen
Nokia Bell Labs, United States
This tutorial aims to provide an overview of the essential components, such as lasers, modulators, and high-speed RF signal generation, for ultra-high-speed optical transceivers. Additionally, potential research directions for future transceivers will be mentioned.

11:15-11:30·ACP2025-0731-133
Low Complexity FTN Signaling Enabled by Feedback-Free THP and Abs-K-Means Clustered Nonlinear Equalizer for Intra-DCI
Jiawen Yao[1], Dongdong Zou[1*], Wei Wang[2], Lei Hu[1], Fan Li[2], Yi Cai[1]
1.Soochow University, China; 2.Sun Yat-Sen University, China
An ultra-low complexity FTN signaling scheme enabled by a feedback link free THP and Abs-K-Means clustered TMP nonlinear equalizer is proposed. According to the experimental results, a 79.17% complexity reduction is achieved compared to the typical THP DP-VNLE.

11:30-11:45·ACP2025-0731-23
Low-Complexity Cosine-Term-Based Nonlinear Improved Weighted DFE for C-Band IM/DD Systems
Yutong Liu[1], Junwei Zhang[1], Fan Li[1], Zhaohui Li[1], Chao Lu[2]
1.Sun Yat-Sen University, China; 2.The Hong Kong Polytechnic University, Hong Kong, China
A cosine-term-based nonlinear improved weighted DFE (CTIWDFE) is proposed for a C-band 100-Gb/s PAM-4 60-km system, which reduces computational complexity by 47% and improves receiver sensitivity by 0.2 dB compared to the improved weighted VDFE.

11:45-12:00·ACP2025-0731-51
180-Gbaud Dual-Polarization Subsampling Transmission with 100-GSa/s DAC Based on Partial Response Signaling and Carrier Phase Recovery
Yimin Hu[1], Yixiao Zhu[1*], Xiang Cai[2], Ziheng Zhang[1], Chongyu Wang[1], Weisheng Hu[1], Fan Zhang[2*]
1.Shanghai Jiao Tong University, China; 2.Peking University, China
We experimentally demonstrate 130-Gbaud dual-polarization QPSK signal sub-sampling transmission with only 100-GSa/s DAC, based on partial response and carrier phase recovery. We achieve up to 180-Gbaud transmission, corresponding to a record sub-sampling rate of 0.56.

12:00-12:15·ACP2025-0801-146
Bit-Level Probabilistic Shaping Four-Dimensional Modulation with Two-Stage Carrier Phase Recovery for 200G DFB-based Cost-Effective TFDM-PON
Yifan Chen[1*], Chen Wang[2], Jianjun Yu[2], Fan Li[1], Jianyu Long[2], Mingzhu Yin[1], Wei Wang[1], Weihao Ni[1], Yuheng Liu[1]
1.Sun Yat-sen University, China; 2.Fudan University, China
A bit-levelPS-4D-16QAM scheme with two-stage CPR addresses DFB laser phase noise. In 200GDFB-deployed TFDM-PON simulationover 20km SSMF, it achieves 37.4-dB power budget at 7% HD-FEC threshold and ~0.6-dB RPS gain versus PDM-16QAM.

12:15-13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday
Modeling and monitoring of optical communication systems
Presider: Yanfu Yang, Harbin Institute of Technology, China

13:30-14:00·ACP2025-0801-140 **Invited**
Realistic and Efficient Modeling of Semiconductor Optical Amplifiers for WDM Transmission
Hartmut Hafermann*, Loig Godard, Abir Hraghi, Iosif Demirtzioglou, Xiaohui Zhao, Yann Frignac
Optical Communication Technology Lab, Paris Research Center, Huawei Technologies France, France
This paper reviews three recent SOA modeling methodologies -the effective Agrawal model, a semi-phenomenological reservoir model, and a closed-form Gaussian noise model- that enable realistic and efficient simulations and estimation of nonlinear penalties.

14:00-14:15·ACP2025-0801-219
A Fast and Accurate Estimation Method for the Polarization Impairments Induced OSNR Penalty
Tianrun Sun, Jiarun Zhao, Peiyun Ge, Yichao Wang, Bin Zhang, Nan Cui, Xiaoguang Zhang, Lixia Xi*
Beijing University of Posts and Telecommunications, China
A method is proposed to estimate OSNR penalty due to polarization impairments, reducing consumed time by a factor of 2000 compared with exhaustive Monte Carlo signal transmission simulations, while maintaining accuracy

14:15-14:30·ACP2025-0807-1
Phase Noise Tolerance for Low-Pilot-Overhead OFDM Terahertz Links Beyond 64-QAM
Bowen Liu*, Takasumi Tanabe
Keio University, Japan
This work quantifies phase noise tolerance in 64-QAM 2048-OFDM THz links, revealing that MRRs enable error-free transmission with minimal pilot overhead and significantly reduced DSP complexity.

14:30-14:45·ACP2025-0815-137
Single Pulse Assisted Front-End Response Estimation and Pre-compensation for Bandwidth-Limited Coherent Optical Communication Systems
Ziang Chen, Zhongxing Tian, Zeyu Feng, Dongdong Zou, Huan Huang, Lin Sun, Gordon Ning Liu, Yi Cai*
Soochow univercity, China
A measurement-driven single pulse assisted pre-compensation scheme is proposed to mitigate the loss of high-frequency content, as well as spectrum ripples observed in bandwidth-limited coherent communication systems. Experiments demonstrate about 0.5 dB OSNR gain at an 7% FEC threshold compared to schemes without single pulse assistance.

14:45-15:00·ACP2025-0815-76
Group Delay Characterization by Cepstrum Method with Mux/Demux Interference Removal
Liang Junpeng[1*], Wei Jinlong[1*], Fan Linsheng[1], Sun Zhongliang[1], Xu Zhaopeng[1], He Zhixue[1*]
Dept. of Circuits and System Peng Cheng Laboratory, China
We propose a cepstrum based method for measuring the differential mode group delay (DMGD) in few mode fibers. Various potential impairments that may influence on the measurement are assessed, the results show that the proposed method is robust to noise, laser line-with, and suffer from less influence of CD and PMD over 5km test range. And we also conduct a comparative experiment to eliminate the influence of group delay introduced by the multiplexer/Demultiplexer. The experimental results are compared with those obtained using correlation method, showing a relative error fluctuation within 0.01ps/m.

15:00-15:15·ACP2025-0801-12
Efficient Rate-Adaptive Information Reconciliation with LightGBM-Assisted Syndrome Estimation in QKD-Classical Coexistence Networks
Zhuoming Yang, **Xun Zhu,** Qianhui Guo, Zikun Zhang, Shang Gao, Yanni Ou*, Kun Xu
State Key Laboratory of Information Photonics and Optical Communications Beijing University of Posts and Telecommunications Beijing, China
Arate-adaptive information reconciliation with LightGBM-assisted syndrome estimation is proposed for QKD-classical coexistence networks to effectively estimate QBER with millisecond-level runtime. Simulationshow that the proposed scheme achieves an overall average efficiency improvement of 10.2%

15:15-15:30·ACP2025-0801-164
Composite Signal Fiber-longitudinal Power Profile Estimation Scheme Used in Digital Subcarrier Multiplexing Systems
Runzhe Fan[1], Xulong Yan[1], Fan Zhang[2], Xian Zhou[1*]
1.USTB, China; 2.PKU, China
A composite signal fiber-longitudinal power profile estimation scheme is proposed for digital subcarrier multiplexing (DSCM) systems. For the 4×30GBaud DSCM system, localization mean absolute error (MAE) improved from 7 km to below 1 km, while anomaly estimation MAE improved from 0.8 dB to below 0.15 dB.

15:30-16:00 Coffee Break
15:30-17:30 Poster Session
18:30-20:30 Banquet & Awards Ceremony

08:30-10:00 · November 8, 2025 · Saturday
DSP for communication (III)
Presider: Xiang Li, China University of Geosciences, China

08:30-09:00·ACP2025-0801-199 **Invited**
Low-Cost Coherent Detection from Short-Reach to Long-Haul Transmission
Yixiao Zhu[1*], Xiansong Fang[2], Xiang Cai[2], Yimin Hu[1], Ziheng Zhang[1], Lingjun Zhou[2], Xian Zhou[3], Weisheng Hu[1], Fan Zhang[2*]
1.Shanghai Jiao Tong University, China; 2.Peking University, China; 3.University of Science and Technology Beijing, China
Coherent optics can enable high-capacity interconnects for AI data centers and computing networks. We review recent advances in low-cost coherent systems, highlighting residual carrier for phase noise tracking, XPM mitigation, and equalization-enhanced phase noise compensation.

09:00-09:15·ACP2025-0815-21
Low-Complexity Nonlinear Equalizer with a Hybrid Decision Scheme Based on Threshold Pruning for IM/DD Systems
Wenxiang Cui[1], Quanzhen Luo[1], Lipeng Feng[2], Yi Cai[1], Gangxiang Shen[1], Gordon Ning Liu[1*]
1.Soochow University, China; 2.China Telecom Research Institute State Key Laboratory of Optical Fiber and Cable Manufacture Technology, China
We propose a novel hybrid decision scheme based on threshold pruning, which removes redundant branches in multi-symbol decision. The proposed scheme significantly reduces complexity with negligible performance degradation in high-speed IM/DD PAM-4 systems.

09:15-09:30·ACP2025-0815-36
Mitigation of Dither-Signal Beat Interference in Optical SSB System with Remodulation-based Distortion Reconstruction
Jun Dong, Tianwai Bo*, Zhuo Wang, Haolei Gao, Zhongwei Tan, Yi Dong
Beijing Institute of Technology, China
We propose a receiver-side remodulation-based distortion cancellation technique to mitigate the dither-signal beat interference caused by the double-sideband dither signals generated in the transmitter. The proposed scheme improves the system's receiver sensitivity by ~1.8dB.

09:30-09:45·ACP2025-0815-57
Low Complexity Chase Decoder for Open Forward Error Correction
Liu Yuxi[1], Ma Zhengyu[1], Zhao Xue[1], Zhang Jing[1*], Yang Qi[2], Qiu Kun[1]
1.University of Electronic Science and Technology of China, China; 2.Huazhong University of Science and Technology, China
We propose a modified Chase-Pyndiah decoder for oFEC code. The proposed decoder reduces the use of look-up tables (LUTs) and flip-flops (FFs) in FPGA implementation by approximately 16.0% and 20.2% without any performance degradation.

09:45-10:00·ACP2025-0815-71
An Energy-Efficient Fully-Pipelined Dispersion Compensation Hardware Accelerator for Optical Fiber Communications
Bochang Wang, Zheli liu, Zixuan Shen, Xianqiao Liao, Ming Tang, Chao Wang*
School of Optical and Electronic Information Huazhong University of Science and Technology, China
This paper presents an energy-efficient dispersion compensation hardware accelerator design for coherent optical fiber communication. To reduce computational complexity, a complex-plane rotation algorithm is proposed to eliminate the complex multiplication in frequency-domain dispersion compensation through a sequence of fixed-angle rotations. To enhance both energy efficiency and computing speed, a fully pipelined complex-plane rotation module is designed by unrolling the rotation operator into a sequence of cascaded operators using only shifts and adders. The dispersion compensation accelerator design exhibits only 8% degradation in dispersion compensation accuracy as compared to the baseline design, under a 240 km transmission distance at 25 Gb/s with 9 dB OSNR. FPGA implementation demonstrates the proposed design can achieve a 6.5 x energy efficiency improvement against the baseline design, operating at 100 MHz and 1V.

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Optical ISAC
Presider: Jingchuan Wang, Hong Kong Polytechnic University, Hong Kong, China

10:30-11:00·ACP2025-0806-2 **Invited**
Integrated Sensing and Communications for Metropolitan Environments
Alan Pak Tao Lau[1*], Yaxi Yan[1], Jingming Zhang[1,2], Yinghuan Li[1], Liwang Lu[1], Jingchuan Wang[1], Chao Lu[1]
1.The Hong Kong Polytechnic University, Hong Kong, China; 2.Southern University of Science and Technology, China
We review our recent works on integrated sensing and communications and highlightsmart city applications in metropolitan environments through deployed fibers across Hong Kong

11:00-11:30·ACP2025-0728-14 **Invited**
Gaussian Pulse-Based PSS-PPM Scheme for Optical Integrated Sensing and Communication Systems
Fengyuan Tian[1], Jian Zhao[2*], Yunfan Zhang[2], Gan Zheng[1], **Tianhua Xu**[1*]
1.University of Warwick, United Kingdom; 2.Tianjin University, China
We present a Gaussian pulse-based PSS-PPM optical ISAC system, enabling simultaneous communication and sensing. Simulation results confirm low bit error rates and high-accuracy distance estimation under atmospheric turbulence for both single- and multi-user scenarios.

11:30-11:45·ACP2025-0801-168
Forward-Transmission Vibration Sensing in MDM Optical Communication Systems Using Weakly-Coupled FMFs
Xiaolai Fu[1,2], Xinke Tang[1*], Xu Zhang[1], Zhixue He[1], Jian Song[2], Jintao Wang[2*]
1.Pengcheng Laboratory, China; 2.Tsinghua University, China
We propose a forward-transmission vibration sensing scheme based on DMGD in weakly-coupled FMFs, enabling simultaneous coherent communication and vibration sensing. Simulations confirm accurate vibration localization with relaxed timing synchrony requirement.

11:45-12:00ACP2025-0801-44
Lightweight Semantic Communication Empowered Spaceborne Optical Wireless Transmissions
Ziyang Meng[1,2], Hangfei Zhang[1,2], Jianhua He[1,2], Yongsheng Gong[1,2], Lyu Congmin[1,2], Lu Lu[1,2*]
1.Technology and Engineering Center for Space Utilization, Chinese Academy of Sciences, China; 2.University of Chinese Academy of Sciences, China
Optical wireless communications (OWC) have been considered a promising solution for delivering massive data in next-generation spaceborne computing constellations, where a powerful space data-center is connected with a huge number of edge nano-satellites with limited computing resources. An important issue in spaceborne computing is the asymmetric property between the edge node and the datacenter. Another important issue in OWC enabled space computing is its low-pass characteristics even using laser diodes (LDs), and thereby constraining the capacity of OWC intra-satellite links, leading to poor overall system performances. Semantic communication, with its advantages in source compression and channel adaptability, may overcome these limitations. However, state-of-the-art semantic models are often large and difficult to deploy on spaceborne edge computing nodes with limited resources. To address these challenges, we propose LitaSem, a \textbf{li}gh\textbf{t}weight \textbf{a}symmetric \textbf{sem}antic communication model designed for high-quality image transmission over low-pass OWC channels. Specifically, we first conduct architectural optimizations and propose a parameter-efficient design approach to shrink the overall model size; and then shift the edge node’s computational burden to the datacenter; and finally jointly integrate OWC’s low-pass channel characteristics into the end-to-end training process. Experimental results show that LitaSem achieves a 17\% reduction in model size compared to classical semantic models, while delivering average gains of 9.54~dB in Peak Signal-to-Noise Ratio (PSNR) and 0.22 in Strutural Similrity Index Measure (SSIM). These findings demonstrates the potential of LitaSem for efficient and robust image transmission in resource asymmetric-and-constrained spaceborne computing constellations with limited communication bandwidths.

12:00-13:30 Lunch Break

13:30-15:30 · November 8, 2025 · Saturday
Optical transmision and sensing techniques
Presider: Yixiao Zhu, Shanghai Jiao Tong University, China

13:30-14:00·ACP2025-0801-124 **Invited**
Recent Advances in Integrated Forward Vibration Sensing in Optical Communication Systems
Bang Yang, Moxuan Luo, Quhao Zhuo, Jianwei Tang, Yaguang Hao, **Yanfu Yang***
Harbin Institute of Technology, China
Integrated fiber-based forward sensing and communication enables environmental monitoring without additional receivers. This talkhighlights recent advances in phase and polarization-based sensing, while discussing current challenges.

14:00-14:15·ACP2025-0814-23
Integration of In-band Polarization-Based Sensing and Communication via Fraction Domain Multiplexing
Yue Wang[1], **Li Wang**[1*], Yibin Li[1], Changyuan Yu[1], Ming Tang[2*], Zixian Wei[1]
1.The Hong Kong Polytechnic University, Hong Kong, China; 2.Huazhong University of Science and Technology, China
We have proposed an integrated scheme of in-band spectrum polarization sensing and standard coherent communication via fraction domain multiplexing (FrDM). The proposed approach is verified through 480Gb/s DP-16QAM over 32.5km fiber, achieving 6kHz vibration detection.

14:15-14:30·ACP2025-0721-4
Experimental Demonstration of Multi-User Full-Duplex RO-ISAC System
Chen Shuhang, Zeng Zhihong, **Chen Chen***
Chongqing University, China
A multi-user full-duplex retroreflective optical ISAC (RO-ISAC) system using wavelength division duplexing (WDD) and interference cancellation is proposed. Experimental results demonstrate the feasibility of multi-user joint sensing and communication in the RO-ISAC system.

14:30-14:45·ACP2025-0811-8

Orbital Angular Momentum Beam Distribution Recovery based on Reservoir-computing stimulated Generative Adversarial Network (RC-GAN)

Shuiqiu Diao, Jianjun Li, Tianfeng Zhao, Baojian Wu, Kun Qiu, Feng Wen*

Key Lab of Optical Fiber Sensing and Communications, Ministry of Education, School of Information and Communication Engineering University of Electronic Science and Technology of China, China

We propose a novel method for recovering orbital angular momentum (OAM) beams based on the reservoir-computing stimulated generative adversarial network (RC-GAN). By combining the modified GAN with the RC network, our method effectively recovers distorted OAM beam distributions under a wide range of atmospheric turbulence strengths. The investigations show that the peak signal-to-noise ratio (PSNR) and the structural similarity index measure (SSIM) of up to 53.61 dB and 0.9984 for the recovered OAM distributions, respectively. Furthermore, the training time is significantly reduced by 60% compared to the conventional CNN-based GANs. Our proposed RC-GAN could serve as a viable solution for addressing atmospheric turbulence effects in future satellite-to-ground laser communications.

14:45-15:00·ACP2025-0813-2

Optics-Informed Residual Convolution Network Equalizer with Adaptive Nonlinear Activation for 140 Gbps PAM4 VCSEL-MMF Links

Yuting Xu[1], Zhaopeng Xu[1], Jianwei Tang[1], Chuanchuan Yang[2], Yuping Zhao[2]

1.Pengcheng Laboratory, China; 2.Peking University, China

This paper proposes an optics-informed residual convolution network with learnable activation function for high-speed VCSEL-MMF optical interconnects. The proposed method significantly enhances performance across 130–140 Gbps PAM-4 transmissions, outperforming Volterra and conventional neural network baselines.

15:00-15:15 · ACP2025-0814-4

Adaptive Threshold Segmentation with Connected Component Expansion for Low-Intensity Scattering Images Extraction in Acoustic Levitation-Based Angular-Resolved Measurements

Yi Yang, **Zixuan Zhao*,** Jingshi Yang

Xi'an Univ of Posts & Telecommunications, China

In underwater optical communication and detection systems, the concentration of suspended particles such as chlorophyll significantly affects channel performance. By accurately obtaining scattering images of underwater impurity particles, a channel scattering model for underwater wireless optical communication can be established. In order to accurately obtain low-intensity scattering images under low signal-to-noise ratio, this paper proposes an adaptive largest-component area thresholding method (ALCA) to improve the measurement accuracy of chlorophyll solution scattering characteristics and provide high-quality input for underwater optical communication channel modeling The proposed method integrates intensity distribution features with connected-component information to adaptively adjust the segmentation threshold and perform expansion compensation for weak-scattering regions, thereby suppressing noise interference while preserving fine structural details. In the experiments, a self-developed angle-resolved scattering measurement system based on acoustic levitation technology was employed to acquire full-angle scattering images of chlorophyll solutions, which were then compared with the results obtained using global threshold segmentation (GLOBAL) and local adaptive threshold segmentation (LOCAL) methods. Quantitative analysis based on four key evaluation metrics demonstrates that the proposed method outperforms the reference algorithms in terms of weak scattering region completeness, boundary accuracy, and noise robustness. This approach ensures high-precision extraction of the scattering phase function, providing a reliable foundation for physics-based optical communication link simulations and performance prediction.

15:15-15:30 · ACP2025-0815-95

Hybrid ML Framework for QoT Prediction and Impairment Diagnosis in Heterogeneous Coherent Optical Networks

Ivan Chebykin[1*], George Andreev[2], Dimitrii Starykh[1], Oleg Nanii[3], Vladimir Treshchikov[1]

1.T8, Russia; 2.IRE RAS, Russia; 3.MSU, Russia

We present a hybrid ML framework combining regression and classification for QoT prediction in coherent optical networks. Trained on realistic data, it enables accurate estimation and detection of inoperability causes across diverse topologies and configurations

15:30-16:00 Coffee Break

16:00-17:30 · November 8, 2025 · Saturday
Transmisions systems and devices
Presider: Fabio Bottoni, Cisco, United States

16:00-16:30·ACP2025-0729-46 **Invited**
Novel optical amplifiers for optical communications and beyond
Aleksandr Donodin
Aston University, United Kingdom
This talk explores emerging optical amplifiers based on novel materials and spectral bands. We discuss their potential to enable scalable communications and extend into applications beyond traditional telecom networks.

16:30-17:00·ACP2025-0731-86 **Invited**
Beyond 100-Gbps Visible Light Communications Enabled by Thin-Film Lithium Tantalate Electro-optic Modulators
Changjian Guo*
National Center for International Research on Green Optoelectronics, South China Normal University, China
This talk explores the development of visible light electro-optic modulators base on thin-film lithium tantalite platform. We discuss their advantages in power, bandwidth, and integration, and demonstrating beyond 100Gbps/λ high-speed underwater optical wireless communications.

17:00-17:15·ACP2025-0728-10
Simplified Degenerate Modes Reception Scheme Using only 2 x 2 MIMO-DSP for Weakly-Coupled FMFs Transmission
Chengbin Long[1,2], Gang Qiao[1], Baolong Zhu[1], Yuyang Gao[3], Mingqing Zuo[4], Jian Cui[5], Jiarui Zhang[1], Siyuan Liu[1], Honglin Ji[2], Lei Shen[6], jie Luo[6], Yongqi He[1], Zhangyuan Chen[1,2], Juhao Li[1,2*]
1.State Key Laboratory of Photonics and Communications, Peking University, China; 2.Pengcheng Labs, China; 3.School of Computer and Communication Engineering, University of Science and Technology Beijing, China; 4.Department of Fundamental Network Technology China Mobile Research Institute, China; 5.Department of Networks, China Mobile Communications Group Co., Ltd., China; 6.State Key Laboratory of Optical Fiber and Cable Manufacture Technology YOFC, China
We propose a simplified reception scheme using only 2 x 2 MIMO-DSP for degenerate modes to accelerate hardware implementation in weakly-coupled FMF transmission system. The scheme is experimentally verified by 4-wavelength, 4-LP-mode mode-division-multiplexing transmission over 60 km FMF.

17:15-17:30·ACP2025-0731-13 **Industry Innovation Nomination**
Real-Time 228.48 Pb/s•km Transmission Demonstration over 5 x 80-km 7-Core Fiber Using 1.2-Tb/s/λ Transceivers Spanning a 12-THz C+L Band
Anxu Zhang[1], Yueqiu Mu[1], Lipeng Feng[1], Lijun Ma[2], Lei Shen[3], Xishuo Wang[1], Yi Ding[1], Zhengyu Liu[1], Shuo Xu[4], Lei Zhang[3], Jie Luo[3], Yi Yu[2], Xiaoli Huo[1], Junjie Li[1], Chengliang Zhang[1]
1.China Telecom Research Institute State Key Laboratory of Optical Fiber and Cable Manufacture Technology, China; 2.Huawei Technologies Co. Ltd, China; 3.State Key Laboratory of Optical Fiber and Cable Manufacture technology Optical valley laboratory, China; 4.State Key Laboratory of Optical Fiber and Cable Manufacture technology, China
Real-time transmission of 7-core x 68-λ x 1.2-Tb/s/λ PCS-64-QAM signals across a 12-THz C+L band spectrum over 5 x 80-km MCF is achieved, resulting a total throughput of 571.2 Tb/s and a record capacity-distance product of 228.48 Pb/s·km.

Track 3: Network Architectures, Management and Applications

13:30-15:30 · November 6, 2025 · Thursday
Advances in Autonomous Optical Networks
Presider: Yongcheng Li, Soochow University, China

13:30-14:15 · ACP2025-0801-55 **Keynote**
Toward Autonomous Optical Networks: Leveraging SDN, ML, and Real-Time Telemetry
Piero Castoldi
Scuola Superiore Sant'Anna, Italy
This keynote explores how SDN, real-time telemetry, and AI/ML are reshaping optical networks enabling adaptive control, cross-layer integration and intelligent automation for building future-proof optical infrastructures to meet future connectivity demands.

14:15-14:45 · ACP2025-0814-5 **Invited**
International Optical Networks towards 2030 and Beyond (ION-2030) for the AI Era
Xiang Liu
Huawei Technologies, China
In this invited talk, we presentrecent advances in the ITU-T initiative onInternational Optical Networks towards 2030 and Beyond (ION-2030) for the AI era, highlightingthe mutual enhancement of AI and optical networking technologies.

14:45-15:00 · ACP2025-0714-2
Towards Low Latency and High Reliability Optical Network Automation: A Hierarchical Governance Multi-Agent Framework
Yu He[1], Yongjie Shi[2], Yuchen Song[2], Qibin Wu[2], Lixia Xi[1], Xiaoguang Zhang[1*]
1.Beijing University of Posts and Telecommunications, China;2.Huawei Technologies Co., Ltd., China
We propose a novel multi-agent hierarchical governance system for optical networks management. By dividing tasks between regional and core agents, the framework reduces service downtime by 74% while improving log parsing accuracy by 22%.

15:00-15:15 · ACP2025-0801-103
OptiAlarmRCAgent: An Intelligent Agent for Alarm Root Cause Analysis in Optical Networks
Jiahai Sun, Hongxiang Wang*, Yuhang Li, Guanjun Gao, Yuefeng Ji, Beibei Zhang
Beijing University of Posts and Telecommunications, China
We propose OptiAlarmRCAgent, a unified intelligent agent integrating graph retrieval-augmented generation (GraphRAG) and deep search technology.Experimental results indicate that this agent achieves commendable performance in terms of alarm root-cause accuracy in optical networks.

15:15-15:30 · ACP2025-0812-11
Adaptive Distributed DNN Inference Offloading in Multi-Access Edge Computing Networks Interconnected by Metro Optical Networks
Jingjie Xin, Xin Li*, Shanguo Huang
Beijing University of Posts and Telecommunications, China
This paper proposes an adaptive distributed DNN inference offloading scheme to flexibly splitDNN inference tasks in MEC networks interconnected bymetro optical networks. Simulation results showthe proposed scheme achieves a high acceptance ratio.

15:30-16:00 Coffee Break

16:00-17:45 · November 6, 2025 · Thursday
Scalable AI in Optical Infrastructure
Presider: Nan Hua, Tsinghua University, China

16:00-16:30 · ACP2025-0812-3 **Invited**
Exploration of Optical Transmission Network Technology Supporting Distributed Training of Large Language Models
Yuyang Liu[1*], Anxu Zhang[1], Xia Sheng[1], Kai Lv[1], Hao Liu[1], Lipeng Feng[1], Xishuo Wang[1], Tao Ma[2], Zhenfang Wang[2], Xiaoli Huo[1], Junjie Li[1]
1.China Telecom Research Institute, State Key Laboratory of Optical Fiber and Cable Manufacture Technology, China;2.China Telecom Corporation Limited, China
The rapid growth of large language models (LLMs) has exceeded the capacity of single data centers, making distributed training across multiple sites essential. Optical transmission networks have become the carrier base for massive data in distributed training due to their characteristics of ultra large bandwidth, ultra-high reliability, and ultra-low latency. Starting from the analysis of the training requirements for large models, this paper introduces the training capabilities and current situation of mainstream companies, and analyzes and prospects the optical transmission network technology suitable for distributed training in multiple data centers.

16:30-17:00 · ACP2025-0915-8 **Invited**
TBD
Yunbin Xu
China Academy of Information Communications Technology(CAICT), MIIT, China
TBD

17:00-17:30 · ACP2025-0813-13 **Invited**
Field Trial of Decentralized Training with Separation of Compute and Storage over 240km Based on Optical Transport Network for Artificial Intelligence
Shan Cao[1], Dechao Zhang[1], Jiang Sun[1], Mingqing Zuo[1], Tao Wei[2], **Dong Wang[1*]**
1.China Mobile Research Institute, China;2.China Mobile Communications Group Hubei Co., Ltd., China
A novel OTN-based decentralized training scheme with separation of compute and storage is proposed and demonstrated in a field trial. The PP training efficiency remains 99.29% when the transmission distance extends to 240 km

17:30-17:45 · ACP2025-0815-91
Conflict-Free Table-Based Timeslot Switching Strategy for Distributed AI Training in a Multi-granularity All-Optical Spine-Leaf Network
Jichen Zhang, Jiawei Zhang*, Bojun Zhang, Zhiqun Gu, Yuefeng Ji*
Beijing University of Posts and Telecommunications, China
We propose a conflict-free table-based timeslot switching strategy, which establishes the conflict-free conditions for optical timeslot switching in multi-granularity all-optical spine-leaf networks through mathematical modeling, and then jointly with predictions of distributed AI training traffic to generate the conflict-free switching timeslot tables. It enables non-blocking optical timeslot switching effectively reducing the source-side blocking rate by 2.87% and improving network throughput by 42.87%.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Optical Wireless Communication
Presider: Jun Li, Soochow University, China

08:30-09:15 · ACP2025-0910-1 **Keynote**
Advanced Techniques for Beam-Steered High-Capacity Optical Wireless Networks
Ton Koonen
Eindhoven University of Technology, Netherlands
Unprecedented wireless capabilities can be achieved by directed narrow infrared beams, providing very high data rates to many densely spaced users individually. Novel concepts for further increasing data capacity and augmenting receiver performance are presented.

09:15-09:45 · ACP2025-0915-11 **Invited**
TBD
Junwen Zhang
Fudan University, China
TBD

09:45-10:00 · ACP2025-0802-5
Adaptive Deep Reinforcement Learning-based Smart Handover for Hybrid Li-Fi and Wi-Fi Networks
Zhiwen Yang, Kai Zhang, Yuhan Dong*
Tsinghua Shenzhen International Graduate School, China
We propose an adaptive smart handover scheme based on the double deep Q-network (DDQN) for hybrid Li-Fi and Wi-Fi networks to address frequent handovers and enhance policy stability. Simulation results show that the proposed scheme improves average system throughput by approximately 25% and reduces the total handover rate by over 55% compared to conventional benchmarks.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Transmission Systems & Physical Layer
Presider: Junwen Zhang, Fudan University, China

10:30-11:00 · ACP2025-0510-1 **Invited**
How intermodal interference affects WDM networks based on hollow core fiber
Thierry Zami*, Nicola Rossi, Bruno Lavigne
ASN, France
Since hollow core fiber is now seen as a very promising component for future telecommunication WDM networks, we examine how its benefit for large core networks depends on intermodal interference and on possible optoelectronic regeneration

11:00-11:30 · ACP2025-0801-115 **Invited**
Disaster-Resilient Provisioning in C+L Multi-Band Optical Networks
Minwei Fan[1,2], Yuanhao Liu[1,3], **Ning Deng[1,3]**
1.Great Bay University, China;2.Southern University of Science and Technology, China;3.Dongguan Key Lab of Intelligence and Information Technology, China
We propose a novel provisioning and protectionscheme for C+L multi-band WDM networks, with enhancedsurvivability in accident or disaster-caused multi-failure scenarios. We have incorporated practical C+L system characteristics into our model and designed a computation-efficient heuristicsolution.

11:30-11:45 · ACP2025-0801-151 **Industry Innovation Nomination**
Causal Learning Based Faults Localization Fusion Method for Large-scale OTN
Xin Qin[1*], **Xiaotian Jiang[1]**, Zhengyi Zou[2], Yadong Gong[1], Hui Li[2], Xiaofeng Wu[3], Rentao Gu[2], Xiaoli Huo[1], Meng Chen[4], Junjie Li[1]
1.China Telecom Research Institute, China; 2.Beijing University of Posts and Telecommunications (BUPT), China; 3.Cloud Network Operations Department, China Telecom, China; 4.China Telecom Intelligent Network Technology Co.Ltd., China
This study proposes a slice-based Topological Hawkes Process (sTHP) for alarm analysis and integrating AI classification with interpretable causal modeling to localize faults in large-scale OTN. The field trials show 98.8% root faults localization accuracy (9.7% over Apriori), balancing model transparency and algorithmic precision

11:45-12:00 · ACP2025-0801-62
A Novel Method for Optical Fiber Asymmetry Delay Compensation
Rongduo Lu[1*], Liuyan Han[1], Han Li[1], Chunming Yu[2], Wei Hong[3]
1.China Mobile Research Institute, China;2.China Mobile Group Beijing Co., Ltd, China;3.China Mobile Group Zhejiang Co., Ltd, China
We propose a novel machine-learning-based method using sparse optimization to infer optical fiber asymmetry, achieving sub-10-nanosecond accuracy asymmetrycompensation in large-scale 10k+ node networks without manual OTDRmeasurement.

12:00-13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday

Signal Processing & Fault Diagnosis

Presider: Ning Deng, Great Bay University/Dongguan Key Lab of Intelligence and Information Technology, China

13:30-14:00 · ACP2025-0731-73 **Invited**

Feedforward Compensation of Frequency Drift and Phase Noise of Sub-THz Signal in Optical Heterodyne Technique

Kyungmin Woo, **Hoon Kim***

KAIST, Korea

We present a feedforward compensation scheme that significantly enhances frequency and phase performance of sub-THz signals generated by the optical heterodyne technique.

14:00-14:30 · ACP2025-0801-6 **Invited**

Experimental Insights on Fault Localization and Energy Efficiency in Multi-Core Fiber Systems

Andrea Marotta[1*], Giammarco Di Sciullo[1], Cristian Antonelli[1], Mëmëdhe Ibrahimi[2], Giovanni Simone Sticca[2], Francesco Musumeci[2], Massimo Tornatore[2]

1.University of L'Aquila, Italy;2.Politecnico Di Milano, Italy

We report experimental results from the multi-core-fiber testbed in the city of L'Aquila, demonstrating machine-learning-based fault localization that achieves 94% accuracy and discussing energy efficiency in spatially-multiplexed optical systems.

14:30-14:45 · ACP2025-0815-5

Fault Identification in Optical Networks Based on Distillation and Synthetic Sample Augmentation

Meiru Wang[1], Hui Li[1*], Xin Qin[2], Yadong Gong[2], Yuqing Han[2], Zheqing Lv[2], Xiankun Zhu[3], Xiaowei Lou[3], Rentao Gu[1]

1.Beijing University of Posts and Telecommunications (BUPT), China;2.China Telecom Research Institute, China;3.China Telecom Intelligent Network Technology Co.Ltd., China

We propose the Distillation and Synthetic Minority Oversampling Technique Enhanced Root Cause Alarm Framework, achieving over 90% precision and recall and reducing missed-detection and false-alarm rates by over 70% with root-cause alarms less than 1%.

14:45-15:00 · ACP2025-0729-13

DQN-Based Online Optimization of Amplifier Reconfiguration Order for Stability and Reliability in Intelligent Optical Networks

Yu He[1], Yongjie Shi[2], Yuchen Song[2], Yihang Lou[2], Lixia Xi[1], Xiaoguang Zhang[1]

1.Beijing University of Posts and Telecommunications, China;2.Huawei Technologies Co., Ltd., China

We propose a DQN-based online method for optimizating EDFA reconfiguration order in optical networks, featuring anadaptive reward design. This approach avoids up to 1 dB of GSNR degradation and consistently outperforms 97% random orders.

15:00-15:15 · ACP2025-0815-41

Feature Correlation-based Data Augmentation for QoT Estimation in Optical Networks

Xin Qin[1], **Jie Li[2]**, Boya Sun[1], Zhiqun Gu[2*], Xiaotian Jiang[1], Xia Gao[1], Rentao Gu[2], Xiaoli Huo[1], Yuefeng Ji[2]

1.China Telecom Research Institute, China;2.Beijing University of Posts and Telecommunications, China

We propose a data augmentation strategy based on feature correlation, realizing high-precision QoT estimation of lightpaths with few samples. Simulation results show that the proposed method can reduce the data requirements of QoT estimation by 79% with the same accuracy, effectively saving the training samples.

15:15-15:30 · ACP2025-0722-5

TopoFair: A Fairness-Aware Topology Selection for Reconfigurable Data Center Networks

Zhiwei Yu[1], Chengze Du[1], **Heng Xu[1]**, Haojie Wang[2], Bo Liu[1], Jialong Li[1*]

1.Shenzhen University of Advanced Technoloy, China;2.China Mobile Research Institute, China

We propose a lightweight Post-Selection strategy TopoFair to solve the unfairness of opera by balancing the distribution of hops, improving flow completion time up to 49% without sacrificing efficiency.

15:30-16:00 Coffee Break

15:30-17:30 Poster Sessiom

18:30-20:30 Banquet & Awards Ceremony

Track 3: Network Architectures, Management and Applications

08:30-10:00 · November 8, 2025 · Saturday
Secure Communication and Networking
Presider: Wei Wang, Beijing University of Posts and Telecommunications, China

08:30-09:00 · ACP2025-0606-1 **Invited**
Reconfigurable Intelligent Surface Aided Covert Communication over Optical Network
Huatao Zhu
National University of Defense Technology, China
To overcome the near-far effects and physical obstructions at the receiving end for spread-spectrum communication, areconfigurable intelligent surface aided covert communication scheme over optical network is proposed and demonstrated by a proof-of-concept experiment.

09:00-09:30 · ACP2025-0801-129 **Invited**
Toward Real-World Quantum Networks: Interoperability, Coexistence, and High-Rate QKD
Domenico Ribezzo[1*], Sebastiano Cocchi[1], Zahidy Mujtaba[2], Qi Wu[3], Antonio Mecozzi[4], Cristian Antonelli[4], Alessandro Zavatta[5], Davide Bacco[1]
1.University of Florence, Italy;2.Technical University of Denmark, Denmark;3.Hong Kong Polytechnic University, Hong Kong, China;4.University of L'Aquila, Italy;5.National Institute of Optics, Italy
We present four real-world experiments demonstrating progress toward quantum network deployment, showcasing cross-border connectivity, interoperability of infrastructures, and the use of quantum properties and technologies to enhance key rates and enable coexistence with classical communication.

09:30-09:45 · ACP2025-0727-10
Globally Balanced Multidimensional Resource Allocation for Data Center Optical Networks Secured by Quantum Key Distribution
Yijia Zheng[1], Yuan Cao[1*], Xiaoyu Wang[2]
1.Nanjing University of Posts and Telecommunications, China;2.China Academy of Information and Communications Technology, China
This paper proposes a globally balanced multidimensional resource allocation algorithm for data center optical networks secured by quantum key distribution, increasingthe success probability of cloud-edge service requests by 24.42%, while improvingmultidimensional resources utilization.

09:45-10:00 · ACP2025-0731-44
Purification-enabled Entanglement Capability-Prioritized Routing in Quantum Networks
XuanLi Dou[1], Xiaosong Yu[1], Yuhang Liu[1], Jingjing Geng[2*], Yongli Zhao[1], Jie Zhang[1]
1.Beijing University of Posts and Telecommunications, China;2.Wuhan Software Engineering Vocational College, China
This paper addresses the issues of resource allocation in resource-constrained quantum networks by proposing a Purification-enabled Entanglement Capability-Prioritized Routing Algorithm(Q-PCRA). Simulation results show that, compared with the baseline, the proposed algorithm achieves higher service success rate and better end-to-end fidelity in resource-constrained scenarios.

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Sustainable Data Center Solutions
Presider: Huatao Zhu, National University of Defense Technology, China

10:30-11:00 · ACP2025-0915-10 **Invited**
Optical Switching Enhanced AI Data Centers
Xuwei Xue
Beijing University of Posts and Telecommunications, China
Optical switching technologies are emerging as a pivotal innovation to address the escalating bandwidth and energy demands of artificial intelligence (AI) data centers. In this talk, we will present promising schemes for deploying optical switches in AI data centres, highlighting the deployment benefits of link reconfiguration, flow forecasting and redirection, and full mesh link provision.

11:00-11:30 · ACP2025-0813-17 **Invited**
Uniform-Cost Multi-Path Routing for Reconfigurable Data Center Networks
Jialong Li
Shenzhen University of Advanced Technoloy, China
Reconfigurable data center networks (RDCNs) challenge hop count-based routing due to dynamic topologies. We propose Uniform-Cost Multi-Path (UCMP) routing, balancing latency and bandwidth efficiency, achieving up to 98% lower FCT and 1.55× bandwidth efficiency.

11:30-11:45 · ACP2025-0814-38
Carbon-Aware LLM Inference Instance Deployment and Workload Assignment Across Geo-distributed Data Centers
Yanran Xiao, Wei Wang, Qiaojun Hu, Yibo Wang, Yajie Li, Yongli Zhao, Jie Zhang
Beijing University of Posts and Telecommunication, China
We optimize LLM inference deployment and workload assignment across geo-distributed data centers, using a MILP model to minimize GHG emissions under latency constraints. Results show strategic regional allocation significantly reduces carbon footprint in heterogeneous global infrastructures.

11:45-12:00 · ACP2025-0729-51
SWAN: A Network-Aware Scheduler for Adaptive Optical Network Reconfiguration in Distributed LLM Training
Xingyu Liu, Dianxuan Fu, Xiaomin Liu, Yihao Zhang, Weisheng Hu, Qunbi Zhuge*
Shanghai Jiao Tong University, China
We propose SWAN, a network-aware strategy scheduler that supports switching of parallelization strategies in distributed LLM training by orchestrating optical network topology reconfigurations, achieving up to 38.2% higher network throughput in simulations.

12:00-13:30 Lunch Break

13:30-15:30 · November 8, 2025 · Saturday
Network Architecture & Switching Technologies
Presider: Xuwei Xue, Beijing University of Posts and Telecommunications, China

13:30-13:45 · ACP2025-0731-27
Field Trial of NaaS-based Service Auto-management Mechanism for Multi-domain Optical Networks
Haibin Huang, Liuyan Han*, Minxue Wang, Wenhui Zhou, Han Li
Department of Fundamental Network Technology, China Mobile Research Institute, China
We propose a network-as-a-service (NaaS)-based network automation mechanism for optical networks, and evaluate its automation performances in field tests. The results show that the proposed NaaS-based mechanism achieves faster service setup and adjustment.
Keywords: NaaS, service auto-management, multi-domain optical network

13:45-14:00 · ACP2025-0815-127
Digital Twin-Assisted Health Assessment for S+C+L-Band Transmission
Yu Tang[1], Yan Shi[1], Yujia Yang[2], Shikui Shen[1], Chuangye Wang[1], He Zhang[1], Zelin Wang[1], Guangquan Wang[1], Xiaomei Ma[1], Zhengsi Shi[1], Xiaocun Liu[1], Mei Song[1], Danshi Wang[2], Xiongyan Tang[1]
1.China Unicom, China;2. Beijing University of Posts and Telecommunications, China
Health assessment is essential for ensuring reliable operation and proactive maintenance in optical networks. In this work, we demonstrate digital twin-assisted health assessment for a 4-span S+C+L-band transmission system, where optical power and OSNR assessment are carried out.

14:00-14:15 · ACP2025-0730-48
Revisiting Routing Optimization in Cross-Layer Networks with LLM-Assisted Auxiliary Graphs
Ruikun Wang[1], Qiaolun Zhang[2], Jiawei Zhang[3], Xin Wang[4], Zheng Zhang[2], Zhiqun Gu[3], Jingjing Wang[1], Massimo Tornatore[2]
1.Qingdao University of Science and Technology, China;2.Politecnico di Milano, Italy;3.Beijing University of Posts and Telecommunications, China;4.Beijing Information Science and Technology University, China
We investigate routing optimization in cross-layer networks using a large language model (LLM)-assisted auxiliary graph. Numerical results show that it significantly outperforms both heuristic and DRL methods in terms of resource efficiency and latency reduction.

14:15-14:30 · ACP2025-0815-35
A Novel Node Upgrade Strategy for Partial-Port Wavelength-Conversion MB-OXCs in Multi-Band Optical Networks
Feifei Jin, Ningning Guo, Yongcheng Li, Gangxiang Shen*
Soochow University, China
Upgrading conventional multi-band optical cross connects (MB-OXCs) to partial-port wavelength conversion (PPWC) MB-OXCs can significantly improve blocking performance in multi-band optical networks. However, PPWC MB-OXCs incur higher costs due to the need for inter-band wavelength converters. Furthermore, node upgrades are typically implemented gradually rather than all at once, raising the question of how to upgrade these nodes efficiently. To address this, we propose a novel strategy that selectively upgrades certain critical nodes to PPWC nodes while keeping the remaining nodes as conventional MB-OXCs. Simulation results demonstrate that the proposed strategy can substantially reduce service blocking while maintaining low network costs.

14:30-14:45 · ACP2025-0730-57
Twisted and Folded: Increasing the Capacity of Clos-WSS Optical Cross-Connect (OXC)
Jiemin Lin[1], Gangxiang Shen[2], Yongcheng Li[2]
1.Cloud Computing Corp., China Telecom., China;2. Soochow University, China
In this paper, we propose the TF-Clos-WSS OXC, which integrates the TF-Clos architecture into the conventional Clos-WSS OXC. TF-Clos-WSS OXC improves capacity over conventional Clos-WSS by eliminating idle WSS ports needed for non-blocking. N×N

14:45-15:00 · ACP2025-0814-48
Multi-Hop Power-Spectrum and GSNR Prediction based on Cascade Learning
Shangbo Lin[1], Zhiqun Gu[1*], Xin Qin[2], Xiaotian Jiang[2], Shaopeng Li[1], Jiawei Zhang[2], Xiaoli Huo[2], Yuefeng Ji[1]
1. Beijing University of Posts and Telecommunications, China;2.State Key Laboratory of Optical Fiber and Cable Manufacture Technology. China Telecom Research Institute. China;
We propose a cascade learning framework for QoT based on ANN and ISRSGN for C+L WDM operating optical network. Simulations confirm the proposed method's high accuracy in predicting hop-level power-spectrum and GSNR.

15:00-15:15 · ACP2025-0815-23
Topology-Repairing Based on Inter-Satellite Laser Link Reconfiguration in Optical Satellite Networks
Chongzhu Huang, Wei Wang*, Qiaojun Hu, Yi An, Yongli Zhao, Jie Zhang
Beijing University of Posts and Telecommunications, China
This paper presents a topology-aware link reconfiguration (TALR) scheme that improves network availability under laser terminal failures, reducing blocking probability by 27.9% and decreasing isolated nodes by 23.3% in simulation.

15:15-15:30 · ACP2025-0815-125
Spatio-Temporal Datacenter Selection and Routing in Bandwidth-Limited Optical Satellite Networks
Kexin Gao, Wei Wang*, Yanran Xiao, Yujie Li, Yongli Zhao, Jie Zhang
Beijing University of Posts and Telecommunications, China
STDSRM mitigates spatio-temporal congestion in LEO-DCI networks via joint optimization, reducing blocking ratio by 74.3%. It combines semi-dynamic topology planning (SDRCP) and datacenter selection (STDSS) to resolve tidal-user and DC hotspot congestion.

15:30-16:00 Coffee Break

16:00-17:30 · November 8, 2025 · Saturday
Space-Ground Integrated Networks
Presider: Jun Li, Soochow University, China

16:00-16:30 · ACP2025-0814-43 **Invited**
Robust Space-Ground Integrated Optical Networking over Dynamic LEO Satellite Constellations
Wei Wang, Yongli Zhao, Jie Zhang
Beijing University of Posts and Telecommunications, China
The mobility of LEO satellites challenges network's availability and stability. This work investigates survivability strategies to enhance the robustness of optical satellite networks, emphasizing redundancy, fault tolerance, and adaptive reconfiguration to sustain reliable space-ground communications.

16:30-16:45 · ACP2025-0801-174

Impact of Acquisition, Tracking and Pointing (ATP) Capability on Inter-Satellite Path Selection and Performance Evaluation

Shichun Liu[1], Nan Hua[2,3,4], Kangqi Zhu[2,3,4], Zhenrong Zhang[1,5,6*], Shangyuan Li[2,3,4], Xiaoping Zheng[2,3,4]

1.Guangxi University, China;2.Beijing National Research Center for Information Science and Technology (BNRist), China;3.State Key Laboratory of Space Network and Communications Department of Electronic Engineering, China;4.Tsinghua University, China;5. School of Computer, Electronics and Information, China;6.Guangxi Key Laboratory of Multimedia Communications and Network Technology, China

We analyze the acquisition process of inter-satellite laser communication and propose ATP-aware routing to avoid weak links, thereby improving the performance of satellite optical networks.

16:45-17:00 · ACP2025-0814-17

Eavesdropping-Aware Secure Routing in Optical Satellite Networks: A Topology Performance Comparison

Zihao Lin[1], Liyazhou HU[1*], Wang Wei[2], Zhu Han[3], Zhao Yongli[2], Zhang Jie[2]

1.Shenzhen Polytechnic University, China;2.Beijing University of Posts and Telecommunications, China;3.University of Coimbra, Portugal

This paper proposes an eavesdropping-aware routing method for optical satellite networks. Compared to the performances in-full-mesh topology, the fully interconnected topology effectively reduces path risk, latency, and number of hops, but consumes more energy.

17:00-17:15 · ACP2025-0815-32

Sun-Outage-Aware SRLG Modeling and Path Protection in Satellite Optical Networks

Yansong Fu, Yongli Zhao*, Wei Wang, Xin Li, Wenhong Liu, Jie Zhang

Beijing University of Posts and Telecommunications, China

We propose an SRLG model to mitigate simultaneous sun-induced optical link failures in satellite networks and design a path protection scheme, reducing service blocking rate by 40.1% while maintaining complete protection.

17:15-17:30 · ACP2025-0815-126

A Deep Reinforcement Learning-Based Service Path Prediction Strategy in Multi-Layer LEO Optical Satellite Networks

Yue Wei[1], Hua Wang[1*], Wei Wang[2], Yifeng Li[1], Long Wang[3], Yongli Zhao[2]

1.College of Computer and Information Engineering (College of Artifical Intelligence), Nanjing Tech University, China;2.State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China;3.Innovation Academy for Microsatellites of Chinese Academy of Sciences, China

ML-LEO OSNs face dynamic topology and resource challenges. We propose a DRL-based service path prediction strategy using logical domains and MINLP optimization, significantly reducing end-to-end delay and improving load balancing compared to existing methods.

Track 3: Network Architectures, Management and Applications (Parallel Session)

13:30-15:30 · November 6, 2025 · Thursday
Core & Transport Network Evolution
Presider: Xiaoliang Chen, University of Science and Technology of China, China

13:30-14:15 · ACP2025-0814-26 **Keynote**
How the future optical x-haul network architecture in 6G may be implemented? A view from Europe
Ioannis Tomkos
University of Patras, Greece
In this talk, we will outline the evolving vision of major EC-funded research consortia (FLEX-SCALE & PROTEUS-6G) that are investigating the future optical network infrastructure innovations that should be developed to satisfy the stringent requirements of emerging 6G mobile networks.

14:15-14:45 · ACP2025-0721-1 **Invited**
Recently technologies and ITU-T standardization progress of optical networks
Shikui Shen
China Unicom Research Institute, China
This paper summarized recently advance technologiesinnovation and ITU-Tstandardization progress of optical networks, mainly including 800GandbeyondWDM/OTN, C+L band transmission, digital twin, convergentsensing and communication, open and disaggregated, new fibres, and free space optical communication, etc.

14:45-15:15 ·· ACP2025-0912-1 **Invited**
LLM-Powered AI Agents for Autonomous Optical Networks: Recent Advances and Field Trial Demonstrations
Qizhi Qiu, Yihao Zhang, Xiaomin Liu, Lilin Yi, Weisheng Hu, **Qunbi Zhuge***
Shanghai Jiao Tong University, China
Large language models (LLMs) have catalyzed artificial intelligence (AI) agent development for autonomous optical networks (AONs). This invited paper reviews our recent progress in leveraging LLM-powered AI agents for realizing AONs in field-deployed networks.

15:15-15:30 · ACP2025-0801-206
Field-trial Investigations into the Impact of Digital Twin Accuracy on Optical Power Optimization
Xiaomin Liu[1], Cheng Yuming[1], Yihao Zhang[1], Xiang Shaowen[1], Qiu Qizhi[1], Massimo Tornatore[2], Hu Weisheng[1], Qunbi Zhuge[1*]
1.Shanghai Jiao Tong University, China;2.Politecnico di Milano, Italy
This paper evaluates the impact of Digital Twin (DT) accuracy on optical power optimization using a field-trial testbed.

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Data Center & Computing-Centric Networking
Presider: Weigang Hou, Northeastern University, China

16:00-16:30 · ACP2025-0724-7 **Invited**
Accelerating Collective Communications in Optical Rackless DC with P4-based In-Network Computing
Weichi Wu, Xingming Cui, Zeyu Li, Xiaoliang Chen, **Zuqing Zhu**
University of Science and Technology of China, China
This work presents P4-ORDC, a novel architecture that exploits the mutual benefits of optical rackless data centers (ORDCs) and in-network computing (INC) to accelerate collective communications. Specifically, P4-ORDC reshapes collective communications by leveraging optical circuit switching (OCS) to flexibly group computing nodes with more intensive mutual demand and INC to perform in-network aggregation. We devise a hierarchical grouping-based job scheduling scheme to optimize the timing of jobs' computing and communication phases and OCS configurations in P4-ORDC. Our proposal is verified with real-world experiments and numerical simulations, demonstrating job completion time (JCT) reduction over benchmarks.

16:30-17:00 · ACP2025-0801-131 **Invited**

Co-packaged optics for high-bandwidth and energy-efficient network in AI data center

Shaoliang Yu

Zhejiang Lab, China

The advancement of AI has created entirely new demands for computing. CPO, capable of delivering high bandwidth, power efficient, and low latency interconnect, represents the inevitable trends for the evolution of data center networks.

17:00-17:15 · ACP2025-0718-4

Novel Deterministic Ultra-Low Latency Multi-Services Slicing Technology for Data Center Network and Field Trial

Han Li[1], Liuyan Han[1*], **Minxue Wang[1]**, Hongqiang Zou[2], Lirong Bai[2], Sheng Liu[1], Wei Xue[3], Xinyu Chen[1], Rongduo Lu[1], Dechao Zhang[1]

1.China Mobile Research Institute, China;2.China Mobile Communications Group Co., Ltd., China;3.Huawei Technologies Co., Ltd., China

A novel deterministic low-latency and multi-service slicing technology for DC is reported. Field trials with 3 slicing-tasks show 0.99ms latency, 19.84us jitter, and 10.7-fold jitter reduction over 150km across 3 AZs compared to traditional solutions.

17:15-17:30· ACP2025-0722-4

Learning Optimal Transport for GPU Allocation: A Deep Learning Approach to Efficient Resource Scheduling

Chengze Du[1], Zhiwei Yu[1], **Heng Xu[1]**, Haojie Wang[2], Bo Liu[1], Jialong Li[1*]

1.Shenzhen University of Advanced Technoloy, China;2.China Mobile Research Institute, China

We propose Deep Optimal Transport (DOT), combining deep learning with optimal transport for GPU resource allocation. Experiments show DOT achieves near-optimal performance while reducing carbon emissions by 20% versus baselines.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday

Vehicular Optical Networks

Presider: Jialong Li, Shenzhen University of Advanced Technoloy, China

08:30-09:15 · ACP2025-0915-25 **Keynote**

Towards Autonomous Communication Infrastructures: From Programmability to Intelligence

Paolo Monti

Chalmers University of Technology, Sweden

The talk explores the path toward autonomous communication infrastructures, highlighting how virtualization, AI/ML, and automation enable self-driving networks. It discusses opportunities, challenges, and limitations to assess the realistic potential of autonomy.

09:15-09:45 · ACP2025-0814-3 **Invited**

Optical Evolution for In-Vehicle Network

Weigang Hou

Chongqing University of Posts and Telecommunications, China

We systematically explorethe evolution of in-vehicle optical network architectures, and our reflective meta-surfaces can function as an alternative in-vehicle optical switching unit.

09:45-10:00· ACP2025-0815-39

FASync: A Fast and Accurate Time Synchronization Mechanism for All-Optical Metropolitan Spine-Leaf Networks

Xingyi Zhang, Yuanhang Shi, Huitao Zhou, Jiawei Zhang[*], Yuefeng Ji[*]

Beijing University of Posts and Telecommunications, China

FASync is a two-stage time synchronization scheme for all-optical MSLN, decoupling synchronization from static slots, compensating link delays, fusing multi-path offsets, achieving sub-10 ns accuracy and 40%+ sync latency reduction.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Optical Access Network Technologies
Presider: Jiawei Zhang, Beijing University of Posts and Telecommunications, China

10:30-11:00 · ACP2025-0722-9 **Invited**

Standard Development and Deployment Status of Fiber-to-the-Room (FTTR)

Yuanqiu Luo[1], **Yan Zeng[2]**, Frank Effenberger[1]
1.Futurewei Technologies, United States;2.Huawei Technologies, China

This invited talk reviews the latest standardization efforts on Fiber-to-the-Room (FTTR) in ITU-T, ETSI, and CCSA, and provides an overview of its deployment status and adoption trends across global markets.

11:00-11:30 · ACP2025-0731-119 **Invited**

Unified Optical Access Network: Architecture and Bandwidth Scheduling

Wanting Han[1], Xiang Lu[2], **Jun Li[1]**
1.Soochow University, China;2.Universitat Politècnica de Catalunya, Spain

This paper introduced a unified optical access network that integrates 50G passive optical network (PON) and G.fin, as well as a unified scheduling protocol. The PON bandwidth can be reserved by using scheduling information of G.fin to reduce upstream latency.

11:30-11:45 · ACP2025-0814-22

Bandwidth Allocation Algorithm for Industrial Passive Optical Networks Based on Multi-branch LSTM-Attention Model

Weiwei Han[1, 2, 3], Yan Shao[2], Zelin Wang[2], Guangquan Wang[2], Xiongyan Tang[2*], Min Zhang[3]
1.China United Network Communications Group Corporation Limited, China;2.China Unicom Research Institute, China;3.State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China

Targeting industrial PON scenario, we propose a bandwidth allocation algorithm based on multi-branch LSTM-Attention model. Compared to IPACT algorithm, the proposed algorithm is load-independent and maintains low latency (around 1ms), especially under high loads.

11:45-12:00 · ACP2025-0815-44

Stochastic Network Calculus-based Bandwidth allocation scheme for Asynchronous Time-Sensitive Industrial Applications in TDM-PON

Lizhu Liu[1], Chen Su[2], Yuefeng Ji[1*], Jiawei Zhang[1*]
1.Beijing University of Posts and Telecommunications, China;2.Purple Mountain Laboratories, China

We propose an optimized bandwidth allocation scheme utilizing stochastic network calculus theory. The proposed scheme reduces transmission window sizes while still guaranteeing deterministic transmission,thereby improving both schedulability and resource utilization efficiency.

12:00-13:30 Coffee Break

13:30-15:30 · November 7, 2025 · Friday
Next-Generation Industrial Passive Optical Networks
Presider: Xiaosong Yu, Beijing University of Posts and Telecommunications, China

13:30-14:00 · ACP2025-0730-9 **Invited**

Communication and Sensing via Hermite-Gaussian Time-Domain Mode-Division-Multiple-Access

Xiaonan Yu
Changchun University of Science and Technology, Germany

We propose a method for time-domain mode division multiplexing based on Hermite Gaussian (HG) signals that can simultaneously perform communication and sensing tasks. An all-electronic time-domain mode division multiplexing transceiver is designed and implemented. The core of this transceiver is a delay-locked loop (DLL) to achieve signal phase locking, thereby enabling mode division multiplexed communications. Through simulation, we verify that this scheme can not only transmit multiplexed data streams at GHz-level communication rates but also simultaneously performs sensing, demonstrating its unique 'communication-sensing integration' capability. This research provides an important step for the development of next-generation integrated, high-speed space laser communication systems.

14:00-14:30 · ACP2025-0915-9 **Invited**
TBD
Jiawei Zhang
Beijing University of Posts and Telecommunications, China
TBD

14:30-14:45 · ACP2025-0815-99
Service Slice-based Deterministic Bandwidth Allocation Scheme for Industrial TDM-PON
Zhiqing Wei, Xin Li*, Yongli Zhao*
Beijing University of Posts and Telecommunications, China
To address the problem that existing TDM-PON bandwidth allocation schemes cannot simultaneously provide deterministic guarantees and differentiated service isolation for diverse industrial applications, we propose a Service Slice-based Deterministic Bandwidth Allocation (SSDBA) scheme. This scheme combines service-aware network slicing with time-aware scheduling, introducing multi-dimensional constraints such as delay, jitter, and slice isolation. Simulation results show that SSDBA can achieve deterministic transmission, and the average bandwidth efficiency is 14.66% than FBA.

14:45-15:00 · ACP2025-0801-98
Statistical and Deterministic Delay Guarantee for Industrial PON: A Network Calculus Approach
Weixuan Fan, Jin Li*, Yonghan Wu, Yi Huang, Dongxu Zhang, Min Zhang
Beijing University of Posts and Telecommunications, China;
We proposed a statistical and deterministic delay guarantee mechanism based on network calculus to provide differentiated upstream delay guarantees.

15:00-15:15 · ACP2025-0730-5
First Demonstration of FTTR-based RFID Network for Integrated Sensing and Communication
Shan Zhang[1], Junwei Li[1], Jinglong Zhu[1], Dechao Zhang[1], Yan Zeng[2], Yuanqiu Luo[3]
1.China Mobile Research Institute, China;2.Huawei Technologies, China;3.Futurewei Technologies, United States
A hybrid network architecture integrating FTTR and RFID technologies is firstly proposed to support both gigabit coverage and IoT connections. Leveraging FTTR's coordinated management and sub-190μs low-latency channel, RFID performance is improved and validated in field trials.

15:15-15:30 · ACP2025-0815-2
Noise-resilient Hardware Fingerprinting for Physical-layer Authentication in Passive Optical Networks
Fan Ouyang, Wei Wang, Jie Zhang*, Tianhe Liu, Yongli Zhao, Yajie Li
Beijing University of Posts and Telecommunications, China
We propose a noise-resilient PON device authentication method via STFT and attention-fused DSCNN, achieving 99.5% accuracy at 20dB SNR with robust noise resistance.

15:30-16:00 Coffee Break
15:30-17:30 Poster Sessiom
18:30-20:30 Banquet & Awards Ceremony

Track 4: Optoelectronic Devices and Integration

13:30-15:30 · November 6, 2025 · Thursday
Laser and Active Devices (1)
Presider: Hiroyuki Tsuda, Keio University, Japan

13:30-14:00 · ACP2025-0801-100 **Invited**
Dynamics of Quantum Dot Frequency Comb Lasers
Jianan Duan
Harbin Institute of Technology (Shenzhen), China
This work demonstrates dynamic control of frequency- and amplitude-modulated combs, along with significant pulse width reduction, by employing a fourth-order 100 GHz colliding-pulse mode-locked quantum dot laser with external optical feedback.

14:00-14:30 · ACP2025-0915-12 **Invited**
Octave-spanning supercontinuum generation from an integrated ultrafast laser
Jianqi Hu
University of Hong Kong, Hong Kong, China
In this talk, I will present our recent results in generating an octave-spanning supercontinuum from an inte-grated mode-locked laser, both on a photonic integrated silicon nitride (Si3N4) platform. The seed laser is based on a linear Mamyshev oscillator cavity formed by two spectrally offset waveguide Bragg gratings. Within this cavity, an erbium-doped Si3N4 waveguide provides optical amplification and nonlinear broadening to bridge circulating pulse spectra reflecting from the two gratings. Such a simple laser architecture enables mode-locking, producing streams of pulses with femtosecond duration and nanojoule energy. The output pulses, after de-chirping, can directly drive a 1.5-octave-spanning supercontinuum in a dispersion-engineered Si3N4 waveguide. Theses results herald fully-integrated, self-referenced optical frequency combs for a wide range of applications.

14:30-14:45 · ACP2025-0813-16
Direct epitaxy of InAs/GaAs quantum dot laser array on Si (001)
WanLin Liu[1,2], KeHan Jiang[1,2], Kun Zhou[1,2], JiaZe Xu[1,2], Tao Yang[1*], XiaoGuang Yang[1,2*]
1.Laboratory of Solid State Optoelectronics Information Technology, Institute of Semiconductors, Chinese Academy of Sciences, China;2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China
A 1.3 micron InAs/GaAs quantum dot distributed feedback (DFB) laser with high output power, low noise and insensitivity to optical feedback is realized on Si(001) substrate.

14:45-15:00 · ACP2025-0815-136
Narrow-linewidth hybrid-integrated self-injection locked laser at 1015.75 nm
Hongfei Zhang[1], Yilin Wu[1], Sigang Yang[1], Hongwei Chen[1], Hui Wang[2], Minghua Chen[1*]
1.Department of Electronic Engineering, Tsinghua University, China;2.Changzhou Smartcore Optoelectronic Limited, China
A hybrid integrated self-injection locked laser at 1015.75 nm is demonstrated with an intrinsic linewidth of 470.4 Hz, which is favorable towards quantum computing based on Rubidium atoms.

15:00-15:15 · ACP2025-0815-50
Compared performance of Buried Ridge and Semi-Insulating Buried Structures Quantum Dash Lasers on Indium Phosphide platform
Emmanuel Bourgon, **Alexandre SHEN**, Cosimo Calo, Dalila Make, Delphine Néel, Mokhtar Korti, Nicolas Vaissière, Florence Martin, Karim Mekhazni, Frédéric Pommereau, Olivier Delorme, Arnaud Wilk
III-V Lab, France
We report comparative studies of Semi-Insulating Buried Heterostructure- (SIBH) versus Buried Ridge Structure- (BRS) processed InP based quantum dash lasers in the C band. We show that the SIBH structure outperforms the BRS structure in terms of laser output power and characteristic temperature (T0).

15:15-15:30 · ACP2025-0815-49
Classification of Multi-dynamics States from Semiconductor Lasers Based on Photonic Reservoir Computing
Shoudi Feng, Nianqiang Li, Huang Yu, Pei Zhou, Kuenyao Lau
Soochow University, China
Dynamics-based states for complex systems are of vital importance in the analysis and application. We apply photonic reservoir computing to classify the multiple dynamic states generated by semiconductor lasers and demonstrate its potential application in classification of multi-dynamics states.

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday

Laser and Active Devices (2)

Presider: Jianan Duan, Harbin Institute of Technology (Shenzhen), China

16:00-16:30 · ACP2025-0608-1 **Invited**

Ultracompact flatband high-Q single-mode semiconductor lasers

Qijie Wang, Jieyuan Cui

Nanyang Technological University, Singapore

Here we demonstrate a flat-band laser supplemented by multiple bound states in the continuum. By confining light in all three dimensions, a high Q factorultracompact (~3λ) terahertz quantum cascade laseris reported.

16:30-16:45 · ACP2025-0725-2

Bidirectional Electrostatic-Actuated HI MEMS-VCSEL

Jisheng Wang, Ning Cui, Hongzhuo Wang, Lishan Fu, Liangliang Zhu, Baolu Guan*

Beijing University of Technology, China

To overcome high voltage and mode hopping in conventional MEMS-VCSELs, this study fabricated a bidirectionally tunable HI MEMS-VCSEL using a three-plate capacitor. Operating below 14 V, it achieved 30.1 nm redshift/blueshift tuning. This validates the structure's feasibility for wide-range tuning and new applications.

16:45-17:00 · ACP2025-0729-8

Optically pumped vertical-cavity surface-emission laser based on quasi-2D perovskite

Liangliang Zhu, Shuai Huang, Qin Zhang, Sunan Li, Baolu Guan

Beijing University of Technology, China

Quasi-2D perovskites have a large exciton binding energy, a natural quantum well structure and a high fluorescence quantum yield (PLQY). Compared with traditional 3D perovskites, the higher environmental stability and unique energy-funnel process of quasi-2D perovskites have attracted widespread attention. In this paper, an optically pumped vertical-cavity surface-emission laser (VCSEL) was constructed using quasi-2D perovskite as the gain medium and distributed Bragg reflector (DBR) as the reflector, achieving a laser output of 535 nm with a laser threshold of 2.2 $\mu J\ cm^{-2}$ and a linewidth of 0.88 nm. In addition, the constructed quasi-2D perovskite VCSEL also demonstrated qualified stability.

17:00-17:15 · ACP2025-0730-10

High-power and dense semiconductor optical amplifier array

Yang Ke, Yueyang Shi, Ying Liu, Yanfang Wang, Ruijun Wang, Siyuan Yu

State Key Laboratory of Optoelectronic Materials and Technologies, School of Electronics and Information Technology, Sun Yat-sen University, China

We present a high-powerand dense c-band semiconductor optical amplifier array. Each channel of the array exhibits a high output power greater than 22dBm, with channel-to-channel uniformity better than 0.5 dB.

17:15-17:30 · ACP2025-0730-56

Monolithically SOA-Integrated DFB Laser for High-Power, Sub-15 GHz Optical Modules in CPO and RoF Systems

Jie Liang, Anyao Zhu, Zhengqing Ding, Kun Zhan, Ying Yu, Siyuan Yu

Sun Yat-sen University, China

We demonstrate an SOA-integrated DFB laserwhich exhibits an optical power over130mW, an SMSRexceeds 45 dB, an averaged RIN of below -145 dB/Hzand a 3dB modulation bandwidth exceeds15 GHz at 20°C.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Laser and Active Devices (3)
Presider: Jianqi Hu, University of Hong Kong, Hong Kong, China

08:30-09:00 · ACP2025-0730-1 **Invited**

Design and Integration Strategies of Active Photonic Integrated Devices on Flexible Platforms

Qingyan Deng[1], Jingyu Chang[1], Yuting Ye[1], Jialing Jian[2], Jianghong Wu[3], Hongtao Lin[4], **Lan Li[1*]**

1.Department of Electronic and Information Engineering, School of Engineering, Westlake University, China; 2.Westlake University, China; 3.Department of Applied Physics, The Hong Kong Polytechnic University, Hong Kong, China;4.College of Information Science and Electronic Engineering, Zhejiang University, China

We propose design and integration strategies for high-performance active photonics on flexible platforms. By leveraging monolithic and hybrid approaches with functional optoelectronic materials, we establish pathways toward complete flexible optoelectronic links, showcasing potential for future wearable systems.

09:00-09:15 · ACP2025-0731-9

Chirp Properties of Single-Mode Multi-Aperture VCSEL Operating at SWDM Wavelengths and Analysis of Transmission Capability for Short Reach Applications

Xin Chen[1*], Nikolay Jr. Ledentsov[2], Abdullah S. Karar[3], Jason E. Hurley[1], O. Yu. Makarov[2], Hao Dong[1], Ahmad Atieh[3], Li Ming-Jun[1], Nikolay Ledentsov[2]

1.Corning Incorporated, United States Minor Outlying Islands; 2.VI Systems GmbH, Germany; 3.Optiwave System Inc., Canada

We characterized the chirp properties of SM MA VCSEL operating at SWDM wavelengths and showed that the chirp can interact with chromatic dispersion favorably to enhance short reach transmission at high data rate.

09:15-09:30 · ACP2025-0801-163

C-band thin film lithium niobate hybrid integrated actively mode-locked laser

Qiang Ying, Rui Ma, Zijun Huang, Xinlun Cai

Sun Yat-sen University, China

We demonstrate the first C-band hybrid integrated mode-locked laser fabricated on the thin film lithium niobate platform. The measured central wavelength, pulse width, average power, peak power, pulse energy are 1542.4 nm, 7.228 ps, 1.778 mW, 22 mW and 0.159 pJ, respectively.

09:30-09:45 · ACP2025-0802-9

High-Power hybrid integrated 850 nm III-V-Si3N4 DBR laser

Yueyang Shi, Yang Ke, Jincheng Wei, Ruoyu Xiong, Ruijun Wang, Siyuan YU

State Key Laboratory of Optoelectronic Materials and Technologies, School of Electronics and Information Technology, Sun Yat-sen University, China

We present a hybrid integrated III-V-Si_3N_4DBR laser operating in the 850 nm waveband. The laser outputs an optical power of 32.1 mW with a side mode suppression ration of 41 dB.

09:45-10:00 · ACP2025-0811-3

Thermally Stable High Power 1.3 μm InAs/GaAs Quantum Dot Distributed Feedback Laser Arrays with Ultra-Narrow Linewidth and Low-Noise

KeHan Jiang, Tao Yang, XiaoGuang Yang, JiaZe Xu, Kun Zhou

The Institute of Semiconductors, Chinese Academy of Sciences, China

We demonstrate a thermally stable, high-power InAs/GaAs quantum dot four-channel distributed feedback laser array featuring an ultra-narrow linewidth and low noise.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Photonics & Photonic Devices(1)
Presider: Lan Li, Westlake University, China

10:30-11:00 · ACP2025-0915-13 **Invited**
Key technologies and integrated chips for microwave photonic radar
Sha Zhu
Nankai University, China
This report presents the essential technologies underpinning microwave photonic radar, encompassing the generation, transmission, and processing of high-frequency, broadband radar waveforms in the optical domain. It also introduces recent breakthroughs in thin-film lithium niobate-based photonic millimeter-wave radar that have achieved centimeter-level resolution in range, velocity, and ISAR measurements.

11:00-11:30 · ACP2025-0815-33 **Invited**
300-mm Silicon Photonics Platform and High-performance Devices for Optical Interconnect Applications
Xiao Hu, Fengxin Yu, Fangchen Hu, Haiwen Cai, Wei Chu
Zhangjiang LAB, China
Silicon photonics leverages the advances of both optoelectronics and microelectronics, enabling high-speed, low-power, and cost-effective optical interconnects through highly integrated chips. In this contribution, we will report on our recent advances in silicon photonics devices. Based on the 300-mm platform, we have developed high-performance electro-optic modulators and photodetectors that support high-throughput optical interconnects.

11:30-11:45 · ACP2025-0718-8
Advanced Mid-Infrared On-Chip Spectrometer with High Resolution and Broad Bandwidth
Da Lv[1], Long Zhang[1], Dajian Liu[1,2], Gaopeng Wang[1], Ming Zhang[1,3], Haorui Liu[1], daoxin Dai[1,3,4*]
1.State Key Laboratory of Extreme Photonics and Instrumentation, Zhejiang Key Laboratory of Optoe-lectronic Information Technology, College of Optical Science and Engineering, Zhejiang University, China; 2.ZJU-Hangzhou Global Scientific and Technological Innovation Center, Zhejiang University, China; 3.Ningbo Research Institute, Zhejiang University, China; 4.iaxing Key Laboratory of Photonic Sensing & Intelligent Imaging, Intelligent Optics & Photonics Research Center, Zhejiang University, China
We demonstrate a spectrometer on silicon for mid-infrared, which consists of a high-Q micro-ring resonator and cascaded adiabatic elliptical micro-ring resonators. Experimentally, the spectrometer features a high resolution of 50 pm and a broad working bandwidth of 230 nm in the 2-μm band.

11:45-12:00 · ACP2025-0801-122
Breaking the Bandwidth-Resolution Tradeoff in Chip-scale Spectrometers using Vernier Subwavelength Grating Microrings
Hao Deng, Haoran Wang, Ziyang Xiong, Yan Fan, Tong Lin, Junpeng Lu
School of Electrical Science and Engineering Southeast University, China
We experimentally demonstrate a miniaturized Vernier silicon photonic spectrometer based on two cascaded subwavelength gratings microrings. Experimental results show an average resolution of 75 pm over a 160 nm bandwidth for a footprint of less than 0.002 mm²

12:00-13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday
Photonics & Photonic Devices(2)
Presider: Kaiyi Wu, Chalmers University of Technology, Sweden

13:30-14:15 · ACP2025-0801-127 **Keynote**
Large scale silicon photonics and system
Xingjun Wang
Peking University, China
We will introduce our group's work about large scale silicon photonic device, chip and system.

14:15-14:45 · ACP2025-0801-36 **Invited**
Platform-First Photonic Integrated Circuits: All-Silicon Solution
Yuan Yuan
Northeastern University, United States
Silicon has long served as the foundational material for photonic integrated circuits, yet its intrinsic optoelectronic limitations have historically constrained device performance. Our research systematically unlocks the full potential of silicon by advancing modulators, photodiodes, and non-volatile optical memories, culminating in a highly scalable, cost-effective all-silicon solution for large-scale photonic systems.

14:45-15:00 · ACP2025-0731-63
Wafer-Level Characterization of Low-Loss Silicon Photonic Devices Using a High-Throughput and Robust On-Chip Test Structure
Yufei Liu[1], Ying Wang[1], Baosuan Chen[1], Weixiang Hu[1], Wei Chu[1], Haiwen Cai[2], Fenghe Yang[1*]
1.Zhangjiang Laboratory, China; 2.Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China
A test structure based on microring resonators is proposed to enable high-throughput and stable wafer-level characterization of ultra-low-loss photonic devices. All measurements are performed directly on the wafer, demonstrating exceptional stability and alignment tolerance: the relative deviation of the median insertion loss across 68 dies remains below 1.7% under varying input optical powers. Furthermore, on-wafer testing of five randomly selected dies exhibits a loss standard deviation below 0.004 dB over the 1545–1555 nm wavelength range, evidencing excellent wavelength insensitivity. This method is applicable to a wide range of fundamental ultra-low-loss passive components for photonic integrated circuits (PICs). The test structure's wafer-level compatibility, combined with its resilience to power fluctuations and alignment errors, enables high-throughput automated, cost-effective characterization in photonics foundries. This capability is critical for reducing manufacturing costs and accelerating the commercialization of next-generation photonic devices.

15:00-15:15 · ACP2025-0815-31
3.5D Co-Packaged Optics Based on a Silicon Interposer for High Densisty Interconnects
Chen Hu[1], Hairong Mao[2], Qian Zhang[1], Jinsheng Xu[1], Jia Li[1], Yueqi Zhao[1], Chenhui Li[1*]
1.Zhejaing Lab, China; 2.Hangzhou International Innovation Institute, Beihang University, China;
We propose a novel 3.5D embedded co-packaging solution for opto-electronic integration. A silicon interposer is fabricated with a 330μm-deep cavity structure using deep reactive ion etching (DRIE), achieving a sidewall angle of 1° to accommodate the co-designed photonic integrated circuits (PIC). The PIC chip was mounted active side facing upward using conductive silver-based adhesives in the previously described cavity. The surface of silicon interposer is act as a stop layer during pick and place process. Subsequently, a modulator driver is bridged and bonded above the PIC and interposer, achieving the shortest connection between the electronic integrated circuits (EIC) and PIC. The packaged transmitter supports 50GBaud PAM4 signals conversion, demonstrating its potentials for high-density integration applications.

15:15-15:30 · ACP2025-0815-133
Ultra-Low-Loss 250nm-thick Silicon Nitride Photonic Integrated Circuits
Zhonghan Wu, Haiyan Jia, Xin Xu, jiarui Zhang, Zhangjun Huang, Zhichao Ye
Hangzhou Qoretek Co., Ltd., China
We demonstrate an ultra-low-loss 250nm Si_3N_4 PIC platform. It features 0.5 dB/m waveguide loss and inverse-designed components, including MMIs (~20 mdB) and crossings (~4.5 mdB), enabling large-scale, high-performance integration.

15:30-16:00 Coffee Break
15:30-17:30 Poster Session
18:30-20:30 Banquet & Awards Ceremony

08:30-10:00 · November 8, 2025 · Saturday
Modulators and high-speed PIC applications (1)
Presider: Yonghui Tian, Lanzhou University, China

08:30-09:00 · ACP2025-0731-60 **Invited**

448 Gbps optical-amplification-free transmission using TFLN modulator

Armands Ostrovskis[1,2*], Toms Salgals[1], Darja Cirjulina[1], Said El-Busaidy[2], Michael Koenigsmann[2], Benjamin Krüger[2], Fabio Pittalà[2], Lu Zhang[3], Xianbin Yu[3], Hadrien Louchet[2], Robert Jahn[2], Kazuo Yamaguchi[2], Markus Gruen[2], Vjaceslavs Bobrovs[1], Marcel Zeiler[2], Xiaodan Pang[1,3], Oskars Ozolins[1,4]

1.Riga Technical university, Latvia; 2.Keysight Technologies Germany, Germany; 3.Zhejiang University, China; 4.RISE Research Institutes of Sweden, Sweden

Rapid development of AI drives demand for next-generation transceivers. Therefore, we explore approaches enabling 448 Gbps optical-amplification-free transmission in the O-band using a TFLN modulator with 0.6 Vpp driving voltage.

09:00-09:15 · ACP2025-0730-59

Highly efficient acousto-optic modulation in antimony trisulfide with strong photoelasticity integrated on thin-film lithium niobate

Yaqi Liu, Lutong Cai, Lin Zhang

State Key Laboratory of Precision Measuring Technology and Instruments, Tianjin University, China

We demonstrate a highly efficient (0.7 rad/√mW) acousto-optic modulatorwith a giant photoelastic coefficient of 2.4,first extracted in antimony trisulfide, an order of magnitude larger than that of $LiNbO_3$ and other used chalcogenide glasses.

09:15-09:30 · ACP2025-0731-94

High-speed Broadband Wavelength-Parallel Modulation Enabled by Lithium Niobate Asymmetric Modulator

Chaoqian Li[1], Yunlong Nie[1], Hang Song[1], Chenming Zhao[2], Yuquan Peng[2], Chaoyang Zhang[2], Hao Tang[1], Xianmin Jin[1,2,3*]

1.Center for Integrated Quantum Information Technologies (IQIT), School of Physics and Astronomy and State Key Laboratory of Optics and Communications, Shanghai Jiao Tong University, China; 2.TuringQ Co., Ltd., China; 3.Chip Hub for Integrated Photonics Xplore (CHIPX), Shanghai Jiao Tong University, China

An integrated asymmetric modulator based on thin-film lithium niobate, achieving broadband wavelength-parallel modulation across the entire C-band with high consistency over 7.3 bit and large modulation range exceeding 0.59, with electro-optic bandwidth surpassing 64.25 GHz.

09:30-09:45 · ACP2025-0714-6

On-chip Fourier Transform Spectrometer based on Thin Film Lithium Niobate Michelson Interferometer Modulator

Hao Yao, Jiayao Deng, Yuzhe Sun, Kaixin Chen

University of Electronic Science and Technology of China, China

We propose and experimentally demonstrate an on-chip Fourier transform spectrometer based on an electro-optic Michelson interferometer modulator fabricated on thin-film lithium niobate. The device features a low half-wave voltage of 0.233 V with a compact electrode length of 6.4 cm, benefiting from the double-pass modulation of the Michelson structure. A spectral resolution of 3.8 nm is achieved, and accurate reconstruction of a broadband spectrum spanning about 100 nm is demonstrated.

09:45-10:00 · ACP2025-0726-7

Mode-Engineered SiN-to-BTO Hybrid Electro-Optic Modulator

Yaqi Feng

Beijing University of Posts and Telecommunications, China

We present a compact thin-film barium titanate modulator integrated with SiN waveguides, demonstrating a low Vπ·L of 0.16 V·cm and negligible optical loss, optimized for efficient EO modulation

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Modulators and high-speed PIC applications (2)
Presider: Yu Li, Shanghai Jiao Tong University

10:30-10:45 · ACP2025-0711-4
200-Gb/s/λ PAM4 Operation for CWDM4-EML Using a Simple Ridge Waveguide Structure and CoC Assembly
Koichi-H Huang, Jian Fang, Shuai Liu, Ming Yu, Xiaoli Ge, Chen Gao, Yanghuo Zhang, Cedric Gao, Kaifeng Yang
Zetta Semiconductor Co., Ltd., China
We have successfully demonstrated massproduction-friendly CWDM4 200-Gb/s/λ PAM4 EMLs with a ridge waveguide, single butt-joint based on InGaAsP-MQW regrowth, and optimized CoC assembly, achieving over 60 GHz bandwidth and TDECQ below 3.0 dB.

10:45-11:00 · ACP2025-0714-7
Monolithically Integrated 4×100 Gb/s Directly Modulated Laser Array
Huan Li, Longfei Zhang, Daibing Zhou, Dan Lu, Lingjuan Zhao, Song Liang
Institute of Semiconductors, Chinese Academy of Sciences, China
A monolithically integrated 4-channel directly modulated 1.3 μm DFB laser array has been fabricated. The device modulation bandwidth is larger than 27 GHz for all four channels. 100 Gb/s PAM4 data transmission of the device has been demonstrated.

11:00-11:15 · ACP2025-0717-5
100 Gb/s directly modulated 1.3 μm dual wavelength DFB laser for THz communications
Longfei Zhang[1,2,3], Huan Li[1,2,3], Song Liang[1,2,3*]
1.State Key Laboratory of Optoelectronic Materials and Devices, Institute of Semiconductors, Chinese Academy of Sciences, China; 2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China; 3.Beijing Key Laboratory of Low Dimensional Semiconductor Materials and Devices, China;
We report 100 Gb/s PAM4 data modulation of 1.3 μm dual wavelength DFB laser, which is a promising light source for photonics based THz communication systems.

11:15-11:30 · ACP2025-0728-5
A 4×50 Gb/s Electro-absorption Modulated Tunable DBR Laser Array
Mengyang Zhong[1], Huan Li[2], Fei Guo[2], Dan Lu[2], Yanrong Song[1], Daibing Zhou[2*], Song Liang[2*]
1.Beijing University of Technology, China; 2.Institute of Semiconductors, Chinese Academy of Sciences, China
We propose an InP-based monolithically integrated four-channel TEML array chip. Each channel supports 50 Gb/s NRZ signal modulation, while featuring parallel modulation capability and a simple tuning method.

11:30-11:45 · ACP2025-0731-48
62 GHz Silicon Photonic Lumped Mach-Zehnder Modulator with Passive RC Equalizer
Jianing Wang[1], Yihang Li[1,2], Jian Li[1,2], Xi Wang[1], Rongxing Mao[1], Rui Zhong[1], Shuang Gao[1], Guodong Gao[1], Ke Xu[1,2*]
1.Harbin Institute of Technology, Shenzhen, China; 2. Peng Cheng Laboratory, China
We demonstrate a silicon photonic lumped Mach-Zehnder modulator (MZM) that incorporates a series passive RC equalizer. With 1 mm length, the MZM achieves a record-high 3 dB bandwidth of 62 GHz among lumped MZMs.

11:45-12:00 · ACP2025-0801-73
Silicon Photonic Elliptical Microring Modulator with Ultra-wide Bandwidth over 110 GHz
Jian Li[1,2], Yihang Li[1,2], Kaihang Lu[3], Yuxiang Yin[3], Jianing Wang[1], Yeyu Tong[3*], Lei Wang[2], Hon Ki Tsang[4], Ke Xu[1,2*]
1.Harbin Institute of Technology, Shenzhen, China; 2.Peng Cheng Laboratory, China; 3.The Hong Kong University of Science and Technology (Guangzhou), China; 4.The Chinese University of Hong Kong, Hong Kong, China
We proposed and experimentally demonstrated a silicon photonic elliptical microring modulator with over 110 GHz electro-optic bandwidth operating at C-band. This elliptical microring modulator can support single-lane four-level pulse amplitude modulation up to 112 Gbaud.

12:00-13:30 Lunch Break

13:30-15:30 · November 8, 2025 · Saturday

Inverse Design

Presider: Hongtao Lin, Zhejiang University, China

13:30-13:45 · ACP2025-0718-3

Inverse-designed compact waveguide crossing for short-wavelength mid-infrared

Yaru Wang[1,2], Muhe Zhang[1,2], Zunyue Zhang[1,2*], Tiegen Liu[1,2], Jiaqi Wang[3*], Hon Ki Tsang[4], Zhenzhou Cheng[1,2*]

1.School of Precision Instrument and Opto-electronics Engineering, Tianjin University, China; 2.Key Laboratory of Opto-electronic Information Technology, Ministry of Education, China; 3.College of Physics and Optoelectronic Engineering, Shenzhen University, China; 4.The Chinese University of Hong Kong, Hong Kong, China

We demonstrate an inverse-designed waveguide crossing at 2.35 μm wavelengths. Experimental results show that the device exhibits an insertion loss of 0.24 dB with a crosstalk of -28.67 dB.

13:45-14:00 · ACP2025-0801-161

Inverse-designed Multi-mode Recirculating Structures on Silicon

Yifan Zhao, Yi Hu, Yiding Zheng, Hengtai Xiang, Jingshu Guo, Daoxin Dai

Zhejiang University, China

We propose and demonstrate the silicon-integrated multi-mode recirculating structures, realized via a semi-inverse design methodology. These structures exhibit insertion losses comparable to conventional schemes and achieve up to eightfold compactness in size. Experimentally, Mach-Zehnder interferometers embedding these structures reveals insertion losses of 1~2 dB and 1.8~3 dB for the 3-pass and 4-pass designs, respectively, alongside extinction ratios surpassing 20 dB.

14:00-14:15 · ACP2025-0813-11

Inverse Design for Ultra-Compact Mode Size Converter

Ying Chen[1], Li Liu[1*], Jiazhu Duan[2]

1.China University of Geosciences, China; 2.China Academy of Engineering Physics, China

We have developed novel optimization algorithms that improve the design paradigm of compact photonic components, achieving record-breaking miniaturization while maintaining high performance. The critical achievementis the realization of a 12 μm-0.5 μm mode size converter with an extremely short length of 2.43 μm, delivering over 90% transmission efficiency.

14:15-14:30 · ACP2025-0814-40

Inverse Design of a High-Performance Edge Coupler Operating at 2-μm Wavelength Band

Jinxuan Lin[1], Chenxingyu Huang[1], Jin Li[1], Bin Xu[1], Ni Zhang[2], Kun Yuan[2], Yihong Zhao[2], H. Y. Fu[1*]

1.Tsinghua University, China; 2. Shenzhen Jufei Optoelectronics Co, China

A trident-shaped edge coupler with subwavelength grating structures is proposed through inverse design, achieving coupling efficiency of −0.52 dB/−0.61 dB for the fundamental TE/TM mode at 2-μm wavelength, with 1-dB bandwidth exceeding 200 nm.

14:30-14:45 · ACP2025-0814-8

Generative-deep-learning-model-based fabrication error prediction for digital inverse-designed devices

Yue Xu[1], Yizhou Zhang[1], Yu Li[1,2*], Jianping Chen[1,2], Linjie Zhou[1,2]

1.State Key Laboratory of Photonics and Communications, Shanghai Jiao Tong University, China; 2.SJTU-Pinghu Institute of Intelligent Optoelectronics, China

Fabrication errors limit practical inverse-designed silicon photonic nanostructures. We propose a generative deep-learning model predicting device fabrication deviations. Validated on MMI splitters, it achieves 0.5dB prediction error for performance degradation, enabling robust large-scale nanofabrication.

14:45-15:00 · ACP2025-0815-139

Accelerated Inverse Design of 1×2 Wavelength Multiplexer Based on Fabrication Constraints

Jin Li[1,2], Bin Xu[1], Jinxuan Lin[1], Zhenmin Chen[2], Zhengtong Liu[2], Connie Chang-Hasnain[1,3], H. Y. Fu[1*]

1.Tsinghua University, China; 2.Peng Cheng Laboratory, China; 3.Berxel Photonics Co., Ltd., China

We realized the inverse design of a 1 × 2 wavelength multiplexer using the Schur complement domain decomposition and the effective index method, improving the computational efficiency of FDFD while satisfying strict fabrication constraints.

15:00-15:15 · ACP2025-0730-29
An Ultra-compact Scalable Three-mode (De)Multiplexer by GPU-accelerated Inverse Design
Jiahao Li[1], Xiang Li[2], Lin Wu[1], Ming Luo[1], Yuan Li[2], Qi Zhou[2], Hanbing Li[1], Tianye Huang[2], Ying Qiu[1*]
1.State Key Laboratory of Optical Communication Technologies and Networks China Information and Communication Technologies Group Corporation, China; 2.School of Mechanical Engineering and Electronic Information, China University of Geosciences (Wuhan), China;
We design and fabricatea 4.8 μm × 1.94 μm silicon photonic three-mode (de)multiplexer with ultra-low loss and crosstalk, broadband operation over the O-U bands, and robustness to fabrication errors via GPU-accelerated inverse design.

15:15-15:30 · ACP2025-0731-129
Ultra-Compact Inverse-Designed On-Chip Photonic Differentiator
Hao Jiang[1], Yuanrong Zhang[1], Kaiyuan Wang[1], Qiaomu Hu[1], Luluzi Lu[2], Shuang Zheng[1*], Minming Zhang[1*]
1.Huazhong University of Science and Technology, China; 2.Wuhan Fisilicon Microelectronics Technology Co., Ltd., China
We present an ultra-compact on-chip optical time-domain differentiator via inverse design based on a photonic crystal-like structure, with 26 μm² area, 10 nm effective bandwidth, and picosecond-level pulse differentiation capability.

15:30-16:00 Coffee Break

16:00-17:30 · November 8, 2025 · Saturday
LiDAR and Optical Phased Arrays
Presider: Hao Hu, Technical University of Denmark, Denmark

16:00-16:30 · ACP2025-0731-120 **Invited**
Integrated Optical Phased Arrays and LiDAR Application in Silicon Photonics
Huaqing Qiu[1], Mathias Prost[1], Guillaume Croes[1], Hao Hu[2], Joost Brouckaert[1], Roelof Jansen[1], Peter Gerets[1], Marcus Dahlem[1]
1.IMEC, Belgium; 2.Technical University of Denmark, Denmark
We present our recent research on integrated optical phased arrays and demonstrate a monolithically integrated biaxial LiDAR system based on an optical phased array on the silicon photonic platform for scalable 3D sensing applications.

16:30-17:00 · ACP2025-0731-10 **Invited**
Heterogeneously Integrated Silicon Photonics in Open Access PDK for LiDAR and Optical Interconnects
Hanxing Shi, Kimchau Nguyen, Beichen Wang, Han Yun
Openlight Photonics, United States
We demonstrate OpenLight's open-market Si-III-V photonics platform, including heterogeneously integrated III-V lasers and EAMs. This platform enables single-chip transmitter PICs for emerging LiDAR and datacom transceivers in the AI-driven market.

17:00-17:15 · ACP2025-0801-114
On-demand, Arbitrary, Precise Beamforming with Integrated Optical Phased Arrays
Shichong Yang, Baihe Feng, Fuhao Yu, Guihan Wu, Jing Yuan, Wei Jiang
Nanjing University, China
We demonstrate the Arbitrary Precise Pattern former (APP-former) to generate complex beams using optical phased arrays without iterative measurements. With Bregman divergence-based linearization, the APP-former efficiently optimizes beams with closed-form solutions per step despite nonconvexity.

17:15-17:30 · ACP2025-0801-70
A Lidar system Based on Rotating Liquid Crystal Polarization Grating
Site Luo
College of Health Science and Environmental Engineering, Shenzhen Technology University, China
This is the first engineering solution of lidar based on LCPG. The beam steering scheme is constructed by taking a LCPG as the first order and a wedge prism as second order to solvedisturbance beam problem, and a circular light absorption film is coated on the center of the wedge prism to absorb 0-order beam from LCPG.

Track 4: Optoelectronic Devices and Integration (Parallel Session)

13:30-15:30 · November 6, 2025 · Thursday
Functional Devices (1)
Presider: Shunfa Liu, Sun Yat-sen University, China

13:30-14:00 · ACP2025-0619-1 **Invited**
Unipolar Quantum Optoelectronic Devices for Mid-Infrared Free Space Optical Communication
Xiaodan Pang
Zhejiang University, China
We present recent progress on unipolar quantum optoelectronic devices for mid-infrared free space optical communication, highlighting experimental results and discussing challenges toward high-speed, long-distance transmission using quantum cascade lasers, modulators, and detectors.

14:00-14:30 · ACP2025-0729-9 **Invited**
High-quality photonic quantum devices based on semiconductor cavity quantum electrodynamics
Shunfa Liu
Sun Yat-sen University, China
In this talk, I'll present techniques forconstructing and manipulating cavity quantum electrodynamics systems implemented on a semiconductor platform, as well as their applications in developing high-quality single-photon sources and high-fidelity entangled photon pair sources.

14:30-14:45 · ACP2025-0815-40
Passive PDMS-Based Temperature Stabilization for High-Q Optomechanical Microcavities
Mengmeng Chen, Bing Sun
1.Advanced Photonic Technology Lab, College of Electronics and Optical Engineering and College of Flexible Electronics (Future Technology), Nanjing University of Posts and Telecommunications, China
Self-compensating PDMS/silica microcavity slashes optomechanical frequency drift to 71 Hz/°C, enabling ultrastable magnetic field sensing without sacrificing Q or threshold.

14:45-15:00 · ACP2025-0723-3
Band-Rejection Filter with Grating-Assisted Directional Coupler Embedded in Mach-Zehnder Interferometery Arms
Sabah Al-ithawi
University of Electronic Science and Technology of China, Iraq
Optical filters play a crucial role in optical communication and information process systems. In this paper, a band-rejection filter with grating-assisted directional couplers embedded in Mach-Zehnder interferometer arms is proposed and demonstrated experimentally on polymer

15:00-15:15 · ACP2025-0815-6
Rapid Co-Extraction of Effective and Group Refractive Indices for Integrated Photonic Waveguides
Yong Hu, Jiaxin Gu, Chenhui Li, qingyang Du, Shaoliang Yu
Zhejiang Laboratory, China
Accurately and efficiently determining the refractive index of integrated photonic waveguides is crucial for the design of photonic devices. In this paper, we propose a novel approach for simultaneously extracting the effective and group refractive index through selective mode splitting of the photonic crystal microring resonator. The method is experimentally validated on a silicon nitride waveguide platform, achieving measurement accuracy exceeding 0.02% for the effective refractive and 0.5% for the group index within a single measurement.

15:15-15:30 · ACP2025-0801-1
Ultra-High Sensitivity 50G-Class APD Based on a Microhole Array Metasurface for High-Speed PON Applications
Ning Wang[1], Junwei Li[1*], Xinjia Qiu[2], Wenjun Chen[2], Zhen Dong[2], Xiaoshuo Jia[1], Borui Li[2], He Yuan[2], Zelin Wang[2], Dechao Zhang[1]
1.China Mobile Research Institute, China; 2.Huawei Technologies Co., Ltd., China
We demonstrate the first 50G-class APD operating at O-band using a microhole array based metasuface structure. Simulation results show that the photon absorption efficiency and APD responsivity are improved to be 95% and 9.65A/W, respectively. With this APD, the receiver sensitivity of 50Gb/s signal reaches -27.5dBm.

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Functional Devices (2)
Presider: Xiaodan Pang, Zhejaing University, China

16:00-16:15 · ACP2025-0721-3
Directional Couplers with Arbitrary Coupling Ratios Using Pseudomagnetic Fields in Photonic Crystals
Pan Hu, Shuaihu Liu, Lu Sun, Yikai Su
Shanghai Jiao Tong University, China
We propose and experimentally demonstrate directional couplers with arbitrary coupling ratios usingpseudomagnetic fieldsin silicon photonic crystals attelecommunication wavelengths.This work may enable diverse PMF-based functional devices in many fields, such as quantum information processing, nanophotonics, and optical communications.

16:15-16:30 · ACP2025-0801-165
Bandgap-Dispersion Engineered Athermal MZI Filter with Wavelength-Selective Thermal Drift
Zhiyuan Zhou[1], Yao Sun[1], Yaxiao Lai[2], Changyu Hu[3], Hao Hu[3], Bo Zhao[3], Jun Liu[3], Shuang Zheng[1, 4*], Minming Zhang[1, 4*]
1.Huazhong University of Science and Technology, China; 2.Caliopa Lab of Belgium Research Centre Huawei Technologies Research & Development Ltd, China; 3.Hubei Jiu Feng Shan Laboratory, China; 4.Optics Valley Laboratory, China
We demonstrate an athermal MZI filter using silicon nitride subwavelength waveguides with near-zero thermal drift at 1555 nm and 15 pm/K sensitivity at 1510 nm, enabling simultaneous sensing and stable transmission.

16:30-16:45 · ACP2025-0815-117
Ultra-Compact Si-SiN Interlayer Coupling Using Shortcuts-to-Adiabaticity
Yang Yunhong, Xu Weihan, Yuan Qiqi, Wang Danye, Lu Liangjun, Zhou Linjie, Chen Jianping
Shanghai Jiao Tong University, China
This work presents an ultra-compact, broadband, fabrication-tolerant SiN-Si coupler via STA, with a tapered mode-evolution region. The 14 μm device has 0.082 dB insertion loss (1500–1560 nm), 0.059 dB at 1550 nm.
Keywords: adiabatic devices, silicon photonics, interlayer waveguide couplers

16:45-17:00 · ACP2025-0815-73
A Preset-free Wavelength Locking Method for Microring Resonators Based on Temporal Logic and Dithering Signals
Yizhou Zhang[1], Bohan Chu[1], Yue Xu[1], Yu Li[1, 2*], Jianping Chen[1, 2], Linjie Zhou[1, 2]
1.Shanghai JiaoTong University, China; 2.SJTU- Pinghu Institute of Intelligent Optoelectronics, China;
A wavelength locking method for microring resonators based on dithering signals and temporal logic. Estabilished apreset-free feed-back algorithm, reaching locking precises of 20and 22 pm ,respectivly, under 1Hz-560pm and 40Hz-100pm thermal fluctuations.

17:00-17:15 · ACP2025-0801-74
Crosstalk Mitigation in Multi-Channel ThermoOptic Chips from Common-Ground Voltage Division
Mingshen Peng[1], Xiaoqun Yu[1], Jiaqi Li[1], Jinjie Zeng[1], Shuai Lin[1], Yanfeng Zhang[2*]
1.Sun Yat-sen University, China; 2.Sun Yat-sen University & Hefei National Laboratory, China
This study examines common-ground voltage division effects on multi-channel micro-ring resonance peaks during thermal tuning. Under the same supplied power, the current source can achieve more effective heating than the voltage source (increasing from 0.32nm to 0.35nm) and provide better consistency (with the variance decreasing from 0.015 to 0.004).

17:15-17:30 · ACP2025-0729-1
Hybrid Reconfigurable Optical Add Drop Multiplexer with Asymmetrical Filtering Profiles
Qiang Wang[1*], Balakrishnan Sridhar[1], Rao Lingampalli[1], Pradeep Swargam[1], Iwan Kartawira[1], Manveer Singh[1], Robert Huey[2], Jay Pabley[2]
1.Equinix Inc, United States; 2.Equinix, United States
ROADM combined with passive splitters doubles port counts, but with many limitations. By introducing asymmetrical filtering profiles between multiplexer and demultiplexer, we overcome current limitation. Additional benefits includereducing bandwidth narrowing and improving spectral efficiency.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday

Functional Devices (3)

Presider: Jiawei Wang, Harbin Institute of Technology (Shenzhen), China

08:30-09:00 · ACP2025-0723-9 **Invited**

Magnet-optical Isolator and Switch for Photonic Integrated Circuits

Yuya Shoji

Institute of Science Tokyo, Japan

We present waveguide-based magneto-optical (MO) isolator and switch. Heterogeneous integration of MO garnet on silicon photonic platform and Si-based MO isolator were developed. In addition, we introduce non-volatile MO switches for photonic computing applications.

09:00-09:15 · ACP2025-0801-209

Bidirectional Diode-Driven Calibration-Free Mach-Zehnder Switch for Scalable Photonic Circuits

Xiaolu Liu[1], Lijia Song[2], Jiayue Zhu[1], Huan Li[1*], Daoxin Dai[1*]

1.State Key Laboratory for Modern Optical Instrumentation, College of Optical Science and Engineering, Zhejiang University, China; 2.International Research Center for Advanced Photonics, Zhejiang University, China

We demonstrate a calibration-free 2×2 Mach-Zehnder switch (MZS) and a 4×4 MZS array that integrates thermally actuated phase shifters with oppositely connected diodes on each arm, enabling bidirectional thermo-optic control via polarity-switched voltage inputs.

09:15-09:30 · ACP2025-0814-1

Single-layer Polarization-insensitive Silicon Optical Switch based on Series Phase Shifter

Ningyu Zhang, Song Tianqi, Jing Wang

Southern University of Science and Technology, China

We present a novel polarization-insensitive silicon optical switch based on single-layer channel waveguide and specially designed series phase shifter. The device achieves 2.3 dB insertion loss, ~65 mW P_{π}, and 20 dB extinction ratio.

09:30-09:45 · ACP2025-0727-3

High-delay-density and Low-loss Silicon Optical Delay Line Using Waveguide Superlattice

Tianqi Song, Ningyu Zhang, Jing Wang

Southern University of Science and Technology, China

We presentahigh-delay-density and low-losssilicon opticaldelay line that combines a broadened Archimedean spiral with waveguide superlatticesto achieve half-wavelength pitch. This delay line exhibits 0.245 dB/cm loss and 3.5 ns/mm² delay density.

09:45-10:00 · ACP2025-0801-181

S+C+L-bands 90° hybrid on silicon

Yi Hu, Ziyang Wang, Guojiang Yang, Laiwen Yu, Jingshu Guo, Daoxin Dai

Zhejiang University, China

We demonstrate a 90° hybrid operating in entire S+C+L bands, theoretically with insertion loss 1.6 dB, CMRR 22 dB, phase error 13°. Signal port input measurements show acceptable performance.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Photodetector
Presider: Yuya Shoji, Institute of Science Tokyo, Japan

10:30-10:45 · ACP2025-0717-2
High-Responsivity Ge Photodetector with 110 GHz Bandwidth at 1310 and 1550 nm Based on 300-mm Silicon-Photonic Platform
Wang Xu[1,2], Song Jinwen[2], Yu Fengxin[2], Yang Chengkun[2], Wang Xin[1,2], Shen Ruoyu[2], Yang Fenghe[2], Zhao Haibin[1], Chu Wei[2], Hu Xiao[2*], Cai Haiwen[2*]
1.Fudan University, China; 2.Zhangjiang Laboratory, China
We demonstrate lateral germanium photodetectors on a 300-mm CMOS silicon photonics platform, achieving a bandwidth of up to 110 GHz with responsivities exceeding 0.97 A/W at 1310 nm and 1.08 A/W at 1550 nm.

10:45-11:00 · ACP2025-0717-4
Beyond 110 GHz L-Band Ge Photodetector under − 1 V Based on 300-mm Silicon-Photonic Platform
Wang Xu[1,2], Song Jinwen[2], Yu Fengxin[2], Yang Chengkun[2], Wang Xin[1,2], Shen Ruoyu[2], Yang Fenghe[2], Zhao Haibin[1], Chu Wei[2], Hu Xiao[2*], Cai Haiwen[2*]
1.Fudan University, China; 2.Zhangjiang Laboratory, China
We demonstrate a race-track Ge photodetector with over 110 GHz bandwidth and 0.8 A/W responsivity at 1590 nm. The Ge PDs are fabricated on a 12-inch CMOS silicon photonic platform by Ge epitaxial deposition process.

11:00-11:15 · ACP2025-0730-50
High Responsivity and High Output Power Photodiodes Utilizing Distributed Bragg Reflectors
Mengjing Xu, Bing Xiong, Changzheng Sun, Zhibiao Hao, Jian Wang, Lai Wang, Yanjun Han, Hongtao Li, Lin Gan, Yi Luo
Tsinghua University, China
Modified uni-traveling-carrier photodiodes (MUTC-PDs) with distributed Bragg reflectors are proposed for high responsivity and high output power. The fabricated 20-μmdiameter PD exhibits 50 GHz bandwidth with 0.73 A/W responsivity and 16 dBm output power.

11:15-11:30 · ACP2025-0731-102 **Industry Innovation Nomination**
57-GHz C+L Band Germanium Waveguide Photodetector with Interleaved Junctions
Yihang Li[1,2], Jianing Wang[1], Yuxiang Yin[3], Jian Li[1,2], Kaihang Lu[3], Xi Wang[1], Daoqun Liu[2], Xi Xiao[2], Lei Wang[2*], Yeyu Tong[3*], Ke Xu[1,2*]
1.Harbin Institute of Technology, Shenzhen, China; 2.Peng Cheng Laboratory, China; 3.The Hong Kong University of Science and Technology (Guangzhou), China
We demonstrated a C+L band germanium waveguide photodetector with interleaved junctions, fabricated by standard multi-project wafer process. Responsivity of 0.62 A/W and 3-dB bandwidth of 57 GHz were measured under -3 V at 1625 nm. It supports high-speed photodetection of 96 Gb/s NRZ signals.

11:30-11:45 · ACP2025-0731-33
A 106 Gbps Silicon-Germanium Photodiode with 0.94 A/W Responsivity at the O-Band Eabled by Microring Resonator Enhancement
Chao Cheng, jintao xue, Shenlei bao, Qian liu, xiangling bu, xishan yu, binhao wang
Xi'an Institute of Optics and Precision Mechanics of CAS, China
We demonstrate a microring resonator-enhanced silicon-germanium photodiode that achieves a responsivity of 0.94 A/W at 1313.5 nm using a 1.8 μm ultrashort germanium absorption region. Under a reverse bias voltage of 4 V, the device exhibits an exceptionally low dark current of 11 nA and a 3 dB OE bandwidth of 50 GHz. High-speed performance is validated by clear eye diagrams at 53.125 Gbps non-return-to-zero and 106.25 Gbps four-level pulse amplitude modulation signals. This approach offers a promising solution for enhancing photodiode responsivity, with strong potential for use in wavelength-division multiplexing systems.

11:45-12:00 · ACP2025-0801-31
CMOS Compatible Silicon Ultraviolet-Enhanced Avalanche Photodiode
Jing Xiao[1,2,3], Gang Yang[1,2], Fujun Sun[1,2*], Tianyang Fu[1,2], Zaili Yang[1,3,4], Gao Hong[1,3,4], Wei Tang[1,2,3], Yuhang Wang[1,2,3], Yan Yang[5,6*]
1.Key Laboratory of Fabrication Technologies for Integrated Circuits, Chinese Academy of Sciences, China; 2.Institute of Microelectronics, Chinese Academy of Sciences, China; 3.School of Integrated Circuits, University of Chinese Academy of Sciences, China; 4.Institute of Microelectronics, Chinese Academy of Sciences BeiJing, China, China; 5.Key Laboratory of Fabrication Technologies for Integrated Circuits, China; 6.Chinese Academy of Sciences Institute of Microelectronics, Chinese Academy of Sciences, China
We demonstrate a CMOS-compatible ridge-type silicon ultravioletavalanche photodiode with an ultra-shallow junction, achieving high responsivity and quantum efficiency at 397 nm, with potential for scalable on-chip readout of trapped-ion qubit fluorescence.

12:00-13:30 Lunch Break

13:30-15:15 · November 7, 2025 · Friday

Optical Computing (1)

Presider: Deming Kong, Technical University of Denmark, Denmark

13:30-14:00 · ACP2025-0610-1 **Invited**

Programmable silicon photonic integrated circuits for optical computing

Rui Tang

Keio University, Japan

Our recent progress on silicon photonic matrix-vector multiplication processors will be introduced, which employ multiplexing across different domains such as wavelength, waveguide, and time.

14:00-14:15 · ACP2025-0718-5 **Oral**

Non-volatile programmable photonic network based on MZI and phase-change materials

Shengqiang Li, Pengxing Guo, Wei Sun, Haoxuan Huang, Jiahao Zhou, Weigang Hou, Lei Guo

School of Communications and Information Engineering, Chongqing University of Posts and Telecommunications Chongqing, China

This paper presents a non-volatile programmable photonic circuit that utilizes the phase-change material Sb_2Se_3 integrated with a Mach-Zehnder interferometer to form a non-volatile tunable basic unit (NV-TBU), offering an alternative to conventional electrical or thermal tuning methods. The NV-TBU exhibits an insertion loss of less than 0.041 dB and crosstalk below −33.85 dB, while requiring zero static power consumption. By integrating the NV-TBU within a hexagonal mesh architecture, the proposed design enables versatile photonic signal processing and retains its configuration state even when powered off. Simulation results shows that the proposed photonic circuit can be reconfigured to function as an optical differentiator, microring resonator, optical filter, and optical router through the programmable control of the NV-TBUs.

14:15-14:30 · ACP2025-0801-20

Multifunctional Photoelectronic Units Enabling Scalable Photonic Computing

Yuxin Sun[1], Huan Li[2*]

1.College of Optical Science and Engineering, Zhejiang University, China; 2.Zhejiang University, China

Addressing photonic neural networks' scalability and nonlinearity limits, we propose the C3-PCDNN architecture. Its multifunctional C3 unit enables complex-domain nonlinearity, loss compensation, and residual connections, achieving 57.3% accuracy on 1,623-class tasks—15% above non-residual networks.

14:30-14:45 · ACP2025-0814-7

Human Action Recognition with an Integrated Deep Topological Photonic Reservoir Computer

Yihang Lai[1], Zhiwei Yang[2], Qi Chen[1], Tian Zhang[1*], Jian Dai[1], Kun Xu[1]

1.Beijing University of Posts and Telecommunications, China; 2.China Information and Communication Technology Mobile Communication Technology Company Ltd. (CICT Mobile), China

We propose a 5 × 5 integrated deep-topology photonic reservoir computer. It exhibits a significant enhancement in memory capacity (from 7.6 bitsto 24.6 bits) and achieves high accuracy on human action recognition (90%) in video streams.

14:45-15:00 · ACP2025-0801-27

Reconfigurable on-chip diffraction-based convolution processor

Wencan Liu[1], Yuyao Huang[1], Zhenghang Zhang[1], Peng Meng Chan[1], Run Sun[1], Tingzhao Fu[2], Yuhao Wang[1], Sigang Yang[1], Hongwei Chen[1*]

1.Tsinghua University, China; 2. National University of Defense Technology, China

We present an integrated, reconfigurable diffractive convolutional processor based on a hard-parameter sharing algorithm. This enhanced the optoelectronic system performs 12- kernel parallel convolutions, achieving a73% reduction in power-intensive digital computations.

15:00-15:15 · ACP2025-0814-29

Bio-Inspired Graded Photonic Neurons for Efficient Reservoir Computing

Huang Yu, Yang Yigong, Zhou Pei, Lau Kuenyao, Li Nianqiang

Soochow University, China

We present a graded neuron model inspired by biological vision, implemented using a commercial distributed feedback (DFB) laser with optoelectronic feedback to modulate carrier dynamics. The feedback loop enables a continuously adjustable output response, emulating the analog encoding capability of graded potentials while maintaining a hardware-friendly design. A reservoir computing architecture is constructed based on this graded neuron, providing a compact and energy-efficient platform for neuromorphic computation. Experimental evaluation on the Iris dataset demonstrates effective feature representation and high classification accuracy. This fully electrical scheme eliminates the need for optical injection and external modulators, reducing system complexity, cost, and power consumption, and is adaptable to various semiconductor laser types.

15:30-16:00 Coffee Break

15:30-17:30 Poster Sessiom

18:30-20:30 Banquet & Awards Ceremony

08:30-09:45 · November 8, 2025 · Saturday
Advanced Materials (1)
Presider: Lei Bi, University of Electronic Science and Technology, China

08:30-08:45 · ACP2025-0728-19
Optical absorption properties of $PtSe_2$-on-silicon waveguide devices
Tianping Xu[1], Rui Niu[1], Liqiang Qi[1], Shuqi Xiao[2], Tiegen Liu[1], Hon Ki Tsang[2], Jiaqi Wang[3*], Zhenzhou Cheng[1*]
1.Tianjin University, China;2. The Chinese University of Hong Kong, Hong Kong, China;3. Shenzhen University, China
We studied optical absorptions of $PtSe_2$-on-silicon devices by integrating low-dimensional $PtSe_2$ films on ultrathin silicon devices. The absorption coefficients of the $PtSe_2$-on-silicon waveguide and microring were 0.0648 dB/μm and 0.453 dB/μm at 2200 nm wavelengths.

08:45-09:00 · ACP2025-0729-33
Erasable Optical Probe for Photonic Integrated Circuits Using Phase Change Materials
Dongyue Sun, Mingyu Zhu, Yujun Liu, Huan Li, Daoxin Dai, Yaocheng Shi
Zhejiang University, China
We present an erasable optical probe to monitor waveguide power in photonic integrated circuits, controlled by laser-induced crystallization/amorphization of embedded phase change materials . It is applicable for the detection and pre-calibration of phase errors.

09:00-09:15 · ACP2025-0815-121
Slow-light BTO Modulator With Over 150GHz Electro-optic Response
Yantao Wu
Huazhong University of Science and Technology, China
We proposed a Mach-Zehnder modulator on a silicon-nitride-loaded barium titanate platform using a slow-light waveguide. This compact 312-μm device achieves a 150 GHz bandwidth and a 0.08 V·cm half-wave voltage-length product.

09:15-09:30 · ACP2025-0815-87
Nonvolatile Silicon-based Optical Switch based on Low-loss Phase Change Material
Wencheng Yue[1], Kai Liang[1,2], Shuai Lei[1,3], Yongge Li[1,3], Yan Cai[1*]
1.State Key Laboratory of Materials for Integrated Circuits, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China; 2. University of the Chinese Academy of Sciences, China; 3. University of Shanghai for Science and Technology, China
We proposed and fabricated a nonvolatile silicon-based optical switch utilizing low-loss Sb2Se3, achieving reversible amorphous-to-crystalline phase transition via rapid thermal annealing (RTA). The switch exhibits insertion losses (ILs) below 1 dB for both bar and cross states at 1550 nm, with extinction ratios (ERs) reaching ~17 dB. Broadband performance is achieved, with 3 dB bandwidths extending across the measured spectral range (1530 nm - 1580 nm) and ERs consistently exceeding 14 dB. This compact switch showcases low loss, broadband, and zero static power consumption, promising for reconfigurable photonic integrated circuits.

09:30-09:45 · ACP2025-0815-98
A novel phase change material-based non-volatile optical router for optical network-on-chip
Xiangyu He, Pengxing Guo, Wei Sun, Haoxuan Huang, Shengqiang Li, Weigang Hou, Lei Guo
Chongqing University of Posts and Telecommunications, China
This paper introduces a novel non-volatile optical router based on phase change material Sb2Se3, delivering high extinction ratio, reduced insertion loss, enhanced area efficiency, and low power consumption, making it ideal for high-performance optical network-on-chip.

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Advanced Materials (2)
Presider: Yaocheng Shi, Zhejiang University, China

10:30-10:45 · ACP2025-0801-159
Microring Resonator Enhanced Graphene Photodetector Based on Photo-Thermoelectric Effect
Yiding Zheng[1], Tiannan Han[2], Hengtai Xiang[1], Yuanrong Li[1], Junhuan Li[1], Leyi Hu[1], Laipeng Ma[3*], Jingshu Guo[1*], Daoxin Dai[1*]
1.State Key Laboratory of Extreme Photonics and Instrumentation, College of optical Science and Engineering Zhejiang University Hanghzou, China, China; 2.Shenyang National Laboratory for Material Science Institute of Metal Research, Chinese Academy of Sciences, China; 3.Shenyang National Laboratory for Material Science Institute of Metal Research, Chinese Academy of Sciences Shenyang, China, China
A microring graphene photodetector based on the photo-thermoelectric effect is demonstrated, realizing a responsivity of 2.55 V/W and a linear range up to 1.51 mW. It provides a relatively high responsivity and wide-band solution for on-chip detection with a CMOS-friendly fabrication process.

10:45-11:00 · ACP2025-0801-189
Waveguide-Integrated Graphene-Colloidal-Quantum-Dots-Graphene heterostructure Photodetector with High sensitivity
Hengtai Xiang[1], Jing Liu[2], Laiwen Yu[1], Yuanrong Li[1], Liang Gao[2], Jingshu Guo[1*], Jiang Tang[2], Daoxin Dai[1*]
1.Zhejiang University, China; 2.Huazhong University of Science and Technology, China
A graphene-colloidal quantum dot-graphene heterojunction waveguide photodetector is demonstrated, achieving a high responsivity of 37.9 A/W, a low dark current of 1.7 nA, and a noise-equivalent power of 0.01 pW/Hz$^{1/2}$.
Keywords: silicon photonics, photodetector, graphene, quantum dots

11:00-11:15 · ACP2025-0801-192
Compact Mid-Infrared Inverse-Designed Passive Devices Based on LNOI
Deng Haoqing[1], Zhang Guowu[2], Yu Zejie[1], Dai Daoxin[1]
1.State Key Laboratory of Extreme Photonics and Instrumentation, College of Optical Science and Engineering, Zhejiang University, China; 2.Jiaxing Key Laboratory of Photonic Sensing & Intelligent Imaging, Intelligent Optics & Photonics Research Center, Jiaxing Research Institute, Zhejiang University, China
Compactpassivedevicesoperating at~3700 nm,including polarization beam splitter,power splitter, and waveguide crossing,are experimentally developed bythe inverse-designmethodon an x-cut lithium niobate on insulator platform.

11:15-11:30 · ACP2025-0731-115
High-Precision 90-Degree Electro-Optic Hybrid with Ultra-Low Phase Error
Siyuan Zhou, **Guanyu Chen**, Ziyao Zhang, Hua Yu, Tao Zhu
Chongqing University, China
An integrated 90° electro-optic hybrid on thin-film lithium niobate utilizes an MMI structure and on-chip phase shifter to achieve 1° phase error and 20 dB CMRR across 1530–1580 nm with sub-3 V drive voltage.

11:30-11:45 · ACP2025-0731-117
Broadband and Robust Suspended Grating Coupler on Ultra-Thin Lithium Niobate
Jindong Lu, **Guanyu Chen**, Ziyao Zhang, Hua Yu
Chongqing University, China
A high-efficiency suspended grating coupler on ultra-thin X-cut LNOI achieves -3.5 dB coupling loss, 90 nm bandwidth, and strong fabrication tolerance, enabling scalable light coupling into fully-etched suspended photonic structures for LNOI integration.

12:00-13:30 Lunch Break

13:30-15:30 · November 8, 2025 · Saturday
Optical Computing (2)
Presider: Rui Tang, Keio University, Japan

13:30-14:00 · ACP2025-0725-5 **Invited**
Multidimensionally Encoded Photonic Matrix Multipliers for Digital Optical Neural Networks
Deming Kong
Technical University of Denmark, Denmark
We present our recent works on high-precision optical matrix multipliers utilizing multi-dimensional encoding schemes. We explore applications in high-definition image processing and YOLO object detection, demonstratingenhanced accuracy and potential for real-world inference tasks.

14:00-14:15 · ACP2025-0729-38
General-Purpose Programmable Photonic Circuit as an Ising Hamiltonian Computing Engine
Jose Roberto Rausell Campo[1], Nayem Al Kayed[2], Bhavin Shastri[2], Jose Capmany Francoy[1]
1.Universitat Politècnica de València, Spain; 2.Queen´s University, Canada
We demonstrate a photonic Ising machine implemented on a general-purpose programmable photonic platform, experimentally performing high fidelity parallel optical matrix-vector multiplications for 3×3 and 4×4 Hamiltonian calculations, and succesfully solving a three-node ferromagnetic coupling problem.

14:15-14:30 · ACP2025-0730-58
High-wavelength-uniformity artificial gauge field based micorings for photonic tensor computing
JiaYuan Guo, Wenjia Zhang, Zuyuan He
Shanghai Jiao Tong University, China
We design a microring resonator based the artificial-gauge-field method, which has low fluctuations in extinction ratios and bandwidths within different resonant peaks and different applied voltages, and the close optical weighting bound for 20 wavelengths.

14:30-14:45 · ACP2025-0801-109
Deep convolutional optical neural networks based on MRR array and microcomb
Yunlong Li, Zihang Yang, Haowei Tang, Hao Jiang, Shuang Zheng, Minming Zhang
Huazhong University of Science and Technology, China
We propose a deep convolutional optical neural networks architecture based on MRR array and microcomb. Using the system, the handwritten digits recognition task was simulated with 98.61% accuracy without the assistance of electronic neural networks.

14:45-15:00 · ACP2025-0801-28
A 3.28 TOPS Optoelectronic Neuromorphic Accelerator Achieved by Quadratic Scaling Using Optical Frequency Comb
Ying Zhu[1], Kailai Liu[2], Shujie Pan[3], Xin Hua[1], Yifan Liu[1], Xinyu Yang[1], Yuhan Gong[2], Chao Yang[2], Ming Luo[2], Hongguang Zhang[1], Daigao Chen[1], Siming Chen[3], Xi Xiao[1, 4*]
1.National Information Optoelectronics Innovation Center, China; 2. State Key Laboratory of Optical Communication Technologies and Networks, China; 3. Laboratory of Solid State Optoelectronics Information Technology, China; 4. Peng Cheng Laboratory, China
We propose an integrable optoelectronic neuromorphic accelerator with quadratic scaling, achieving 3.28TOPS and 98.00% accuracy using optical frequency combs.

15:00-15:15 · ACP2025-0801-52
Achieving Non-Unitary Linear Computations on Photonic Networks via Hermitian Augmentation
Xinyu Yang[1], **Ying Zhu**[1], Yifan Liu[1], Xueyi Jiang[1], Hongguang Zhang[1], Daigao Chen[1], Xi Xiao[1, 2*]
1.National Information Optoelectronics Innovation Center, China; 2.Peng Cheng Laboratory, China
We propose Hermitian Augmentation for non-unitary linear matrix computations on photonic networks, achieving fidelity above 0.997 and MNIST accuracy of 90.10% under imperfections, adaptable to various architectures.

15:15-15:30 · ACP2025-0801-200
N-ary Distributed Architecture Based on Noise-Aware Search for Large-Scale Photonic Convolutional Neural Networks
Ruijia Guo, Yongmei Sun, Zheng Li, Yaoxian Gao
Beijing University of Posts and Telecommunications, China
We builda systematic modeling for MZI-based network with imperfections andproposean N-ary distributed architecture based on noise-aware search for large-scale photonic convolutional neural networks, achieving a 60.59% relative accuracy improvementover existing architectures.

15:30-16:00 Coffee Break

16:00-17:30 ·November 8, 2025 · Saturday

Nonlinear Optics

Presider: Xiaodan Pang, Zhejiang University, China

16:00-16:30 · ACP2025-0630-2 **Invited**

Vernier microcombs for optical atomic clocks and optical frequency synthesizers

Kaiyi Wu[1,2*], Victor Torres-Company[1], Jason McKinney[2], Andrew Weiner[2]

1.Chalmers University of Technology, Sweden; 2.Purdue University, United States

Stabilization of on-chip microcomb establishes phase-coherent links between optical and radio frequencies. Our Vernier dual-microcomb scheme overcomes thehigh radio frequency detection challenges in octave-spanning microcombs, enabling stabilized microcomb systems and demonstrating precision metrology applications.

16:30-16:45 · ACP2025-0731-57

Efficient frequency tuning of SiNx optical paramatric oscillator

Yuxuan Ouyang, Yanfeng Zhang, Jiaqi Li, Jinjie Zeng, Shuai Lin, Jieyang Wang, Yinchen Xie, Siyuan Yu

SUN YAT-SEN UNIVERSITY, China

We demonstrate efficient broadband continuous tuning of idler frequencies generated through Kerr optical parametric oscillation in a silicon nitride microring resonator, enabled by highly efficient suspended heaters.

16:45-17:00 · ACP2025-0731-91

Direct and Deterministic Single Soliton Generation Enabled by Avoided Mode Crossing in Microresonators

Zhaopeng Li, Qilin Yang, Lilu Wang, Heng Zhou, Bo Xu, Kun Qiu, Yong Geng

University of Electronic Science and Technology of China, China

In this paper, we experimentally demonstrate the direct and deterministic generation of single-soliton in microcavities, which avoids the complex state transitions from the Turing pattern to the chaotic state and then to the soliton state.

17:00-17:15 · ACP2025-0731-38

Broadband Second-Harmonic Generation in a Double-Layer Thin-Film Lithium Niobate Tapered Waveguide

Yuan Li, Lutong Cai, Lin Zhang

Tianjin university, China

We demonstrate broadband second-harmonic generation in a tapered waveguide on the platform of double-layer thin-film lithium niobate. A bandwidth of around 60 nm and a conversion efficiency of around 45% W^{-1} are achieved.

17:15-17:30 · ACP2025-0815-124

A SPICE Model for Nonlinear Dynamics of Silicon Micro-Ring Modulators

Zhiyuan Zhou[1], Zhihan Sun[1], Yueyang Yu[1], Yantao Wu[1], Tian Qi[1], Shengjiang Dai[2], Changyu Hu[2], Hao Hu[2], Bo Zhao[2], Jun Liu[2], Shuang Zheng[1,3*], Minming Zhang[1,3*]

1.Huazhong University of Science and Technology, China;2. Hubei Jiu Feng Shan Laboratory, China;3. Optics Valley Laboratory, China

We propose a SPICE-compatible model for silicon micro-ring modulators (MRMs). The model integrates nonlinear electro-optic effect and self-heating dynamics, enabling transient and steady-state simulations within circuitlevel design environments

Track 5: Microwave Photonics and Optical Signal Processing

13:30-15:30 · November 6, 2025 · Thursday
Terahertz technologies and applications
Presider: Nianqiang Li, Soochow University, China

13:30-14:15 · ACP2025-0605-5 **Tutorial**
Terahertz-Bandwidth Signal Processing with Low-Bandwidth Electronics
Thomas Schneider
TU-Braunschweig, Germany
We review orthogonal sampling for the down-conversion of high-bandwidth into parallel low-bandwidth signals, which drastically reduces the requirements for the electronic signal processing in the optical transceivers and increases SINAD and ENOB.

14:15-14:45 · ACP2025-0624-2 **Invited**
Photonic Terahertz Chaotic Integrated Sensing and Communications (Chaotic-ISAC)
Lu Zhang
Zhejiang University, China
This talk presents our recent work on photonic terahertz chaos for secure ISAC systems, integrating chaos generation, encryption, and radar with optimization framework to balance communication, sensing, and security performance.

14:45-15:00 · ACP2025-0725-6
Filterless Spectral Efficiency Enhancement in Photonics-Assisted Terahertz Communication System viaTwin-SSB Modulation
Zhanjiang Wang[1], Kaile Li[2], Qiufei Song[1], Feixiang Zhang[1], Shuhui Zhou[1], Tong Li[1], Yibo Huang[1], Jianguo Yu[1*]
1.Beijing University of Posts and Telecommunications, China; 2.Hangzhou Institute of Technology, Xidian University, China
We propose a twin-single-sideband (twin-SSB) modulation scheme for a 400 GHz photonics-assisted térahertz communication system. The scheme employs DSP to separate the left-sideband (LSB) and right-sideband (RSB) signals, thereby eliminating the need for bandpass filters. Simulation results confirm that the BER for both sidebands falls below the HDFEC threshold of 3.8 × 10−3.

15:00-15:15 · ACP2025-0725-7
Symbol-Level Channel Modeling for 300 GHz Photonic-Assisted THz Communication Systems Using CGAN with Attention
Qiufei Song[1], Kaile Li[2], Zhanjiang Wang[1], Shuhui Zhou[1], Feixiang Zhang[1], Tong Li[1], Xiande Lin[1], Jianguo Yu[1*]
1.Beijing University of Posts and Telecommunications, China;2.Xidian University, China
We propose a conditional generative adversarial network (CGAN)-based channel modeling framework for 300 GHz photonic-assisted terahertz (THz) communication systems. The model achieves accurate symbol reconstruction with robust generalization under diverse conditions, yielding normalized mean squared errors (NMSEs) as low as 1e−4 in optimal channel cases. In the bad environment, incorporating a self-attention mechanism improves the symbol error rate (SER) by up to 3.8 dB.

15:15-15:30 · ACP2025-0730-30
Resonance-Enhanced FM Noise in Semiconductor Lasers for High-Speed Fiber-THz Convergence Links at 320 GHz
Zhigang Xin[1], Jiao Zhang[2*], Min Zhu[1*], Qing Zhong[1], Weidong Tong[1], Yunwu Wang[2], Mingzheng Lei[2], Junjie Ding[2], Yuancheng Cai[2], Bingchang Hua[2], Yucong Zou[2], Jianjun Yu[2]
1.Southeast University, China; 2.Purple Mountain Laboratories, China
We experimentally investigated the robustness of fiber-THz convergence systems to semiconductor laser resonance-enhanced FM noise, enabling 120 Gb/s links with linewidths up to 500 kHz at 1 GHz resonance, under the HD-FEC threshold.

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Microwave Photonics and Radar Systems
Presider: Lu Zhang, Zhejiang University, China

16:00-16:30 · ACP2025-0915-15 **Invited**
Photonics-assisted stepped-frequency radar
Ziqian Zhang
The University of Sydney, Australia
Stepped-frequency radar has been widely adopted across diverse applications, including improving climate models to understand global warming, detecting subglacial liquid water on Mars, enabling pedestrian detection for vehicle emergency braking, and facilitating contactless monitoring of vital signs to prevent unattended medical emergencies in aged care. Recent advancements have focused on enhancing signal phase stability and purity, expanding carrier frequency and bandwidth, and driving photonic integration to achieve size, weight, and power (SWaP) optimisation. These developments have led to significant performance improvements in photonics-assisted radars. In this talk, we will focus on a photonic approach to SF radar based on the optical frequency shifting loop (FSL), which enables the generation of ultra-wideband, phase-coherent radar waveforms beyond the limits of electronic methods. By leveraging the OFSL's ability to precisely and rapidly shift optical frequencies, this technique produces broadband microwave signals with high time-frequency linearity and spectral purity, enabling millimetre-level range resolution and robust Doppler detection. We will discuss the underlying principles, recent experimental advances, and demonstrations of high-resolution radar imaging and vital-sign sensing. Finally, we provide forward-looking future directions, including photonic integration and the potential for space-based radar applications.

16:30-17:00 · ACP2025-0716-3 **Invited**
Controllable microwave pulse signal generation based on an actively mode-locked optoelectronic oscillator
Zhen Zeng
University of Electronic Science and Technology of China, China
A novel method for controlling microwave pulses generated by an actively mode-locked optoelectronic oscillator is proposed. By designing the driving waveforms applied to OEO, microwave pulses with programmable pulse width and position can be obtained.

17:00-17:15 · ACP2025-0731-127
Turbulence-Resilient Synthetic Aperture Lidar Imaging Based on Slow-Time Optimization
Linlong He[1], Yan Li[1*], Zhengjie Wang[1], Jin Wu[2], Ziqi Song[2], Zhuang Wu[2], Ziqian Fan[3], Wenjie Guo[1], Jian Wu[1]
1.Beijing University of Posts and Telecommunications, China; 2.The Aerospace Information Research Institute, Chinese Academy of Sciences, China; 3.tianjin University, China
Atmospheric turbulence introduces phase errors and power fluctuations in Synthetic Aperture Lidar imaging. We optimize slow-time length to balance SNR and resolution. Experiments confirm this strategy enhances long-range imaging robustness under turbulence.

17:15-17:30 · ACP2025-0730-41
Chaotic Signal Generation and Compressive Sensing Ranging via Laser Injection with Optoelectronic Feedback
Xinyao Han, Fangzheng Zhang, Xiaoyue Yu, Xin Yan, Hao Wang, Shilong Pan
Nanjing University of Aeronautics and Astronautics, China
This paper proposes a novel method for chaotic signal generation and compressive sensing ranging based on laser injection with optoelectronic feedback. By introducing an optoelectronic feedback loop into an optically injected laser system,the correlation dimension of generated chaotic signals is increased from 5.96 (without feedback) to 13.38 and the spectral flatness is improved from 0.61 to 0.80. When applied to compressive sensing radar ranging, the maximum down-sampling ratio can reach up to 590, significantly reducingthe data volume required for chaotic radar ranging.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Microwave photonic signal processing(I)
Presider: Tong Lin, Southeast University, China

08:30-09:15 · ACP2025-0731-58 **Tutorial**

Spatial multiplexing meets dispersion diversity: Enabling advanced signal processing with multicore and few-mode fibers

Mario Annier González, Sergi García, **Ivana Gasulla**

Universitat Politècnica de València, Spain

This invited paper presents key experimental results on advanced signal processing using dispersion-diversity multicore and few-mode optical fibers, enabling reconfigurable true-time delay lines for optical and microwave signals through spatial parallelism and chromatic dispersion diversity.

09:15-09:45 · ACP2025-0801-24 **Invited**

Photonic Array Signal Digitization and Processing: From Architectures to Wideband Applications

Na Qian, Defu Zhou, Yinfu Liu, Peilin Li, Gengle Han, Weiwen Zou

Shanghai Jiao Tong University, China

With the rapid evolution of array signal processing, there is a growing demand for higher data rate, broader bandwidth, and greater consistency. This talk provides an overview of novel architectures for array signal digitization and processing based on photonic technologies, as well as their applications.

09:45-10:00 · ACP2025-0723-5

An Optical Computing-in-Memory Convolutional Processor based on Wavelength-Mode Hybrid Multiplexing and Phase Change Material

Haoxuan Huang, Pengxing Guo, Wei Sun, Shengqiang Li, Xiangyu He, Jiahao Zhou, Weigang Hou, Lei Guo

Chongqing University of Posts and Telecommunications, China

This paper proposes anoptical computing-in-memoryconvolutional processor, which leverages hybrid wavelength-mode multiplexingand phase-change material. First, a subwavelength grating-based mode converter is designed, which realizes highly robust on-chip mode conversion across 9 TE modes. Second, a low-crosstalk optical computing-in-memory multiplication unit is realized, which utilizes the phase-change material Ge2Sb2Se4Te1and a passive dual-microring resonator. By combining these designs, this work realizes a 4 × 9 scale optical convolutional processor which attains a computational density of 41.14TOPS/mm2and an energy efficiency of 12.03TOPS/W. The performance of this architecture was validated on the CIFAR-10 dataset, achieving an inference accuracy of 91.45%.

10:00-10:30 Coffee Break

08:30-10:00 · November 7, 2025 · Friday
Microwave photonic signal processing (II)
Presider: Na Qian, Shanghai Jiao Tong University, China

10:30-11:00 · ACP2025-0731-106 **Invited**

Broadband signal processing using dense wavelength demultiplexed silicon photonic hybrid

Tong Lin, Yan Fan, Haoran Wang, Junpeng Lu, Zhenhua Ni

Southeast University, China

We propose a robust 8-λ 200 GHz-grid dense wavelength division multiplexing coherent receiver using a silicon photonic chip. RF channelizing and 1-Tb/s optical transmission link are demonstrated.

11:00-11:30 · ACP2025-0724-6 **Invited**

Photonics-enabled High-sensitivity and Wide-bandwidth Microwave Phase Noise Analyzers

Jingzhan Shi

Nanjing Normal University, China

Phase noise is a critical performance metric in microwave systems, and the advancement of microwave signal sources introduces new requirements for phase noise analyzers (PNAs) in terms of sensitivity and bandwidth. Conventional electronic PNAs face considerable challenges in fulfilling these enhanced demands. This presentation reviews recent developments in photonic-based microwave PNA research. Microwave photonic (MWP) PNAs are primarily divided into two categories: those based on phase detection and those based on frequency discrimination. MWP phase-detection PNAs employ ultra-short-pulse lasers or optoelectronic oscillators as reference sources to achieve excellent sensitivity. In contrast, MWP frequency-discrimination PNAs are further classified into photon-

ic-substitution-type PNAs and MWP quadrature-frequency-discrimination PNAs. These systems utilize advanced MWP techniques to improve overall performance, providing wider bandwidth and greater sensitivity than traditional methods. Finally, the presentation discusses the current challenges in phase noise measurement technologies and proposes potential research directions aimed at enhancing measurement capabilities.

11:30-11:45 · ACP2025-0731-15

Real-time Ranging System for Coherent LiDAR based on FPGA and Pseudo-random Code Modulation

Jiamin Liu[1], Qianwu Zhang[1,2*], Junjie Zhang[1,2], Zhiyong Lu[3], Wenpeng Cui[4], Xianzhuo Li[1], Zixuan Ming[1], Wenzhong Liu[1], Kun Chen[1]
1.Shanghai University, China; 2.Teralink Optical Corporation (Shanghai), China; 3.Transmission and Detection Technology, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China;4.Beijing Smartchip Microelectronics Technology Company Limited, China

We propose an FPGA-based real-time ranging method using dual-channel coherent lidar, resolving ambiguity and resource constraints throughsegmented processing. Results show 3889 meters long-range measurement with 11.5 dB high SNR and 4.1 ms low latency.

11:45-12:00 · ACP2025-0815-18

Noise-Regulated Optoelectronic Ising Sampler for Accelerated and Noise-Robust Restricted Boltzmann Machines Training

Jiakai Dong, Zihao Chen, Yibin Wan, Zhixian Zhou, Jie Liu, Siyuan Yu
Sun Yat-sen University, China

We experimentally demonstrated a noise-regulated optoelectronic Ising machine for efficient training of restricted Boltzmann machines. Spins are time-multiplexed optical pulses; controllable analog noise tunes an effective temperature to enhance sampling. Leveraging the Ising–RBM energy equivalence, the hardware produces Boltzmann-like samples that accelerate learning. On MNIST, the system achieves effective dimensionality reduction and accurate reconstruction, and maintains high fidelity under large input noise. These results indicate a practical path to robust, hardware-accelerated probabilistic learning.

12:00–13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday
Optical Communications and sensings
Presider: Yang Liu, Huazhong University of Science and Technology, China

13:30-14:00 · ACP2025-0605-4 **Invited**

Microwave Photonics Empowered Integrated Sensing and Communication for 6G

Wang Lihan
National Key Laboratory of Microwave Photonics, China

This talk provides an overview of microwave photonic technologies in wireless communication and sensing, illustrating the performance enhancement brought by photonics. The recent progress and typical performance metrics of key technologiesare discussed.

14:00-14:30 · ACP2025-0729-42 **Invited**

Recent Advances in Microwave Photonic Sensing Technologies

Yiping Wang
Nanjing Normal University, China

Microwave photonics, an interdisciplinary field, focuses on the interaction between microwaves and optical waves, enabling the generation, transmission, processing, and measurement of wideband microwave signals using photonic techniques. Microwave photonic sensors are one of the active sub-fields that utilize optical sensors to detect physical quantities such as temperature, strain, and pressure, and employ microwave photonic methods for precise sensing information extraction, offering distinct advantages like high resolution and rapid response. This presentation comprehensively reviews the latest progress in microwave photonic sensing technologies. It begins with an introduction to the fundamental principles of microwave photonic sensing. Subsequently, it elaborates on recent technological breakthroughs, including novel sensor designs, improved demodulation techniques, and enhanced integration levels. The applications of these sensors in diverse fields such as biomedicine, environmental monitoring, and new energy are also presented. Finally, potential future research directions and challenges in the development of microwave photonic sensing technologies are discussed, aiming to provide valuable insights for further research and development in this area.

14:30-14:45 · ACP2025-0709-2
Non-Uniform Programmable Silicon Photonic Mesh
Cristina Catalá-Lahoz, José Capmany
Universitat Politecnica de Valencia, Spain
By embedding defect cells inside a uniform hexagonal lattice, programmable photonic meshes attain Vernier-driven path length diversity, extending the free spectral range up to 133 GHz and reducing sampling time to 7.5 picoseconds.

14:45-15:00 · ACP2025-0726-6
Photonic Terahertz Secure Communication with High-dimensional Quantum Noise Cipher
Xiaoxiao Li[1], Qiuzhuo Deng[1], Yuan Cao[2], Oskars Ozolins[3,4], Xiaodan Pang[1,3,4], Lu Zhang[1*], Xianbin Yu[1*]
1. Zhejiang University, China; 2. Nanjing University of Posts and Telecommunications, China; 3. Riga Technical University, Latvia; 4.RISE Research Institutes of Sweden, Sweden
We propose a high-dimensional quantum noise cipher-based photonic terahertz secure communication scheme, with effective anti-eavesdropping and anti-correlation attackcapabilities. The experiment demonstrates a 20 Gbps transmission operating at 286 GHz over a 10-meter wireless link.

15:00-15:15 · ACP2025-0727-11
Scintillation-Resistant Coherent Free-Space Optical Communication Based on Local-Oscillator Power Controlling
Penghao Luo[1], Boyu Dong[1], Haoyu Zhang[1], Yinjun Liu[1], An Yan[1], Guowei Jiang[2,3], Jianyang Shi[1], Nan Chi[1], Junwen Zhang[1*]
1.Fudan University, China; 2.Shanghai Satellite Network Research Institute Co., Ltd, China; 3.School of Aerospace Engineering and Applied Mechanics, Tongji University, China
We propose an approach based on power-controlled local-oscillator to mitigate turbulence-induced scintillation in FSO communication. Experimental results in a 100-Gbps 16-QAM system demonstrate that our approach can decrease the standard-deviation of EVM by over 74%.

15:15-15:30 · ACP2025-0728-9
Network Traffic Prediction using Enhanced Photonic Reservoir Computing Based on VCSEL
Ling Zheng[1*], **Xinrui Hu[1]**, Pan Zhang[1], Xingxing Guo[2], Yahui Zhang[2], Shuiying Xiang[2]
1.Xi'an University of Posts and Telecommunications, China; 2.Xidian University, China
With the growth of Internet technology and network scales, intelligent network management is crucial, especially for accurate traffic prediction to enhance security and user experience. Network traffic is complex, with non-stationarity, nonlinearity, and long-range dependence, making it hard to predict accurately. Traditional methods are insufficient. This study proposes an enhanced photonic reservoir computing model for network traffic prediction. The model uses a vertical-cavity surface-emitting laser based RC to map traffic data to a high-dimensional space and extract features, while LSTM captures temporal characteristics to improve accuracy. It shows strong noise resistance and adaptability. The simulation results demonstrate that, compared to RC and LSTM, the proposed method reduces the normalized root mean square error of the UK academic network dataset collected over different time periods by19% and 24%, respectively. Furthermore, this study investigates the effects ofthe number of training epochsandthe initial learning rateon the model performance.

15:30-16:00 Coffee Break
15:30-17:30 Poster Session
18:30-20:30 Banquet & Awards Ceremony

08:30-10:00 · November 8, 2025 · Saturday
Photonic integrated circuits & devices (I)
Presider: Jiejun Zhang, Jinan University, China

08:30-09:00 · ACP2025-0622-1 **Invited**
Integrated electro-optic devices based on Pockels materials
Mengke Wang
University of Electronic Science and Technology of China, China
This talk discusses the importance of integrated electro-optic devices in microwave photonics and optical signal processing, and presents our recent progress in developing integrated devices based on thin-film lithium niobate, barium titanate, and electro-optic polymers.

09:00-09:30 · ACP2025-0731-146 **Invited**
Integrated microwave photonics based on graphene and related materials
Alberto Montanaro
CNIT, Italy
Graphene recently allowed the realization of new integrated optoelectronic devices enabling microwave photonics functionalities, which were revealed to be particularly promising for the next generation radio technology. This talk will present an overview of these results, and some perspectives on their use for the realization of novel 6G antennas concepts based on the interplay of integrated photonics and novel 2D materials.

09:30-09:45 · ACP2025-0801-61
On-chip High Isolation Optical Filter enabling 76 dB CNR,-115.8dBc/Hz phase noise,44dB SNR RF Beating Generation for Beamforming
Ruijin Qiu, Ranfeng Gan, Zhenhua Li, Jie Liu, Siyuan Yu
Sun Yat-sen University State Key Laboratory of Optoelectronic Materials and Technologies, China
An On-chip High Isolation Optical Filter architecture based on Ring-Assisted Mach-Zehnder Interferometer (RAMZI) is proposed to avoid the impact of linewidth and optical path difference (OPD) on RF performance. The RF beating generation system based on such device operates in the sub-15 GHz RF band, achieving a carrier-to-noise ratio (CNR) of up to 76 dB, a phase noise (PN) of −115.8 dBc/Hz@10 kHz, and a signal noise ratio (SNR) of 44.06 dB for 16QAM, 300M Baud. In addition, the system can be applied to the generation of high isolation carrier-suppressed single-sideband (CS-SSB) signals, with carrier isolation and signal isolation levels of up to 46 dB and 53 dB respectively.

09:45-10:00 · ACP2025-0815-122
Photonic Generation of Wideband Frequency-Agile Microwave Signal Using High-Q On-Chip Optical Filters
Yangteng Zhang, Kunlong Li, Bin Wang, Weifeng Zhang
Beijing Institute of Technology, China
We propose a photonic approach to generating wideband frequency-agile microwave signals, which exhibits a frequency range spanning 2-30 GHz, a minimum frequency step of 1 MHz and a low phase noise of -110 dBc/Hz@10 kHz.

10:00-10:30 Coffee Break

10:30-11:45 · November 8, 2025 · Saturday
Photonic integrated circuits & devices (II)
Presider: Mengke Wang, University of Electronic Science and Technology of China, China

10:30-11:00 · ACP2025-0801-3 **Invited**
Roadmapping the large-scale integrated photonic tensor core
Zhongjin Lin*, Weihua Yan, Furong Zhong, Xinlun Cai*
Sun Yat-sen University
Here, we summarize the architectures of integrated photonic tensor cores, discuss their capabilities for large-scale matrix computation, and highlight photogenerated charge integration-based one as a promising architecture for enabling such computation.

11:00-11:30 · ACP2025-0801-60 **Invited**
Silicon Photonics Accelerator and Processor for AI Using Integrated Coherent Technologies
Ying Zhu[1], Xin Hua[1], Yifan Liu[1], Xinyu Yang[1], Xueyi Jiang[1], Hongguang Zhang[1], Daigao Chen[1], Xi Xiao[1,2*]
1.National Information Optoelectronics Innovation Center, China; 2.Peng Cheng Laboratory, China
To achieve high-speed and energy-efficient AI computing, we develop photonic AI neuromorphic accelerators and multifunctional programmable processors, integrating innovations from circuit and architecture to algorithm and system.

11:30-11:45 · ACP2025-0801-150
Photonic Dilated Convolution Operator Using Matched Dispersion Coefficient Mechanism
Ruilin Liao, Yixuan Zheng, Yifu Xu, Yuhang Song, Yunping Bai, Xingyuan Xu
The State Key Laboratory of Information Photonics and Optical Communications, School of Electronic Engineering, Beijing University of Posts and Telecommunications, China
We proposed a reconfigurable photonic-based dilated convolution operator using matched dispersion mechanism. It achieves efficient multi-scale feature extraction with fewer optical combs, demonstrating its potential in photonic neural network applications.

12:00-13:30 Lunch Break

13:30-11:45 · November 8, 2025 · Saturday

Advanced Photonic Systems and Applications(I)

Presider: Xiaojun Xie, Southwest Jiaotong University, China

13:30-14:00 · ACP2025-0813-20 **Invited**

Photonic Platforms for Neuromorphic Computing

Chaoran Huang

The Chinese University of Hong Kong, Hong Kong, China

This talk explores advanced photonic platforms, from 2D silicon photonics to 3D metasurfaces, enabling high-speed, low-power neuromorphic computing for AI. We highlight innovations in intelligent signal processing, machine vision, and enhancing accuracy and reliability.

14:00-14:30 · ACP2025-0730-11 **Invited**

Kerr-Induced Coherent Spectral Processing for Versatile Generation of Optical Frequency Combs

Chester Shu, Zijian Li, Chen Ding

The Chinese University of Hong Kong, Hong Kong, China

We demonstrate a Kerr-induced coherent spectro-temporal processing scheme for the generation, processing, and spectral conversion of optical frequency combs (OFCs). Our platform enables the formation of new OFCs with enlarged and programmable free spectral ranges.

14:30-14:45 · ACP2025-0728-7

A Sliding Window Enhanced Photonic Time Delay Reservoir Computing System for Load Forecasting

Ling Zheng[1], **Pan Zhang[1]**, Xinrui Hu[1], Xingxing Guo[2], Yahui Zhang[2], Shuiying Xiang[2]

1.Xi'an University of Posts and Telecommunications, China; 2.Xidian University, China

This research presents a photonic time-delay reservoir computing (TD-RC) system for short-term load forecasting (STLF). The system utilizes a sliding window technique to reconstruct the features of the raw data, while employing a vertical cavity surface emitting laser (VCSEL) as a nonlinear node, effectively enhancing the model's nonlinear dynamic characteristics. The model's performance is validated using load datasets from Panama and Johor, Malaysia, and the impact of model parameters on forecasting performance is investigated. Compared to existing models, TD-RC model reduces the mean absolute percentage (MAPE) by 26% to 39% (35% to 50%), and the model's computation time decreases by 45% to 62% (52% to 67%). The results demonstrate that the proposed model can achieve accurate load forecasting while reducing computation time.

14:45-15:00 · ACP2025-0729-16

Beyond 100G Photonics-Aided THz Real-Time Transmission Based on Envelope Detection and Low-Complexity FPGA Implementation

Yikai Wang[1], JunJie Ding[2], Min Zhu[1], Long Zhang[2], Jia Meng[1], WeiDong Tong[1], Yuancheng Cai[2], Jiao Zhang[2], Bingchang Hua[2], Mingzheng Lei[2], Kaihui Wang[3], Jianjun Yu[3]

1.Southeast University, China; 2.Purple Mountain Laboratories, China; 3.Fudan University, China

We demonstrate a photonics-aided THz real-time transmission system at 300 GHz based on FPGA, achieving record-breaking 105-Gbps THz signal transmission over 3-meter wireless link by using envelope detection scheme, antenna polarization multiplexing and low-complexity DSP.

15:00-15:15 · ACP2025-0730-24

SNR-Enhanced Constant-Envelope THz Signal Transmission at 300 GHz based on Modified Arctangent Algorithm

Jiankang Li[1], Yuancheng Cai[2*], Xiang Meng[1], Zicheng Fang[1], Jiao Zhang[2], Mingzheng Lei[2], Bingchang Hua[2], Junjie Ding[2], Xingyu Chen[2], Yunwu Wang[2], Jianjun Yu[2], Min Zhu[1*]

1.Southeast University, China; 2.Purple Mountain Laboratories, China

We demonstrated a constant-envelope THz signal transmission over the 1-m wireless link at 300GHz, employing modified arctangent algorithm for phase demodulation. Compared with the intensity modulation scheme, over 15-dB SNR improvements and enhanced robustness are achieved.

15:15-15:30 · ACP2025-0815-55

Joint Time and Frequency Transfer Based on a Stabilized Optical Fiber Link

Zhuoran Li[1], Xiang Liu[2], Wei Wei[1*], Weilin Xie[1], Yi Dong[1]

1.Key Laboratory of Photonic Information Technology, Ministry of Industry and Information Technology School of Optics and Photonics Beijing Institute of Technology, China; 2.Institute of Science & Technology Innovation Dongguan University of Technology, China

We demonstrate a distributed dual-site time-frequency transfer system using optical links with tens-of-femtosecond stability. The Allan deviation of 100MHz frequency reaches 1e-15, and the time deviation for the 1PPS time signal reaches 1e-12.

15:30-16:00 Coffee Break

16:00-17:00 · November 8, 2025 · Saturday

Advanced Photonic Systems and Applications(II)

Presider: Jingzhan Shi, Nanjing Normal University, China

16:00-16:30 · ACP2025-1001-1 **Invited**

High-Speed and High-Power Photodetectors: From Homogeneous Material Devices to Heterogeneous Integrated Chips

Xiaojun Xie[1,2*]

1.Southwest Jiaotong University, China; 2.Key Laboratory of Photonic-Electronic Integration and Communication-Sensing Convergence, Ministry of Education, China

This talk summarizes the evolution of high-performance photodetectors, tracing the progression from homogeneous material devices to heterogeneous integrated chips that break these barriers to achieve high speed, high power and multi-functional integration.

16:30-16:45 · ACP2025-0731-135

Generation of Tunable Phase-Coded Microwave Pulses Based on Active Mode-Locking Optoelectronic Oscillator

Boxiong Cui[1], Chenyang Ma[1], Cheng Gu[2], Xinyu Jin[1], Wen Xie[2], Zhengyang Xie[1*], Xin Zhao[1], Pengwei Gong[2], Zheng Zheng[1]

1.Beihang University, China; 2.Beijing Institute of Radio Metrology and Measurement, China

We proposes and verifies a method for generating phase-coded microwave pulse signals based on Active Mode-Locking (AML). With the help of the AML Optoelectronic(AML-OEO), this scheme utilizes a phase modulator driven by phase-coded signals, where the duration of each voltage polarity code is the same as the OEO loop delay, generating phase-coded coherent microwave pulse trains. Such signals have the advantage of a large time-bandwidth product, which can balance the detection range and range resolution of radar, while also possessing characteristics such as anti-interference and low interception. In experiments, we successfully obtained square wave signals and phase-coded pulse sequences encoded with 7-bit Barker codes.

16:45-17:00 · ACP2025-0731-70

Cost-Effective and Bandwidth-Extended Instantaneous Frequency Measurement Based on Stimulated Brillouin Scattering

Jingbo Li, Wei Zhao, Liang Hu, Jianping Chen, Guiling Wu

Shanghai Jiao Tong University, China

A cost-effective and bandwidth-extended instantaneous frequency measurement scheme based on stimulated Brillouin scattering achieves unambiguous frequency-to-time mapping, extending measurement bandwidth to 35 GHz with sub-2 MHz accuracy and 50 μs interception.

Track 6: Micro-, Nano-, and Quantum Photonics: Science and Applications

13:30-15:15 · November 6, 2025 · Thursday
Quantum Photonics
Presider: Ping Zhao, Sichuan University, China

13:30-14:15 · ACP2025-0801-38 **Tutorial**
Nonlinear and quantum photonics in SiC-on-Insulator Microring Resonators
Andrew Poon*, Jiantao Wang, Qianni Zhang, Jiayang Li
The Hong Kong University of Science and Technology, Hong Kong, China
In this tutorial, we will give an overview and present our latest progress in nonlinear and quantum photonics using 4H-SiCOI microring resonators, highlighting their potential for integrated quantum photonic technologies.

14:15-14:45 · ACP2025-0731-61 **Invited**
Monolithic integration of III-V quantum dot lasers and silicon waveguides on SOI
Wenqi Wei
Songshan Lake Materials Laboratory, China
Direct epitaxial growth of III-V quantum dot (QD) lasers on Si (001) substratesis recognized as the mostpromising and low-cost method for realizing high-performance on-chip light sources in silicon photonic integrated circuits (PICs). Although great progresses have been made only about growing III-V QD lasers on Si, monolithic integration of III-V lasers and siliconwaveguideson the same waferis still unavailable. Here, we demonstrate an embedded InAs/GaAs QD laser directly grown on the trenched SOI substrate, enabling monolithic integration with buttcoupled silicon waveguides. The novel (111)-faceted silicon hollow structures are introduced by homoepitaxial method and used for epitaxial growth of high-quality III-V materials on thepatterned trenched SOI platform. The (111)-faceted sawtooth structures are effectiveto suppress the antiphase boundaries (APBs) and lattice-mismatch defects. After heteroepitaxial growth of 2 μm-thick III-V buffer layers, including InGa(Al)As/GaAs quantum well dislocation filters and AlGaAs/GaAs supperlattices, high-quality III-V film with low threading dislocation density (~10^6/cm^2) and low surface roughness (RMS < 1nm) is achieved on the trenched SOI substrate. By utilizing the trenched SOI substrate with pre-defined silicon waveguides, high-performance embedded InAs QD lasers with monolithically out-coupled silicon waveguide are achieved. By resolving the fabrication challenges in such monolithic integrated architecture, embedded III-V lasers on SOI with continuous-wave lasing up to 85 °C are obtained. And the maximum output power of 6.8 mW can be measured from the butt-coupled silicon waveguide, with an estimated coupling efficiency of approximately -6.7 dB. The results presented here provide a scalable and low-cost epitaxial method for the realization of on-chip light sources directly coupling to the silicon photonic components for future high-density photonic integration.

14:45-15:15 · ACP2025-0731-17 **Invited**
Quantum Dot Lasers: Advances, Applications and Prospects
Siming Chen
Institute of Semiconductors, CAS, China
QD lasers offer superior performance with narrow-linewidth, temperature-stability, wavelength-flexibility, resistance to optical feedback and integration potential. This talk explores their advantages, emerging applications in communications and photonics, and recent progress in device performance and integration.

15:30-16:00 Coffee Break

16:00-17:30 · November 6, 2025 · Thursday
Integrated Photonics
Presider: Ting Wang, Institute of Physics CAS, China

16:00-16:45 · ACP2025-0729-30 **Keynote**
Chiral optical modes in silicon-based integrated microresonators
Jiawei Wang
Harbin Institute of Technology SZ, Germany
We present silicon-based microring resonators with tailored structural asymmetry for on-chip chirality control, enabling on-chip functionalities such as enhanced sensing, non-reciprocal transmission, directional and mode-selective emission, and non-Hermitian quantum cavity electrodynamics.

16:45-17:30 · ACP2025-0915-16 **Tutorial**
An overview of the capacity limits of classical and quantum optical communication systems
Rene Essiambre
Nokia Bell labs, United States
A survey of the capacity of optical communication systems to transmit information will be presented. We will focus on classical capacities over optical fibers to capacity limits using quantum technologies.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Integrated Photonics
Presider: Haowen Shu, Peking University. China

08:30-09:00 · ACP2025-0726-8 **Invited**
Lateral monolithic integration of III-V devices on SOI
Ying Xue
The Chinese University of Hong Kong, Hong Kong, China
This talkpresentslateral monolithic integration of III-V on SOI, enabling high-quality, co-planar device configurations with unique performance in lasers and photodetectors while achieving efficient in-plane coupling between III-V and Si.

09:00-09:15 · ACP2025-0731-43
Waveguide integrated superconducting single-photon detectors with near-unity absorption
Ilya Stepanov[1*], Evgeniy Sergeev[1,2], Sergey Avdeev[1], Aleksey Kramarenko[1], Kirill Buzaverov[1,2], Oksana Shmonina[1], Aleksandr Baburin[1,2], Ilya Ryzhikov[1], Ilya Rodionov[1,2]
1.Bauman Moscow State Technical University, Russia;2.Dukhov Research Institute of Automatics (VNIIA), Russia
We demonstrateNbN-based detectors monolithically on a SiN photonic platform with the possibility of both edge and grating coupling. Detectors have demonstrated absorption efficiencies of up to 99.78%, making them near-perfect absorbers of telecom light.

09:15-09:30 · ACP2025-0731-3
Seamless process technology for the flexible fabrication of high-density photonic integrated circuits
Evgeny Sergeev[1,2*], Kirill Buzaverov[1,2], Aleksandr Baburin[1,2], Sergei Avdeev[1,2], Sergei Bukatin[2], Aleksei Kramarenko[2], Evgeniy Lotkov[1,2], Evgeny Zikiy[1,2], Ilya Ryzhikov[2], Ilya Rodionov[1,2]
1.Dukhov Research Institute of Automatics (VNIIA), Russia;2.FMN Laboratory Bauman Moscow State Technical University, Russia
In this paper, we achieved the fabrication of low- and high-density photonic integrated circuits with ultra-low losses using a new hard-mask-based process flow, suitable for R&D fabrication.

09:30-09:45 · ACP2025-0802-4
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.Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland;2.Luxtelligence SA, Switzerland
We trace thermal effects in Si_3N_4microresonators to Cu impurities diffusing from Si substrates. By developing Cu gettering techniques, we achieve deterministic soliton microcomb generation via slow laser scanning.

09:45-10:00 · ACP2025-0731-128
Design and Simulation of High-bandwidth Photonic-electrical Integrated Transceiver Based on 2.5D LTCC/HTCC Packaging
Jiaxin Zheng[1], Jianyu Shi[1], Yan Zhou[2], Hao Wu[2], Yu Sun[1], Junde Lu[1], Jie Shi[1], Lanling Chen[1], Yueqin Li[1], Jian Sun[1], Zhengsong Li[1], Jun Qin[1]
1.Beijing Information Science and Technology University, China;2.Peking University Yangtze Delta Institute of Optoelectronics, China
In this paper, a high bandwidth photonic-electrical integrated transceiver based on 2.5D LTCC/HTCCpackaging isdesignedand simulated. The transceiver achieves a bandwidth of approximately 40 GHz, with clear eye diagramobserved at 60 Gbps.

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Quantum Photonics
Presider: Yu Zhang, Huazhong University of Science and Technology, China

10:30-11:00 · ACP2025-0816-6 **Invited**
On the Fundamentals of Quantum Electronics: Schrödinger and Dirac Equations
Xiaomin Ren
Beijing University of Posts and Telecommunications, China
The fundamentals of quantum mechanics, surely also of quantum electronics, have been found of some imperfections. Based on the relevant remedy regarding de Broglie relationship of wave-particle duality, both Schrödinger equation and Dirac equation are comprehensively modified.

11:00-11:15 · ACP2025-0801-79
Twin-Field Quantum Key Distribution Coexists with Classical Communication over Hollow-Core Fibers
Weiwen Kong[1], Yongmei Sun[2*], Zhenhua Li[1], Qi Zhao[1], Yuting Wang[2], Yaoxian Gao[2], Jianjun Tang[1*]
1.China Telecom Research Institute, China;2.State Key Lab. of Info. Photo. and Opt. Comm. Beijing Univ. of Posts and Telecom, China
We propose a noise-aware wavelength allocation scheme enabling stable twin-field QKD and classical communication coexistence over hollow-core fibers. By interleaving channels and minimizing nonlinear noise, our approach significantly improves transmission distance and power compatibility for hybrid quantum-classical networks.

11:15-11:30 · ACP2025-0815-30
An Optical Reservoir Computing Design based on Two-Dimensional Quantum Walk
Yushu Wang, Yuheng Ding, Yang Chen, Yangcan Long, Ming Tang, Chao Wang[*]
Huazhong University of Science and Technology, China
Two-Dimensional Quantum Walk Reservoir Computing (2D-QWRC) is proposed to address insufficient nonlinearity in computation systems based on quantum walk. Evaluation showed its notable performance improvement in the function fitting task and potential in prediction tasks.

11:30-11:45 · ACP2025-0815-25
Broadband Quantum Light Source on a SiC Chip
Hong Zeng[1,2], Li-Ping Zhou[3,4], Bing-Cheng Yang[3,4], Yun-Ru Fan[1,2*], Hao Li[3,4], Li-Xing You[3,4], Xin Ou[3,4,5,6*], Guang-Can Guo[1,2,7,8], Qiang Zhou[1,2,7,8*]
1.Institute of Fundamental and Frontier Sciences, China;2.University of Electronic Science and Technology of China, China;3.Shanghai Institute of Microsystem and Information Technology, China;4.Chinese Academy of Sciences, China;5.The Center of Materials Science and Optoelectronics Engineering, China;6.University of Chinese Academy of Sciences, China;
7.CAS Center For Excellence in Quantum Information and Quantum Physics, China;8.University of Science and Technology of China, China
We reportentangledphoton pairs generation in a 4H-silicon carbidemicroring chip via spontaneous four-wave mixing, achievinghigh generation rate, strong entanglement, and wide spectral bandwidth for integrated quantum photonics.

11:45-12:00 · ACP2025-0731-22
Integrating of optical frequency with quantum key distribution based on 10-km 7-core fiber
Lai Yu[1], Li Zhang[2], Zhicheng Jin[1], Jialiang Wang[1], Fangxiang Wang[3], Lei Liu[4*], Youzhen Gui[1*]
1.Shanghai Institute of Optics and Fine Mechanics, China;2.Anhui Asky Quantum Technology CO., LTD, Wuhu, China;3.University of Science and Technology of China, China;4. Westlake University, China
We report the first experimental demonstration hybrid transmission of ultra-stable optical frequency references and quantum key distribution (QKD) signals over a homogeneous multi-core fiber (MCF).The frequency transfer system achieves frequency stabilization at the remote site via active phase noise compensation. A QKD system implementing the BB84 phase-encoding protocol with decoy states is integrated within the platform.

12:00-13:30 Lunch Break

13:30-15:30 · November 7, 2025 · Friday
Optical Devices: Lasers, Filters, and Waveguides
Presider: Zejie Yu, Zhejiang University, China

13:30-14:00 · ACP2025-0731-114 **Invited**
Visible Brillouin–quadratic microlasers in thin–film lithium niobate platform
Jintian Lin
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China
On-chip visible Brillouin-quadratic microlaser was reported at 780 nm wavelength in a 117-μm-diameter thin-film lithium niobatemicrodisk, enabled bysecond harmonic generation of cross-polarized narrow-linewidth Stokes Brillouin lasing (SBL) in the microdisk via dispersion engineering.

14:00-14:30 · ACP2025-0730-37 **Invited**
Spatiotemporal spectral filtering chip based on active materials
Tingbiao Guo
Zhejiang University, China
This report will introduce a high-performance spatiotemporal spectral filter chip based on active materials, discuss the advantages and disadvantages of different active materials in the construction of spatiotemporal filter chips.

14:30-14:45 · ACP2025-0815-140
Generation of Supercontinuum Spectrum in Dual–Core Tantalum Pentoxide Waveguides
Xueying Sun[1], Xingyu Tang[2], Qiankun Li[1], Zhenyu Liu[2], Yongyuan Chu[1], Chengbo Mou[1], Qiancheng Zhao[2*], Hairun Guo[1*]
1.Shanghai University, China;2.Southern University of Science and Technology, China
We demonstrate a high-dimensional dispersion control strategy via dual-core Ta_2O_5waveguides, enabling broadband supercontinuum generation. This provides an effective solution for on-chip broadband SC spectra in Ta_2O_5-based platforms.

14:45-15:00 · ACP2025-0815-86
Brillouin Scattering Induced Absorption via Backward Brillouin Scattering on SOI platform
Mingyu Xu, Peng Lei, Yunhui Bai, Xinglong Li, Zhangyuan Chen, Xiaopeng Xie[*]
Peking University, China
We present the first experimental demonstration of Brillouin scattering induced absorption with backward stimulated Brillouin scattering (SBS) on SOI platform.

15:00-15:15 · ACP2025-0728-17
Mode–Selective Lasing In Dye–Coated Rolled–Up Microtube Cavities
Mingquan Deng[1], Jin Li[1], Xiujie Dou[1], Yaoming Wei[1], Yang Tan[2], Jiawei Wang[1*]
1.Harbin Institute of Technology, Shenzhen, China;2.Shandong University, China
We demonstrate the experimental realization of optically pumpedlasing in a dye-coated nanomembrane-based microtubular cavity. By tailoring axial confinement through nanomembrane patterning, we observe higher-order axial modes. Mode-selective lasing is discerned with distinct threshold powers.

15:15-15:30 · ACP2025-0713-2
Common–Mode Noise Suppression with Dual Self–Injection Locked DFB Lasers on a Si_3N_4 Microring
Siyang Li, Zhiming Shi, Xukun Lin, Hairun Guo[*]
Shanghai University, China
We demonstrate dual self-injection locking of DFB lasers to a 200 GHz silicon nitride microresonator, achieving linewidth narrowing and 23 dB relative frequency noise suppression at 100 Hz offset via common-mode rejection.

15:30–16:00 Coffee Break
15:30–17:30 Poster Session
18:30–20:30 Banquet & Award Ceremony

08:30-10:00 · November 8, 2025 · Saturday
Integrated Photonics
Presider: Tiantian Li, Xi'an University of Posts & Telecommunications, China

08:30-09:00 · ACP2025-0722-3 **Invited**
Photonic Integration for Advanced Multidimensional Optical Applications
Yeyu Tong
Hong Kong University of Science and Technology (Guangzhou), China
We will provide an overview of our recent research advancements in integrated silicon photonics devices and programmable circuits, focusing on their applications in advanced multidimensional optical systems for future high-performance sensing, signal processing, and interconnects.

09:00-09:30 · ACP2025-0729-25 **Invited**
Ultra-broadband optical parametric amplification using nonlinear integrated waveguides
Ping Zhao
Sichuan University, China
In this talk, I will present our recent progress in ultra-broadband continuous-wave optical parametric amplification based on third-order nonlinear integrated waveguide. Moreover, applications such as high-speed all-optical wavelength conversion will also be included

09:30-09:45 · ACP2025-0801-205
A Programmable On-Chip Dual-Polarization Optical Filter
Tiantian Li[1*], **Huanlu Zhang[1]**, Yumeng Liu[1], Zhangfeng Ge[2], Zhanqiang Hui[1], Huimin Du[1]
1.Xi'an University of Posts & Telecommunications, China;2.Peking University Yangtze Delta Institute of Optoelectronics, China
A dual-polarization programmable on-chip filter was demonstrated. Two polarizations show FSR tuning of 72.25% and 69.48%, maximum out-of-band suppression of 34.83 dB and 23.61 dB, and 3 dB bandwidth adjustment of 30.32% and 35.06%.

09:45-10:00 · ACP2025-0731-11
Reconfigurable ultralow-loss silicon nitride photonic integrated circuits for prototyping of optoelectronic devices
Kirill Buzaverov[1,2*], Aleksandr Baburin[1,2], Evgeny Sergeev[1], Sergey Avdeev[1], Evgeniy Lotkov[1], Sergey Bukatin[1], Ilya Stepanov[1], Alexey Kramarenko[1], Ali Amiraslanov[1], Dmitriy Serkin[1], Ilya Ryzhikov[1,3], Ilya Rodionov[1,2]
1.FMN Laboratory, Bauman Moscow State Technical University, Russia;2.Dukhov Research Institute of Automatics (VNIIA), Russia;3. Institute for Theoretical and Applied Electromagnetics RAS, Russia
The paper presents the possibilities of prototyping integrated optoelectronic devices based on the developed technology for manufacturing silicon nitride photonic integrated circuits. We achieve ultralow propagation loss of less than 0.02 dB/cm in the wavelength range of 1510-1630 nm. Basic passive and active integrated optical components are also characterized, including grating couplers, microresonators, and thermo-optic phase shifters.

10:00-10:30 Coffee Break

10:30-12:00 · November 8, 2025 · Saturday
Quantum Photonics
Presider: Jiawei Wang, Harbin Institute of Technology Shenzhen, China

10:30-11:15 · ACP2025-0815-75 **Tutorial**
III-V Telecom Quantum-Dot lasers Monolithically Grown on Si Platform for Si Photonics
Huiyun Liu
UCL, United Kingdom
High-performance Si-based 1300-nm InAs/GaAs quantum-dot lasers and 1550-nm InAs/InP quantum-dot lasers have been demonstrated on Si substrates. This presentation will summarize the development milestones of III-V lasers monolithically grown on a Si platform.

11:15-11:30 · ACP2025-0815-78

Duplex Quantum Teleportation System Using a Spatial Multiplexing Quantum Light Source

Yazhou Zhao[1], Riyao Song[1], Jiarui Li[1], Hao Li[2], Lixing You[2], Yao Xiao[3], Yunru Fan[1], Guangcan Guo[1, 3, 4], Qiang Zhou[1, 3, 4]

1.Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology of China, China;2.Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China;3.Center for Quantum Internet, Tianfu Jiangxi Laboratory, China;4.CAS Center For Excellence in Quantum Information and Quantum Physics, University of Science and Technology of China, China

We experimentally demonstrate a duplex quantum teleportation system based on a spatially multiplexing quantum light source. Two independent Bell-state measurements enable full-duplex operation, providing a symmetric architecture for scalable quantum internet.

11:30-11:45 · ACP2025-0731-72

On-Chip Real-Time Shot Noise Calibration for Continuous-Variable Quantum Key Distribution

Xuesong Xu, Shiqi Zhang, Lu Fan, Song Yu, Lei Zhang*, Yichen Zhang*

Beijing University of Posts and Telecommunications, China

We develop a continuous-variable quantum key distribution system with an integrated optical switch for real-time shot noise calibration, achieving a secret key rate of 5.11 Mbps over 25.3 km for practical applications.

11:45-12:00 · ACP2025-0815-58

Quantum Teleportation over Hollow-Core Fiber Links

Ji Zhang[1], **Riyao Song**[2], Yu Qin[3], Jie Sun[1], Lipeng Feng[4], Huimin Tan[1], Yichun Shen[3], Yazhou Zhao[2], Hao Li[5], Lixing You[5], Yao Xiao[6], Yunru Fan[2], Guangcan Guo[2, 6, 7], Qiang Zhou[2, 6, 7*],

1.Cloud and Network Development Department, China Telecom Corporation Limited, China;2.Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology of China, China;3.R&D Department, Jiangsu Zhongtian Technology Co., Ltd., China;4.State Key Laboratory of Optical Fiber and Cable Manufacture Technology, China Telecom Research Institute, China;5.Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China;6.Center for Quantum Internet, Tianfu Jiangxi Laboratory, China;7.CAS Center For Excellence in Quantum Information and Quantum Physics, University of Science and Technology of China, China

We demonstrate quantum teleportation over hollow core fiber (HCF) links on the China Telecom testbed for the first time. By leveraging HCF's minimal latency, low dispersion, and robustness against environmental disturbances, we achieve high fidelity teleportation with telecom-compatible components, which confirms HCF as a promising channel for the quantum internet.

12:00-13:30 Lunch Break

13:30-15:30 · November 8, 2025 · Saturday
Optical Devices: Metamaterials, Metagratings
Presider: Xuhan Guo, Shanghai Jiao Tong University, China

13:30-14:00 · ACP2025-0628-1 **Invited**

Integrated Photonic Metamaterial Antennas for High-Performance Beam Steering

Junjia Wang

Southeast University, China

Recent breakthroughs in optical phased array (OPA) technology have unlocked new possibilities for precision beam control in applications such as LiDAR, free-space optical communication, and imaging. To address persistent challenges in OPA design, we present metamaterial antenna architectures that advance both performance and integration. First, we demonstrate a subwavelength grating antenna that leverages ridge-waveguide structures and backward-emitting mechanisms to enable exceptional longitudinal beam steering, achieving a record-low beam divergence of 0.13°, a 40.4° scanning range, and ultra-high wavelength sensitivity of 0.236°/nm. Second, we introduce an inverse-designed metamaterial antenna platform capable of full 360° two-dimensional (2D) beam steering, maintaining a narrow beam divergence of 1.3° × 1.55° within an ultra-compact 560 μm² footprint. Both approaches significantly outperform conventional waveguide grating antennas in sensitivity or footprint reduction and support multi-beam operation for enhanced spatial resolution. These advances pave the way for next-generation, multifunctional OPA systems with high-performance beam steering capabilities.

14:00-14:30 · ACP2025-0729-39 **Invited**

Electrically and optically reconfigurable phase change materials-integrated photonic devices

Junying Li

Hangzhou Institute for Advanced Study, University of Chinese Academy of Sciences, China

Chalcogenide phase change materials (PCMs) are promising candidates for ultra-compact, zero-static-power-consumption programmable photonics due to their high refractive index contrast induced by reversible phase transitions between amorphous and crystalline states. In this talk, we will present our work on the development and fabrication of low-loss phase-change thin films, the monolithic back-end integration of phase-change materials into silicon photonics, electrically programmable multi-bit nonvolatile phase and intensity modulation, and laser direct-written PCM-integrated photonic devices. We have successfully realized a series of photonic devices, including nonvolatile optical switches, filters, photonic memories, reconfigurable attenuators, rewritable displays, and reconfigurable geometric phase in hybrid integrated photonics. We highlight that the PCMs can not only provide key technologies for programmable optical networks and in-memory computing, but also enable a powerful platform for investigating advanced physical mechanisms with flexible reconfigurability.

14:30-14:45 · ACP2025-0815-113

Polarization-independent 4-mode multiplexer based on reflective metasurface

Pengjiu Zhao, Jiangbing Du*, Zuyuan He

Shanghai Jiao Tong University, China

A polarization-independent 4-mode multiplexer with submillimeter footprint (127 μm × 635 μm) based on metasurface with a reflector on the backside is demonstrated achieving a minimum insertion loss of 4.3 dB at 1550 nm.

14:45-15:00 · ACP2025-0723-1

Dynamically Reconfigurable Phase-Change Metasurface on Single-Mode Fiber for Near-Infrared Spectroscopy

Yuru Li[1*], Wanting Ou[1], Zhaohui Li[2]

1.Sun Yat-sen University, China;2.Guangdong Provincial Key Laboratory of Optoelectronic Information Processing Chips and Systems, School of Electrical and Information Technology, Sun Yat-sen University, China

This paper proposes an ultra-wideband spectrometer based on the integration of single-mode fiber and a chalcogenide phase-change material. The chalcogenide phase-change material Sb_2Se_3 exhibits a near-zero extinction coefficient and a high refractive index in the near-infrared region. It can dynamically switch between amorphous and crystalline states, exhibiting a significant difference in refractive index between the two states. An Sb_2Se_3 film was integrated onto a single-mode optical fiber, and its phase state was reversibly modulated through controlled crystallization and amorphization induced by continuous-wave and femtosecond laser irradiation, enabling the realization of a reconfigurable metasurface. As a result, we obtain a spectral resolution of 2 nm and cover a response bandwidth of 275 nm in the wavelength range from 1400 nm to 1675 nm.

15:00-15:15 · ACP2025-0729-45

Real-Time Observation of Ultrafast Thermo-Optic Nonlinearity in Time-Varying Effective Epsilon-Near-Zero Media

Jiaye Wu[1*], Xuanyi Liu[2], Marco Clementi[3], Shuang Qiu[2], Limin Lin[2], Zhang-Kai Zhou[2*], Camille-Sophie Brès[1*]

1.École Polytechnique Fédérale de Lausanne (EPFL), Switzerland;2.Sun Yat-sen University, China;3.Università di Pavia, Italy

We present a real-time observation of the ultrafast thermo-optic nonlinearity in time-varying effective epsilon-near-zero (ENZ) media. The results of this work might enable the design of integration-compatible near-terahertz ultrafast thermo-optic modulators withlow intensity demands.

15:15-15:30 · ACP2025-0731-132

Ultra-Broadband optical 90° hybrid based on thin film lithium niobate

Zhiqiang Ju, Ming Zhang*, Daoxin Dai*

Zhejiang University, China

We realize a TFLN subwavelength-grating 2×4 MMI 90° hybrid with 0.8 dB loss, >20 dB CMRR, <4.5° phase error over C+L wavelength band with an ultra-compact footprint of ~ 10 × 140 μm².

15:30-16:00 Coffee Break

16:00-17:30 · November 8, 2025 · Saturday

Optical Communications, Sensing, and Imaging

Presider: Liangjun Lu, Shanghai Jiao Tong University, China

16:00-16:30 · ACP2025-0801-175 **Invited**

A 1.28 Tbps/Fiber Silicon Photonic DWDM Transceiver for Advanced Optical Interconnects

Shenlei Bao, Chao Cheng, Jintao Xue, Xianglin Bu, Qian Liu, Binhao Wang*

Xi'an Institute of Optics and Precision Mechanics of CAS, China

This paper presents an 8 × 160 Gbps/fiber microring-based silicon photonic transceiver optimized for chip-to-chip interconnects. The silicon-photonic transceiver architecture leverages wavelength-division multiplexing via microring modulators and dual-ring drop filters, significantly enhancing the bandwidth density.

16:30-16:45 · ACP2025-0815-59

Photon-Counting Polarimetric Imaging LiDAR with a Learning-Based Denoiser

Song Li, Haoran Sun, Hedong Liu, Pengcheng Shao, Yuanzhe Lan, Haofeng Hu, Xiaolong Hu

Tianjin University, China;

We implement a four-branch denoiser for polarimetric imaging LiADR that uses a fractal superconducting nanowire single-photon detector. This denoiser permits the polarimetric imaging LiDAR to acquire images with decent qualities in photon-starved conditions and relatively short acquisition time.

16:45-17:00 · ACP2025-0731-67

Promoting Carrier Envelope Offset Frequency Detection with DBR Defect-Based Angle-Tunable Narrow Band Filter

Lu Wang, Siyan Wang, Qiankun Li, Chengbo Mou, Hairun Guo*

Shanghai University, China

We design and fabricate a DBR narrow bandpass filter at visible and applied it to the detection of laser carrier envelope offset frequency by means of inline f-3f self-referencing in chipscale nanophotonic supercontinuum processes.

17:00-17:15 · ACP2025-0731-101

Analysis of Mode Chirality in Microring Resonators via Imaging of Out-of-Plane Light Scattering

Jinjiang Lin[1], Jin Li[1], Ran Cheng[1], Jiaqi Zhao[1], Yang Tan[2], Jiawei Wang[1*]

1.Harbin Institute of Technology Shenzhen, China;2.Shandong University, China

We present a method to assess mode chirality in spiral microring resonators through out-of-plane light scattering imaging which quantitatively maps the asymmetries in the intracavity field intensity. The approach further resolves the chirality changes induced by molecular coating.

17:15-17:30 · ACP2025-0801-95

Experimental Realization of High-Performance Orbital Angular Momentum Demultiplexing Based on Quasi-wavelet Conformal Mapping

Han Cao, Jian Wang

Huazhong University of Science and Technology, China

We employ quasi-wavelet conformal mapping to design micro-structures enabling precise demultiplexing of multiple OAM modes. Experimental results demonstrate successful demultiplexing of 11 OAM modes (l = -5 to +5) across the 1525-1570 nm bandwidth.

Track 7: Photonic Sensors & Bio-Photonics

Place: Function Room K3

13:30-15:30 · November 6, 2025 · Thursday
Multifunctional Photonic Sensors
Presider: Tuan Guo, Jinan University, China

13:30-14:15 · ACP2025-0507-2 **Keynote**
Thermally Drawn Multifunctional Fibers
Lei Wei
Nanyang Technological University, Singapore
Thermally drawn multifunctional fibers have emerged as a new yet promising route to enable unprecedented development in information technology. This talk provides an overview of the basic concepts, fabrication processes, and developments of semiconductor fibers.

14:15-15:00 · ACP2025-0605-2 **Keynote**
Fiber multifunction-integrated devices for sensing
Fei Xu
Nanjing University, China
With the development of materials science and manufacture technology, the conventional homogeneous doped core and pure cladding structures in a silica fiber have evolved with a new paradigm shift by merging the multi-structures and multi-materials. This emerging trends in optical fibers aim to break the fundamental limit by a single structure and material, and extend their photonic and optoelectronic applications. Here we will show some all-fiber multifunction-integrated devices developed in our labs and their applications in imaging, laser and sensing will also be discussed.

15:00-15:30 · ACP2025-0609-1 **Invited**
Optical micro-/nanofibers enabled sensors and actuators
Lei Zhang
Zhejiang University, China
In this talk, I will introduce our group's recent progress on microfluidic sensors, microforce sensors, and photoactuators based on optical micro-/nanofibers.

15:30-16:00 Coffee Break

16:00-18:00 · November 6, 2025 · Thursday
Multifunctional Photonic Sensors
Presider: Fei Xu, Nanjing University, China

16:00-16:45 · ACP2025-0915-18 **Keynote**
TBD
Kyunghwan Oh
Yonsei University, Korea
TBD

16:45-17:15 · ACP2025-0729-14 **Invited**
Fiber-optic sensors based on wavelength-swept lasers
Min Yong Jeon*, Min Su Kim, Ji Su Kim, Sung Yoon Cho, Soyeon Ahn
Chungnam National University, Korea
We present an ultra-wideband wavelength-swept laser (WSL) with a 440 nm tuning range, enabling real-time dynamic sensing by converting spectral information into the time domain. Applications include FBG, gas, and humidity fiber-optic sensors.

17:15-17:45 · ACP2025-0731-145 **Invited**

Field-deployable calibration-free 1f wavelength modulation spectroscopy systems for trace gas monitoring

ARUP CHAKRABORTY
IIT Gandhinagar, India

This talk will describe the development of robust, field-deployable, battery-powered, fully automated and remotely accessible tunable diode laser-based calibration-free 1f wavelength modulation spectroscopy (WMS) systems for vehicle-mounted and drone-based trace gas measurements in India.

17:45-18:00 · ACP2025-0725-1

Heterogeneous Integrated MEMS-VCSEL: A New Generation of High-Speed Broad-Spectrum Gas Detector

Hongzhuo Wang, Ning Cui, Jisheng Wang, Baolu Guan*
Beijing University of Technology, China

This study proposes a heterogeneous integrated MEMS-VCSEL, which can detect small molecule gases including helium and carbon dioxide, with a sensitivity of 1800 nm/RIU and a response time of less than 3 seconds.

18:00-20:00 Welcome Reception

08:30-10:00 · November 7, 2025 · Friday
Distributed Optical Fiber Sensors
Presider: Yongkang Dong, Harbin Institute of Technology, China

08:30-09:15 · ACP2025-0915-17 **Keynote**

Forward Brillouin scattering in few-mode fibres: Opportunities for accurate temperature sensing

Marcelo A. Soto
Universidad Técnica Federico Santa María, Chile

This presentation will provide an overview of the mechanisms, key features, and experimental and simulation results of forward Brillouin scattering in few-mode fibres, highlighting its potential for high-precision temperature sensing.

09:15-09:45 · ACP2025-0915-20 **Invited**

Multifunctional Integrated Fiber-Optic Ultrasonic Transducers and Imaging Applications

Qizhen Sun
Huazhong University of Science and Technology, China

Fiber-optic ultrasonic transducers offer advantages such as high integration, broad bandwidth, and immunity to electromagnetic interference, which facilitate superior imaging resolution in narrow working spaces and extreme conditions. In recent years, we have conducted a series of studies on high-sensitivity, multifunctional integrated ultrasonic sensing technologies based on special fibers and structures. This presentation will highlight advancements in highly integrated all-fiber photoacoustic/ultrasonic hybrid transducers and dual-modal imaging technology, as well as an all-fiber ultrasonic transducer with ultrasound transmission and reception capabilities. Besides, their applications in endoscopic imaging, battery health monitoring, non-destructive testing, etc will be discussed.

09:45-10:00 · ACP2025-0729-6

Traffic Trajectory Segmentation and Multi-Target Micro-Parameter Extraction via DAS

Siyuan Peng, Yingqing Wu, Ke Liu, Chunye Liu, Jie Li, Taichao Wang, Minglu Li, Zinan Wang*
Key Laboratory of Optical Fiber Sensing and Communications University of Electronic Science and Technology of China, China

Proposes a DAS-based traffic extraction solution. Using high-resolution DAS for stable signal acquisition, it autonomously designs algorithms and trains networks to classify events, extract trajectories, and get vehicle speed/wheelbase, pedestrian metrics (speed, stride, cadence).

10:00-10:30 Coffee Break

10:30-12:00 · November 7, 2025 · Friday
Distributed Optical Fiber Sensors
Presider: Qizhen Sun, Huazhong University of Science and Technology, China

10:30-11:00 · ACP2025-0915-19 **Invited**
Chaotic Raman Distributed Optical Fiber Sensing and Its Applications
Mingjiang Zhang
Taiyuan University of Technology, China
TBD

11:00-11:30 · ACP2025-0731-66 **Invited**
Forward Transmission based Distributed Vibration Sensing and its integration to optical fiber communication systems
Yaxi Yan*, Liwang Lu, Alan Pak Tao Lau, Chao Lu
The Hong Kong Polytechnic University, Hong Kong, China
We review our recent works on forward transmission based distributed optical fiber vibration sensing and its integration to optical fiber communication systems. Developments from systematic design to advanced digital signal processing algorithms are introduced.

11:30-12:00 · ACP2025-0815-45 **Invited**
Remote phase-sensitive OFDR: decoupling spatiotemporal resolution from sensing distance
Shuaiqi Liu
Harbin Institute of Technology, China
Common-path, self-referenced φ-OFDR is proposed toforma remote sensing window decoupling spatiotemporal resolution and sensing distance. Together with scattering-enhanced fiber and noise suppression technique,we achieve 2 cm spatial resolution and 2 kHz frequency response range near the end of 75 km fiber, enabling high-resolution distributed sensing over long-haul fiber.

12:00–13:30 Lunch Break

13:30-16:00 · November 7, 2025 · Friday
Distributed Optical Fiber Sensors
Presider: Yaxi Yan, The Hong Kong Polytechnic University, Hong Kong, China

13:30-14:00 · ACP2025-0915-23 **Invited**
TBD
Bo Liu
Zhejiang LAB, China
TBD

14:00-14:30 · ACP2025-0729-15 **Invited**
Optical frequency comb enabled distributed fiber sensing
Zhiyong Zhao
Huazhong University of Science and Technology, China
In this talk, I will present our recent advances in optical frequency comb enabled distributed fiber sensing, and I will show how the optical frequency combs revolutionize the field of frequency-swept distributed fiber sensing.

14:30-15:00 · ACP2025-0916-1 **Invited**
Operando Events Monitoring with Fiber Sensors in Lithium Metal Batteries
Xun Guan
Tsinghua University Shenzhen International Graduate School, China
We develop an operando spatiotemporal super-resolution thermal monitoring system capable of real-time, super-resolution temperature mapping across the lithium anode of Lithium metal batteries, which is innovativefor localized battery sensing, analysis and fault warning.

15:00-15:15 · ACP2025-0724-1
Linewidth-Tolerant Cost-Effective Phase-Sensitive OTDR with Simultaneous Loss and Vibration Monitoring Ability
Jingchi Cheng[1], Can Zhao[2*], Tao Shang[1*], Jing Jiang[1], Ming Tang[3]
1.Xidian University, China;2.Shenzhen University, China;3.Huazhong University of Science and Technology, China
Leveraging random phase modulation and digital subcarrier multiplexing, we experimentally demonstrated a novel cost-effective phase-sensitive optical time-domain reflectometer using a commercial 200-kHz linewidth laser, with the ability to simultaneously monitor the fiber loss and vibration.

15:15-15:30 · ACP2025-0801-5
A Transformer Network for Real-Time Integrated Demodulation and Denoising for DAS
Ke Liu, Siyuan Peng, **Yingqing Wu,** Chunye Liu, Minglu Li, Jie Li, Taichao Wang, Zinan Wang[*]
Key Laboratory of Optical Fiber Sensing and Communications University of Electronic Science and Technology of China, China
To overcome limitations in conventional phase demodulation methods while enhancing the processing efficiency of massive DAS data, we propose a Transformer-based network for real-time integrated demodulation and denoising for DAS.

15:30-15:45 · ACP2025-0814-12
Enhanced Sensing Resolution using Spectrum Reassignment in OFDR
Zihang Ji, Zhou Xu, Tianle Chen, Yangjun Zheng, Lei Tu, Liang Wang[*], Ming Tang
Huazhong University of Science and Technology, China
We propose a high-performance OFDRbased on SPRS. The spatial resolution is enhanced to 4.8 mm, which shows 2.5 times improvement over traditional OFDR. While the strain sensing resolution is improved by 3.2 times.

15:45-16:00 · ACP2025-0814-45
Distributed strain sensing using Doppler-shift-immune φ-OFDR with ultra-weak reflection array and Quinn estimation based spectral correction
Yapeng Wang, Weilin Xie[*], Sijing Yang, Qiang Yang, Congfan Wang, Xiang Zheng, Wei Wei, Yi Dong
Beijing Institute of Technology, China
We report on a Doppler-shift-immune φ-OFDR based on Quinn estimation based spectral correction and ultra-weak fiber gratings. The proposed method permits suppressing the demodulation errors induced by Doppler effect, thus allows achieving high-precision distributed strain sensing.

15:30-16:00 Coffee Break
15:30-17:30 Poster Session
18:30-20:30 Banquet & Awards Ceremony

08:30-10:00 · November 8, 2025 · Saturday
Novel Photonic Sensors
Presider: Lipeng Sun, Jinan University, China

08:30-09:00 · ACP2025-0915-21 **Invited**
TBD
Ruohui Wang[1]
Northwest University, China
TBD

09:00-09:30 · ACP2025-0731-29 **Invited**
Chaotic Raman optical fiber sensing
Jian Li
Taiyuan university of technology, China
Chaotic Raman Distributed Optical Fiber Sensing (CR-DOFS) is an innovative technology for long-range, high-precision temperature monitoring. It integrates chaotic laser light — characterized by broadband spectrum and low coherence — with the spontaneous Raman scattering effect in optical fibers. Conventional pulsed Raman sensing faces the inherent distance-resolution trade-off due to pulse width limitations. CR-DOFS overcomes this by leveraging the noise-like properties of chaotic light. It employs an auto-correlation signal processing method to achieve continuous distributed sensing over ultra-long distances. The operating principle involves injecting chaotic pump light into the sensing fiber. The intensity of the backscattered Raman anti-Stokes signal is temperature-dependent. By demodulating the cross-correlation function between this scattered signal and the original chaotic light, temperature variations along the entire fiber can be accurately localized. This technology significantly enhances anti-interference capability, effectively

suppressing Rayleigh scattering noise and external environmental disturbances, while achieving meter-level or even sub-meter spatial resolution. With critical applications in power cable monitoring, oil/gas pipeline leak detection, and structural health monitoring of large-scale infrastructure, CR-DOFS provides a breakthrough solution for fully distributed temperature sensing in complex environments.

09:30-10:00 · ACP2025-0730-3 **Invited**
Chalcogenide-based photonic integrated devices and sensing applications
Jingshun Pan[1*], Zhaohui Li[2]
1.South China Normal University, China;2.Sun Yat-sen University, China
Chalcogenide-based materials, belonging to the sixth main group, have garnered widespread attention owing to their myriad advantages, including transmissibility spanning the visible to mid-infrared wavelength ranges, ultra-low optical loss, high nonlinearity, and substantial elasto-optical coefficients. Herein, we present innovative research on chalcogenide-based materials, encompassing chalcogenide compound-based material systems, the fabrication of integrated photonic chips and devices, as well as integrated chip demodulation systems and their applications. This study explores a novel chalcogenide-based material characterized by exceptional elasto-optical coefficients, whose fabrication process enables efficient detection of high-sensitivity ultrasonic signals. We have successfully fabricated a photonic micro-ring array device with a quality factor approaching 10^6, a noise-equivalent pressure as low as 2.2 mPa/Hz^(1/2), and an ultrasonic signal bandwidth coverage of 175 MHz. Leveraging advanced parallel spectroscopic detection technology, our research achieves wavefront array detection of ultrasonic fields, with applications encompassing photoacoustic imaging of living zebrafish, three-dimensional photoacoustic imaging of leaf veins, and real-time online blood pressure monitoring in humans, thereby demonstrating extensive application prospects.

10:00-10:30 Coffee Break

10:30-11:30 · November 8, 2025 · Saturday
Photonic Sensors for Electrical Battery
Presider: Ruohui Wang, Northwest University, China

10:30-11:00 · ACP2025-0729-48 **Invited**
In situ fiber-optic monitoring of electrochemical interfacial dynamics
Lipeng Sun
Jinan University, China
We developed a fiber-optic sensor with ultrahigh refractive index sensitivity for in-situ monitoring of electrode-electrolyte interfaces, enabling real-time tracking of catalytic reactions and revealing reaction mechanisms in electrochemical studies.

11:00-11:30 · ACP2025-0729-52 **Invited**
Operando Decoupling of Lithium-ion Transport Dynamic of Batteries Using Tilted Fiber Bragg Grating Sensors
Fu Liu
Northwestern Polytechnical University, China
An operando fiber-optic method has been developed to monitor ion transport in batteries, revealing deviations from the DFN model and highlighting the need for models that account for nonuniform reaction and current density.

12:00-13:30 Lunch Break

13:30-16:00 · November 8, 2025 · Saturday
Photonic Bio-sensors
Presider: TBD

13:30-14:00 · ACP2025-0731-31 **Invited**
SPP-MIM Hybridization to Combine SPR and LSPR for Biosensing
Tian Yang
Shanghai Jiao Tong University, China
The hybridization of surface plasmon polaritons and the metal-insulator-metal waveguide provides such a metamaterial film that combines the advantages of SPR and LSPR. A remarkable enhancement of surface sensivities were obtained across a broad spectral range, using a grating-coupling configuration.

14:00-14:30 · ACP2025-0624-1 **Invited**

Fiber-Optic Theranostics: Towards Precision Tumor Diagnosis and Treatment

Yang Ran

Jinan University, China

Effective treatment of malignant tumors remains a formidable challenge in modern medicine. Fiber-optic theranostics (FOT), which integrates optical fiber technology with phototheranostics, has driven a paradigm shift in the precise diagnosis and treatment of deep-seated tumors by overcoming light penetration limits, circumventing systemic toxicity. Embodying the /medicine-on-a-fiber/ revolution, optical fibers have evolved from simple waveguides to multifunctional theranostic platforms that minimize tissue invasion. Herein, we discuss recent advances in functionalized FOT probes for tumortheranostics, which establish a comprehensive diagnostic-therapeutic-evaluative integrated workflow. Before treatment, tumor edge identification is achieved by revealing the-tumor biomarker gradients (e.g., pH, hypoxia). During treatment, the FOT system not only enables targeted delivery oftherapeutic doses(thermal and drugs) to tumor sites for intraoperative synergistic photothermal-chemotherapy but also provides real-time dose monitoringthrough integrated fiber-optic sensors. After treatment, postoperative efficacy is assessed through dynamic biomarker tracking of residual microenvironments. Collectively, these functionalized FOT probes advance precision oncology toward complete-tumor managementcycles.

14:30-15:00 · ACP2025-0814-19 **Invited**

High-Performance Fiber-Optic Photoacoustic Sensing for Advanced Endomicroscopy

Long Jin

South China Normal University, China

We present high-sensitivity fiber-optic photoacoustic sensing technology using optical amplification, overcoming piezoelectric sensor limitations. A miniaturized endoscopic system enables simultaneous microvascular and oxygenation imaging, advancing gastrointestinal disease diagnosis through in vivo visualization.

15:00-15:15 · ACP2025-0801-225

Fast Scanning Slanted Light Sheet Array Microscopy

Long Kai[1], Junming Zhou[1,2], Junyi Li[2], Nanguang Chen[1,2*]

1.National Unversity of Singapore, Singapore;2. NUS (Suzhou) Institute, China

Mechanical scanning slanted light sheet microscopy achieves three-dimensional scanning by moving samples. Due to the inertia and precision limitations of mechanical stage motion, mechanical drift, vibration, and positioning errors are prone to occur during sample movement, which not only reduces the efficiency of repeated scanning, but also may cause disturbances to the sample, especially to imaging living biological samples. This manuscript developed a novel fast scanning slanted light sheet array microscopy based on a transmission grating and cylindrical microlens array, which enables the light sheet array to cover the entire region within the sample field of view. Its compact structure is compatible with traditional upright widefield microscope, and it has great advantages in high-efficiency 3D fluorescent imaging and real-time 3D scattering imaging.

15:15-15:30 · ACP2025-0815-146

Physics-Aware Cross-Attention Framework Accelerating TFBG-based Plasmonic DNA Bio-sensing

Shenqi Yang[1], Yifan Duan[1], Jiahui Jin[1], Yunting Du[2], Yang Zheng[2], Xiaojing Tong[2], Yang Zhang[1*], Wei Peng[1]

1.Dalian University of Technology, China;2.Cancer Hospital of Dalian University of Technology (Liaoning Cancer Hospital & Institute), China

We propose a Physics-Aware Cross-Attention framework for accelerated TFBG-SPR biosensing, leveraging full-spectrum temporal encoding with Langmuir-kinetics regularization to jointly predict analyte concentrations and adsorption rates from early-stage sensorgrams.

15:30-15:45 · ACP2025-0729-34

Monocular Depth Estimation Assisted iToF-RGB Fusion for Improved Depth Resolution

Yutong Deng, Yansong Du, Yuting Zhou, Feiyu Jiao, Jian Song, Xun Guan

Tsinghua University, China

This paper presents an iToF-RGB fusion framework that reprojects and enhances iToF depth maps via a dual-encoder fusion network, achieving improved depth accuracy, structural consistency, and expanded field-of-view across synthetic and real world scenarios.

15:45-16:00 · ACP2025-0731-150

Neural Network-Assisted Extraction of Laguerre-Gaussian Coefficient through Quadriwave Lateral Shearing Interferometry for Speckle Field Sensing

Rong Li, Deng Liu, Liangwei Zhu, Shuhui Li*, Jian Wang

Wuhan National Laboratory for Optoelectronics, School of Optical and Electronic Information, Huazhong University of Science and Technology, China

We propose a neural network-assisted quadriwave lateral shearing interferometry (QLSI) for speckle field sensing. Through a well-trained network, the mapping between the input QLSI interferograms and the coefficients of Laguerre-Gaussian modes can be established. The Pearson correlation coefficient of reconstructed speckle fields exceed 0.97 and 0.87 in intensity and phase profile.

13:30–15:30 · November 6, 2025 · Thursday
Best Student Paper Award I

Presider: TBD

13:30-13:45 ·ACP2025-0729-31
Longitudinal Structure Deformation Monitoring of Nested Anti-resonant Nodeless Fiber based on Multi-beam Interference
Jinze Li, Cong Zhang*, Di Lin, Jianping Li, Meng Xiang, Yuwen Qin, Songnian Fu
Guangdong University of Technology, China
We propose a multi-beam interference model enabling micron-level deformation characterization in nested antiresonant nodeless fiber (NANF), achieving 3.5% error for most parameters and 7% for wall thickness, suitable for in-line drawing monitoring.

13:45-14:00 ·ACP2025-0817-4
Generation of Cnoidal Waves and Solitons in an Erbium-doped Fiber Laser with Tunable Modulation Depth
Ruilong Song, Hongbo Jiang*, Zhiming Yang, Jiayi Shen, Xiaoyun Tang, Lei Jin
Harbin Engineering University, China
We continuously tune modulation depth in a fiber laser by tailoring intracavity PDL, revealing a reversible transition from cnoidal waves to soliton rain driven solely by polarization adjustments at constant pump power.

14:00-14:15 ·ACP2025-0724-15
Joint Dual-Pilot and MRC Aided NOMA-DSCM for 240-Gbps Coherent PON with Extended Far-End ONU Coverage
Chen Ding[1*], Yutian Liu[1], Qiarong Xiao[1], Zijian Li[1], Zixian Wei[2], Changyuan Yu[2], Chaoran Huang[1], Chester Shu[1]
1. The Chinese University of Hong Kong, Hong Kong, China; 2. The Hong Kong Polytechnic University, Hong Kong, China
We present a demonstration of a joint dual-pilot aided and MRC aided NOMA-DSCM system for coherent PON, achieving 240 Gbps and up to 2.86 dB diversity gain, extending far-end ONU coverage with interference-resilient phase estimation.

14:15-14:30 ·ACP2025-0730-34
C-Band 112-Gb/s OOK Transmission over 100-km SSMF Enabled by Cluster-Assisted Equalization
Qiang Bin[1], Yutong Liu[1], Junwei Zhang[1*], Zhaohui Li[1], Chao Lu[2]
1. Sun Yat-Sen University, China; 2. The Hong Kong Polytechnic University, Hong Kong, China
C-band 112-Gb/s OOK transmission over 100-km SSMF is demonstrated, enabled by joint equalization with a weight-sharing absolute-term FFE (WSATFFE) and a cluster-assisting look-up-table-based DFE (CLUTDFE). Compared to WSATFFE-WSDFE, the WSATFFE-CLUTDFE saves 30% in real-valued multiplications.

14:30-14:45 ·ACP2025-0731-140
FPGA-based Real-Time Synchronization with Robustness and Low Complexity for Burst-Mode 100G Coherent Passive Optical Networks
Renle Zheng, An Yan, Penghao Luo, Yongzhu Hu, Junhao Zhao, Xuyu Deng, Jianyang Shi, Nan Chi, Junwen Zhang*
Key Laboratory of EMW Information (MoE), Fudan University, China
We propose and demonstrate FPGA-based real time synchronization with high robustness and low complexity for burst-mode 100 Gbps coherent PON, based on a novel 91.43 ns preamble, achieving a power budget exceeding ITU-T N1 class (29 dB).

14:45-15:00 ·ACP2025-0727-8
Reliable Multi-Station and Multi-Satellite Ground Space Optical Networking by Spatio-Temporal Prediction of Space-Ground Atmospheric Laser Communication Channel
Han Wang[1], Nan Hua[2, 3, 4*], Kangqi Zhu[2, 3, 4], Zhenrong Zhang[1*], Shangyuan Li[2, 3, 4], Xiaoping Zheng[2, 3, 4]
1. School of Computer, Electronic and Information, Guangxi Key Laboratory of Multimedia Communications and Network Technology, Guangxi University, China; 2. Beijing National Research Center for Information Science and Technology (BNRist), China; 3. State Key Laboratory of Space Network and Communications, China; 4. Tsinghua University, China
This study proposes a Multi-Parameter Joint Prediction (MPJP) architecture for resilient ground-space optical networking. It predicts atmospheric parameters via fused meteorological data, enabling intelligent optical path switching to significantly enhance reliability under weather disturbances.

15:00-15:15 ·ACP2025-0727-9
Reinforcement Learning-based Fine-Tuning Large Language Model for High-Performance Alarm Analysis in Optical Networks
Yanli Liu[1], Yue Pang[2], Yidi Wang[1], Min Zhang[1], Xiaoyuan Ren[3*], Danshi Wang[1*]
1.Beijing University of Posts and Telecommunication, China; 2. China Telecom Cloud Network Operating System R&D Center, China; 3. Chinese Institute of Electronics, China
A large language model (LLM) specialized for alarm analysis in optical networks is developed through reinforced fine-tuning (ReFT) rather than a basic prompt. In the context of alarm analysis, the ReFT-enhanced LLM demonstrates improved accuracies across the four typical tasks.

15:15-15:30 ·ACP2025-0801-41
A Fully Real-Domain and Nonlinear Optical Neural Network Architecture
Shan Jiang, Bo Wu, Jialong Zhang, Wenguang Xu, Hailong Zhou, Jainji Dong*
Huazhong University of Science and Technology, China
We propose a dual MRR architecture driven by the differential photocurrent of PDs, which for the first time simultaneously enables real-valued input, computation, and cascaded real-domain nonlinear activation within optical neural networks. The nonlinear response, exhibiting a Tanh-like function, is experimentally demonstrated and further applied to the generator of a generative adversarial network.

15:30–16:00 Coffee Break

16:00–17:30 · November 6, 2025 · Thursday
Best Student Paper Award II

Presider: TBD

16:00-16:15 ·ACP2025-0801-71
AWG-based 128-channel end-to-end matrix multiplication chip
Chun Gao[1], Xiaowan Shen[1], Xinxiang Niu[2], Zejie Yu[1], Yiwei Xie[1], Pan Wang[1], Xiaowen Dong[2*], Huan Li[1*], Daoxin Dai[1*]
1. Zhejiang University, China; 2. Huawei Technologies Co., Ltd, China
This work designs and demonstrates a 128-channel, end-to-end optical matrix-computing chip based on an AWG. Characterized with an RNN, the system achieves a normalized mean-square error of 0.0205 on the Mackey-Glass sequence prediction task.

16:15-16:30 ·ACP2025-0815-105
Low-loss and Compact Silicon Nitride Photonic Chip for Dispersion Control
Weihan Wang, Ruitao Ma, Shujun Liu, Mingyu Zhu, Zejie Yu, Daoxin Dai*
State Key Laboratory for Modern Optical Instrumentation, College of Optical Science and Engineering, Zhejiang University, China
We demonstrate an on-chip dispersion controller on silicon nitride, featuring a compact footprint, a maximal dispersion of +23.906 ps/nm and -23.799 ps/nm, a low loss of 0.188 dB/cm and low group delay ripples.

16:30-16:45 ·ACP2025-0731-108
Novel Photonic Synchronization Approach for Dual Optical Frequency Combs Based on Spread Spectrum Communication
Yaoping Wu, Jincong Hu, Biao Ge, Ningyuan Zhong, Ke Zhang, Hui Yang, Lianshan Yan, Xihua Zou
Southwest Jiaotong University, China
This paper proposes a novel photonic synchronization approach for dual optical frequency combs (OFCs) based on spread spectrum communication. This approach drastically reduces the required large tunable optical delay value through the Vernier effect between the two distinct free spectrum ranges (FSRs) of dual OFCs in the receiver. In experiments, the optical delay value is dramatically proliferated by a factor of 207. This enables a high-efficient synchronization procedure for dual OFCs based on spread spectrum communication or covert communication, reducing the conventionally required maximum optical delay value from 6250 ps to 30.16 ps.

16:45-17:00 ·ACP2025-0815-81
An Approach for Optical Pulse Sequences Achieving (n+1/2) Repetition Rate Multiplication
Ping Li, Kunlin Shao, Xiaohu Tang, Zhouyang Pan, Yamei Zhang*, Dan Zhu, Shilong Pan
National Key Laboratory of Microwave Photonics, Nanjing University of Aeronautics and Astronautics, China
An innovative temporal Talbot effect-based technique for optical pulse sequence repetition rate control is presented, capable of achieving arbitrary (n+1/2) multiplication factors. Distinguished from conventional temporal Talbot effect configurations, this approach incorporates a pre-phase modulation process rather than directly employing phase-free optical pulse sequences. The core novelty lies in the straightforward phase manipulation of optical pulses, where carefully designed temporal phase signals allow for precise control of repetition rate through subsequent dispersion. Both numerical simulations and experimental validations have confirmed the effectiveness and feasibility of this method. Experimental demonstrations successfully achieved repetition rate multiplication (RRM) factors of 1/2, 3/2, and 5/2, validating the operational principles and functionality of the proposed technique. The results indicate that this method provides a robust and flexible solution for precise repetition rate control in optical pulse sequences.

17:00-17:15 ·ACP2025-0814-2
Towards over 100 Gb/s Channel Rate Arrayed 850-nm Transmitter for High-Speed Optical Wireless Communication
Peng Yan[1,2], Shenghui Wu[2], Yunhao Zhang[1,2], Haowen Shu[1*], Xingjun Wang[1*]
1. Peking University, China; 2. Pengcheng Laboratory, China
We implement an 850-nm vertical-cavity surfaceemitting laser (VCSEL) array based high-speed optical wireless transmitting system. Leveraging advanced packaging, all four channels achieve a record-high data rate of over 100 Gb/s in a short stress pattern random quaternary (SSPRQ) PAM4 pattern with a transmitter and dispersion eye closure quaternary (TDECQ) of less than 2.0 dB.

17:15-17:30 ·ACP2025-0815-43
Simplified Linewidth-Tolerance OFDR based on Embedded-Referencing Phase Noise Compensation
Shuyan Chen[1], Huan He[2], Zhiyong Zhao[1*], Ming Tang[1], Chao Lu[2]
1. Huazhong University of Science and Technology, China; 2. The Hong Kong Polytechnic University, Hong Kong, China
We present a simplified linewidth-tolerant OFDR employing embedded-reference phase noise compensation, demonstrating 13.8mm spatial resolution over 1.9km with 200kHz-linewidth laser using single-receiver architecture.

18:00–20:00 Welcome Reception

13:30–15:30· November 6, 2025 · Thursday
Best Paper Award I
Presider: TBD

13:30-13:45 ·ACP2025-0731-107
FPGA-Accelerated Correlation OTDR for Rapid and High-SNR Fibre Reflectometry
Te Ke, Tao Zeng*, Yingmei Pan, Lin Zheng, Baichuan Shao, Ziqing Liu, Botao Yang, Yimei Pan, Ziye Zhong, Ming Luo
State key laboratory of Optical Communication Technologies and Networks, China Information Communication Technologies Group Corporation, China
AnFPGA-accelerated correlation OTDR achieving 2cm resolution over 95km in real timeis proposed. Compared to the 95 km detection limit of single-pass offline correlation, a 2^{35}sample zoom-in window improves SNR by 20 dB, clearly resolving fine reflections with high speed and fidelity.

13:45-14:00 ·ACP2025-0814-46
A Cost-Effective GRIN Fiber Adapter with Enhanced Misalignment Tolerance for Intra-Vehicle Optical Networks
Zhihao Li, Gordon Ning Liu*, Yi Cai, Gangxiang Shen, Leyuan Zhang, Yu Chen
Soochow University, China
We propose a cost-effective fiber adapter for multimode fiber connection, which adopts a non-contact structure with a built-in GRIN fiber. Simulation results demonstrate it enhances misalignment tolerance and offers large fiber length tolerance.

14:00-14:15 ·ACP2025-0730-47
Single-Lane 600-Gb/s IM-DD Link Based on TFLN MZM at sub-pJ/bit for AI Clusters
Ruiting Cheng[1], Zhaopeng Xu[1], Shangcheng Wang[1], Honglin Ji[1*], Xiansong Fang[2], Yixiao Zhu[3], Lulu Liu[1], Tonghui Ji[1], Lingjun Zhou[2], Zhixue He[1], Weisheng Hu[3], Juhao Li[2]
1. Peng Cheng Laboratory, China; 2. Peking University, China; 3. Shanghai Jiao Tong University, China
We experimentally demonstrate single-lane 600-Gbit/s IM-DD transmission link with 154-Gbaud PS-PAM-20 modulation based on a 65-GHz TFLN MZM in the C-band for high-speed and power-efficient AI clusters. Net 466.4-Gbit/s transmission without electrical amplifiers is achieved with sub-pJ/bit energy efficiency for optical interconnecting applications.

14:15-14:30 ·ACP2025-0809-1
Single Photodiode Reception of 686-Gb/s Signal by Optical Triple Band Multiplexing for AI Clusters
Yixiao Zhu[1*], Xiang Cai[2], Xiansong Fang[2], Chenbo Zhang[2], Yimin Hu[1], Ziheng Zhang[1], Lingjun Zhou[2], Chongyu Wang[1], Fan Zhang[2], Weisheng Hu[1]
1. Shanghai Jiao Tong University, China; 2. Peking University, China
We experimentally demonstrate triple-band optical multiplexing to extend the digital-to-analog convertor bandwidth without using radio-frequency oscillators and mixers. We achieve single-photodiode reception of 686.6-Gb/s line rate signal over 200-m single-mode fiber for AI clusters.

14:30-14:45 ·ACP2025-0812-4
EO comb Enabled 10.56 Tbit/s Self-Homodyne Transmission and Enhanced φ-OTDR for ISAC with a 7-Core Fiber
Xu Liu, Chenbo Zhang*, Yi Zou, Zhangyuan Chen, Weiwei Hu, Xiangge He, Xiaopeng Xie
Peking University, China
We propose an ISAC system based on an EO comb and 7-core fiber, achieving 10.56 Tbit/s self-homodyne transmission and high-fidelity φ-OTDR sensing, with improved SNR and fading reduction for metro-scale networks.

14:45-15:00 ·ACP2025-0802-6
Enhancing FTTR Performance with Preemptive Downlink Scheduling
Ang Li[1], Jinhan Cai[1], Biswanath Mukherjee[2], Gangxiang Shen[1*]
1. Soochow University, China; 2. University of California, United States
This paper proposes a preemptive downlink scheduling method for fiber-to-the-room (FTTR) networks that optimizes frame aggregation and leverages Wi-Fi 8's channel preemption to coordinate multi-priority traffic and reduce delay. The adoption of the preemptive algorithm and FTTR centralized control scheduling can reduce the end-to-end average delay of the four types of traffic.

15:00-15:15 ·ACP2025-0815-51
Dynamic Autonomous Domain Division in Multi-layer Optical Satellite Networks
Xiaoyuan Fan, Yongli Zhao*, Wei Wang, Yansong Fu, Zijian Cui, Jie Zhang
Beijing University of Posts and Telecommunications, China
Dynamic clustering for LEO/MEO enables efficient multi-domain management, improving stability and cutting end-to-end latency by 35%.

15:15-15:30 ·ACP2025-0731-100
8×8×2λ optical switch based on 3D integrated dual coupled microring resonators
Yuanchao Yu, Xin Li, Wei Gao, Liangjun Lu, Jianping Chen, Linjie Zhou, Yanyang Zhou, Wansu Bao
Shanghai Jiao Tong University, China
We demonstrate an 8 × 8 × 2λ space-and-wavelength selective switch (SWSS) based on three-dimensional (3D) integrated dual coupled microring resonators. Full characterization of all switch paths shows an average fiber-to-fiber (on-chip) insertion loss (IL) of 9.4 dB (0.8 dB) with the worst crosstalk of -10.8 dB. The switch exhibits optical bandwidth above 48 GHz and maintains power penalties below 0.33 dB under 25 Gbps on-off keying (OOK) signal transmission.

15:30–16:00 Coffee Break

16:00–17:15· November 6, 2025 · Thursday
Best Paper Award II

Presider: TBD

16:00-16:15 ·ACP2025-0801-154
36×200 Gbps Hybrid Mode/Wavelength Division Multiplexing Transmitter in Lithium Niobate on Insulator
Mingyu Zhu, Dajian Liu, Weihan Wang, Weike Zhao, Ruitao Ma, Daoxin Dai*
Zhejiang University, China
We demonstrated a 36-channel hybrid mode/wavelength division multiplexing transmitter on lithium-niobiate-on-insulator with 0.5 dB excess loss and 30 dB crosstalk. A high-speed data transmission at a rate of 7.2 Tbps can be obtained.

16:15-16:30 ·ACP2025-0815-101
High-Performance III-V/Si_3N_4 Hybrid-Integrated Mode-Locked Laser
Mengran Qiao[1], Xiaoying Guo[1], Xinhang Li[1], Yuyao Guo[1,2*], Yu Li[1,2], Liangjun Lu[1,2], Jianping Chen[1,2], Linjie Zhou[1,2]
1. Shanghai Jiao Tong University, China; 2. SJTU-Pinghu Institute of Intelligent Optoelectronics, China
We demonstrate a high-performance III-V/Si_3N_4mode-locked laser. Stable passive mode-locking achieves a wide 3-dB bandwidth of 9.12 nm and a narrow 10-dB linewidth of 443 Hz. Hybrid mode-locking further enhances the frequency stability.

16:30-16:45 ·ACP2025-0808-1
Quantum correlations on a lithium tantalate chip
Dan Xu[1,2], Yunru Fan[1,2,3*], Bowen Chen[4,5], Chengli Wang[4,5*], Xuqiang Wang[4,5], Jiachen Cai[4,5], Haizhi Song[1,6], You Wang[1,6], Jingbo Qi[7], Hao Li[8], Lixing You[8], Kai Guo[9], Xin Ou[4,5*], Guangcan Guo[1,2,3,10], Qiang Zhou[1,2,3,10*]
1. Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology of China, China; 2. Key Laboratory of Quantum Physics and Photonic Quantum Information, Ministry of Education, University of Electronic Science and Technology of China, China; 3. Center for Quantum Internet, Tianfu Jiangxi Laboratory, China; 4. State Key Laboratory of Materials for Integrated Circuits, Shanghai Institute of Microsystem and Information Technology, China; 5. The Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China; 6. Southwest Institute of Technical Physics, China; 7. School of Physics, University of Electronic Science and Technology of China, China; 8. National Key Laboratory of Materials for Integrated Circuits, Shanghai Institute of Microsystem and Information Technology, China; 9. Institute of Systems Engineering, AMS, China; 10. CAS Center For Excellence in Quantum Information and Quantum Physics, University of Science and Technology of China, China
We demonstrate, for the first time to our knowledge, correlated photon-pair generation in a lithium tantalate ($LiTaO_3$) micro-ring resonator (MRR) via spontaneous four-wave mixing (SFWM), marking a significant step toward integrated quantum photonics on this scalable and mature platform. Our results open the door to monolithically unifying classical and quantum photonic functionalities within a single $LiTaO_3$ circuit.

16:45-17:00 ·ACP2025-0815-120
Optical Frequency Comb-Enabled Parallel Single-Photon 3D Imaging
Jiao Liu, Jianhao Duan, Bin Wang*, Weifeng Zhang
Beijing Institute of Technology, China
We propose a multi-channel single-photon LiDAR system utilizing an electro-optical frequency comb for rapid and precise 3D imaging. The system achieves a 1.11-cm ranging accuracy and a 3,800-pixels/s acquisition rate at a 5.5-meter distance.

17:00-17:15 ·ACP2025-0801-130
High Efficient Optical Convolution via Multidimensional Photonic Multiplexing
Baoyue Liu, Shifan Chen*, Yunping Bai*, Xingyuan Xu
Beijing University of Post and Telecommunications, China
We demonstrated a high-efficiency optical convolution accelerator (heOCA) that multiplexes three dimensions of space, wavelength, and time. It achieves near 100% bit efficiency—triple of single-path architectures—and 93.8% MNIST classification accuracy.

18:00–20:00 Welcome Reception

Poster Session

Track 1: Optical Fibers, Fiber-based Devices

ACP2025-0515-1

Simultaneous Multi-Gas Sensing with Miniaturized Fiber Fabry-Perot Interferometer-Based Photothermal Spectroscopy
Karol Krzempek*
Wroclaw University of Science and Technology, Poland
We demonstrate simultaneous methane and carbon dioxide detection using photothermal spectroscopy with a miniature fiber Fabry-Perot interferometer. The system measures gas-induced refractive index changes at 1550 nm while targeting specific absorption lines at 1651 nm and 2001 nm.

ACP2025-0620-1

Multi-Reference-Compatible Frequency Stabilization of DFB-LDs Lasers Using Fabry-Perot Etalon and Acetylene Cell
Ye Gao
Tianjin University, China
In this work, we propose a novel frequency-stabilized laser scheme that is compatible with various absorption-spectrum-based frequency reference devices. Experimental results demonstrate that the proposed laser achieves a frequency stability on the order of 10^{-10}.

ACP2025-0714-3

Robust Fiber Type Identification from Power Profile Estimation Using an Encoder-Decoder Network
Kehan He[1], Yongjie Shi[2], YuChen Song[2], Yihang Lou[2], Xiaoguang Zhang[1], Lixia Xi[1*]
1.Beijing University of Posts and Telecommunications, China; 2.Huawei Technologies Co., Ltd., China
We propose an encoder-decoder network for robustly identifying fiber types from PPE-derived waveforms, achieving 95% accuracy in complex simulations and successfully identifying fiber types in a 140GBd DP-16QAM, 8-span transmission testbed.

ACP2025-0718-7

Thermalization of the Rayleigh-Jeans distribution in graded-index ring-core multimode fibers
Fengyi Zhang, Hu Zhang*, Bohao Xu, Jiaqi Wang, Xiaoguang Zhang, Lixia Xi
Beijing University of Posts and Telecommunications, China
Weinvestigate the beam self-cleaning (BSC) effect in a graded-index (GRIN) ring-core multimode fiber (MMF) in the framework of thermodynamics, uncovering its atypical thermalization characteristics.

ACP2025-0724-2

Broadband Random Fiber Laser with Chirped Fiber Bragg Grating Feedback
Runnan Guan, Runhao Li, Jing Zhang, Yifei Qi, Wangyouyou Li, Zinan Wang*
Key Lab of Optical Fiber Sensing and Communications University of Electronic Science and Technology of China, China
In this paper, we design and implement a high-reffectivity chirped fiber Bragg grating (CFBG) and, using a simple structure, successfully generate a 3.5 nm RFL.

ACP2025-0724-9

Sensing Branch Multiplexing for Linear Sagnac Interferometer Based on Phase-Generated Carrier Technique
Zhongzheng Yuan, Yuchen Song*, Kaiyuan Wang, Yixiao Ma, Qian Xiao, Bo Jia
Fudan University, China
This paper proposes a sensing branch multiplexing method for linear Sagnac interferometer, achieved by applying modulations of different frequencies to distinct branches. This method can achieve good quality of recovered phase and high localization accuracy.

ACP2025-0729-19

Improved PGC-Arctan Demodulation Algorithm by Combining Odd Harmonics
Fangshuo Shi[1], Haoyan Liu[1], Yuxiang Wei[1], Wenbo Wang[1], Xinyu Cao[1], Yanjun Chen[2*], Zhengbin Li[1]
1.Peking University, China; 2.Central South University, China
We propose an improved PGC-Arctan demodulation algorithm that combines odd harmonics proportionally to maximize the signal-to-noise ratio of fiber-optic interferometric sensor. Without changing optical configuration, the proposed algorithm enhances sensitivity by a factor of 1.59.

ACP2025-0729-7

Design and Optimization of an All-Fiber Mode Multiplexer for C-Band via Tapered Side-Polished Processing

Yingying Zhou[1,2], Junpeng Liang[2*], Mingjing Zeng[2], Xiuquan Cui[2], Jianwei Tang[2], Hao Shi[2], Cancan Chen[2], Jianyu Wang[2], Hua Yu[1], Zhaopeng Xu[2], Zhixue He[2], Jinlong Wei[2*]

1.South China University of Technology, China; 2.Pengcheng Laboratory, China

We present a detailed comparative numerical study of two fabrication methods for all-fiber mode-selective couplers used as mode (de)multiplexers. Both designs achieves over 90.92% coupling efficiency and crosstalk below −15.56 dB. Furthermore, our results show that the use of standard ITU-T G.652.D singlemode fiber (SMF) can provide similar coupling efficiency as dedicated SMF does.

ACP2025-0730-16

780 nm GHz Harmonic Mode-locked Pulses Generation via Frequency Doubling

Mengxue Guo[1], Kai Wang[1], Qianqian Huang[1], Lilong Dai[1], Haochen Tian[2], Hairun Guo[1], Chengbo Mou[1*]

1.Shanghai University, China; 2.National Institute of Metrology, China

Wereport the first demonstration of 780 nm GHz pulsegeneration via frequency doubling, seeded by a harmonic mode-locked fiber laser. This approach offers asolution for generating 780 nm pulses and enables various applications.

ACP2025-0730-20

Ultra-sensitive Fiber Gas Pressure Sensor based on the Harmonic Optical Vernier Effect

Yujian LI[*]

The Hong Kong Polytechnic University, Hong Kong, China

This paper presents a novel ultra-sensitive fiber gas pressure sensor leveraging the Harmonic Optical Vernier Effect (HOVE) based on hollow core fiber and single core side hole fiber.

ACP2025-0731-149

10-LP Mode Scrambler Based on MPLC with 7 Phase Masks

liu liu, Ziling shen, Jie Zhang, He Wen[*]

Beijing University of Posts and Telecommunications, China

Scrambling modes with different propagation velocities effectively reduces the impact of differential mode group delay on mode-division multiplexing transmission. We propose a mode scrambler, which directly swaps mode pairs instead of separating, exchanging and recombining them in the conventional schemes, to facilitate scrambling with simple structure and low loss. Multi-plane light conversion (MPLC) technique is employed to construct a 10-LP mode scrambler. The experimental insertion loss, mode-dependent loss, and average mode crosstalk are −3.8-dB, −4.8-dB, and −9.5-dB, respectively. The device offers a promising solution for DMGD suppression in few-mode fiber systems.

ACP2025-0731-19

Noise Analysis and Fiber Optimizationfor Coexistent Transmission of Classical Signals and Quantum Key Distribution

Qi Zhao[1], Gang Wang[2], Li Pei[3], Tianqi Dou[1], Weiwen Kong[1], Jianjun Tang[1]

1.China Telecom Research Institute, China; 2.China Telecom, China; 3.Beijing Jiaotong University, China

This article derives the noise model of a quantum-classical coexistence system based on few-mode fibers(FMF). Furthermore, a nanopore-assisted FMF is designed to significantly enhance the transmission distance of quantum signals by over 40%.

ACP2025-0731-6

Design of Six-Mode Polarization-maintaining Photonic Lantern

Zhao Wang[1], Qijun Yan[1], Cai Xiao OuYang[2], Yan Li[1*], Jifang Qiu[1], Jian Wu[1]

1.Beijing University of Posts and Telecommunications, China; 2.Wuhan Vocational College of Software and Engineering, China

We design a six-mode polarization-maintaining photonic lantern. It exhibits a refractive index difference of more than 10^{-4} in both the x and y directions, and the crosstalk exceeds -20 dB, demonstrating good polarization- maintaining performance.

ACP2025-0801-128

Compact Environmentally-Stable Figure-9 Fiber Laser with Large Repetition Rate Tuning Ranges

Rongwei Zhu, Liang Hu[*], Ziang Qiu, Zijie Zhou, Guiling Wu, Jianping Chen

Shanghai Jiao Tong University, China

A compact "figure-9" fiber laser with stable environment is proposed, the repetition rate of the laser is 246 MHz, the direct output pulse width is 103 fs, the 3 dB spectral width is 52 nm.

ACP2025-0801-162

Design of Few-Mode Hollow-Core Anti-resonantFibers with Bridge-Linked Concentric Tube Pairs

Mengjuan Qin, Youchao Jiang*, Yafan Su, Shiying Xiao, Wenhua Ren, Guobin Ren, Fengping Yan

Beijing Jiaotong University, China

This paper proposes a novel bridge-linked dual-nested anti-resonanthollow-core fiber with low-mode transmission performance. The study investigates the influence of the proposed fiber structure parameters on the confinement losses(CL)of each mode in the core. It also provides a detailed analysis of how the effective refractive index and CL of each mode in the fiber change with wavelength under optimal structural parameters. The optimized BLN-ARF can transmit five modes (LP_{01}, LP_{11}, LP_{21}, LP_{02}, and LP_{31}) in the 1-1.6 μm wavelength range. In the 1.6-1.8 μm range, it can transmit four modes (LP_{01}, LP_{11}, LP_{21}, and LP_{31}). The effective refractive index difference Δn_{eff}between each mode is greater than 1×10^{-4}, significantly suppressing coupling between the five LP modes and preventing channel crosstalk between different modes. Furthermore, LP_{01}, LP_{11}, LP_{02}, and LP_{31}all achieve the lowest CLat 1.12 μm, which are 1.84×10^{-7} dB/m, 2×10^{-6} dB/m, 2.5×10^{-4} dB/m, and 2.86×10^{-3} dB/m, respectively.Furthermore, the bending loss and manufacturing tolerances of this BLN-ARF structure were also investigated.

ACP2025-0801-167

Mode Field Diameter with Petermann II Far-FieldDefinition Matching for Minimized Coupling Loss between AR-HCF and SMF

QinYu[1*], ZhuJie[1], WangCaoyuan[1], Hongli Wang[2], LiNuo[1], GuJu[1], XiaoWenzhe[1], Yichun Shen[2], XiaoLimin[1*]

1.College of Future Information Technology, Fudan University, China; 2.R&D Department, Zhongtian Technology Advanced Materials Co., Ltd., China

In this paper, the mode field diameters (MFDs)of the fabricated AR-HCFswere experimentallyinvestigated using near-field MFD with Gaussian approximation and far-field MFD with Petermann II definition. Our simulated and experimental resultsdemonstratethat the coupling loss was minimized when the far-field MFD with Petermann II definition of AR-HCF matchedthat of reverse-tapered SMF, which wasmeasured by a commercial fiber analysis system.

ACP2025-0801-172

A FDM system for polarimetric fiber laser sensor array based on beat frequency demodulation

Jinglin Feng, Shiying Xiao*, Ying Wang, Beilei Wu, Zixiao Wang, Youchao Jiang

Beijing Jiaotong University, China

A FDM system for polarimetric fiber laser sensor array is proposed based on beat frequency demodulation. The system array is consists of three sensors, each formed by a section of Erbium-doped fiber (Hi-Bi EDF) and a pair of wavelength matched fiber Bragg gratings (FBGs). Since the differences of cavity length, the beat frequency signal for each sensor can be detected using frequency division multiplexing (FDM) technology. This system only require a photodetector(PD) and an electrical spectrum analyzer(ESA) to simultaneously monitor all sensors, which reduces the cost of the system and demonstrated promising prospects.

ACP2025-0801-203

Dynamic Scattering Imaging in Ring Core Fiber via Enhanced Optical Neural Networks with Zernike-Vortex Modulation

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We introduce a space-Fourier domain-enhanced optical convolutional neural network (EOCNN) that enables speckle reconstruction in Ring Core fibers(RCF) platforms.The concept and implementation establish a new framework for complex photonic systems.

ACP2025-0801-32

Spectral Reconstruction of Mode-Locked Fiber Laser via Multimode Fiber

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We propose a spectral reconstruction scheme for mode-locked fiber lasers based on MMF (multimode fiber) and MCF (multicore fiber). This scheme achieves the mapping of spectral information to pulse sequences through the MMF-MCF structure.

ACP2025-0801-56

Design of ultra-low modal delay multimode fiber for200G per lane VCSEL-MMF based links

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A novel ultra-low modal delay multimode fiber (MMF) is proposed, providing theoretically higher bandwidth at 850nm compared to OM3/4 fibers while exhibiting strong coupling efficiency with commercial VCSELs.

ACP2025-0801-85

Resonant Couplings for Vortex Modes in Twisted Threefold Rotationally Symmetric Hollow-Core Fiber

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We numerically show that transmission of vortex modes can be supported in a twisted threefold rotationally symmetric hollow-core fiber. With twist rate increasing, the vortex modes can resonantly couple to the capillary modes at certain twist rates, causing a series of resonant peaks in the loss spectrum. The obtained results suggest that the fiber has potential applications in filtering and conversion of optical vortex.

ACP2025-0801-99

Efficient Task-Adaptive Compression for Distributed Vibration Sensing with Learnable Lightweight Convolutional Operators

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This paper presents a lightweight, learnable convolutional sensing operator for distributed vibration sensing, achieving 97% event recognition accuracy using only 4% of raw data, significantly reducing computation and outperforming compressed-sensing-based methods.

ACP2025-0806-4

A Low-Loss Fan-In/Fan-Out Device Based on Mode Field Robustness

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Fan-in/Fan-out (FI/FO) devices are crucial components for achieving low-loss connections between multi-core fibers (MCFs) and single-mode fiber (SMF) arrays. During the fabrication of FI/FO devices using the fused taper method, the mode field diameter (MFD) of conventional bridge fibers undergoes significant changes in the tapering process. This paper design a mode-field-robust bridge fiber (MFF-BF) featuring a two-step step-index waveguide structure, which effectively addresses the issue of drastic mode field variations during the tapering process. During the simulation process of reducing the cladding diameter from 125 μm to 38.5 μm, MFD showed a smooth change On the other hand， by introducing a low-refractive-index trench structure in the cladding, the fiber enhances the confinement capability of electromagnetic fields in optical waves, thereby reducing inter-core coupling crosstalk (XT). Based on this design, the bridge fiber was fabricated using modified chemical vapor deposition (MCVD) and drawn. And a seven-core FI/FO device fabricated through the fused taper method. Ultimately, the average insertion loss (IL) of the prepared device was below 0.5 dB, and the average XT was below -50 dB. The proposed robust bridge fiber addresses the complexity issues of traditional vanish-core fibers in FI/FO device fabrication, effectively reducing IL and XT while enhancing the applicability of FI/FO devices in communication systems.

ACP2025-0811-9

Pump Feedback Polarization Control for RIN Reduction inan NPR-based Stretched Pulse Fiber Laser

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We report an experimental demonstration that suitable polarization control of the pump feedback light provided by the FBG reduces the RIN of the pump laser, thus improving the noise performance of the stretched-pulse fiber laser.

ACP2025-0814-32

Design of a pump coupling mode multiplexer based on multi-plane light conversion

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Multi-plane light conversion (MPLC) combines free-space propagation with spatial phase modulation to enable efficient and complex spatial light transformation. Addressing the challenge of precise multi-wavelength, multi-mode field generation and coupling in specialty fibers, this paper presents an end-to-end design and optimization of an MPLC system using a wavefront matching algorithm. The system converts an input array—one 980 nm pump beam and three 1550 nm signal beams—into the LP_{01}, LP_{11a}, LP_{11b} ,and LP_{21} modes supported by a ring-core fiber (RCF). By inversely designing a series of phase plates, a compact device integrating pump coupling and mode multiplexing is realized. Systematic analysis of phase plate number and spacing reveals an optimal setup of four plates spaced 20 mm apart, yielding insertion loss (IL) below 0.5 dB, mode-dependent loss (MDL) of 0.8 dB, and average mode purity (MP) above 94%. These results validate the MPLC device as an efficient, high-fidelity solution for generating structured composite fields in advanced mode-division multiplexing fiber systems, such as ring-core fiber amplifiers

ACP2025-0814-39

Experimental Demonstration of Bend-Resilient Imaging Using a Multimode Multi-Core Fiber

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We experimentally demonstrate bend-resilient imaging using a multimode multi-core fiber (MM-MCF). Sub-images acquired from different positions are stitched to reconstruct the full field of view under various bending conditions, demonstrating high resilience to bending.

ACP2025-0815-132

A Hybrid Spectral–Phase Fusion Algorithm for Blind–Zone Elimination in OFDR Shape Sensing with UWFBG Arrays

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A novel hybrid spectral-phase fusion algorithm has presented to simultaneously utilize both spectral and phase information from the grating, enabling strain detection in the traditionally inaccessible inter-grating regions and effectively doubling the spatial sampling rate.

ACP2025-0815-61

A high-resolution interleaved dual-comb spectroscopy system based on dual recirculating frequency-shifting loops

Yihan Wang, Yin Xu, Hualong Bao*
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We demonstrate interleaved dual-comb spectroscopy using dual recirculating frequency-shifting loops. It measures $H^{13}C^{14}N$ gas absorption over 240 GHz bandwidth with 100 MHz resolution and a maximum measurement deviation below 3% compared to the reference spectrum.

ACP2025-0815-65

A Flat, Low-Noise, Multi-Wavelength Laser Source Based on a Brillouin Cavity

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A flat, low-noise, multi-wavelength laser source is achieved via FSOIL by injecting external light into the Brillouin cavity. It features 0.08 Hz^2/Hz white noise and 1 dB spectral flatness with high coherence.

ACP2025-0819-3

Variable frequency and pulse width 1560 nm pulsed incoherent source for core pumping of Gain-Switched Thulium-doped fiber laser

kevin Lui*, Ray Man, KS Tsang, Dicky Chung*, Victor Ho, Sonia Wong
Amonics Limited, China

A 1560 nm nanosecond incoherent pulsed ASE source for core pumping gain-switched Thulium-doped fiber lasers. The pulse energy exceeded 80 μJ, with a peak power greater than 1300 W and pulse width of 60 ns.

ACP2025-0820-10

Simultaneous sensing of Transverse Load and temperature based on forward Brillouin Scattering using thin-diameter optical fiber

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We propose and experimentally demonstrate, for the first time, a simultaneous temperature (T) and transverse load (L) sensing technique based on forward Brillouin scattering in a thin-diameter optical fiber. The experiment reveals that the minimum theoretical measurement errors for T and L are 0.09 °C and 0.67 g, respectively.

ACP2025-0820-12

Optical Fiber Shape Reconstruction Based on Optimized Space Curve Helical Extension Method

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We propose a novel 3D shape reconstruction method for multi-core optical fibers using a space curve helical extension approach. Compared with the traditional Frenet-Serret reconstruction method, this approach regards the arc-length element of the space curve as a helical segment for simultaneous bending and torsion measurement. The method performs non-uniform interpolation optimization algorithm with high curvature variation rates and abrupt curvature direction changes. Experimental results demonstrate that this approach enhances the reconstruction accuracy of 3D space curves, showing significant potential for advanced fiber optic shape sensing applications.

ACP2025-0820-15

Multicore fiber-tip polymer Mach-Zehnder interferometer for breath monitoring

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We propose and demonstrate a multicore fiber-tip polymer Mach-Zehnder interferometer manufactured by two-photon polymerization for breath monitoring.The multicore fiber-tip sensor has the characteristics of ultracompactness, fast, and flexibility, and it is promising to be a useful tool for non-contractbreath monitoring.

ACP2025-0820-3

Measurement of Brillouin Scattering in High-PressureCO_2-Filled Hollow-Core Fibers with Low Coupling Loss

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We present a high-efficiency Brillouin scattering measurementin a 25-meter hollow-core fiber (HCF) filled with carbon dioxide (CO_2) at gas pressures ranging from 5to 35bar. By optimizing the fiber coupling structure, we achieve a low couplingloss of 0.8dBeven in high-pressure conditions,which would facilitate all-fibergas-phase Brillouin sensing.

ACP2025-0820-5

Gas Absorption in Low-Loss Anti-resonant Hollow-Core Fibers

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We fabricated a 4.2 km low-loss hollow-core anti-resonant fiber with the transmission loss of 0.3 dB/km at 1550 nm. We reported carbon dioxide absorption in HCF with splicing ends in detail. The temperature-dependent variation of carbon dioxide absorption was observed from 20℃ to 60℃ .

ACP2025-0820-6

Quasi-distributed and Simultaneous Sensing of Temperature and Acoustic Impedance Based on frequency-division Multiplexed Depolarized GAWBS

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We propose and experimentally demonstrate a quasi-distributed sensing scheme for the simultaneous measurement of temperature and acoustic impedance, based on frequency-division multiplexed depolarized GAWBS using cascaded optical fibers with diameters of 80 μm and 125 μm.

ACP2025-0820-7

3D printed multicore fiber-tip whispering-gallery- mode resonator

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A multicore fiber-tip whispering-gallery-mode resonator was proposed and demonstrated. The resonator was manufactured by two-photon polymerization, and was used to detect the concentration of volatile organic compounds. The ultracompact probe sensor is expected to be applied in some biochemical scenarios.

ACP2025-0820-9

3D printed multicore fiber-tip Mach-Zehnder interferometer

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We propose and demonstrate a multi-core fiber-tip polymer Mach-Zehnder interferometer manufactured by two-photon polymerization for Volatile Organic Compound Concentration Sensing. As MCF have characteristics of high integration and small size, high-sensitivity gas concentration measurement can be achieved on a micro-nano scale platform.

ACP2025-0830-1

Exploration of specific applications of fiber sensors in the Internet of Things

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A Fiber sensor refers to a devicethat converts the state of the object being measured into measurable optical signals. In fiber sensors, the main function of fibers is to transmit light beams and act as optical modulators. Fiber sensors simplify installation by eliminatingthe need for complex circuit connections. With the continuous development of sensors towards increased sensitivity, precision, adaptability, compactness, and intelligence, fiber sensorsare widely used in various industries, including the industrial Internet of Things, smart cities, environmental monitoring, medical health, national defense, and safety. From the perspective of the Internet of Things industry, fiber sensors offer numerous advantages and characteristics that can meet the construction and operationalneeds of the Internet of Things. Therefore, based on an overview of the application characteristics and advantages of fiber sensorsin the Internet of Things, this paperproposes specific applications of fiber sensorsin the Internet of Things, aiming to leverage the role of fiber sensorsand promote high-quality development of the Internet of Things industry.

Track 2: Optical Transmission Systems, Subsystems and Technologies

ACP2025-0603-1

Vibration Localization under Unidirectional Single-Channel Transmission Conditions in the DSCM Systems Based on Non-Reciprocity

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We propose a vibration localization method with frequency-domain pilot tones for vibration-induced phase extraction and achieving vibration localization based on non-reciprocity of vibration-induced phase and link dispersion under single-channel unidirectional transmission.

ACP2025-0714-8

Integrated Computation and Communication with Fiber-optic Transmissions

Jiahao Zhang[1,2], Lu Zhang[1,2*], Xiaodan Pang[1,3,4], Oskars Ozolins[3,4], Qun Zhang[2], Xianbin Yu[1*]

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Fiber-optic transmission systems are leveraged not only as high-speed communication channels but also as nonlinear kernel functions for machine learning computations, enabling the seamless integration of computational intelligence and communication

ACP2025-0714-9

Deep Photonic Reservoir Computing for Long-haul Fiber Transmission Systems Nonlinearity Compensation

Jiahao Zhang[1,2], Lu Zhang[1,2*], Xiaodan Pang[1,3,4], Oskars Ozolins[3,4], Qun Zhang[2], Xianbin Yu[1*]

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We propose deep photonic reservoir computing combined with advanced readout scheme to compensate fiber nonlinearity, achieving comparable performance to digital backpropagation method in long-haul fiber link with reduced complexity and unknown fiber parameters.

ACP2025-0722-6

Phase Modulation-based Fiber-Optic Radio Frequency Transfer Using Dispersion Shifting

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We propose and demonstrate a phase modulation-based fiber-optic radio frequency transfer using dispersion shifting. The measured frequency stabilities reach 4.8×10^{-14} at 1 s and 7.7×10^{-17} at 10,000 s, respectively.

ACP2025-0724-10

Fast and Accurate Optical Fiber Channel Modeling Based on Factorized Fourier Neural Operator for PDM Signal Transmission

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Optical fiber channel modeling plays an essential role in simulation, design, performance evaluation and optimization for optical communication system. In this paper, a fast and accurate fiber channel modeling method based Factorized Fourier Neural Operator (F-FNO) is investigated, which achieves computational efficiency and accuracy improvement through the strategy of combining separable spectral layers and improved residual structures. The simulation results show the normalized mean square error (MSE) between the F-FNO method and split-step Fourier method (SSFM) with step size of 0.1km is less than 0.006 in 1600 km 28GBaud 16QAM polarization multiplexing (PDM) optical coherent communication system within the whole launch power ranging from -3dBm to 6dBm. The time consumption is reduced from 137.39s to 1.24s utilizing a central processing unit (CPU), and form 9.27s to only 0.005s using a graphic processing unit (GPU), respectively.

ACP2025-0724-3

Hybrid Check Generalized LDPC Convolutional Codesfor Optical Fiber Communications

Yinlong Shi[1*], Tao Kai[1], Zitao Wei[1], Jian Wang[1], Yongben Wang[1], Xiang Li[2], Yong Chen[2], Xiangjun Lu[3]

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We construct a class of 28%-overhead HC-GLDPC-CCs with the BCH codes as component code, andinvestigate the effects of code length, the number of iterations, and the proportion of GC nodeson GLDPC codes. The error floor with 24 iterations is below 10^{-15} for an input BER of 4.51e-2.

ACP2025-0724-5

Multiplexed Bessel-Gaussian Vortex Beam Chaotic Communication in Obstructed Turbulent Links

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A free-space optical (FSO) communication system based on chaotic encryption and multiplexed Bessel-Gaussian vortex beams (BGVB) is proposed. This enables high-fidelity transmission at 16 Gbit/s aggregate capacity with enhanced security and robustness.

ACP2025-0725-3

Slot-Oriented Deterministic Allocation for Latency and Jitter Minimization in Industrial PON

Kyeong Hwan Doo[*], Kwang Ok Kim, Hwan Seok Chung

ETRI, Korea

We demonstrate a slot-oriented deterministic allocation (SLODA) scheme to minimize latency and jitter in passive optical network (PON) for industrial applications.

ACP2025-0726-12

A multi-core optical transmission system based on four-dimensional probabilistic shaping 1024QAM

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An experimental multi-core optical transmission system based on four-dimensional probabilistically shaped (PS) 1024-ary quadrature amplitude modulation (QAM) is proposed. Experimental results of the seven-core system demonstrate that a higher probability distribution parameter in 1024QAM leads to a lower BER.

ACP2025-0726-2

Demonstration of Integrated Chaos Communication and Fiber Optic Vibration Sensing In Optical Fibers

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We propose a novel chaotic communication and sensing detection scheme based on random envelope linear frequency modulation (RE-LFM) signals. Integrating sensing technology into secure optical transmission systems can provide early warning of security threats and anomaly detection capabilities for confidential communication systems.

ACP2025-0726-9

Self-Homodyne Alamouti Receiver based on Lightweight Neural Network for Low-ComplexityCoherent PONs

Lu Zhang, Hui Yang[*], Xihua Zou, Lianshan Yan, Wei Pan

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A neural network-based self-homodyne Alamouti receiver is proposed for coherent PONs. This hardware-level impairment-suppressing architecture eliminates complex MIMO equalization, reducing DSP complexity by 77.8% and improving sensitivity by 1.5 dB with MHz-class lasers.

ACP2025-0728-2

POF-Based CDMA-VLC System Employing Modified Gold Code with Nonlinear Permutation Function

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We propose a novel CDMA-VLC system with POF using modified Gold code. It achieves the system capacity of 5.85 Gbps, with 1.5 Gbps increase over traditional Gold code, corresponding to 34.5% enhancement.

ACP2025-0728-4

Triple-Band WDM Transmission for DCI over 160km with 800 Gb/s per Channel

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To meet high-capacity DCI demand, we explore ultra-wideband transmission over 160 km. We used an L-band segmented power optimization method that fits multiple linear regions independently. Simulation results show this approach effectively improves GSNR flatness.

ACP2025-0729-10

Accurate Low-complexity Modified EGN Model Based on Quasi-Monte Carlo Integration Method in Short-reach O-band Coherent-lite WDM Systems

Qiao Yaojun[1*], Xie Fei[1], Zhou Yutao[1], Zhou Hao[1], Quan Baoxuan[1], Jiang Yingjie[1], Du Tang[1], Chen Yu[2], Luo Ji[2], Zheng Bofang[2], Yang Aiying[3]

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We propose a modified EGN model based on the quasi Monte Carlo method (QMC-MEGN), to reduce both the fiber nonlinear noise estimation error and complexity up to 85% and 97.4% near zero-dispersion frequency, respectively.

ACP2025-0729-18

Iterative Demodulation and Decoding of Combined Trellis-Coded Modulation and LDPC Coding for Optical Fiber Communications

Tiancheng Sun, Yi Cai*, Zhongxing Tian, Qing Wang, Huan Huang, Dongdong Zou
Soochow University, China

We propose an iterative demodulation and decoding scheme that integrates trellis-coded modulation with low-density parity-check coding through a unified iterative receiver architecture, The proposed scheme offers a 0.8 dB gain over its counterparts with the same spectral efficiency.

ACP2025-0729-20

Online-Trained Adaptive PowerEqualization in C+L-BandOptical Networks

Yaoyang Zhang, Yiwen Yang, Zhaojun Xu, Yan Zuo, Wu Liu*, Ming Luo
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We demonstrate an adaptive power equalization scheme using online-trained neural networks for 104 C+L-band channels, which achieves target-specific power profiles within 18 training iterations, while maintaining effectiveness under target alterations and monitored channel reductions.

ACP2025-0729-21

Demonstrationof Microwave Photonic StealthIntegrated Sensingand Communication System

Feng Jiang, Huatao Zhu, Xin Zhang, Xiangming Xu, Shuwen Chen*, Feiyu Li, Yibo Liu, Yongliang Yin
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This paper proposes a microwave photonic stealth integrated sensingand communication system based on an amplified spontaneous emission (ASE) light source. Utilizingthe broad-spectrum characteristicsand low coherence of the ASE light source, the modulated signal achieves concealment performancein the optical domain. The feasibility of the proposed method is verified by a proof-of-concept experiment. Linear frequencysignals with a frequency range from 2 to 3 GHz are used as electrical carrier and integrated sensing and communicationsignals are generated by using ASK and BPSK modulation formats. The experimental results showthat the signals can be hidden in optical domain while ensuring the communication and sensing performance.

ACP2025-0729-27

Optical STAR-RIS Enhanced Visible Light Positioning with Full Blockage

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We propose an OSTAR-RIS-enhanced two-room VLP system using adjacent-room LEDs to overcome full blockage, derive an ML estimator and CRLB, and show via simulations that increasing elements reduces RMSE by 36% and triples coverage.

ACP2025-0729-3

FPGA-based Implementation of Low-Complexity QC-LDPC for Real-Time 50G-PON Systems

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A low-complexity QC-LDPC codefor high-speed 50G-PON is implemented on FPGA-based OLT and ONU prototypes. The proposed QC-LDPC achieves 50 Gbps performance with reduced hardware resource utilization. An optical gain of about 8.7 dB and error-free 40 Gbps transmission are demonstrate through real-time testing.

ACP2025-0729-41

Performance of Single-Photon, Multiple-Photon, and Analog Detection Modes of SiPM in Underwater Wireless Optical Communication

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In this paper, ultralow photon flux links using a silicon photomultiplier (SiPM) with single-photon, multiple-photon, and analog detection modes for underwater wireless optical communications (UWOC) are reported. Different optical link distances may be suitable for three different detection modes of SiPM. Furthermore, the transmitter employs a blue nixie tube array with adjustable light intensity as the light source, which demonstrates the SiPM device's sensitivity.

ACP2025-0730-14

Dynamic congestion-temperature collaborative optimization algorithm inOptical Network-on-Chip

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This paper proposes the DCTO algorithm for ONoC to solve performance bottlenecks from congestion-temperature interaction, outperforming XY, only-T and only-C in three scenarios and boosting transmission performance and thermal reliability.

ACP2025-0730-19

Detection and Recognition of Multi-Modulation-Format Signals in Optical Camera Communications

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We propose a signal detection and modulation recognition scheme for optical camera communications, supporting multiple formats and achieving a joint detection and recognition error probability below 0.01% when the bit error rate is around 10^{-2}.

ACP2025-0730-27

PIMA: Pretrained-Initialized Meta-Adaptation for Power Spectrum Prediction in Multi-Span Optical Multiplex Segments with Few Samples

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We propose a pretrained-initialized meta-adaptation based hybrid network for accurate power prediction with few samples. On an experimental six-span OMS, the proposed method achieves 0.165 dB MAE using only 25 training samples.

ACP2025-0730-44

A Mamba-Based Model Using Serialized Data Structure for Fast Quality of Transmission Estimation in Optical Networks

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We propose a serialized data structure enabling the Mamba model to learn device impact on signals for QoT estimation in C+ band WDM systems, achieving 0.1 MAE and 3% Transformer FLOPs.

ACP2025-0730-49

Efficient Compensaiton of Intra and Inter-channel Nonlinearity via Fourier Neural Operator for WDM Optical Transmission System

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In this paper, a joint intra and inter-channel nonlinearity compensation method is proposed, which is based on Fourier neural operator (FNO). The effectiveness of this scheme is verified by extensive simulations of 5-channel 28GBaud polarization division multiplexing (PDM) 16QAM signal 1200km coherent optical transmission.The results show that the FNO-based scheme achieves 2.78dB, 1.13dB and 0.45dB Q-factor improvement at the launch power of 5dBm/channel compared with only chromatic dispersion compensation (CDC), CDC and self-phase modulation (SPM) compensation with 16StPS-DBP, and multi-channel 5StPS-DBP, respectively. Compared with multi-channel 16StPS-DBP, the Q-factor gap is only 0.3dB at the optimal launch power, while the computation complexity is reduced to only 14.5% in terms of real multiplications (RMs) per symbol per polarization.

ACP2025-0730-54

An Extended EGN Model with Span-Specific Corrections for Hybrid G.653/G.655 Fiber Links

Yutao Zhou[1], Fei Xie[1], Du Tang[1], Baoxuan Quan[1], Hao Zhou[1], Yingjie Jiang[1], Aiying Yang[2], Yaojun Qiao[1*]

1.Beijing University of Posts and Telecommunications, China; 2.Beijing Institute of Technology, China

We propose an extended enhanced Gaussian noise (EGN) model with span-specific corrections for hybrid G.653/G.655 systems, accounting for dispersion slope and multi-channel interference (MCI). The model achieves less than 0.4 dB error in normalized non-linear interference (NLI) power versus split-step Fourier method (SSFM) in hybrid fiber transmission.

ACP2025-0731-12

Demonstration of Low-Cost High-Capacity Optical Interconnects at C Band Enabled by Optical Frequency Combs with Hollow-Core Fibers

Yuhan Gong[1], Jin Tao[1], Ming Luo[1], Lin Wu[1], Mian Wu[1], Ziang Xiao[2], Gang Xu[2], Ying Zhu[3], Chao Yang[1*]

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This paper presents a high-performance short-distance optical interconnect solution based on the combination of OFC and HCF. Experimental results validate 320 Gb/s ((40 Gb/s × 8)) optical interconnect over 10 km HCF.

ACP2025-0731-122

Rapid-Tuning ECL Wavelength Control System for LEO-Ground Coherent Optical Communication

Xu Yang, Zongbi Yu, Yuanzhe Qu, Weiwei Mo, Hao Li, Yingxiong Song*

Shanghai University, China

We propose a rapid-tuning ECL wavelength control system for LEO-ground coherent optical communication. Experimental results demonstrate that the ECL achieves a Doppler frequency shift range of [-9.68, 12.40] GHz and a maximum sweep rate of 1.32 GHz/s.

ACP2025-0731-124

Transformer-based Multimodal Semantic Communication System for Optical Interconnect in Data Centers

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A Transformer-based unified semantic communication system is proposed for multimodal data transmission in DCI systems. Compared with the conventional paradigm, the proposed method not only achieves superior performance but also reduces bandwidth by at least 30%, which enhances DCI’s robustness and efficiency.

ACP2025-0731-136

12-Gbps/15-m Real-Time White Visible Light Communication Enabled by Tricolor R/G/B Laser Diodes and 16QAM-OFDM

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We experimentally demonstrated a 12-Gbps/15-m real-time tricolor red/green/blue (R/G/B) laser diodes based white visible light communication (VLC) system based on 16 quadrature amplitude modulation orthogonal frequency division multiplexing (16QAM-OFDM) using the field programmable gate array (FPGA). To the best of our knowledge, this is the highest data rate in real-time white VLC systems that has ever been reported.

ACP2025-0731-139

FEC-assisted Soft Radius Directed Equalization in Coherent Optical Interconnection

Junyuan Song, Ze Dong, Xiangjun Xin, Rui Wang, Jun Ming, Yujia Mu

Beijing Institute of Technology, China

This paper proposes an FEC-assisted soft radius directed equalization with recursive least squares algorithm (FEC-assisted RLS-SoftRDE) algorithm for robust polarization demultiplexing in bandwidth-limited coherent systems. Using soft information from FEC-decoder to generate probabilistic /soft ring/ symbol radius estimates, our created a more reliable error reference than hard decisions. Demonstrated in a challenging 60 GBaud DP-64QAM system, the algorithm overcomes bandwidth-induced ISI limitations and mitigates rapid polarization rotation (RSOP). Results show significant gains: 3 dB lower EVM (~-18 dB), LDPC decoding to 1e-5 BER in 3-5 iterations, and 4.5 MHz RSOP tracking capability.

ACP2025-0731-141

Multi-Bit Flipping Polar Decoder Based on End-to-End Reinforcement Learning in IM/DD Optical Interconnection

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Beijing Institute of Technology, China

A reinforcement learning-aided bit-flip decision algorithm is proposed for high-speed optical interconnection systems. The CRC syndrome serves as the decoding state to guide a bit-flip agent in optimizing flip actions through iterative environment interactions. Experimental results show that the algorithm improves receiver sensitivity by 0.8-dB compared to traditional SCF decoders while reducing decoding complexity by 84%.

ACP2025-0731-37

Experimental demonstration of co-transmission of high-power energy light and bidirectional high-speed data signals over standard single-mode fiber

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In this work, we experimentally demonstrate the first power-over-fiber (PoF) system with 1064 nm based 10-W optical power and O-band commercial 4×25 Gbit/s Gbit/s bidirectional data signals transmitted simultaneously over 1 km standard single-mode fiber (SSMF). The optical power transmission efficiency (OPTE) reaches up to 58.5%, and the converted electrical power is ~600 mW after optimizing the fiber fusion splicing. Meanwhile, the bit error rates (BERs) of four-channel data signals are all lower than the hard forward error correction (HD-FEC) threshold of 3.8E-3.

ACP2025-0731-46

Experimental Verification of Potential and Feasible VHSP Simplified Coherent Architectures

Xiatao Huang*, Guoqiang Li*, Zhongyi Wang, Wenhua Zhu, Xingang Huang, Bo Liu

ZTE Corporation, China

We introduce the VSHP coherent PON process in standardization, and implement three experimental systemsby onepair of coherent transceivers to compare the coherent and simplified coherent PON performances.

ACP2025-0731-47

Design of a Low-Power ConsumptionOWC System Supporting Transmission over 330m

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A low-power optical wireless communication (OWC) system is proposed based on the 16-ary pulse position modulation(16-PPM). The system supports 330 m communication at 12.5Mbps, with 18° (transmitter) and 10° (receiver) angular tolerance at 140 m, and maintains low optical power consumptionof 5.875×10^{-7} J/bit.

ACP2025-0731-54

CNN-Transformer Hybrid Architecture for Accurate Power Spectrum Prediction in Multi-Span OMS

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1.Beijing University of Posts and Telecommunications, China; 2.Huawei Technologies Co., Ltd.., China

We implement a CNN-Transformer hybrid network for power prediction under diversified channel-loading configurations. Leveraging transfer learning with only 135 real-world samples, MAE below 0.10 dB is achieved in an experimental C120 6-span OMS.

ACP2025-0731-65

Mode-division multiplexing with elliptical vortices

Zhenyu Wan, Min Yang, Bing Han, Guofeng Yan, Jian Wang*
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We propose a novel mode-division multiplexing scheme that leverages the topological charge, ellipticity, and orientation angle of elliptical Laguerre-Gaussian (ELG) beams to construct a set of multi-dimensional orthogonal channels. Exploiting the singularity-preserving property of ELG modes in the far field, we successfully demultiplex the transmitted ELG modes after free-space propagation and realize a 120 Gbaud 16QAM single-carrier signal transmission.

ACP2025-0731-7

First Experimental Demonstration of Deep Learning-Enabled OAM-DM Optical Communication

Yu Xiao, Dongmei Deng*
South China Normal University, China

We first experimentally demonstrate deep learning directly recognizing amplitude-modulated OAM-DM signals, achieving 100% accuracy even under strong underwater turbulence.

ACP2025-0731-71

High-speed Photonic Reservoir Computing Based on Microring Resonators

Suhua Wang[1], Yujia Yin[1], Shuai Wan[2], Hongliang Ren[3], Chunhua Dong[2], Mingyi Gao[1*]
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In this work, we proposed and experimentally demonstrated a high-speed photonic reservoir computing system based on micro-ring resonator. Excellent NMSE performance has been achieved, 0.150 for the NARMA10 task, 0.014 for the Mackey-Glass prediction, and 0.083 for the Santa Fe time series forecasting, with signal processing rate of 25 Gb/s.

ACP2025-0731-74

Turbulence phase reconstruction by OAM-based modal decomposition for ultra-low crosstalk free-space vortex beam multiplexing

Yaoyao Liu, Gengliang Zhao, Lang Zhou, Xiaohang Jia, Andong Wang, Long Zhu*
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We propose a turbulence compensation scheme for free-space vortex beam multiplexing communications by orbital angular momentum (OAM)-based turbulence phase reconstruction (OAM-TPR). A convolutional neural network (CNN) is employed to establish the relationship between distorted beam distributions and turbulent OAM coefficients. After compensation, the received power of the target mode (l=3) is enhanced 1, 3 and 5 dB under weak to strong turbulence (D/r_0=2, 4 and 6), respectively. Furthermore, significant crosstalk suppression is observed, with over 18 dB reduction for the adjacent mode (Δl=1) and over 13 dB suppression for the lager mode spacing (Δl=2) averagely. The OAM-TPR compensation method offers a novel solution for mitigating mode crosstalk in atmospheric OAM multiplexing communications.

ACP2025-0731-78

Experimental demonstration of turbulence and obstruction resistant free-space optical communication with Bottle vortex beams

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To improve the transmission performance of free-space optical (FSO) communication systems under turbulence conditions and multi-sized obstructions, we experimentally demonstrate a 72 Gbit/s FSO communication link and investigate the transmission characteristics of Bottle vortex beams (BVBs) for the first time. The obtained experimental results show that, compared to Bessel beams and OAM beams, BVBs exhibit superior resistance to turbulence， with reduced received power fluctuation and lower average bit-error rate (BER) under moderate turbulence conditions and obstacle conditions. Specifically, at 4 mm obstacle size, the average received optical power of BVBs is increased by 3 dBm and 11 dBm, respectively. In addition, under an obstacle size of 3 mm, the required transmitter power at BER of 3.8×10^{-3} is relaxed by 10 dB comparing with the conventional OAM beam under atmospheric turbulence D/r_0= 2.

ACP2025-0731-82

Transition-constrained Enumeration Sphere Shaping for Probabilistic Shaping Optical Transmission System

Honglei Yang[1], Lishan Yang[1*], Chenglin Bai[1*], Hengying Xu[1], Yuanhao Cui[1], Xuezhen Wang[2], Guizhen Wang[1], Yaozheng Yue[1], Chunyi Su[1]

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To address energy fluctuations in probabilistic shaping for optical transmission systems, this work proposes transition-constrained enumerative sphere shapingby introducing cumulative energy transition constraints into the ESS framework to stabilize amplitude variations.

ACP2025-0731-90

Sequence-Optimized Sphere Shaping with Short Blocklength for Optical Transmission System

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This paper proposes a Sequence-Optimized Sphere Shaping (SO-SS) scheme for probabilistic shaping (PS) transmission system. The scheme employs a two-stage algorithm to optimize amplitude sequences while ensuring energy efficiency.

ACP2025-0731-93

Transformer-Based High-Performance Modeling for OFDM-MMW-RoF Link

Qiyue Hu[*], Jia Ye[*], Wei Pan, Lianshan Yan, Xihua Zou

Southwest Jiaotong University, China

In this paper, a Transformer-based modeling for orthogonal frequency division multiplexing-millimeter wave-radio over fiber (OFDM-MMW-RoF) links is developed and experimentally validated, where Transformer is a type of deep learning network.

ACP2025-0731-95

Statistical Characterization of Multi-path Interference in Short-reach O-band Coherent-lite Optical Systems

Baoxuan Quan[1], Fei Xie[1], Hao Zhou[1], Yutao Zhou[1], Yingjie Jiang[1], Yaojun Qiao[1*], Yu Chen[2], Bofang Zheng[2], Du Tang[3], Aiying Yang[4]

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We investigate the impact of chromatic dispersion and the number of reflection paths on MPI-induced degradation in short-reach O-band coherent-lite optical systems, showing that the closer the MPI resembles a Gaussian distribution, the more severe the system performance degradation becomes.

ACP2025-0801-104

Design and Implementation of FPGA-Based Real Time BER Measurement System for NLOS Ultraviolet Communication

Dong Zhu, Yong Zuo[*], Tian Luo, Hongzhen Zhang, Xiaobin Hong, Jian Wu

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This paper designs and implements a real-time bit error rate measurement system for ultraviolet communication. Experimental results demonstrate that the system possesses reliable measurement capability and accurately evaluates communication performance under different scenarios.

ACP2025-0801-108

Impact of DC Drift on Pairwise Maximum Likelihood Receiver with Single-FFT in Layered Asymmetrically Clipped Optical OFDM Systems

Yamin Huang, Wenhui Ma, Xuezhi Hong[*]

South China Normal University, China

The impact of DC drift on the pairwise maximum likelihood receiver with single-FFT in layered asymmetrically clipped optical orthogonal frequency division multiplexing systems is analyzed. Mitigation methods are proposed and verified both numerically and experimentally.

ACP2025-0801-11

Multi-mode Multiplexing Few-mode Fiber OTDR for Fast Fading Noise Reduction

Zicheng Huang, Jianlong Mao, Qiong Wang, Feng Liu[*]

Wenzhou University, China

This work optimizes FMF-OTDR performance via high-order spatial mode diversity merging. By expanding detection dimensions and measuring unexcited modes' backscattering, it inherently reduces noise, achieving superior dynamic range and faster detection speed

ACP2025-0801-113

A Novel Multi-Scale Analysis Framework for channel modeling in optical Fiber Communication Systems

Haifeng Yang, Yongjun Wang*, Chao Li, Shuaihang Wang, Xin Zhang, Qi Zhang
Beijing University of Posts and Telecommunications, China

This paper proposes a multi-scale neural network modeling method-multi-scale Fourier Neural Operator (MFNO). By constructing multi-scale features of optical signals, MFNO employs multiple parallel branches that simultaneously operate on spatial variations and the input field of the network. Compared to a single time domain feature input, this approach significantly improves the accuracy of fiber modeling.

ACP2025-0801-141

Optical Omnidirectional Transmitter for Underwater Wireless Optical Communication

Jiaming Lin, Lu Wang, Tongzheng Sun, Shuanghe Liu, Jian Song, Yuhan Dong*
Shenzhen International Graduate School, Tsinghua University, China

An LED-based omnidirectional UWOC transmitter achieves alignment-free, mobile operation, delivering 151 Mbps at 5 m and 50 Mbps at 10 m with stable performance across yaw angles, enabling high-speed dynamic underwater communication.

ACP2025-0801-142

Adaptive FD-DPD and FD-MRC for Underwater Wireless Optical Communication System

Lu Wang, Jiaming Lin, Tongzheng Sun, Shuanghe Liu, Jian Song, Yuhan Dong*
Shenzhen International Graduate School, Tsinghua University, China

To improve the data rate of LED-based UWOC, we propose an adaptive frequency domain digital predistortion and a frequency domain maximum ratio combining algorithms. In a standard pool, the UWOC system achieves 5m-159.9Mbps and 20m-50.8Mbps.

ACP2025-0801-149

Mitigation of Four-Wave Mixing-Induced Signal Quality Degradation Using All-Optical Wavelength Conversion

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Network Service Systems Labs., NTT, Inc., Japan

We evaluate the wavelength dependence of mitigating four-wave mixing (FWM)-induced signal degradation using all-optical wavelength conversion (AO-WC). Our results show AO-WC enables long-haul 16-QAM transmission across all channels, even with noise from AO-WC and FWM.

ACP2025-0801-153

Energy-Efficient Multi-UAV Path Planning for VLC Networks via Multi-Agent Reinforcement Learning

Yibin Wang, Wentao Ye, Kai Zhang, Yuhan Dong*
Shenzhen International Graduate School, Tsinghua University, China

We propose EEMAPP, a MARL-based framework for energy-efficient UAV-VLC deployment. Using centralized training and structured rewards, EEMAPP achieves superior path coordination, faster convergence, and 42% higher energy efficiency than baseline methods.

ACP2025-0801-180

Performance Enhanced Φ-OTDR Enabled by Frequency-Multiplexed Barker Pulse Coding

Wanxin Li, Dongdong Zou, Zheyuan Lin, Zhentao Zhang, Huan Huang, Yi Cai*
Soochow University(suzhou), China

A novel frequency-multiplexed Barker-coded Φ OTDR is proposed. This system achieves a fourfold increase in interrogation repetition rate and nearly 5 dB SNR gain over the Golay-coded case, while significantly reducing hardware complexity.

ACP2025-0801-185

Coarse frequency offset estimation using an improved spectrum sliding window for DSCM systems

Xiaozheng Li[1], Jingshuai Qiao[1], Yayun Xu[1], Hengying Xu[1,2*], Hong Liu[1], Xusheng Li[1], Chenglin Bai[1,2*], Xinkuo Yu[1,2], Tongxin Yang[1,2]
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We proposes a frequency offset estimation scheme for digital subcarriers. This scheme is still applicable under the conditions of small roll-off factor and large frequency offset,the estimation accuracy can reach within 30MHz.

ACP2025-0801-19

Demonstration of 200-Gbps/λ IMDD PON Through 20km Hollow-core Fiber

Luyao Huang*
China Telecom Research Institute State Key Laboratory of Optical Fiber and Cable Manufacture Technology, China

We demonstrate a single-carrier 200G IMDD PON in C-band. The power budget of 30.2 dB is achieved through low-loss, low-dispersion, and low-nonlinearity 20-km hollow-core fiber. Our results provide a potential IMDD path for Very high-speed PON (VHSP).

ACP2025-0801-195

Residual Multi-Task Neural Network Equalization for Performance-Complexity Co-Design in 800 Gb/s 960 km Coherent Optical Links

Tonghui Ji[1], Zhaopeng Xu[1*], Qi Wu[2], Honglin Ji[1], Jianghao Li[3], Xingfeng Li[1], Lulu Liu[1], Shangcheng Wang[1], Zhongliang Sun[1], Junpeng Liang[1], Linsheng Fan[1], Jianwei Tang[1], Jinlong Wei[1], Zhixue He[1], Weisheng Hu[4]

1.Pengcheng Laboratory, China; 2.The Hong Kong Polytechnic University, Hong Kong, China; 3.Shandong Normal University, China; 4.Shanghai Jiao Tong University, China

We propose a residual multi-task neural network (RES-MT-NN) for nonlinear compensation in coherent optical transmission. By introducing residual connections, RES-MT-NN achieves the baseline Q-factor with only 56% of the computational complexity required by the single-task neural network, outperforming conventional multi-task neural networks which require 62%, demonstrated on an 800-Gb/s, 960-km PDM-16QAM system.

ACP2025-0801-2

End-to-End of Tomlinson-Harashima Precoding for Faster-than-Nyquist Coherent Optical Fiber Transmission

Xun Liu[1], Qi Xu[1*], Ran Gao[1], Fei Wang[1], Chenchen Wang[1], Junyuan Song[1], Huan Chang[1], Wei Yan[1], Chao Yu[2], Haoran Zhang[2], Mu Yang[2], Xiangjun Xin[1]

1.School of Information and Electronics, Beijing Institute of Technology, China; 2.China Telecom Group Satellite Communication Co., Ltd., China

We propose an end-to-end Tomlinson-Harashima precoding (E2E-THP) for coherent optical fiber transmission systems. It outperforms the conventional THP with optical signal-to-noise ratio (OSNR) improvements of 1.0 dB at 20% soft-decision forward error correction (SD-FEC) threshold.

ACP2025-0801-202

Neural Network-Accelerated On-Site Training for Multi-Impairment Equalization in Single Sideband-Direct Detection 200 Gbps PON Downlink

GuoQian, Xiao Xue, Yang Tao, Zhang Min*, Chen Xue

Beijing University of Posts and Telecommunications, China

We propose a multi-impairment equalization scheme with neural network for accelerated on-site training in 200G PON downlink system, verifying that performance on par with individual ONU training while reducing training time by an average of 28.57%.

ACP2025-0801-204

Fading-noise-resistant Φ-OTDR based on Extended Kalman Filter

Guanfeng Chen, Jun He*, Bin Du, Baijie Xu, Yihang Wang, Yiping Wang

Shenzhen University, China

A fading-noise resistant distributed acoustic sensing system based on second-order extended Kalman filter is proposed. The probability of the fading channels is reduced from 11.8% to 0.2% along 62.5 km fiber, while an improvement of 9 dB of equivalent strain resolution is achieved.

ACP2025-0801-21

Chaos-Enhanced Quantization Noise Injection via Dual Delta-Sigma Modulation for Secure Data Center Optical Interconnects

Wenjun Zeng, Chongfu Zhang*, Xinshuai Liang, Jiebing Xia, Yanwei Li, Yue Lin

School of Information and Communication Engineering, University of Electronic Science and Technology of China, China

We propose a chaos-enhanced quantization noise injection scheme to enhance the security for coherent data center optical interconnection. The effectiveness of the proposed scheme is validated using high-order modulation formats.

ACP2025-0801-212

Enhancing the Spatial Granularity of Power Profile Estimation using Staggered Step MMSE

Zhudong Shi[1], Xulong Yan[1], Rundong Xie[1], Runzhe Fan[1], Fei Liu[1], Yuyang Gao[1], Guiyu Zhang[2], Xian Zhou[1*]

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We propose a staggered step MMSE method that optimizes the spatial granularity of power profile estimation. Results demonstrate that the proposed method can reduce the spatial granularity to half of that of MMSE and improves localization accuracy for anomalous attenuation.

ACP2025-0801-214

Method for IQ skew, Frequency Offset and Power Imbalance Calibration in Upstream TFDM PON

Zebang Pi[1], Xiang Li[2], Ming Li[3], Yuhan Gong[1], Ming Luo1, Jie Li[1*]

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We propose a simultaneous calibration scheme for IQ skew, frequency offset, and power imbalance in coherent TFDM-PON upstream systems, and experimentally verify the scheme in a 200-Gb/s transmission over 20-km SSMF.

ACP2025-0801-217

Parallel Structure for Nonlinearity Mitigation based on Enhanced Regular Perturbation Theory

Yichao Wang, Peiyun Ge, Tianrun Sun, Jiarun Zhao, Lixia Xi*, Xiaoguang Zhang
State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China

We proposed and numerically validated a novel parallel fiber nonlinearity mitigation structure. The approach delivers 0.4 dB Q-factor improvement with 84% complexity saving compared to digital back propagation for 130-GBaud systems.

ACP2025-0801-218

Integrated PC-FMCW Automotive Headlamp for Communication, Sensing, and Illumination

Shuanghe Liu[1], Tongzheng Sun[1], Lu Wang[2], Jiaming Lin[1], Jian Song[1], Yuhan Dong[1*]
1.Shenzhen International Graduate School, Tsinghua University, China; 2.Tsinghua University, China

This work presents a PC-FMCW laser headlamp system integrating communication, sensing, and adaptive illumination, achieving Gbps data rates and sub-meter ranging accuracy with real-time beam control for intelligent driving applications.

ACP2025-0801-220

LiDAR-based Multi-Frame Track-Before-Detect using Multi-Plane Projection and Hough Transform

Tongzheng Sun, Shuanghe Liu, Jiaming Lin, Wang Lu, Jian Song, Yuhan Dong*
Shenzhen International Graduate School, Tsinghua University, China

We propose a track-before-detect algorithm for low-SNR environments. It projects a 4D spacetime point cloud onto six planes, applying independent Hough transforms and a rolling windows strategyto detect non-linear weak track.

ACP2025-0801-224

FPGA-Based Hardware Platform for Software Defined Coherent Optical Communication Systems

Bo Jin, Junhao Ba*, Zhen Zuo, Zhiping Huang, Shudong Yuan
National University of Defense Technology, China

A reconfigurable hardware platform for coherent optical system offline verification, integrating ICR, 40-GSps ADCs, FPGA, successfully demodulates PM-QPSK with EVM 9.96%-19.81% (40 GSps, 12.5-32.5 GBd).

ACP2025-0801-30

Enhanced Frequency-Domain Nonlinear Mitigation with Volterra-Inspired Complex CNN and Mixture-of-Experts Architecture

Zili Fang, Jiaojiao Lv, Yi Zhao, Peiyun Ge, Wenbo Zhang*, Lixia Xi
Beijing University of Posts and Telecommunications, China

We combine the Volterra-series-inspired MoE mitigation framework with physics-inspired complex-valued CNN for fiber nonlinearities. Simulation results demonstrate 0.26 dB and 0.21 dB Q-factor gain over DBP of 10-step-per-span in 32 GBaud and 64GBaud systems.

ACP2025-0801-59

Performance investigation of ground-to-LEO satellite uplink transmission over atmospheric turbulence based on steady optical beam

Zhengjie Wang[1], Hongpeng Lu[1], Wenjie Guo[1], Yan Li[1*], Yang Liu[2], Ze Zhang[3], Hongxiang Guo[1], Xiaobin Hong[1], Jifang Qiu[1], Jian Wu[1]
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We assess steady optical beam (SOB) performance for space-to-ground uplink in atmospheric turbulence via mode fibers. We analyze received-power distributions and photon-noise-limited spectral efficiency, achieving 1–2 bps/Hz, 2–3 dB average and 5.5 dB 90% gains.

ACP2025-0801-63

FEC-assisted Volterra Nonlinear Equalization for IM/DD Optical interconnection

Xuanwei Liu, Junyuan Song, Rui Wang, Shaonan Liu, Jun Ming, Ze Dong
Beijing Insitute of Technology, China

We propose a FEC-assisted Volterra nonlinear equalization scheme for effective mitigation of MZM-induced nonlinear impairments in high-speed IM/DD systems. Experimental validation on a 80 Gbaud optical PAM4 interconnection demonstrates over 1.5 dB receiver sensitivity improvement compared with conventional methods.

ACP2025-0801-66

Low-Complexity Sparse ESN Equalization for Bandwidth-Constrained High-Speed IMDD Optical Communication Systems

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We propose a sparse echo state network-based equalizer for high-speed IMDD optical systems. Sparsity is applied across all neural layers, with LASSO-optimized readout weights and PSO-tuned hyperparameters, we demonstrate249 multiplications/equalized symbol at 200 Gbps.

ACP2025-0801-68

Demonstration of Advanced ISAC with Dense Frequency Multiplexing for SMART network

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We showcase an integrated sensing and communication method via frequency modulation and multiplexing in SMART networks, achieving 0.0625°C temperature resolution by using a shared receiver with coherent communications.

ACP2025-0801-75

Demonstration of 150-GBd PAM-4 Transmissionwith a 128 GSa/s DAC for Hollow-Core Fiber basedShort-Reach Optical Interconnects

Siyue Jin[1], Hui Chen[1*], Qibing Wang[1], Xu Zhang[1], Wei Ding[2], Yingying Wang[2], Lei Wang[1], Zhixue He[1*]
1.Peng Cheng Laboratory, China; 2.Jinan University, China

We demonstrate 150-GBd PAM-4 over 1.4-km NANF using a 128-GSa/s DAC and joint THP-NN equalization, achieving 2.24-Tb/s capacity with 8-λ DWDM in C-band.

ACP2025-0801-78

Demonstration of Core/Shell Narrow Band Quantum-dot Light-emitting Diode (QLED)-based Visible Light Communication

Dawei Xie, Chengbin Kang, Yibin Li, Zixian Wei, Zhongxu Liu, Gang Li, Changyuan Yu[*]
The Hong Kong Polytechnic University, Hong Kong, China

A PAM4-modulated VLC system is demonstrated using an optimized red-emitting quantum-dot LED. The QLED exhibits a maximum external quantum efficiencyof 18.5% andbrightness of 147k nits, whichsupports115 Mbps datatransmission.

ACP2025-0801-81

Coexistence of Silicon Integrated QKD and 8 Tbps OTN over 10 km Hollow Core Fiber

Xu Yan[1], Xin Hua[2], Xianghao Zeng[3], Yan Wu[3], Yanxin Han[2], Ying Zhu[2], Daigao Chen[2], Hongguang Zhang[2], Ping Du[3], Xi Xiao[2*]
1.National Information Optoelectronics Innovation Center, China Information and Communication Technologies Group Corporation (CICT), China; 2.National Information Optoelectronics Innovation Center, China Information and Communication Technologies Group Corporation, China; 3.Fiberhome Telecommunication Technologies Co.,LTD, China Information and Communication Technologies Group Corporation, China

We demonstrate a commercial OTN-QKD coexistence system using silicon photonics over 10 km hollow-core fiber, achieving 2 kbps QKD with 80λ×100 Gbps classical capacity at 11 dBm, setting a new quantum-classical integration benchmark.

ACP2025-0801-83

Demonstration of Real-time 2.8Tb/s SDM Transmission using Commercial QSFP-DD 400Gb/s Optical Modules over 89-km 7-core Fiber for High-speed Metro and DCI Applications

Jian Cui[1*], Chao Wu[1], Zilin Fan[1], Yuxiao Wang[2], Mingkang Lin[3], Cheng Chang[1], Yu Deng[1], Zhuo Liu[1], Weiguang Wang[4], Bin Hao[1], Leimin Zhang[1], Yong Chen[2], Bin Wu[2], Bo Tuo[3], Wei Liu[3], Junyi Lv[3], Lei Shen[5], Lei Zhang[5], Jie Luo[5], Yan Sun[1], Qi Wan[1], Bing Yan[2], Ninglun Gu[1]
1.Department of Networks, China Mobile Communications Group Co., Ltd., China; 2.Network Management Center, China Mobile Communications Group Shandong Co., Ltd., China; 3.Huawei Technologies Co.,Ltd., China; 4.Testing Laboratory of Yangtze Optical Fiber and Cable Joint Stock Limited Company, China; 5.State Key Laboratory of Optical Fibre and Cable Manufacture Technology, YOFC, China

Real-time unrepeated 2.8Tb/s 89-km SDM transmission is experimentally demonstrated over weakly-coupled 7-core fiber using advanced QSFP-DD 400Gb/s optical modules, which is beneficial for next-generation high-speed metro networks and DCI applications.

ACP2025-0801-84

Pre-Decision Aided K-State Reserved Complex MLSE for Digital Subcarrier Multiplexing Systems

Zhuo Wang[1], Hexun Jiang[1*], Yuan Lu[2], Shuai Wei[1], Chengbo Li[1], Yongben Wang[1], Yong Chen[1], Xiang Li[1]
1.ZTE Corporation, China; 2.Shandong Post Planning Designing Co.,Ltd., China

We propose a pre-decision technique to further reduce the computational complexity of complex maximum-likelihood-sequence-estimation (MLSE).Compared to previous K-state reserved complex MLSE, nearly an additional 50% complexity reduction is verified experimentally with negligible performance degradation.

ACP2025-0801-9

Joint Polar-coded Modulation Scheme for Bandwidth-Efficient Short-Reach Optical Interconnnection

Hailian He, Yujia Mu, Junyuan Song, Jun Ming, Ran Gao, Ze Dong[*]
Beijing Institute of Technology, China

We propose a joint polar coded modulation to mitigate system bandwidth limitations in intensity modulation and directly detected (IM/DD) optical interconnection. Experiments demonstrate 2.6 dB improvement in receiver power sensitivity versus conventional PAM4 over 2-km standard single-mode fiber transmission.

ACP2025-0801-91

Turbulence-Resilient Communication through Beam Shaping Enabled by Multi-Region Turbulence Intensity Sensing

Zhou Mengjie[1], Jin Ruizhe[2], Chen Shuangcheng[1], Ding Jiazheng[1], Xu Mingfeng[3], Wu Zheng[1]

1.Tianfu Xinglong Lake Laboratory, China; 2.Fudan University, China; 3.State Key Laboratory of Optical FieldManipulation Science and Technology, China

The system employs multi-region probe beams and turbulence-aware adaptive shaping to enable real-time turbulence sensing and dynamically tailor the communication beam for resilient optical links.

ACP2025-0801-92

Physical-layer secure WDM optical communication based on filtered-feedback phase encryption

Shuo Diao, Haoyu Zhang, Cheng He, Chenpeng Xue*, Zuxing Zhang, Ting Li

NJUPT, China

A physical-layer secure 16 QAM WDM optical communication systemis proposed by using the filtered-feedback phase encryption. Two identically adjustable filters are deployed between the communication parties for the security enhancement and phase decryption.

ACP2025-0801-94

OAM Mode Demultiplexing and Routing using Twisted-Diffraction Neural Network

Yong Yu[1], Tianqu Chen[1], Mingfeng Xu[1], Jiazheng Ding[2], Shuangcheng Chen[2], Mengjie Zhou[2], Xu Xing[1], Mingbo Pu[1], Xiangang Luo[1]

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In this work, we experimentally demonstrate a free-space optical communication system employing twisteddiffraction neural network (T-DNN)for orbital angular momentum (OAM) mode demultiplexing and mode routing.

ACP2025-0803-2

Interference Mitigation for Faster-Than-Nyquist mCAP in Bandlimited VLC Using Variable GIM Scheme

Yungui Nie[1], Chen Chen[2], Siming Mo[3], Xiaodi You[1], Qinghai Lu[3], Zhihong Zeng[2], Jinsheng Zhang[3], Gangxiang Shen[1*]

1.Soochow University, China; 2.Chongqing University, China; 3.Jiangsu Etern Co., Ltd, China

A novel variable gapped index modulation (VGIM) scheme is proposed to mitigate the IBI in FTN-mCAP for bandlimited VLC systems. Experimental results show that FTN-8CAP-VGIM achieves a substantial SE improvement of 108% compared with 8CAP.

ACP2025-0811-2

A Pilot-Aided Kalman Filter Scheme for Joint Equalization of PMD, RSOP and RCD with Resilience to the Carrier Phase Noise

Bin Zhang, Jiarun Zhao, Tianrun Sun, Nan Cui, Lixia Xi, Xiaoguang Zhang*

Beijing University of Posts and Telecommunications, China

We propose a pilot-aided Kalman filter capable of jointly equalizing PMD, RSOP and RCD. Simulation results demonstrate its reduced OSNR penalty, effective equalization performance under severe impairments and its resilience to phase noise.

ACP2025-0811-4

Programmable Spatiotemporal Photonic Ising Machinewith Physical Parallel Simulated Annealing

Jinmin Yang[1], Wenjia Zhang[1], Xin Ye[1], Junjie Yu[2], Zuyuan He[1]

1.Shanghai Jiao Tong University, China; 2.Shanghai Institute of Optics and Fine Mechanics, China

This paper proposes a fully-programmable spatiotemporal photonic Ising machine enabled by physical parallel simulated annealing method, delivering superior convergence speed and solution quality in addressing Max-cut problems from 16 to 1000 spins.

ACP2025-0811-5

Low-Complexity Signal-Signal Beating Interference Mitigation for CADD Receivers with Improved Spectral Efficiency

Jianghao Li[1*], Xinyu Wang[1], Yuan Wan[1], Ke Wang[2], Ampalavanapillai Nirmalathas[3], Christina Lim[3]

1.Shandong Normal University, China; 2.RMIT University, Australia; 3.The University of Melbourne, Australia

We propose quasi-interleaved subcarrier loading and successive SSBI cancellation for CADD, which doubles the spectral efficiency with OSNR penalty 5dB and the number of additional required gap subcarriers 6 to achieve 7% FEC limit.

ACP2025-0812-13

Implicit U-Net Fourier Neural Operator for Fiber Nonlinearity Compensation

Xuanyu Zhou, Lin Jiang*, Jie Wen, Liang Liu, Xingchen He, Anlin Yi, Wei Pan, Lianshan Yan

Southwest Jiaotong University, China

We propose IU-FNO for coherent optical systems, achieving near 5StPs-DBP Q-factor with 80.5% lower complexity, 74.1% fewer parameters, and greatly reduced CPU/GPU processing time.

ACP2025-0812-2

Multifunctional Broadband Optoelectronic Test System via Reused Off-Axis Newtonian Collimator

Xu Ke[1], Yunfei Yan[2*], Yuxin Ouyang[2], Liang Guohao[1], Cai Lijun[1], Xu Chonggao[1]

1.CHENGDU AIRCRAFT INDUSTRIAL (GROUP) CO., LTD., China; 2.Beihang University, China

This paper presents a broadband optoelectronic test system integrating optical axis consistency verification, dynamic target simulation, and laser ranging accuracy testing. The key innovation is the multifunctional reuse of an off-axis Newtonian collimator through optical path switching. Operating across visible (0.4-0.9μm), MWIR (3-5μm), LWIR (8-12μm) and 1064nm laser bands, the system comprises an optical test module, laser ranging simulator, and arc-shaped motion platform. Experimental results demonstrate: beam parallelism ≤5″, maximum field obstruction deviation of 3.072″, ranging accuracy ±0.55m (150m-30,000m range), and collimator wavefront error PVλ/4, RMSλ/40, confirming the system's effectiveness for multispectral optoelectronic testing.

ACP2025-0812-5

OCDM-DA-ROF: Orthogonal Chirp Division Multiplexing-Driven Hybrid Digital-Analog Radio-over-Fiber System for Mitigating Power Fading

Xiaobo Zeng[1*], Liangcai Chen[1], Pan Liu[1], Ruonan Deng[2]

1.Xiangtan University, China; 2.National University of Defense Technology, China

We propose and demonstrate an orthogonal-chirp-division-multiplexing-enabled digital-analog radio-over-fiber technique using discrete Fresnel-transformation, achieving 0.15 km reach extension, 2.83 dB received optical power gain, and 1.2 Tb/s CPRI-equivalent rate in IMDD system with power fading.

ACP2025-0812-6

Wideband radio frequency and time signal distribution using time division multiplex

Wang Chen, Ziang Qiu, Liang Hu*, Guiling Wu, Jianping Chen

Shanghai Jiao Tong University, China

We report a fiber-based, distributed broadband radio frequency (RF) transmission scheme tailored for distributed radar applications. By adopting the optical switching topology, we enable quasi-lossless scaling of remote antenna sites, since the power the optical carrier penalty remains virtually unchanged as the network grows. A co-located RF switch further provides time-division multiplexing (TDM), so that propagation delay estimation and phase error correction are performed concurrently on a single wavelength. Experiments demonstrate two orders of magnitude enhancement in the long-term instability when transmitting a 300 MHz RF signal, proving the feasibility of steady-phase transmission. In time delay measurement, we get a time deviation (TDEV) of 15 ps at 1 s and 2 ps at 4,000 s. For the high-frequency signals, the overall phase error of the 15 GHz RF signal stays below 4◦within 2,000 s, while phase noise measurements confirm excellent broadband fidelity. These results establish a practical platform for high-performance distributed radar systems that demand precise RF synchronization.

ACP2025-0812-7

Demonstration of Free-Space Optical Link Based on Vectorial Optical Polarization Inhomogeneity Coding and Multiplexing

Mingze Cai[1,2], Yuzhuo Cao[1,2], Runshi Wang[1,2], Jing Du[1,2*], Jian Wang[1,2]

1.Huazhong University of Science and Technology, China; 2.Optics Valley Laboratory, China

In this paper, we propose a free-space optical communication system based on multiplexing of vector beams and encoding of their polarization inhomogeneity. The results demonstrate that this communication approach effectively transmits data under atmospheric turbulence

ACP2025-0813-12

Waveform-Level Modeling of Nonlinear WDM Channels Using Fourier-Transformer

Shiwei Wang[1], Xiaoli Huo[2], Xin Qin[2], Rentao Gu[1*], Xiaotian Jiang[2], Yuefeng Ji[1]

1.Beijing University of Posts and Telecommunications, China; 2.China Telecom Research Institute, China

We propose a hybrid modeling framework called Fourier-Transformer (F-Transformer) for optical fiber channels, which integrates Fourier layers with Transformer encoders to jointly capture linear and nonlinear effects. In a 3-channel WDM system over 800 km of SSMF, the F-Transformer achieves a 21.7% improvement in modeling accuracy compared to the baseline FNO model. The results demonstrate the model’s strong generalization ability and high accuracy for waveform-level optical channel modeling in long-distance, multi-channel transmission scenarios.

ACP2025-0813-18

Quasi-Perfect Optical Vortex Beam with Power-Exponent Phase for Free-Space Optical Communication

Lang Zhou, Xiaohang Jia, Yaoyao Liu, Gengliang Zhao, Andong Wang, Long Zhu*

School of Communication and Information Engineering Chongqing University of Posts and Telecommunications, China

In this paper, we introduce a new type of vortex beams, called quasi-Perfect Optical Vortex Beams (QPOVBs), which feature Rotationally Symmetric Power-Exponential Vortex (RSPEV) phase profiles. The QPOVBs are generated by applying a Fourier transform to Bessel beams with RSPEV phases. We analyze the propagation characteristics and beam quality factor (M^2) of QPOVBs and compare them with Laguerre-Gaussian (LG) beams. It is found that the proposed QPOVB has more modes under lower beam quality factor than LG beam. To evaluate their potential in free-space optical communication, we use a grayscale-coded mapping scheme, enabling 32 distinct QPOVB intensity patterns to serve as symbols in the encoding process, and successfully transmit 32-bit grayscale images with QPOVB mode coding. Our work is expected to accelerate the development of future optical communication encoding schemes.

ACP2025-0813-9

Demonstration of a Free-Space Optical Pulse Position Modulation Communication Link Using Space-Time Wave Packets

Guangshuai Meng[1,2], Mingze Cai[1,2], Yuzhuo Cao[1,2], Jing Du[1,2*], Jian Wang[1,2]

1.Huazhong University of Science and Technology, China; 2.Optics Valley Laboratory, China

Simulated FSO system comparing diffraction-free ST wave packets vs. LG beams shows ~3-6 dB lower OSNR penalty (with 7% FEC) under turbulence and varying apertures.

ACP2025-0814-16

A Novel Nested-Structure Chaotic Source Design for Secure Optical Transmission Systems

Yujie Wen, Hongxiang Wang*, Chun Zhang, Yuefeng Ji

State Key Laboratory of Information Photonics and Optical Communications Beijing University of Posts and Telecommunications, China

This paper presents a nested electro-optic chaotic system using coupled feedback loops. The design enhances complexity affordably, achieving 0.0122 Lyapunov exponent, 35.49 GHz bandwidth, and effective time-delay signature suppression.

ACP2025-0814-20

A practical C+L-band power management based on accurate SRS estimation

Yangguang Liu[1], Mo Zhu[1], Yan Zhao[2], Baoluo Yan[2], Wenbo Yu[2], Hu Shi[2], Huan Chen[2*]

1.ZTE Corp., China; 2.ZTE Crop., China

This paper demonstratesan OSNR flattening channel power management methodbased on online SRSestimation for multi-band long-haul transmission systems.Principle and expected performance outcomes are presented.

ACP2025-0814-21

High-Performance WDM PS-PDM 256-QAM Transmission Over DNANF

Tingyu Fu[1], Yu Qin[2], Jiamin Fan[1], Mingyi Gao[1*], Limin Xiao[2], Yichun Shen[3], Jie Zhu[2], Gangxiang Shen[1]

1.Soochow University, China; 2.Fudan University, China; 3.Advanced Materials Co., Ltd. Nantong, China

In this work, we experimentally demonstrate a wavelength division multiplexing (WDM) probabilistic shaping polarization-division multiplexed (PS-PDM) 256-QAM coherent optical transmission system with 14.8-bit/symbol information entropy through a 5-km double nested anti-resonant nodeless fiber (DNANF). Higher launch power tolerance and 1 dB optical signal-to-noise ratio (OSNR) improvement have been achieved.

ACP2025-0814-34

Low-Complexity Two-Stage Frequency Offset Compensation Algorithm for Real-Time Coherent Optical Communication Systems

Muyu Long, Zhenming Yu*, Xiangyong Dong, Yan Ma, Han Wang, Kun Xu

Beijing University of Posts and Telecommunications, China

We propose a two-stage frequency offset compensation algorithm using FFT and a modified Costas loop. Results show it reduces complexity by 42.3% while maintaining comparable BER performance in PDM-16QAM systems, enabling efficient real-time coherent reception.

ACP2025-0814-41

Deep-Learning-Assisted Non-Orthogonal Encoding Enhancing High-Capacity and High-Security UWOC

Zitong Wu, Dongmei Deng*

1.South China Normal University, China

We present a deep-learning-assisted high-capacity and high-security non-orthogonal multiplexing underwater wireless optical communication (UWOC) system. Experiment demonstrates the feasibility of 1,296-ary transmission, achieving a 3.81×10^{-3} BER under strong turbulence.

ACP2025-0815-106

Auxiliary Signal supported Long-Haul Optical Transport Network with CDC-ROADM

Tian Qiu[1], Muxin Shi[1], Binxin Cai[1], Yang Zou[1], Jing Li[1], Pengzhuo Sun[1], Jian Xu[1,2], Han Long[2], Dadan Shan[2], Shenmao Zhang[1], Xiaoxiao Dai[1*], Qi Yang[1]

1.Huazhong University of Science and Technology, China; 2.Accelink Technologies Co. Ltd, China

A method of superimposing auxiliary signal for CDC-ROADM optical transport network(OTN) is proposed. It enables the superposition of an auxiliary signal onto any channel to carry critical information. Through the 1000km OTN experiment, it is proved that the loss caused by this method is less than 0.15dB, and it performs well in long-distance transmission.

ACP2025-0815-107

On Adaptive Zero Forcing for Integrated Polarization Sensing and Coherent OpticalCommunications

Andrej Rode[1*], Laurent Schmalen[1], Christian Häger[2]

1. Karlsruhe Institute of Technology, Germany; 2.Chalmers University of Technology, Sweden

This work examines noise and polarization-dependent loss effects on LMS-based polarization sensing, quantifying channel inversion deviations and exploring adaptive ZF equalization for improvement. The authors highlight trade-offs between estimation accuracy and communication performance

ACP2025-0815-112

Regular Perturbation-Based Nonlinear Pre-distortion for Degenerated-mode Transmission

Junpeng Liang*, Jinlong Wei*, Linsheng Fan, Zhongliang Sun, Zhaopeng Xu, Zhixue He*
Peng Cheng Laboratory, China

We report a transmitter pre-distortion algorithm, derived from perturbation theory, to mitigate the nonlinear effects in four-fold degenerate mode transmission. The impact of link parameter uncertainties on the algorithm's performance is also evaluated.

ACP2025-0815-143

Nonlinear Modeling for High-Speed DAC and ADC BasedOpticalFiber Systems Using Volterra Series Integration

Chenjin Li, Jing Zhang*, Junyuan Nie, Hong Lin, Shen Wang, kun Qiu
University of Electronic Science and Technology of China, China

We propose and experimentally validate a Volterra series-integrated multiplicative-additive noise modeling framework for effectively characterizing complex high-speed digital-to-analog converter and analog-to-digital converter, achieving signal-to-noise-and-distortion prediction accuracy improvements of up to 71 %.

ACP2025-0815-148

A Low-Complexity Soft-Decision Feedback-Enhanced Neural Network for Multi-Impairment Equalization in 200 Gbps SSB-DD PON Downlink

Xue Xiao, Guo Qian, Yang Tao, Zhang Min, Chen Xue
Beijing University of Posts and Telecommunications, China

We propose a low-complexity soft-decision feedback enhanced neural network equalizer for 200 Gbps PAM-4 SSB-DD systems. Compared to a conventional feedforward neural network, it achieves a 0.5 dB sensitivity gain with 77.8% fewer trainable parameters.

ACP2025-0815-152

The ISFA Algorithm-optimized OAM-Multiplexed 16QAM MB-OFDM UWBoF System Transmits Over 5km FMF

Hainuo Wang[1], Yongkang Yuan[2], Changqing Xiang[3*], Siyuan Liu[2], Xiaogang Jiao[1], Xinyi Xi[1], Yifan Chen[3]
1.College of Physics and Electromechanical Engineering Jishou University, China; 2.School of Communication and Electronic Engineering Jishou University, China; 3.College of Physics and Electromechanical Engineering Jishou University, China

This paper proposes the application of Symbol In Frequency Domain Averaging (ISFA) algorithm in OAM-UWB multi-channel communication, successfully realizing a new multiplexing dimension: an OAM four-way multiplexing communication system.

ACP2025-0815-154

Joint Beam Tracking and Compensation for Robust Optical Transmission under Turbulence Effects

Weizhen Niu
Chongqing University of Posts and Telecommunications, China

A beam tracking system based on a single Charge Coupled Device (CCD) detector is proposed to achieve high-precision beam tracking control while reducing system complexity.

ACP2025-0815-155

Optical Sequence Pattern Recognition for Multi-Wavelength BPSK Signals in Photonic Firewalls

Yanbin Shen[1], Yucheng Liu[1], Yanxia Tan[2], Jiabin Cui[1], Yuefeng Ji[1], Guo-Wei Lu[3], Ninghua Zhu[4], Huashun Wen[4]
1.Beijing University of Posts and Telecommunications, China; 2.Research Institute of China United Network Communications Co., Ltd, China; 3.Institute for Materials Chemistry and Engineering, Kyushu University, China; 4.Nankai University, China

This paper proposes an optical direct-detection pattern recognition scheme for multi-wavelength BPSK signals based on optical fourier transformation.

ACP2025-0815-156

Experimental Demonstration of Real-Time Beam Tracking with Single CCD for FSO Systems

Li Tang
Chongqing University of Posts and Telecommunications, China

A beam tracking system based on a single Charge Coupled Device (CCD) detector is proposed to achieve high-precision beam tracking control while reducing system complexity.

ACP2025-0815-16

Transfer Learning-Enabled Efficient Raman Pump Tuning under Dynamic Launch Power for C+L-Band Transmission

Jiaming Liu, Rui Wang, Jinjiang Li, Hong Lin, Jing Zhang*, Kun Qiu
University of Electronic Science and Technology of China, China

We propose a transfer learning-enabled Transformer framework to simultaneously realize accurate modeling and Raman pump design in C+L-band systems. The RMSE for modeling and peak-to-peak GSNR variation/deviation is within 0.22 dB and 0.86/0.1 dB, respectively.

ACP2025-0815-17

Jitter-Resistant Constant Modulus Algorithm for Free-space Optical Communications with Pointing Error Jitter

Jinjiang Li[1], Lijia Wu[1], Shaohua Hu[1], Qi Yang[2], Jing Zhang[1*], Kun Qiu[1]
1.University of Electronic Science and Technology of China, China; 2.Huazhong University of Science and Technology, China

We propose a jitter-resistant CMA to combat pointing errors in FSO systems. The tolerance to pointing error is improved by over 20% compared with conventional CMA with a 3-dB SNR penalty, ensuring robust signal recovery.

ACP2025-0815-37

LO Polarization-Insensitive Reception Based On a Simple Polarization Controller In Self-Homodyne Coherent Detection Systems

Boyang Hou, Nan Cui*, Zhipeng Zheng, Qingxuan Li, Yan Zhang, Xiaoguang Zhang
Beijing University of Posts and Telecommunications, China

A simple polarization controller method was proposed for self-homodyne coherent detection systems, ensuring stable system performance despite random polarization variations, which has been verified through both software and hardware simulations with 1Mrad/s RSOP.

ACP2025-0815-46

Frequency Domain Precise and Ultra-wide Range Monitoring of Transceiver IQ Skew for Coherent Systems Using m-sequence

Gao Ye[1,2], Linsheng Fan[1], Jinlong Wei[1*], Jian Zhao[1*], Zhongliang Sun[1], Junpeng Liang[1], Lingguo Cao[1], Hao Shi[1], Jianwei Tang[1], Xiuquan Cui[1], Jianyu Wang[1], Zhixue He[1], Weisheng Hu[1]
1.Pengcheng Laboratory, China; 2.South China University of Technology, China

This paper proposes a novel m-sequence-based frequency-domain method to simultaneously estimate/separate transmitter/receiver IQ skew in optical coherent systems, with ±0.1 ps accuracy, ≥-16 to 16 symbol periods range in single measurement, robust to IQ imbalance/polarization variations, compatible with existing systems.

ACP2025-0815-48

Symbol-seperated Method for Look-up Table based Digital Pre-distortion for Optical Systems

Yanting ZHOU, Chun Kit Chan*
The Chinese University of Hong Kong, Hong Kong, China

We propose a symbol-separated approach to compress the size of the look-up table (LUT) for digital pre-distortion to combat the fiber nonlinearity in high-speed optical transmission systems. With the reduced size of the LUT, the requirement of memory storage is largely relaxed. Hence, the system scalability is largely enhanced while the performance is guaranteed. By decomposing a multi-symbol LUT into multiple sub-LUTs, substantial size reduction is realized while preserving comparable bit-error-rate (BER) performance.

ACP2025-0815-54

Secure Free-Space Optical Communication System Based on Diffraction-Free Spatiotemporal Wave Packets

Guangshuai Meng[1,2], Mingze Cai[1,2], Yuzhuo Cao[1,2], Jing Du[1,2*], Jian Wang[1,2]
1.Huazhong University of Science and Technology, China; 2.Optics Valley Laboratory, China

Simulated secure optical communication uses fundamental-mode spatiotemporal (ST) wave packets to conceal higher-order modes, demonstrating superior atmospheric turbulence tolerance versus traditional Laguerre-Gaussian concealment.

ACP2025-0815-56

Joint Illumination and Communication Design for Mobile Users in Indoor VLC System

Yuyu Wang, Feiyu Jiao, Yuting Zhou, Yansong Du, Jian Song*, Xun Guan*
Tsinghua university, China

This paper proposes a lighting-unit-based architecture for integrated visible light communication and illumination systems. It enables analytical modeling of illumination and communication performance, and optimizationforenergy efficiency. Simulations verify the framework's effectiveness and scalability.

ACP2025-0815-7

Reliable Raptor Code based OAM division multiplexing free space optical communication system

Zian Wang, Shanyong Cai*, Zhang Zhiguo, Bingchen Liu
Beijing University of Posts and Telecommunications, China

Compared with adaptive LPDC coding (switching between 0.7 and 0.5 code rate), the OAM1 / OAM3 multiplexing system, using the Raptor code, has a more stable performance to resist atmospheric turbulence under different turbulence intensities.

ACP2025-0815-82

Two-stage Doppler Effect Compensation for 100-Gbit/s Inter-satellite Laser Communications

Wu Lijia, Li Jinjiang, Hu Shaohua*, Zhang Jing, Lin Hong, Qiu Kun
University of Electronic Science and Technology of China, China

We propose a two-stage Doppler compensation method for 100-Gbit/s inter-satellite laser communications. We experimentally demonstrate its better Doppler shift tolerance and ~2.5(0.5) orders of magnitude BER reduction compared with the fourth-power-FFT algorithm within 0-6 GHz.

ACP2025-0815-83

The Requirement and Technology of Sensing in Optical AccessNetwork

Luyao Huang*

China Telecom Research Institute State Key Laboratory of Optical Fiber and Cable ManufactureTechnology, China

This paper explores the sensing technologies in optical access networks. It introduces fundamental fiber sensing principles, discusses access network sensing requirementsfrom internal network operations, administration, and maintenance (OAM) to external environment perceptionand analyzes technical challenges such as handling point-to-multipoint architectures. Current solutions including backs-catteringtype, feed-forwardtypesensing, and port differentiation are presented, with future trends focusing on / communication + sensing + computing/ integration and AI enhancement.

ACP2025-0815-93

Classification RNN-Based Equalization for Indoor Non-Line-of-Sight Optical Wireless Communication

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Indoor non-line-of-sight (NLOS) optical wireless communication (OWC) offers robust data transmissions against physical obstacles. This paper proposes an NLOS OWC system with RNN-based classification equalization, and up to 94.8% data rate improvement is experimentally achieved.

ACP2025-0819-2

Parallel LED and RIS Transmissions for Vehicular VLC using Spatial Modulations

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In visible light communications (VLC) where the line-of-sight (LoS) link is blocked, reconfigurable intelligent surface (RIS) can be adopted to transmitting the LED's signals to the receiver. RIS is also capable of sending its own messages on top of the reflected light signals using spatial modulation (SM), so as to further increase overall system throughput. In the literature, the straight-forward parallel LED and RIS transmission techniques, e.g., RIS enabled SM (RIS-SM) and RIS enabled generalized SM (RIS-GSM), only activate all the RIS groups with the same probability, which cannot fully utilize the difference among the VLC channels, leading to worse bit error rate (BER) performances. In this paper, we investigate a rate-adaptive parallel LED and RIS transmission scheme, called RAS, in which the RIS groups are activated using different sets of distributions, and thereby increasing sum rates. To realize RAS, we propose a Huffman-code based RAS (HC-RAS) method, by allocating information bits for different RIS groups according to the Huffman coding distribution. Simulation results show that, HC-RAS can have a 5.5 dB gain compared with state-of-theart constant rate transmission schemes (CRS) using RIS-SM. This finding indicates that, when LED and RIS are exploited jointly using RAS, one can not only dynamically change the data rates for each VLC link, but also increase the overall system throughput in the meantime.

Track 3: Network Architectures, Management and Applications

ACP2025-0729-36

LLM-BasedMulti-Agent Framework for Automated Optical Network Optimization and Planning

Yian Li, Shan Yin*, Guohao Jin, Xiaodong Liu, Mengru Cai, Shanguo Huang
State Key Laboratory of Information Photonics and Optical Communications (Beijing University of Posts and Telecommunications), China

This paper proposes an LLM-basedmulti-agent framework for automated optical network optimization and planning. Evaluated on 2,000 real-world instructions, it achieves 99.3% accuracy and low latency, improving planning efficiency, resource utilization, and reducing technical complexity.

ACP2025-0730-7

Hybrid Direct and Contention-based Bandwidth Allocation in Higher-speed PONs

Zhiwen Ge[1], Zhiyuan Zhong[1], Xiang Lu[2], Yongcheng Li[1], Jun Li[1*], Gangxiang Shen[1]
1.Soochow University, China; 2.Universitat Politècnica de Catalunya, Spain

To enhance system bandwidth efficiency while satisfying diverse latency demands in hybrid traffic scenarios, this paper proposes a hybrid bandwidth allocation scheme for 50G time-division multiplexing passive optical networks that integrates directed bandwidth allocation for time-sensitive services with contention-based dynamic allocation for others.

ACP2025-0731-105

Impairment-Aware Spectrum Allocation with Dedicated PathProtection in C+L Band Elastic Optical Networks

Shiqi Yang[1], Changyin Zhu[1], Xiaoling Wang[1], Weidong Shao[1], Mingyi Gao[1], Bowen Chen[1*], Qiang Wang[2]
1.School of Electronic and Information Engineering, Soochow University, China; 2.Applied Technology College of Soochow University, China

An impairment-aware spectrum allocation scheme with dedicated path protection was proposed to reduce blocking probability and enhance transmission quality in the C+L band elastic optical networks. Simulation results verify the effectiveness of the proposed scheme.

ACP2025-0801-157

Collaborative Resource Optimization for DualPipe-based Distributed Training in the Intelligent Computing Optical Network

Zixin He, Shan Yin*, Mengru Cai, Xiaodong Liu, Pengzhan Zheng, Shanguo Huang
Beijing University of Posts and Telecommunications, China

we proposed a collaborative optimization method of computing and networking resources for DualPipe-based distributed training in the optical network,which interconnects intelligent computing centers.Simulation results demonstrate that our methodoutperform traditional method in reducing task blocking rates and improving training efficiency.

ACP2025-0801-17

Fine-Grained Baseband Functional Elastic Split for Task Offloading in Mobile Edge Computing Supported by PONs

Ying Wang, Haoru Wang, Ming Ye, Bo Tian, Yongfeng Wei, Caili Gong*
Inner Mongolia University, China

This paper proposes a task offloading strategy based on fine-grained elastic split of baseband functions. An ILP model and the FG-BFES algorithm are proposed. Results show that the proposed schemes can reduce optical bandwidth consumption.

ACP2025-0801-173

EO Data Downlink Optimization Strategy for Enhanced Continuity and Reliability in VLEO Optical Networks

Wenlong Cheng[1*], Hui Yang[1], Zhe Niu[1], Qiuyan Yao[1], Buzheng Wei[2], Jie Zhang[1]
1.Beijing University of Posts and Telecommunications, China; 2.China Unicom Research Institute, China

We propose a QoS-Aware Dynamic Routing and Scheduling method for solving the frequent link handovers and low transmission reliability in VLEO data downlink networks. Simulation results show our method significantly enhance service continuity and reliability.

ACP2025-0801-190

Resilient Multicast Provisioning in Network Coding-Enabled NG-RANs

Fansong Kong[1], Xin Wang[1*], Ruikun Wang[2], Jing Jiang[3], Qin Yin[4]
1.Beijing Information Science and Technology University, China; 2.Qingdao University of Science and Technology, Qingdao, China, China; 3.State Grid Economic and Technological Research Institute Co., Ltd., China; 4.Tianjin Branch of Daqing Oilfield Digital, China

We propose a low-resource partial-backup algorithm for coding-node deployment and multicast routing algorithm (LR-PB-CNMR) in network-coding-enabled NG-RANs, offering resilience against failures and eavesdropping with significantly reduced spectrum usage compared to backup-protection schemes.

ACP2025-0801-196

Service-Oriented Hybrid Fairness Scheduling in Downlink Visible Light Communication Networks

Ming Yang[1], Xiaodi You[1*], Jun Li[1], Xiaochuan Zhang[1], Jian Chen[2], Changyuan Yu[3], Mingyi Gao[1], Gangxiang Shen[1]

1.Soochow University, China; 2.Nanjing University of Posts and Telecommunications, China; 3.The Hong Kong Polytechnic University, Hong Kong, China

We propose a service-oriented hybrid fairness scheduling algorithm for downlink visible light communication networks. By incorporating actual service requirements into fairness considerations, it achieves a Jain's fairness index approaching 1 and effectively reduces average delay.

ACP2025-0801-221

A Machine-Learning-Based Approach for Fault Identification and Localization in Optical Transport Networks Using Source-Alarm Matrices

Yadong Gong[1*], Jingwen Hu[2], Yongyi Xie[3], Xin Qin[1], Xiaoli Huo[1], Hui Li[2], Yuqing Han[1], Qian Hu[4], Rentao Gu[2]

1.China Telecom Research Institute, China; 2.Beijing University of Posts and Telecommunications (BUPT), China; 3.China Telecom Shaoxing Branch, China; 4.China Telecom Intelligent Network Technology Co.Ltd., China

This paper proposes a machine-learning-based method for real-time fault identification and localization in Optical Transport Networks. By employing an alarm slicing algorithm and transforming alarm events into source-alarm matrices, our approach effectively distinguishes different fault types and filters noise alarms. Experimental results show that, compared with other machine learning methods, the XGBoost model performs excellently in fault identification, achieving an identification accuracy of 94.85%, and improves the accuracy of subsequent fault localization. The proposed method shows strong generalization ability across different network environments.

ACP2025-0802-7

User Aggregation-based Energy-Saving Strategy in FTTR Networks

Yijun Wang, Jinhan Cai, Gangxiang Shen[*]

School of Electronic and Information Engineering Soochow University, China

As Fiber-To-The-Room (FTTR) networks become more widely deployed, their dense and always-on architecture presents significant energy consumption challenges. This paper proposes a centralized, user aggregation-based energy-saving strategy that dynamically adjusts Sub-Fiber Unit (SFU) activation and station (STA) association. By aggregating STA connections onto fewer active SFUs, the strategy enables idle SFUs to be powered down.

ACP2025-0802-8

Absorbing Intra-node Contention in CD-ROADMs via Traffic Grooming in IP-over-WDM Networks

Zixuan Xu, Gangxiang Shen[*], Yongcheng Li

Soochow University, China

We propose a Port-Aware Traffic Grooming (PA-TG) algorithm that integrates grooming with port-aware RWA to reduce intra-nodecontention in CD-ROADMs and achieve near-CDC performance in IP-over-WDM networks.

ACP2025-0811-6

Efficient Service Scheduling in Hybrid Optical-Electrical LEO Satellite Networks

Cheng Zhang[1], Yangziyu Song[2], Hua Wang[3], Siming Mo[4], Qinghai Lu[4], Qimei Chen[2], Yongcheng Li[1*]

1.Soochow University, China; 2.Wuhan University, China; 3.Nanjing Tech University, China; 4.Jiangsu Etern Co., Ltd., China

This paper investigates the service scheduling problem in low earth orbit (LEO) satellite networks comprising both electrical and optical switching satellites. The problem is formulated as a mixed integer linear programming (MILP) model, with the objective of jointly minimizing the total network energy consumption and the overall task completion time (TCT). Three routing strategies are considered, including least energy consumption (LEC), least delay (LD), and Energy-Latency Balancing (ELB) strategies. A simulated annealing-based heuristic algorithm is proposed for service scheduling in hybrid optical-electrical LEO satellite networks. Simulation results demonstrate that the proposed algorithm with ELB strategy can significantly reduce the total network energy consumption while maintaining low overall TCT, achieving performance that is close to that of the MILP model.

ACP2025-0812-10

An Importance-Aware Strategy for Content Evacuation in Cloud-Optical Networks under Cascading Failures

Deyang Liu[1], Xin Li[1,2], Yike Jiang[1], Yongli Zhao[1,2], Jie Zhang[1]

1.Beijing University of Posts and Telecommunications, China; 2.Beijing University of Posts and Telecommunications Shenzhen Institute, China

We propose the Importance-aware Trajectory-based Content Evacuation (ITCE) strategy to mitigate data loss from cascading failures in cloud-optical networks. By prioritizing content based on business value, ITCE significantly reduces weighted content loss.

ACP2025-0813-4

Traffic Conflict Gain-Adaptive and Load-Aware RWA for LEO Optical Satellite Networks

Yonghan Wu, Jin Li, Yi Huang, Weixuan Fan, Wenbin Chen, Shuo Xia, Yuyang Li, Danshi Wang, Min Zhang

1.Beijing University of Posts and Telecommunications, China

A traffic conflict gain-adaptive and load-aware RWA algorithm is proposed to address routing challenges, enhance quality of service, and maintain low computational complexity in high-dynamic and large-scale low Earth orbit optical satellite networks.

ACP2025-0813-5

Adaptive Resource Allocation Algorithm for Optical Network Based on Meta Learning

Xiaodong Liu, Shan Yin*, Mengru Cai, Shuyao Wang, Xueyu Fan, Shanguo Huang
Beijing University of Posts and Telecommunications, China

We introduce meta learning into resource allocation task and propose the Adaptive Resource Allocation (ARA) algorithm. It shows excellent adaptation ability in different topologies. With the integration of reinforcement learning, the optimization ability is also significantly improved. Simulation demonstrates that ARA reduces the consumption of topology adaptation by 67% compared to DRL.

ACP2025-0814-18

Cross-layer Dynamic Bandwidth Allocation in G.fin based Centralized Wi-Fi Access Network

Zhiyuan Zhong[1], Jun Li[1*], Tao Zeng[2], Yongcheng Li[1], Gangxiang Shen[1]
1.Soochow University, China; 2.China Telecom Research Institute, China

This paper proposes a cross-layer dynamic bandwidth allocation mechanism, where physical layer information from Wi-Fi preamble can be used for bandwidth allocation in G.fin network.

ACP2025-0814-44

Eavesdropping-Aware Secure Routing Based on Beam Accessibility in Optical Satellite Networks

Chenwei Zhang[1], Liyazhou Hu[2], Wei Wang[1], Zijian Cui[1], Yongli Zhao[1], Jie Zhang[1]
1.Beijing University of Posts and Telecommunications, China; 2.School of Electronics and Communication Engineering Shenzhen Polytechnic University, China

LEO laser links enable fast global access but face eavesdropping risks, threatening data security. We model these risks and design two secure routing algorithms, cutting impact by up to 38.47% with minimal load growth.

ACP2025-0814-47

Learned Light Field Compression for Resource-Constrained Acquisition Systems

Lili Zhao*, Wanxin Shi, Jie Li, Meng Guo, Lei Yang, Wei Yu
China Mobile Communications Co., Ltd., China

Light field (LF) imaging produces massive data, challenging storage and transmission. We propose a compression framework reducing large LF data to a 12.8 MB model, surpassing international standard VVC/H.266 in quality under resource-constrained acquisition systems.

ACP2025-0815-119

Robust AI Inference Model Placement with Cross Layer Backup over Optical Transport Networks

Yujie Li, Wei Wang, Tianhe Liu, Yibo Wang, Yongli Zhao, Jie Zhang*
Beijing University of Posts and Telecommunications, China

We propose a cross-layer backup scheme integrating compute-node and network redundancy to ensure service continuity during large-scale disasters, achieving higher resilience, success rates, and sustained GPU utilization under severe failures.

ACP2025-0815-128

Dual-Agent-based Resource Allocation for Synergistic Transmission of Classical and Quantum Signals in Multi-core Fiber Networks

Fengkai Sun, Yongmei Sun*, Yaoxian Gao, Yuting Wang
Beijing University of Posts and Telecommunications, China

We present S-DARL, a dual-agent reinforcement learning scheme for classical–quantum co-propagation in multi-core fiber networks, significantly reducing blocking probability and enhancing synergy compared with state-of-the-art heuristics.

ACP2025-0815-141

Impact of Data Acquisition Accuracy on the Performance of Digital Twin Optical Networks

Junfeng Cao[1,2], Nan Hua[1,2*], Kangqi Zhu[1,2], Qianchi Qin[1,2], Siqi Wu[1,2], Xiaoping Zheng[1,2*]
1.Beijing National Research Center for Information Science and Technology (BNRist), China, China; 2.Department of Electronic Engineering, Tsinghua University, Beijing, China

We present an integrated modeling–emulation–validation framework to systematicallyanalyze how dataacquisition accuracy impactsthe performance of digitaltwin optical networks. The framework is experimentally validated using spectrumclassification tests as a representative scenario, revealing key degradation mechanisms and providing practical guidelines for resource allocation in the sensing layer.

ACP2025-0815-26

Satellite optical network topology dynamic optimization based on Markov Decision process

Yuguo Kuang, Wei Wang, Yansong Fu, Zijian Cui, Yongli Zhao*, Jie Zhang
Beijing University of Posts and Telecommunications, China

This paper proposes grouping satellites by orbit and dynamically adjusting the topology through the Markov Decision Process Based on Relaying (MDPBR) algorithm. Simulations demonstrate that the proposed algorithm can reduce the average number of hops.

ACP2025-0815-4

Semi-supervised Learning-based QoT Estimation for Intelligent Computing Optical Network

Jie Li, Zhiqun Gu*, Xin He, Jiawei Zhang, Yuefeng Ji
Beijing University of Posts and Telecommunications, China

A semi-supervised learning-based QoT estimation method is studied with few labelled samples and unlabeled samples, simulation results demonstrate the proposed method can reduce the prediction error RMSE by 21.12% and 20.61% compared to other methods.

ACP2025-0815-52

Distance-Aware DRL-Based Routing Strategies in QKD-ONs

Shailendra Raghuwanshi[1], Suman Palrecha[2], Vimal Bhatia[1,2*], Xue Hu[2], Bowen chen[2]
1.Indian Institute of Technology Indore, India; 2.Soochow University, China

Resource constraints in quantum key distributionsecured optical networks (QKD-ONs) frequently prevent successful quantum light-path request (QLR) fulfillment. This work introduces a routing and resource assignment (RRA) strategy prioritizing minimal transmission distance to address this limitation. The proposed scheme employs a metric evaluating fiber length to determine optimal quantum signal paths. By minimizing cumulative (photon) travel distance, the proposed approach improves resource efficiency. The proposed distance-aware deep reinforcement learning (DA-DRL) based scheme's performance is evaluated against first-fit (FF) and random-fit (RF) methods, across two network topologies NSFNET and UBN24. Simulation results show that, for NSFNET, the proposed approach scheme reduces blocking by 6.18% and 9.18% and for UBN24, by 2.71% and 3.41%, when compared to FF and RF respectively.

ACP2025-0815-64

Adaptive Reconfigurable Optical Direct-Connect Architecture for Hybrid-Parallel AI Workloads

Wenzhe Li*, Guojun Yuan, Zhan Wang
Institute of Computing Technology, Chinese Academy of Sciences, China

We propose a reconfigurable optical interconnect for hybrid-parallel AI workloads. By leveraging a Jellyfish-inspired topology and traffic-aware reconfiguration, our design supports diverse collective communication patterns. 2048-node simulations with real traces show up to 40% latency reduction over static 3D Torus for large-scale training.

ACP2025-0815-67

Throughput Performance in Mode-Group Division Multiplexing Metro-Scale Data Centre Networks

Yinglong Liang[1], Filipe Ferreira[1], Alejandra Beghelli[2]
1.University College London, United Kingdom; 2.BT Group, United Kingdom

We investigate the throughput performance of a metro-scale datacentre network using MGDM over few-mode fibre. Results show a computationally simple heuristic approach achieves 71% of the maximum achievable throughput by ILP (630 vs. 890 Tbps).

ACP2025-0815-70

Experimentation, Exploration, and Practice of Passive Optical Networks in the Field of Industrial Control

Weng YI
China Telecom Corp Ltd, China

Traditional industrial networks face limited coverage and difficulty inheterogeneous data transmission. This paper explores using PON to address these issues through experiments, achieving positive results.

ACP2025-0815-79

A Method for LEO Satellite Topology Reconfiguration Based on Elastic Optical Network

Yunhui Wang, Hongxiang Guo*, Jian Wu
Beijing University of Posts and Telecommunications, China

The flat topology of LEO satellite networks can impact communication performance. This paper demonstrates through experiments that elastic optical link switching enables path optimization. Additionally, we proposed a topology reconfiguration algorithm. Through comparison with the + Grid, our proposed method demonstrates better performance.

ACP2025-0815-9

Hybrid Testbed for Joint Optical Transmission andSwitchingArchitecturein LEO Networks

Yingzi Xu, Hongxiang Guo*, Jian Wu
Beijing University of Posts and Telecommunications, China

We present a virtual-physical hybrid testbed for system-level validation of joint optical transmission and switching in LEOsatellitenetworks, confirming SDN-controlled reconfigurable paths with switching module insertion loss 18 dB.

ACP2025-0815-97

Link-Correlated Analytical Model of Blocking Probability for Asymmetric Multi-Fiber Optical Networks

Yuxie Wang, Yejia Shang, Yuchen Yang, Lei-Hong Zhang, Yongcheng Li

Soochow University, China

This paper develops a novel link-correlated analytical model for blocking probability in multi-fiber optical networks, specifically considering the scenario where each link contains a different number of fibers, referred to as asymmetric multi-fiber optical networks (aMFONs). The modelincorporates thethree-dimensional Markov chain to capture the load correlation between adjacent links. Simulation results demonstrate that, compared to existing analytical model ignoring link correlation, our proposed link-correlated analytical model achieves significantly higher accuracy and better matches the simulation results.

ACP2025-0817-1

Strategies for Upgrading Multi-Granularity ROADMs in an Optical Transport Network

Zhilin Yuan[1], Peng Zhou[2], Huichao Xu[1], Fengxian Tang[3], Vimal Bhatia[4], Yongcheng Li[1*]

1.Soochow University, China; 2.Wuhan University, China; 3.Shenzhen Polytechnic University, China; 4.Indian Institute of Technology (IIT), India

Multi-granularity reconfigurable optical add-drop multiplexers (MG-ROADMs) can enhance the flexibility and resource utilization of optical transport networks (OTNs) in a cost-efficient manner, as they eliminate the need of expensive flexible wavelength selective switches (WSSs). This cost advantage makes MG-ROADM upgrades an attractive option for improving network performance. This paper addresses the problem of MG-ROADM upgrades and proposes three efficient upgrade strategies: traffic demand-based (TD), node connectivity-based (NC), and node upgradation gain-based (NUG). To evaluate their performance, we develop an efficient routing, granularity, and spectrum assignment (RGSA) algorithm that supports scheduling traffic demands in the optical networks where single-granularity (SG-) and MG-ROADMs coexist. Simulation results show that the NUG strategy selects an upgraded node set closely aligned with our developed mixed integer linear programming (MILP) optimization model, achieving higher average bandwidth utilization than the TD and NC strategies.

ACP2025-0817-2

Graph Convolutional Network-Based Service Path Aggregation and Selection in LEO Optical Satellite Networks

Yiming Liu[1], Hua Wang[1*], Wei Wang[2], Yifeng Li[3], Yongcheng Li[4], Yongli Zhao[2]

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This paper proposes a GCN-based path aggregation strategy for LEO optical satellite networks, improving routing efficiency by reducing computational overhead. Simulations show 28.9% higher bandwidth utilization and 15% better load balance than Dijkstra's algorithm.

ACP2025-0817-3

DRL-Aided Resource Scheduling Scheme for Elastic Optical Computing Power Network

Xiao Lin, Yongjie Huang, Hui Yang, Enguo Chen[*]

Fuzhou University, China

DRL-aided resource-scheduling scheme is proposed for EO-CPN. It merges preemption, storage, and elastic optics to curb AIGC task blocking while maximizing spectrum usage and meeting deadlines.

Track 4: Optoelectronic Devices and Integration

ACP2025-0718-6

High-speed germanium-on-silicon multimode photodiode

Gangqiang Zhou*, Xiong Wanshu, Zhang Na, Zhang Qiang, Lu Chi, Yin Kun, Yu Hui
Zhejiang Lab, China

In this paper, we demonstrate a high-speed germanium-on-silicon (GeSi) multimode photodiode (PD). 100 Gb/s OOK modulation and 200 Gb/s PAM4 modulation are successfully realized for the TE_0 mode, TE_1 mode, and TE_2 mode.

ACP2025-0720-1

High-Efficiency Photonic Antenna for Terahertz Generation in the 275–296 GHz Band Based on MUTC-PD

Yun Wang, Jianguo Yu*, Xiaorui Liu
Beijing University of Posts and Telecommunications, China

This paper presents a photonic antenna operating in the 275-296 GHz range, achieving a 4.67-fold output power increase and 8.4 dBi peak gain at 285 GHz.

ACP2025-0722-7

Thin-film lithium tantalate electro-optic modulator operating at 900nm wavelength

Defeng Shan, Ziliang Ruan, Xijie Wang, Bin Chen, Gengxin Chen, Mingwang Jiang, Guowu Zhang, Liu Liu*
Zhejiang University, China

We demonstrate a low-loss integrated electro-optic Mach-Zehnder modulator in thin-film lithium tantalate at 900nm, featuring a half-wave voltage-length product of 1.65Vcm, an ultra-low optical insertion loss of 0.5dB, a static extinction ratio of 20dB,and a detector-limited bandwidth of 40GHz.

ACP2025-0724-14

Analysis Model for G-Band Photomixer Modules Based on MUTC-PDs

Tian Yuxin[1,2], Xiong Bing[1*], Wang Guizhen[2], Sun Changzheng[1], Hao Zhibiao[1], Wang Jian[1], Wang Lai[1], Han Yanjun[1], Li Hongtao[1], Luo Yi[1]
1.Tsinghua University, China; 2.China Mobile Research Institute, China

We present a novel model to predict the performance of photomixer modules based on MUTC-PDs. By taking packaging introduced deviances into account, the model provides excellent prediction for the frequency responses of G-band photomixers.

ACP2025-0726-5

Research on Optical Interference Imaging Methods Based on New Aperture and Its Optimization Method

Haijian Jin, Yong Zuo*, Xiaohan Song, Ziteng Gao, Xiaobin Hong, Jian Wu
Beijing University of Posts and Telecommunications, China

Thispaper proposes a novel optical interference imaging method with a new aperture and its optimization method. By introducing a new Microlens arrangement rule and its optimization method, the Microlens pairing scheme is modified to improve the image sampling rate and enhance the image reconstruction effect.

ACP2025-0728-11

Based on the MoS_2/$PdSe_2$ Van Der Waals Heterostructure for Scan Imaging

JianQiang Mei[1], Xin He[2]
1.East China Jiaotong University, China; 2.Hangzhou City University, China

We present a MoS_2-$PdSe_2$ vdW heterojunction ultra-broadband polarization-sensitive photodetector using $PdSe_2$'s anisotropy, yielding 3.56 polarization ratio at 532 nm.

ACP2025-0728-16

Compact and Broadband Thin-film Lithium Niobate Fast Quasi-adiabatic Mode (De)Multiplexer for 800G Photonic Interconnection

Mingxiu Yuan, Ya Han*, Gai Zhou, Meng Xiang, Chi Chen, Kebai Lin, Di Peng, Heyun Tan, Cong Zhang, Shuoyang Qiu, Songnian Fu, Yuwen Qin*
Guangdong University of Technology, China

We demonstrate four-channel fast quasi-adiabatic thin-film lithium niobate mode (de)multiplexers for 800G photonic interconnection, achieving the fabricated length-bandwidth values of 50 μm-153 nm, 96 μm-119 nm, and 115 μm-105 nm, respectively.

ACP2025-0728-6

Optimized Design of Photonic Integrated Interference Imaging Based on Multi-Level Microlens Array and CLEAN Algorithm

Ziteng Gao, Yong Zuo*, Xiaohan Song, Haijian Jin, Jiaheng Wang, Jian Wu

Beijing University of Posts and Telecommunications, China

This paper presents a photonic integrated interference imaging method based on a multi-level microlens array and the CLEAN algorithm, which effectively addresses the challenges of sparse sampling and imaging artifacts, significantly improving imaging quality.

ACP2025-0729-23

Hybrid Meta-Heuristic Based Crosstalk-Aware Automatic Mapping for Optical Network-on-Chip

Chen Zhao[1,2], Qiuyan Yao[1,2], Hui Yang[1,2*], Daqing Meng[1,2], Yijie Liang[1,2], Junji Feng[1,2]

1.Beijing University of Posts and Telecommunications, China; 2.State Key Laboratory of Information Photonics and Optical Communications, China

We propose a multi-strategy hybrid meta-heuristic mapping method to address crosstalk issues in Optical Network-on-Chip task mapping. Compared with existing mapping algorithms, this method reduces average crosstalk by 19.4% and improves signal-to-noise ratio by 21.86%.

ACP2025-0729-4

Generalized Inverse Design of a Compact Polarization Beam Splitter on X-cut TFLN

Jiangbo Lyu[1,2], Guangbiao Wang[2,3], Yanhua Shen[2,4], Yazhi Pi[2*], Zhenmin Chen[2*], Ke Xu[1,2,5*], Lei Wang[2]

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This work presents a compact PBS on X-cut TFLN using generalized inverse design with dielectric tensor optimization, achieving efficient TE_0/TM_0 separation, low IL, high PER, and enhanced integration within a 20 × 8 μm² footprint.

ACP2025-0729-5

Generalized Inverse Design of a Compact Thermo-Optic Switch on SOI Platform

Jiangbo Lyu[1,2], Guangbiao Wang[2,3], Yanhua Shen[1,2], Yazhi Pi[2*], Zhenmin Chen[2*], Ke Xu[1,2,4*], Lei Wang[2]

1.Department of Integrated Circuits, Harbin Institute of Technology (Shenzhen), China; 2.Peng Cheng Laboratory, China; 3.School of Electronics and Information Technology, Sun Yat-sen University, China; 4.Guangdong Provincial Key Laboratory of Semiconductor Optoelectronic Materials and Intelligent Photonic Systems, Harbin Institute of Technology, China

We present a compact SOI thermo-optic switch using a generalized inverse design framework that decouples thermal and optical simulations, achieving low IL, suppressed CT, and effective switching with a 15 × 8 μm² footprint.

ACP2025-0729-50

An ultra-broadband optical parametric amplifier based on Ge-Sb-S integrated waveguide

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This work reports an ultra-broadband optical parametric amplifier based on chalcogenide waveguide. Under continuous-wave (CW) pumping , on-chip net parametric gain spectrum exceeding 500 nm (spanning from 1330 nm to 1850 nm) has been achieved

ACP2025-0730-51

850 nm band Wavelength-division multiplexer on the lithium-niobate-on-insulator platform

Yaoxin Bao[1], Jianghao He[1], Ming Zhang[2*], Daoxin Dai[1*]

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An 850 nm band optical filter is demonstrated on the 200 nm-thick X-cut lithium-niobate-on-insulator platform. The proposed optical filter exhibits a box-like spectral response accompanied by high SLSR (~ 32 dB) and low excess loss (~ −0.05 dB).

ACP2025-0730-6

Silicon-based Nanohole Assisted Phototransistor with Different Lattices for Wideband Detection

Ziming Liu, Hongyun Xie*, Yudong Ma, Tieyi Li, Yudi Liu, Weizhao Jiao

Beijing University of Technology, China

We demonstrate silicon-based phototransistors with nanoholes in square and triangular lattices, achieving wideband detection from 400–1000 nm and significantly enhanced responsivity compared to devices without nanohole structures, especially at longer wavelengths.

ACP2025-0730-8

Narrow Linewidth Two-Section DFB Laser Based on Reconstruction Equivalent Chirp Technique

Xiao Liu[1], Shijian Guan[1], Yunshan Zhang[2*], Zeyu Gang[1], Xiangfei Chen[1*]

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A monolithically integrated two-sectionDFBlaser with AR coatings on both facets is proposed. A significant linewidth compression is achieved due to the introduction of optical negative feedback through the reflection section.

ACP2025-0731-112

Single Mode Two Dimensional Photonic Crystal Waveguide on Thin Film Lithium Niobate

Jindong Lu, Guanyu Chen[*], Siyuan Zhou, Ziyao Zhang, Hua Yu

Chongqing University, China

We investigate two-dimensional thin film lithium niobate photonic crystal waveguides, revealing duty cycle–dependent single-mode regimes and mode hybridization, enabling robust single-mode propagation and tunable mode conversion for modulators and integrated optical sensors.

ACP2025-0731-45

Integrated magneto-optical isolator based on high-order absorbing exceptional point

Yaqi Zhou[1], Yan Li[1*], Tingge Dai[2]

1.Ningbo University, China; 2.Zhejiang University, China

We proposed an integrated passive optical isolator based on a third-order absorbing exceptional point (EP).The 20 dB isolation bandwidth could be increased by 85% to 15 GHz, and the isolation ratio could be increased to 43.6 dB with 3.3 dB insertion loss.

ACP2025-0731-53

Demonstration of 2D Beam Emission by a Multi-wavelength Optical Phased Array

Binghui LI

The Chinese University of Hong Kong (shenzhen), China

We demonstrate the 2D beam scanning of an optical phased array through multiple wavelength emissions. A field of view of 9°×35° was accomplished by only thermo-phase control, indicating good potential for high-speed LiDAR scanning.

ACP2025-0731-55

Feedforward Neural Network-Based Integrated Polarization Controller on Thin-Film Lithium Niobate

Yuan Liu, Yanmei Lin, Weihua Yan, Shuxin Wang, Zhongjin Lin[*], Xinlun Cai[*]

Sun Yat-sen University, China

We propose a high-speed thin-film lithium niobate photonic polarization control system, empowered by feedforward neural network. The system achieves a control latency of near 1 μs.

ACP2025-0731-84

Hybrid Integration of Carbon Nanotubes and Silicon Nanobeam Cavity for Efficient Emission Coupling

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We demonstrate an optimization ofemission coupling for hybird integration with carbon nanotubes and silicon nanobeam cavity

ACP2025-0801-166

A fast fiber-optic Fabry-Perot sensing system based on tunable REC-DFB laser array

Yuan Liu, Pan Dai[*], Kaichuan Xu, Jiacheng Wang, Yu Wang, Yuan Lv, Yaqiang Fan, Haolin Xia, Jingxuan Zhang, Yufei Wei, Zhenxing Sun, Junwei Dong, Feng Wang, Xiangfei Chen[*]

Nanjing University, China

A fiber optic Fabry-Perot sensing system based on a tunable reconstruction-equivalent-chirp distributed feedback laser array is introduced. The system enables real-time acquisition of reflection spectra from Fabry-Perot sensors, featuring high dynamic range and stable operation.

ACP2025-0801-18

Bandwidth optimization for silicon photonic receiver based on T-coil network

Yutian Zhang[1], Meng Deng[2], Xiaolong Xu[2], Ziyue Dang[2], Daigao Chen[2], Hongguang Zhang[2], Yu Yu[1*], Xi Xiao[2*]

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This paper presents a bandwidth optimization scheme for high-speed photonic receiver. By introducing a specifically designed T-coil network between the avalanche photodiode (APD) and transimpedance amplifier (TIA), the receiver bandwidth is improved from 12 to 30 GHz, achieving an 150% improvement. The T-coil network employs inductive peak compensation to effectively counteract the frequency response attenuation caused by the junction capacitance of the APD and the input capacitance of the TIA, and theoretical analysis and full-chain co-simulation demonstrate that it not only achieves ultra-wideband lossless matching but also supports larger process tolerances. The proposed solution provides an effective approach for bandwidth optimization of photonic receivers in high-speed optical communication, holding practical value for applications targeting 6G-era rates of 100 Gbps and above.

ACP2025-0801-194

Microrod laser based on localized Er^{3+} doping

Fan Tang, Hao Zhang, Dingfu Zhang, Yanhong Guo, Baicheng Yao*, Teng Tan*

Key Laboratory of Optical Fiber Sensing and Communications (Education Ministry of China) University of Electronic Science and Technology of China), China

We propose a high-Q whispering-gallery-mode (WGM) laser via localized Er^{3+} doping strategy. By accurately introducing erbium ions on surface of a silica thin microrod, we realize an active resonator, which demonstrates a passive loaded Q factor higher than 4.8×10^7. This enables milliwatt threshold lasing with unique high signal-to-noise ratio approaching 40 dB. Such a lasing microcavity fabrication scheme offers a way for flexibly tuning the gain-loss balance in miniature microcavities.

ACP2025-0801-33

Enhancing output of DFB Lasers with Asymmetric Phase Shift and Coupling Coefficient

Siying Li[1], Zhuoying Wang[1], Zhenxing Sun[1*], Xiangfei Chen[1]

Nanjing University, China

A novel REC-based DFB laser using AP and ACC techniques boosts front output power by 30% over symmetric designs. It eases fabrication (less EBL-dependent) and maintains SLM stability, validated experimentally.

ACP2025-0801-34

8-Channel 980-nm Pump Laser Array via Photonic Wire Bonding

Jingjing Li, Wentao Sun,Yue Zhang, Zhenxing Sun*, Rulei Xiao, Xiangfei Chen

Nanjing Univercity, China

A compact eight-channel laser pump source is demonstrated using photonic wire bonding to hybrid-integrate FP lasers and fiber Bragg gratings, achieving stable single-mode emission at 976 nm across all channels.

ACP2025-0801-40

Low Power Consumption Phase Shifter with Waveguide Folded Array Superlattice

Xudong Liu, Yuanjian Wan, Jian Wang*, Yu Zhang

Huazhong University of Science and Technology, China

We designed an optical thermo-optic phase shifter based on a superlattice waveguide array, incorporating an undercut process. This device achieves an ultra-high-density waveguide folded array with mere 200-nm inter-waveguide gap and ultra-low-power π phase shifts consuming only 0.35 mW at 1550nm.

ACP2025-0801-45

Design of Multi-Phase PWM-Driven Thermo-optic Tuning Loop for High-Q Microring Wavelength-locking

Ziying Xie[1,2], Siyuan Zhang[3,4], Yifan Liu[2], Zhicheng Wang[2], Ziyue Dang[2], Hongguang Zhang[2], Daigao Chen[2], Xi Xiao[2*], Min Tan[1*]

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This paper presents a multi-phase pulse width modulation (PWM) driven thermo-optic tuning scheme for thermal ripple reduction. By introducing phase as an additional tuning factor, thermal ripples excited from different phase PWM signals can partially cancel each other, enabling higher tuning accuracy at the same PWM frequencies while maintaining the conversion efficiency. A two-phase PWM-driven tuning loop with post-layout simulation results validates the approach. Implemented in the 65 nm CMOS process, the proposed tuning loop achieves wavelength locking of a microring with Q-factor of around 11,590 and high power efficiency. Compared with other solutions in the literature, it achieves significantly higher resolution and smaller thermal ripple at just 10 MHz clock rate, making it suitable for high-Q microring wavelength locking applications.

ACP2025-0801-97

Experimental Demonstration of Low-Crosstalk Optical Vortex Mode Demultiplexer Assisted by Pattern Search Assisted Iterative (PSI) Optimization Algorithm

Han Cao, Jian Wang
Huazhong University of Science and Technology, China

We propose and experimentally demonstrate a low-crosstalk optical vortex mode demultiplexer based on pattern search assisted iterative (PSI) optimization for coordinate transformation. The device achieves crosstalk levels below −14 dB across the entire C-band.

ACP2025-0802-2

Suspended thin-film lithium tantalate waveguide-integrated photodetector based onpyroelectric effect

Muchun Lin, Ziliang Ruan, Bin Chen, Xijie Wang, Liu Liu, Daoxin Dai
Zhejiang University, China

A suspended waveguide-integrated pyroelectric photodetector on thin-film lithium tantalate platform is demonstrated. The device exhibits a stable pyroelectric response to modulated optical signals at 1550 nm with a peak voltage responsivity of 521 V/W.

ACP2025-0803-1

AI-Enhanced Design Workflow for Photodetectors

Jihong Ye, Yongqing Huang, Shuhu Tan, Liwen Wang, Xiaomin Ren
Beijing University of post and telecommunications, China

We present an intelligent design workflow that integrates machine learning (ML) and genetic algorithm (GA) to enable the automated co-design of high-speed photodetectors.

ACP2025-0804-1

Monolithic SiGe-BiCMOS Receiver with Inductorless Pseudo-Differential Photodetection Achieving 138.9 Gbps/mm² Bandwidth Density

Hao Jiang[1], beiju Huang[2], Meixin Li[1], Xiaoqing Lv[2], Kaixin Zhang[3], Tianjun Liu[4], Qixin Wang[4], Zanyun Zhang[1*]
1.Tiangong University, China; 2.Institute of Semiconductors, Chinese Academy of Sciences, China; 3.Suzhou institute of institute of Microelectronics and Optoelectronics Integration, China; 4.Suzhou institute of Microelectronics and Optoelectronics Ingtegration, China

We present a monolithically integrated 50 Gb/s silicon photonic receiver utilizing pseudo-differential photodetection, pole-zero cancellation, and transconductance regulation, combining ultra-high compactness (0.36 mm²) with high functionality.

ACP2025-0807-2

High-bandwidth and broad-passband silicon slow-light modulator enabling C+L dual-band operation

Meixin Li[1], Hao Jiang[1], Qixin Wang[2], Wenjing Zhang[1], Xiaoqing Lv[3], Kaixin Zhang[2], Tianjun Liu[2], Beiju Huang[3], Zanyun Zhang[1*]
1.Tiangong University, China; 2.Suzhou Institute of Microelectronics and Optoelectronics Integration, China; 3.Institute of Semiconductors, Chinese Academy of Sciences, China

We demonstrate a silicon slow-light Mach-Zehnder modulator with 85 GHz EO bandwidth, supporting 128 Gbaud OOK modulation, with an exceeding 20 nm passband in C/L-band for high-density high-capacity interconnects applications.

ACP2025-0814-13

Phase- jitter -tolerant characterization of programmable photonic circuits

Jiajia Wang*, Haoran Zhang, Shuying Li, Shuran Zhang, Yunping Bai, Xingyuan Xu
Beijing University of Posts and Telecommucations,

We demonstrated a universal and phase-jitter-tolerant characterization technique to measure the dynamic performance of programmable photonic integrated circuits (PICs). This approach provides a promising solution for PIC characterization, enabling accelerated physical parameter training.

ACP2025-0814-30

A Structure of W-Shaped High-Speed Silicon-Based Microring Modulator

Huimin Ji, Keyu Xiong, Bin Li, Manwen Liu, Zhihua Li*, Bo Tang, Kai Huang, Ruonan Liu, Peng Zhang
Institute Of Microelectronics Of The Chinese Academy Of Sciences, China

This paper presents an innovative design of a silicon-based microring modulator based on a W-shaped p-n junction. The proposed device achieve a modulation efficiency of 182.6 pm/V at a bitrate of 80 Gbps in simulation.

ACP2025-0815-100

Low-loss Fiber-Chip Edge Coupler for AlGaAs-on-insulator Platform

Jingwei Chen[1,2], Zhengshun Lei[1,2], Weiqiang Xie[1,2*], Yikai Su[1,2]
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We propose an edge coupler based on the AlGaAs-on-insulator platform, utilizing silicon oxynitride as mode converter. The edge coupler exhibits an average coupling loss of 0.76 dB/facet over a wavelengthrange of 1500-1600 nm.

ACP2025-0815-102

Multi-Wavelength SelectiveControl System Design for Microring Resonator

sen Cheng[1,2], Ruixin Tang[1,2], Junjie Zhang[1,2,3], Ye Wang[4*], Yuanzhe Qu[1,2], Yingxiong Song[1,2*], Qianwu Zhang[1,2,3], Fang Wei[4], Kun Zhao[4], Yingying Chi[5]

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We proposea control system based on an optical link utilizing a SOI technology fabricated MRR. The system achieves wavelength selection and stable wavelength locking within 1.35 seconds for four C-band light waves with arbitrary wavelength spacing exceeding 1 nm.

ACP2025-0815-131

An MPLC-Based 8-Channel C+L-Band Optical 90° Hybrid

Yi Sun, ziling Shen, Jie Zhang, He Wen*

Beijing University of Posts and Telecommunications, China

We propose an 8-channel C+L band optical 90-degree hybrid using multi-plane light conversion with seven phase plates, achieving -1.57 dB insertion loss, -0.51 dB mode-dependent loss, -33.01 dB crosstalk, and 5° phase errors. Tolerance analyses guide design for scalable coherent receivers.

ACP2025-0815-24

High-bandwidth Compact Thin-Film Lithium Niobate Mach-Zehnder Modulator with Transparent Electrode

zhiguo yu, yanbo ren, huan guan, zikuan liu, lifei tian, zhiyong li*

Institute of Semiconductors, Chinese Academy of Sciences, China

An high-bandwidth and high-efficiency thin film lithium niobate (TFLN) traveling-wave (TW) Mach-Zehnder modulator (MZM) with transparent electrodes is experimentally demonstrated. The device has an EO response rolling-off 1.8 dB at 110 GHz, and a 3-dB EO bandwidth extrapolating to be 155 GHz. The half-wave voltage-length products is 1.25 V.cm, and on-chip insertion loss is 2.8 dB.

ACP2025-0815-27

Reflective Coded Aperture Broadband Near-Infrared Snapshot Spectral Imaging

Yutong Li[1], Zhenming Yu[1,2*], LiMing Cheng[1], Jiayu Di[1], Liang Lin[1], Jingyue Ma[1], Tongshuo Zhang[1], Yue Zhou[1], Haiying Zhao[1], Kun Xu[1,2]

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We propose abroadband(700-1600nm) NIR snapshot hyperspectral imager using wavelength-segmented design, specialized optical components and a reflective architecture, delivering a compact, cost-effective, and highly flexible alternative to conventional systems.

ACP2025-0815-28

Integrated snapshot near-infrared hypersepctral imaging framework with diffractive optics

Jingyue Ma[1], Zhenming Yu[1,2*], Zhengyang Li[1], Liang Lin[1], Liming Cheng[1], Kun Xu[1,2]

1.Beijing University of Posts and telecommunications, China; 2.Xiong'an Aerospace Information Research Institute, China

We propose an integrated snapshot near-infrared hyperspectral imaging framework that combines designed DOE with NIRSA-Net. The results demonstrate near-infrared spectral imaging at 700-1000nm with 10nm resolution while achieving improvement of PSNR 1.47dB and SSIM 0.006.

ACP2025-0815-34

High-Speed InGaAs/InAlAs Avalanche Photodiode Based on Heterojunction Dual Charge Layers and Multiple GradingLayers

Lingtong Yang, Yu Li, Xiaofeng Duan*, Kai Liu, Yongqing Huang

Beijing University of Posts and Telecommunications, China

We propose a SAGCMCT avalanche photodiode (APD) based on heterojunction dual charge layersand multiple gradinglayers.

ACP2025-0815-53

An Edge Emitting Laser With on-Chip Integrated Two-Photon Polymerization 3D Printed Sidewall Convex Lens

Wei Yu, Guandong Liu*, Hongli Zhu*

Zhejiang Lab, China

This study demonstrates an alternative monolithic integration approach.A laterally emitting FP laser diode was fabricated.A high-precision two-photon printing process was employed to fabricate a sidewall convex lens forming an on-chip optical system.

ACP2025-0815-68

Hybrid-Integrated Multi-Port Multi-Wavelength Laser Source for Optical I/O

Jiale Xu[1], Zijiang Yang[1*], Wentao Sun[1], Zhenxing Sun[1*], Yue Zhang[1], Jingjing Li[1], Rulei Xiao[1], Feng Xu[2], Xiangfei Chen[1]

1.Nanjing University, China; 2.China United Network Communications Co., LTD Jiangsu Branch, China

We propose and experimentally demonstrate a hybrid-integrated multi-port multi-wavelength laser source, which is composed of a fiber array , multimode interference, photonic wire bonding, and DFB laser array.

ACP2025-0815-72

Nonuniform Mesh Topology Optimization for Inverse Design of Large-Scale Silicon Photonic Devices

Xinran Liu, Jifang Qiu*, Lan Wu, Yan Li, Jian Wu
Beijing University of Posts and Telecommunications, China

We present a nonuniform mesh topology optimization method that reduces design dimensionality while preserving accuracy, validated by simulations of large-scale silicon photonic vertical and multimode couplers.

ACP2025-0815-84

Silicon-Based One-dimensional Slow-Light Waveguide Modulator with High Modulation Efficiency for High-Speed Transmission

Zhen Zhen[1], Xiaobin Liu[1], Siyue Jin[2], Lei Wang[1]
1.Peng Cheng Laboratory, China; 2.15754309327, China

We present a compact, reconfigurable slow-light silicon modulator. The deviceoffers a tunable range of half-wave voltage-length product, reaching as low as 0.12 V·cm. The bandwidth ranges from 5 to 30 GHz.

ACP2025-0815-92

Ultra-Thin Silicon Nitride-Assisted Polarization-Insensitive Edge Coupler Based on Thin-Film Lithium Niobate

Zikuan Liu, Zhiguo Yu, Huan Guan, Yanbo Ren, Paiguang Zhao, Zhiyong Li*
Chinese Academy of Sciences, China

A novel ultra-thin silicon nitride-assisted thin-film lithium niobate polarization-independent end-coupler has been proposed and validated, with optimized matching for TE and TM modes. Simulations show coupling loss as low as 0.22-dB at 1550 nm, with over 98% polarization overlap integration for both modes. Experimental results show single-end face loss of 0.7 dB near 1610 nm, with stable performance over a wide wavelength range and large manufacturing tolerances, supporting high-performance LNOI photonic integration systems.

Track 5: Microwave Photonics and Optical Signal Processing

ACP2025-0527-1

Stable Optoelectronic Oscillation for Weak RF Signal Detection Based on Integrated Mutual Injection DFB Laser

Xin Zhang*, Jin Yang, Feiyu Li, Xiangming Xu, Huatao Zhu, Shuwen Chen*
Information Support Force Engineering University, China

The power stability is improved from 6.27 dB to 0.83 dB, benefiting from the integrated mutual injection Laser. The detection frequency range is flexible and tunable from 1 to 24 GHz for weak RF signal.

ACP2025-0711-2

Optical frequency division referenced toμHz-linewidth quantum-noise-limited lasers

Jiahao Hu, Yanlan Xiao, Heng Zhou*
University of Electronic Science and Technology of China, China

We demonstrate an OFD system leveraging common-cavity bi-color Brillouin lasers as the optical frequency referenceswith Schawlow-Townes linewidth on the 10 μHz level and generating10 GHz microwave oscillator withphase noise of -151 dBc/Hz at 10 kHz.

ACP2025-0714-4

Received Response Based Heuristic Non-binary LDPC Code for NLOS Ultraviolet Communications

Tian Luo[1], Yong Zuo[1*], Dong Zhu[1], Hongzhen Zhang[1], Feiyu Li[2], Jian Wu[1]
1.Beijing University of Posts and Telecommunications, China; 2.National University of Defense Technology, China

This paper proposes a heuristic encoding algorithm for non-binary LDPC parity-check matrices. Simulation results indicate that the proposed scheme significantly lowers the system bit error rate resulting from pulse spreading in ultraviolet communication channels.

ACP2025-0715-2

Photonic-aid dual-band radar using LFM waveforms with opposite chirp polarities

Xuan Li, Tingting Bai*, Yixiao Zhou, Guodong Wang
AFEU, China

A photonic-aid radar using two linear frequency modulated waveforms with different frequency bands and opposite chirp polarities is proposed. The applications such as moving target detection and joint radar communication are demonstrated.

ACP2025-0724-12

First Unified Optical-Microwave Switching: Experimental Demonstration of Frequency-Division Granularity for Hybrid Satellite Networks

Hanxiao Xue, Wenxin Guo, Lingxiao Li, Zhennan Zheng*, Xinlu Gao, Shanguo Huang
Beijing University of Posts and Telecommunications, China

We present the first unified architecture integrating all-optical and microwave photonic switching for cross-domain signal interaction. The system achieves 10 GBaud switchinggranularity with ≤5.36 dB SNR penalty and 16.02% EVM for three modulation formats.

ACP2025-0724-13

Integrated Imaging and Processing Based on Pixel-Level PCMsArray Spatially Modulated by VCSELs

Xiaonan An, Yi Guo, Hongxiang Guo*, Jian Wu
Beijing University of Posts and Telecommunications, China

We propose an all-optical integrated imaging-processing unit usingapixel-level phase-change materials(PCMs) array spatially modulated by VCSELs, featuring single-acquisition/multiple-processing capability for real-time pathology slide analysis.

ACP2025-0727-12

Microwave Photonic Multi-channel Configurable Broadband RF Repeater in Satellite Communication

Lingxiao Li, Hanxiao Xue, Jingxin Zhang, Xinlu Gao*, Zhennan Zheng, Shanguo Huang
Beijing University of Posts and Telecommunications, China

We proposed a microwave photonic RF repeater using an optical signal processor. The maximum ACPR of signals greater than 30dB. The EVM reaches 6.51 %, the SFDR is 114.05 dB·Hz2/3.

ACP2025-0727-5

Microwave Photonic Filter Assisted Asymmetric Triangular Waveform Generation

Xiaohong Lan, Yang Jiang*, Jing Xu, Jiancheng Yu, Jinjian Feng, Tingyi Jiang, Hui Zhang, Yu Wu
College of Physcis, Guizhou University, China

The desired spectral profile of an asymmetric triangular waveform can be achieved by shaping the parabolic waveform's spectrum using a microwave photonic filter. The symmetry factor is easily adjusted by varying the filter's free spectral range.

ACP2025-0727-6

Photonic generation of flat microwave frequency combs using Mach–Zehnder Modulators

Jinjian Feng[1], Yang Jian[1*], Jing Xu[1], Jiancheng Yu[2], Xiaohong Lan[2], Yu Wu[2]

1.College of Physics, Guizhou University, China; 2.College of Physcis, Guizhou University, China

A photonic method for generating flat microwave frequency combs (MFCs) is proposed and experimentally demonstrated. By exploiting the nonlinear modulation transfer function of a Mach–Zehnder Modulator (MZM), two-line or three-line flat combs can be generated. Cascading MZMs combined with a balanced photodetectorinversion function enables the extension of comb line numbers while maintaining good flatness. Theoretical analysis confirms the feasibility of the proposed approach. In proof-of-concept experiments, a 10-line MFC with a flatness of 3.82 dB and a 14-line MFC with a flatness of 4.89 dB are successfully generated. The proposed method enables flexible tuning and good spectral flatness, offering a new access for flat MFC generation.

ACP2025-0729-49

Prediction and Optimization of Satellite Laser Communication Tracking Accuracy Based on Reservoir Computing

Cheng Liu[1], Feng Fan[2], Jianjun Li[1], Tianfeng Zhao[1], Shuiqiu Diao[1], Feng Wen[1*]

1.University of Electronic Science and Technology of China, China; 2.Beijing Institute of Telemetry, China

Addressing the need for high-precision tracking in satellite laser communication, we propose a prediction method based on the reservoir computing (RC) concept. Compared with the conventional prediction method, e.g., the polynomial fitting method, the results show that the proposed RC tracking approach could significantly improve the prediction accuracy by an order of magnitude, resulting into the root mean square error (RMSE) reduced accordingly. The study also reveals the impacts of the data interpolation and the reservoir size on the performance, offering the optimization for practical applications.

ACP2025-0730-42

Bandpass Sampling LFM Radar based on P1 Dynamics of Optically Injected Lasers

Xin Yan[1], Fangzheng Zhang[1], Xiaoyue Yu[1], Genze Wu[1], Hao Wang[1], Yuan Yu[2]

1.Nanjing University of Aeronautics and Astronautics, China; 2.Huazhong University of Science and Technology, China

We propose a microwave photonic radar system that utilizes an optically injected semiconductor laser operating in the period-one (P1) dynamics to generate broadband linear frequency-modulated (LFM) signals from 12.5-13.5 GHz. A four-channel time-division multiplexing (TDM) transmit architecture is implemented. To overcome the bottleneck of high-frequency broadband signal acquisition, bandpass sampling is applied at the receiver, the signal is sampled at 4 GSa/s under the condition of a preserved guard interval. Experimental results demonstrate successful signal reconstruction without distortion at this sampling rate, enabling accurate target ranging. Through integration TDM technology, the system achieves high-precision localization for both single and multiple targets, with a positioning error of 0.95 cm, thereby validating the effectiveness and practical applicability of the proposed bandpass sampling scheme.

ACP2025-0731-123

Optical Format Conversion from QPSK to OOK/PAM4 Channels Enabled by Polarization-assisted Phase-sensitive Amplifier

Yuxuan Dong[1], Yanxia Tan[2], Jiabin Cui[1*], Guo-Wei Lu[3], Yuefeng Ji[1], Ninghua Zhu[4], Huashun Wen[4]

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An opticalformat conversion scheme between QPSK and OOK/PAM4signalsis proposed. This scheme is enabled by polarization-assisted non-degenerated PSA based vector moving, which separates the signal and generated idler into two distinct polarization states.

ACP2025-0731-18

Transmission Characteristics of Frequency-Dependent Vortex Electromagnetic Wave and Imaging Applications

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In this paper, Theoretical derivations and simulations are employed to verify and summarize the propagation characteristics and laws of the frequency-dependent vortex electromagnetic wave. The effectiveness of imaging in both azimuth and elevation is demonstrated.

ACP2025-0731-25

A Dual-Band Microwave Photonic Radar Based on Photonic Frequency Doubling and Data Fusion

Xiaoyu Liu[1,2], Lingjie Zhang[1,2*], Zhenglin Tang[1,2], Mengke Wang[1,2], Zhen Zeng[1,2], Yaowen Zhang[1,2], Zhiyao Zhang[1,2], Yong Liu[1,2]

1.University Of Electronic Science And Technology Of China, China; 2.State Key Laboratory of Electronic Thin Films and Integrated Devices, China

We demonstrate a dual-band microwave photonic radar system based on photonic frequency doubling and de-chirped reception. An equivalent bandwidth of 12 GHz and a corresponding range resolution of 1.72 cm is achieved after data fusion.

ACP2025-0801-107

Long-term Stable Dual-loop Optoelectronic Oscillator Utilizing Phase-locked Loop

Xinyu Zhu[1], Xiyi Weng[1], Zhuoran Li[1], Xiang Liu[2], Wei Wei[1*], Weilin Xie[1], Yi Dong[1]

1.Beijing Institute of Technology, China; 2.Dongguan University of Technology, China

We propose a dual-loop optoelectronic oscillator with enhanced long-term stability based on the phase-locked loop. The output signal achieves a side-mode suppression ratio of 50dB. The overlapping Allan deviation reaches 1.9×10^{-13} at 1000s.

ACP2025-0801-112

Efficiency-Enhanced Optical Comb Generation Based on Achromatic Time Lens Assisted Cross-Phase Modualtion

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we have demonstrated generation of tunable-space optical combs via cross-phase modulation using rate-multiplied pulse trains. The pulse is pre-processed by an achromatic time lens for enhancing conversion efficiency of the optical comb up to 83%.

ACP2025-0801-138

Local Attention-Enhanced End-to-End Learning Framework for Photonic-Based W-band Fiber-mmWave Integrated Communication Systems

LiangtaoChen[1], Dong Boyu[1], Liu Yinjun[1], Ping Dianyuan[1], Li Yaxuan[1], Wei Yuan[2], Chi Nan[2], Zhang Junwen[2*]

1.Fudan University, China; 2.Fudan Univerisity, China

Fiber-mmWave integrated communication systems face significant challenges from complex channel characteristics and computational limitations of existing optimization approaches. This paper proposes a novel local attention-enhanced end-to-end learning framework that reduces computational complexity from $O(L^2)$ to $O(LW)$ while maintaining superior modeling capabilities. The framework integrates a model-driven transmitter, an adaptive channel model with local attention mechanisms for end-to-end training, and a neural receiver with nonlinear equalization. Experimental validation on a 96.5 GHz fiber-mmWave system demonstrates data transmission at 15 GBaud with GMI reaching 5.11 bits/symbol and AIR of 75 Gb/s, showing 0.13-0.24 bits/symbol improvement over baseline methods.

ACP2025-0801-144

Adaptive Noise Compensation for Optical Convolution Systems: A Machine Learning Retraining Approach

Xiyao Jia, Yixuan Zheng*, Yifu Xu, Shifan Chen, Yunping Bai*, Xingyuan Xu

The State Key Laboratory of Information Photonics and Optical Communications, School of Electronic Engineering, Beijing University of Posts and Telecommunications, China

We combined photonic convolution processor and electronic compute unit to achieve portrait segmentation, and proposed a noise retraining method for complex optical links to reduce the impact of noise on model performance.

ACP2025-0801-65

High-Performance Chaotic Signal Generation via Optical Heterodyning of Mutually Injected Semiconductor Lasers

Houlin Wang, Pei Zhou*, Yu Huang, Nianqiang Li

Soochow University, China

Using optical heterodyning of two mutually injected semiconductor lasers, we generate a high-performance chaotic microwave signal (35.91 GHz bandwidth, 9.69 dB flatness, TDS=0.057), demonstrating strong potential in random number generation, radar, and secure communications.

ACP2025-0813-15

A Channelized Multi-Microwave Frequency Measurement System Based on Frequency-to-Time Mapping

Ju Chen, Liangshun Zhao, Yue Zhang, Caili Gong*, Ying Zhan, Yongfeng Wei

Inner Mongolia University, China

A high-precision, ultra-wideband multi-channel microwave frequency measurement system based on FTTM, with 60GHz bandwidth, 36.62GHz/μs speed, 1MHz error, and image interference immunity.

ACP2025-0815-116

Modeling and Noise Impact Analysis of Electro-Optic Comb Time and Frequency Transfer System

Weihan Liang, Chenbo Zhang*, Yi Zou, Zhangyuan Chen, Xiaopeng Xie

Peking University, China

We performed simulation modeling and noise analysis of an electro-optic comb time–frequency transfer system. The impacts of laser linewidth, photodetector noise, modulator bias drift, and dispersion on system performance were investigated. This work aims to provide quantitative references for the system design and practical deployment of electro-optic comb time–frequency transfer systems, offering guidance for the selection of key components and the optimization of system parameters.

ACP2025-0815-118

A narrow-pulse laser recovery method based on non-synchronized linear optical sampling

Chengda Huo, Feng Tian*, Chuanji Yan, Jianwei Zhou, Jing Zhang, Meng Qiu

Beijing University of Posts and Telecommunications, China

A pulse recovery method based on software-synchronized LOS system is proposed. The method reduced the bandwidth and sampling rate requirements for the devices at the receiving end. An experiment sampling on self-developed ytterbium-doped fiber pulsed lasers is completed, the recovery result correlation coefficient achieve reach 0.9745 to the initial signal.

ACP2025-0815-130

Fast Signal Selection and Parallel Multi-Parameter Extraction Technology based on Optical Channelization

Rui Li, Yin He, Xukai Ji, Feifei Yin, Yitang Dai, Kun Xu
Beijing University of Posts and Telecommunications, China

fast signal selection and parallel multi-parameter extraction technology using optical channelization delivers 16-GHz instantaneous bandwidth in single scans, achievingparameter extraction at −76-dBm receiver sensitivity, ≤0.3-MHz frequency error, ≤40-ns time error, and ≤1-dB amplitude deviation.

ACP2025-0815-151

Photonic Architecture for Remote Measurement of DFS and AOA with Self-Interference Cancellation

Liangshun Zhao, Yue Zhang, Ju Chen, Ying Zhan, Caili Gong, Yongfeng Wei*
Inner Mongolia University, China

A photonic architecture based on stimulated Brillouin scattering is proposed for remote multi-parameter measurement of microwave signals. Compared with previous research, the architecture can not only realize the simultaneous measurement of Doppler frequency shift (DFS) and arrival of angle (AOA) without direction ambiguity, but also eliminate the self-interference signals.

ACP2025-0815-63

Low-Phase-Noise Widely Tunable Stepped-Frequency Microwave Carriers in a Dual-Pump Brillouin Cavity

Jiaxuan Wang, Yihan Wang, Jiangsen Ji, Yin Xu, Hualong Bao*
Soochow University, China

We demonstrate an ultra-low noise (-115 dBc/Hz @10 kHz) stepped-frequency microwave carrier tunable from 260-300 GHz, featuring 6.4 GHz scanning bandwidth and 10 × faster frequency hopping rates, meeting next-generation high-frequency requirements.

ACP2025-0815-77

Spectrum-Efficient RoF Link Using MRR-Based Phase Shifters for Signal Demultiplexing

chenhui Liu[1], Wenjie Xuan[1], Xiaoyang Che[1], Yu Liu[1], Junyi Zhang[1], Ruiqi Zheng[1], Jiejun Zhang[1*], Jianping Yao[2], Long Huang[1*]
1.Jinan University, China; 2.University of Ottawa, China

We propose and demonstrate a novel spectrum-efficient radio-over-fiber (RoF) link using a dual-drive Mach-Zehnder modulator (DD-MZM) to multiplex two radio-frequency (RF) signals with an identical RF carrier frequency at the transmitter and two microring resonators (MRRs) to demultiplex the two RF signals at a receiver. The proposed RoF link offers a two-fold increase in transmission capacity with a simple configuration and compensate chromatic dispersion at the same time.

ACP2025-0815-80

Ultrahigh-Precision Flash 3D Velocity Imaging

Shukang Xu, Junze Tian, Jiao Liu, Bin Wang*, Weifeng Zhang
Beijing Institute of Technology, China

We propose an ultrahigh-precision solid-state flash velocity imaging method based on optical coherent detection by leveraging mature CCD sensors. The proposed velocity imaging system exhibits an ultrahigh velocity measurement precision of 1 mm/s.

ACP2025-0816-4

Hybrid FSO and MMW Communication Systems with Simplified Structure and Low Phase Noise

Junjie Zheng, Yejun Liu*
Chongqing University of Posts and Telecommunications, China

We propose a hybrid free-space optical (FSO) and millimeter wave (MMW) communication systemwith simplified structure and low phase noise, which achieves notabletransmission performance even if the laserlinewidthreaches tens of MHz.

Track 6: Micro-, Nano-, and Quantum Photonics: Science and Applications

ACP2025-0723-4

Design of Heterogeneous Integrated Tunable Erbium-doped $LiNbO_3$-GeSbS waveguide laser

Chunxu Wang[1,2*], Bing Yue[1,2], Honglin Ji[1*], Juhao Li[1], Zhixue He[1]

1.Department of Circuits and Systems, PengCheng Laboratory(PCL), China; 2.School of Electronics and Information Technology & Guangdong Provincial Key Laboratory of Optoelectronic Information Processing Chips and Systems, Sun Yat-sen University, China

We propose a CMOS-compatible heterogeneous integrated tunable Er-doped $LiNbO_3$-GeSbS waveguide laser. The resonant cavity structure achieves a transmission loss of 0.3 dB/cm and wavelength tuning across the 1520–1590 nm, while the gain waveguide exhibits a gain of 2.1 dB/cm.

ACP2025-0728-13

Suspended Mid-Infrared Nanobeam Cavity based on Thin Film Lithium Niobate

Zehao Guo, Weixi Liu, Jingshu Guo, Yaocheng Shi[*]

Zhejiang University, China

We first demonstrate a suspended mid-infrared nanobeam cavity on thin film lithium niobite. Experimental results show -1.1 dB insertion loss, Q-factor of over 3000 and an extinction ratio of ~15 dB at 3.6 μm wavelength.

ACP2025-0728-18

High-Efficiency Phase-Change Beam Steering for Wavelength-Selective Optical Switching

Xiaoqi He[1], Yan Li[2], Yuru Li[2], Yanfeng Zhang[1,3], Zhaohui Li[4,5,6]

1.School of Electronics and Information Technology, Sun Yat-sen University, China; 2.School of Microelectronics Science and Technology, Sun Yat-sen University, China; 3.State Key Laboratory of Optoelectronic and Technologies, Sun Yat-sen University, China; 4.School of Electronics and Information Technology, Sun Yat-senUniversity, China; 5.Guangdong Provincial Key Laboratory of Optoelectronic Information Processing Chipsand Systems, Sun Yat-sen University, China; 6.Southern Laboratory of Ocean Science and Engineering, China

We propose a reconfigurable phase-gradient metasurface based on low-loss phase-change material $Sb_2Se_3$for dynamic beam steering. By leveraging the large refractive index contrast in Sb_2Se_3 phase-change, the metasurface generates a tunable phase gradient that enables wavelength-selective beam deflection with high efficiency. This approach provides a compact solution for wavelength-selective optical switches (WSSs), with promising applications in wavelength-division multiplexing (WDM) systems requiring dynamic spatial light control for reconfigurable photonic networks.

ACP2025-0730-17

Dynamics of soliton self-compression in silicon nitride waveguides

Xueying Sun, Hairun Guo[*], Qiankun Li, Yongyuan Chu, Chengbo Mou, Chaoqian Wei

Shanghai University, China

We demonstrate coherent supercontinuum (SC) generation in silicon nitride waveguide chips governed by soliton self-compression regime. Concurrently achieving octave-spanning supercontinuum with few-cycle pulses would benefit to applications from spectroscopy to time-resolved ultrafast detection.

ACP2025-0730-39

Design of a multi-spectral superconducting nanowire singlephoton detector with high efficiency and high speed

Dezhi Li[1*], Ziqi Gao[1], Yan Zhang[1], Kai Yang[1], Shen He[1], Xinyi Liu[2]

1.China Mobile Research Institute, China; 2.Beijing University of Posts and Telecommunications, China

The designed single photon detector shows absorption efficiencies of over 85% at the three target wavelengths of 1550 nm, 1310 nmand 1064 nm while the filling factor of nanowire is only 20%.

ACP2025-0731-118

Photorefractive-Induced Bias Drift Attack Against Continuous-Variable Quantum Key Distribution

Ziyan Zhou, Xuesong Xu, Yichen Zhang, Song Yu[*]

Beijing University of Posts and Telecommunications, China

We theoretically and experimentally demonstrate an attack on continuous-variable quantum key distribution. The attack exploits photorefractive-induced index changes, causing modulator bias drift, leading to overestimated secret key rates and ultimately compromising system security.

ACP2025-0731-5

Silicon nitride integrated electro-optic modulator based on transparent conductive oxides

Evgeniy Lotkov[1,2*], Alexander Baburin[1,2], Ali Amiraslanov[1], Kirill Buzaverov[1,2], Evgeny Sergeev[1,2], Evgeny Chubchev[2], Alexander Dorofeenko[2], Evgeny Tereshenkov[2], Evgeny Andrianov[2], Sergey Avdeev[1,2], Sergey Bukatin[1], Aleksey Kramarenko[1], Ilya Ryzhikov[1], Ilya Rodionov[1,2]

1.FMN Laboratory Bauman Moscow State Technical University, Russia; 2.Dukhov Research Institute of Automatics (VNIIA), Russia

Silicon nitride (SiN) is currently the most prominent platform for photonics in the visible and near-IR wavelength bandwidth. However, realizing fast electro-optic modulators, the key components of any integrated optics platform, remains challenging in SiN. Recently, transparent conductive oxides have emerged as a promising material for photonic integrated circuits. In this work, we take an important step towards combining the advantages of both platforms, reporting for the first-time high-speed indium tin oxide electro-optic modulators based on silicon nitride waveguides. We demonstrate a bandwidth higher than 1 GHz, 9.3-um-length active element and an insertion loss of 5.7 dB for a 300 nm-thickness SiN waveguide platform. Simulation results of optimized device designs indicate that further improvements are possible, offering promising opportunities for silicon nitride photonic integrated circuit platform combined with indium oxide-based layers.

ACP2025-0731-52

Extreme ultraviolet interference lithography based on table-top HHG light source

Mingjie Yao[1], Xia Yu[1*], Hao Li[2], youyang zhou[3], xiaoshi zhang[3]

1.Beihang University, China; 2.Singapore Institute of Manufacturing Technology, China; 3.Yunnan University, China

We present a table-top Extreme ultraviolet interference lithography (EUV-IL) system at 29.6 nm central wavelength of high harmonic generation radiation. The EUV-IL generates periodic aerial images of 22 nm half-pitch (HP) at the two-mirror interference system. In this letter, we investigated the influence of femtosecond EUV laser on high resolution interference pattern. The simulation results of the interference pattern are discussed

ACP2025-0731-79

Non-Line-of-Sight Target Recognition Based on Multi-Detection Points Collaboration Strategy

Qi Zhang, Yue Zheng*, Guangyun Shang, Zhonghao Xi, Yongjian Liu

Beihang University, China

Based on active NLOS system, proposes multi-detection points collaboration with SPAD array and CNN, analyzes key variables' impact; single/multiple target experiments hit 92% accuracy, with great potential.

ACP2025-0731-96

CNN-Based Sub-Pixel Phase-Error Model for LCOS-SLMs

Yuanhao Jiang*, Tomohiro Maeda, Hideyuki Sotobayashi

Aoyama Gakuin University, Japan

We propose a CNN-based model to learn LCOS-SLM sub-pixel phase-distortion patterns. The proposed network predicts 100×100 distorted phase distributions from 5×5 input patterns, achieving 94% agreement with measurements.

ACP2025-0801-10

Evaluation of Q-factor degradation in high-Q silicon nanocavities induced by electron and gamma-ray irradiation

Ayumi Ishihara[1*], Yasushi Takahashi[2]

1.Osaka Metropolitan University, Japan; 2.Okayama University, Japan

We investigated radiation effects on high-Q silicon nanocavities. Electron and gamma-ray irradiation were performed, and Q-factor degradation was quantitatively evaluated. Electron beams induced optical loss, while gamma rays showed negligible impact.

ACP2025-0801-136

Ultra-low loss and ultrabroadband Si_3N_4 waveguide-crossing using an inverse design method

Yan Fan, Haoran Wang, Ziyang Xiong, Hao Deng, Tong Lin*, Zhenhua Ni

School of electronic science and engineering Southeast university, China

A silicon nitride waveguide crossing is demonstrated using a single-hidden-layer neural network-based inverse design. It achieves ultra-low excess loss and 375 nm bandwidth from O to L band. Experimental validation confirms excellent crosstalk suppression and scalability for photonic integration.

ACP2025-0801-152

An On-Chip Tunable Dispersion Compensator Based on 8^{th}-Order FIR Architecture

Shuo Lang[1], Yumeng Liu[1], Zihan Bai[1], Zhangfeng Ge[2], Huimin Du[1], Tiantian Li[1*]

1.Xi'an University of Posts & Telecommunications, China; 2.Peking University Yangtze Delta Institute of Optoelectronics, China

This paper introduces the design andimplementation of an on-chip dispersion compensator based on8^{th}-order FIR architecture. Experimental results show that ithas a dispersion tuning range from -190 ps/nm to +220 ps/nm.

ACP2025-0801-178

Design and Implementation of a Tunable On-Chip Multi-Channel Optical Filter

Zihan Bai[1], Yumeng Liu[1], Shuo Lang[1], Zhangfeng Ge[2], Huimin Du[1], Tiantian Li[1*]

1.School of Electronic Engineering Xi'an University of Posts & Telecommunications, China; 2.Peking University Yangtze Delta Institute of Optoelectronics, China

An on-chip tunable optical filter with multi-channel operation is demonstrated, exhibiting a 0.275 nm FSR, center wavelength tunable up to 45% of the FSR, and extinction ratio adjustable between 12.1 and 17.5 dB; MZI phase tuning enables flexible multi-port power distribution with stable spectra.

ACP2025-0801-186

Performance Analysis of Silicon Microring Resonators using Newtonian Cooling and Non-Fourier Heat Conduction Models

Menglong He*, Matthias Thiele, Abdou Shetewy, Jens Lienig, Kambiz Jamshidi*

Technische Universität Dresden, Germany

We study and compare thermal dynamics and the corresponding nonlinear model (temporal and steady-state response) of active silicon microring resonators using the traditional Newtonian cooling approach and the non-classical non-Fourier heat conduction framework.

ACP2025-0801-208

Strong 1112 nm Dispersive Wave Generation in z-cut TFLN Waveguide for Potential Ytterbium Clock Applications

Lingfang Wang*, Tianyou Tang, Xiang Bai, Zhibang Guo, Lin Chen

University of Electronic Science and Technology of China, China

A strong 1112 nm dispersive wave was generated in a 1 μm-wide z-cut TFLN waveguide, showing potential for integrated photonic-chip optical clocks through supercontinuum evolution under varying pump power and polarization.

ACP2025-0801-48

Polarization-Independent and Efficient Second Harmonic Generation on Thin-Film Lithium Niobate

Hanwen Li, Weixi Liu, Liu Liu, Daoxin Dai, Yaocheng Shi*

Zhejiang University, China

We propose a polarization-independent second harmonic generation device that achieves theoretical TM_0-TM_0 conversion efficiency exceeding 3950 $\%W^{-1}cm^{-2}$ in the 1540–1560 nm range, with a maximum of 4220 $\%W^{-1}cm^{-2}$, which represents 98% of the TE_0-TE_0 efficiency.

ACP2025-0801-50

Broadband Filtering in Femtosecond Laser-Driven Thin-Film Lithium Niobate Microresonator

Lingfang Wang*, Tianyou Tang

University of Electronic Science and Technology of China, China

Leveraging TFLN's strong nonlinearity and polarization-dependent effects, we demonstrated spectral bandwidth tuning of ~300 nm and extinction ratio of ~21 dB, which enabled applications in tunable spectral filtering and on-chip signal processing.

ACP2025-0801-57

Inverse design of on-chip optical filter by tandem neural networks

Xianxian Jiang, Weijie Xu, Junjia Wang*

Southeast University, China

We propose on-chip optical filter implemented through nanopixel architecture, which was inverse designed using tandem neural networks. By simply etching a few squares on a slab waveguide, the device can achieve arbitrary transmission spectra across the 1530–1570 nm range. The measured trans? mission spectral response of the device achieved an extinction ratio exceeding 3 dB, while demonstrating 80% similarity to thetarget response.

ACP2025-0801-76

High-Fidelity OFDM Signal Demodulation Enabled by Optical-Sample-and-Hold Photonic ADC

Le Zhang, Ruiheng Qin, Na Qian, Xinpei Chen, Jiaxing Wu, Weiwen Zou*

Shanghai Jiao Tong University, China

This work demonstrates an all-optical sample-and-hold technique that eliminates timing mismatches in time-interleaved photonic analog-to-digital converters by converting sampled points into sustained temporal segments via optical true-time delay.

ACP2025-0812-1

Frequency-reconfigurable optomechanicalAiry-beam generator

Pengju Kuang, Ning Fu, Yongjun Huang

University of Electronic Science and Technology of China, China

This work presents the theoretical framework and demonstration of frequency-reconfigurable Airy beam generator utilizing optomechanical meta-device. We introduce a high-efficiency meta-atom design that enables dynamic modulationsofreflection amplitude and phase through external optical excitation.

ACP2025-0813-1

808 nm five-junction VCSEL array chip for high-power applications

WangMengqi[1,2], YuLei[1,2*], YangYibo[1,2], XinYifan[1,2], WangYufei[1,2], WangPengfei[1,2], ZhangYejin[1,2], PanJiaoqing[1,2*]
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2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China

The 808 nm VCSEL is of considerable application value across a range of fields. In this work, an electro-optical efficiency of 40.14% and a peak output power of 505 W were attained.

ACP2025-0813-8

Optomechanicaloscillation and Drude electron-hole plasma in Silicon Photonic crystal cavity

Pengju Kuang, Yongjun Huang
University of Electronic Science and Technology of China, China

In this paper, the different cavity dynamic Phenomena with optomechanical oscillation and Drude electron-hole plasma are observed and discussed for a two-dimensional (2D) Photonic crystal cavity with suspended beams.

ACP2025-0814-25

Optical Frequency Comb Control via Staircase and Bistability Effects in Cavity Optomechanical-Thermal Systems

Xiangming Xu, Huatao Zhu, Shuwen Chen, Feiyu Li, Xin Zhang
Information Support Force Engineering University, China

Staircase and bistability effects enable discrete switching of optomechanical frequency combs, achieving 27% tooth count variation with fixed 19.8-MHz spacing

ACP2025-0814-28

Reconfigurable multifunctional nano-photonic device for multiband thermal radiation management

Mingyu Luo*, Zhengyu Zhang, Chao Lu
The Hong Kong Polytechnic University, Hong Kong, China

In this paper, a multi-functional nanostructure with phase change material (PCM) is proposed to achieve tunable infrared detection, radiation cooling and infrared (IR)-laser compatible camouflage. The proposed device can achieve a higher rate of more than 50% laser absorption at 10.6μm while ensuring the average infrared emissivity below 20%. It can be observed from Fig. 1 that the absorption rate of the device in the atmospheric window is significantly reduced, especially at 3-5 μm, the maximum absorption rate is significantly reduced from 95% to 22%, and the average absorption rate is also reduced to about 15%.

ACP2025-0815-1

Long-WaveInfrared Broadband Quarter-Wave Plate Based on Silicon Metasurface

Wenkai Lu[1], Ting Chen[2], Xiaowei Guan[2], Yaocheng Shi[1*]
1.Zhejiang University, China; 2.Jiaxing Research Institute of Zhejiang University, China

Broadband quarter-wave plates aredesignedusing metasurfacecomposed of silicon micro-pillars featuringatruncated elliptical cone. A broadband width of~1.2 μmand a polarization conversion efficiency exceeding 98% are achieved inlong-wave infrared band.

ACP2025-0815-47

Fast Fiber Alignment System for Silicon Photonics Using Model Fitting Approach

Yisu Yang*
Beijing University of Posts and Telecommunications, China

We demonstrate a model fitting approach in fiber-to-chip automatic alignment system. A reduction of 91.4% of number of measurementof traditional alignment can be achieved without degradingthe alignment quality.

ACP2025-0815-8

Multioctave SFDR Stability Characterization in Quartz-based TFLN Modulators up to 50 GHz

Jingmei Zhang, Zihan Tao, Yunhao Zhang, Jianyang Cai, Liyuan Yao, Haowen Shu*, Xingjun Wang*, Yandong He*
Peking University, China

We sysmatically analyze the frequency related linearity andspurious-free dynamic range (SFDR)variations in several mainsteam electro-optical modulators, including silicon modulator and thin-film lithium niobate (TFLN) modulators. Ultra-wideband experimental measurements over an ultra-wideband range up to 50 GHz are performed for the first time to investigate and verify the broadband SFDR stability of a large bandwidth TFLN modulators based on low-loss quartz substrates, result in a consistent SFDR of 97-99 $dB \cdot Hz^{2/3}$.

Track 7: Photonic Sensors & Bio-Photonics

ACP2025-0726-13

A High-Sensitivity Near-Infrared Diffuse Reflectance Sensor for Non-Invasive Glucose Monitoring: Design Principles and Experimental Validation

Wenbo Liu, Jin Liu, Jiayu Chen, Di Sun, Kexin Xu, Tongshuai Han*
Tianjin University, China

This study presents a near-infrared diffuse reflectance sensor optimized for human glucose monitoring, achieving high sensitivity at 1550 nm and capable of detecting changes in human skin glucose concentration as small as 0.37 mM.

ACP2025-0726-3

An Optical Waveguide Surface Plasmon Resonance Sensor for Low Refractive Index Sensing

Kemin Li, Yongzheng Liang, Huanbin Qiu, Jiamin Mou, Haolong Huang, Qingming Chen*
Sun Yat-sen University, China

This work develops a highly sensitive optical waveguide SPR sensor for low refractive index (RI) sensing. A high sensitivity of 11000 nm/RIU has been achieved for RI from 1.33 to 1.36, with 10 times enhancement.

ACP2025-0726-4

A Dye-doped Polymer Fiber Based Strain Sensor

Yufei Ma, Xiaoshi Li, Yongzheng Liang, Yikang Peng, Boran Xie, Qingming Chen*
Sun Yat-sen University, China

This work presents a dye doped polymer fiber for strain sensing. Its absorption loss is proportional to the fiber elongation length. The elongation of 165% and detection sensitivity of 72.8 dB/cm have been demonstrated.

ACP2025-0729-17

Application of Correlation OTDR with High-Resolution Localization in Vehicular PONs

Zhaojun Xu[1,2], Wu Liu[1,2*], Yaoyang Zhang[1,2], Yan Zuo[1,2], Ming Luo[1,2]
1.National Key Laboratory of Optical Communication Technologies and Networks, China; 2.China Information and Communication Technologies Group Corporation, China

We propose a correlation detection-based scheme for fault monitoring and localization in vehicle-mounted PON environments, achieving 4 cm spatial resolution and -30 dBm sensitivity. Reflectivity variations under temperature fluctuations and fiber breaks are experimentally analyzed.

ACP2025-0730-26

Chalcogenide-based Optical Micro-ring Sensor Array Patch for Precise Blood Pressure Monitoring

Xiaokai Cai[1], Zhangyi Sun[1], Bonan Chen[1], Jingshun Pan[2*], Zhaohui Li[1,3*]
1.School of Electronics and Information Technology and Guangdong Provincial Key Laboratory of Optoelectronic Information Processing Chips and Systems, Sun Yat-sen University, China; 2.School of Information and Optoelectronic Science and Engineering, South China Normal University(SCNU), China; 3.Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai), China

We demonstrate an optical pulse-sensing patch employing 10 chalcogenide microring resonators that precisely monitors pulse waveforms, heart rate, and blood pressure, achieving 4 mmHg deviation from commercial monitors through accurate arterial waveform analysis.

ACP2025-0730-36

A Power Transmission Line Monitoring Scheme Using Correlation-Based OTDR

Hanwen Liu[1], Chenwei Zhu[2], Xiang Li[2*]
1.School of Optical and Electronic Information, Huazhong University of Science and Technology, China; 2.School of Mechanical Engineering and Electronic Information,China University of Geosciences, China

Using correlation detection, we propose a dynamic OPGW tension monitoring scheme that achieves 1 cm precision in fault location and stretching sensing. The scheme can achieve icing and galloping monitoring at sampling rates below 10 Hz.

ACP2025-0730-40

High Spatial Resolution Distributed Twist Sensor Based on OFDR in Spun Fiber

Yalin Gao[1], Shuyan Chen[1], Zhiyong Zhao[1*], Zhuyixiao Liu[1], Weijun Tong[2], Ming Tang[1]
1.School of Optical and Electronic Information and Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, China, China; 2.Weijun Tong is with the School of Optical Information and Energy Engineering, School of Mathematics and Physics,Wuhan Institute of Technology,Wuhan, China, China

We proposed and experimentally demonstrated a high spatial resolution distributed twist sensor based on OFDR in spun fiber, which is promisingin applications such as structural safety monitoring, medical intervention, and biomimetic design, etc.

ACP2025-0730-43

Lightweight Multi-Sensor Recognition Network for Optical Sensing System

Yuhao Wang, Yong Zuo*, Yan Wang, Xiaobin Hong, Jian Wu
Beijing University of Posts and Telecommunications, China

A lightweight multi-sensor recognition network is proposed, which integrates camera and lidar information to improve the robustness of object recognition in optical sensing systems.

ACP2025-0731-28

Dual-mode micro-ring resonator for gas and temperature sensing

Qiyue Lang[1], Rongxiang Guo[2], Zunyue Zhang[1], Tiegen Liu[1], Jiaqi wang[3*], Hon Ki Tsang[4], Zhenzhou cheng[1*]
1.Tianjin university, China; 2.Tianjin University, China; 3.Shenzhen University, China; 4.The Chinese University of Hong Kong, Hong Kong, China

A dual-mode microring resonator for gas and temperature sensing. CO_2 and temperature sensitivities are measured as 0.422 pm/% and 0.081 nm/K for the TE_0 mode and 0.591 pm/% and 0.079 nm/K for the TE_1 mode.

ACP2025-0731-35

Comparisive Analysis of Longitudinal Power Monitoring Techniques for PDL Monitoring

Peiyun Ge, Yichao Wang, Tianrun Sun, Zili Fang, Lixia Xi, Xiaoguang Zhang
Beijing University of Posts and Telecommunications, China

We compare the performance and complexity of the three LPM methods for PDL localization, and showing that these techniques capture the distributed lumped PDL values, rather than the true local PDL at each element.

ACP2025-0731-42

Point Cloud Semantic Segmentation Method Based On Edge Feature Enhancement

Yan Wang, Yong Zuo*, Xiaobin Hong, Jian Wu, Yuhao Wang
Beijing University of Posts and Telecommunications, China

Accurate semantic segmentation of LiDAR point clouds is a critical component for perception in autonomous driving, robotics, and intelligent sensing systems. However, the irregular sampling pattern and sparsity of LiDAR data often lead to edge degradation and insufficient context modeling in existing lightweight segmentation networks. To address these challenges, this paper presents EFE-PCSS, an edge feature -enhanced framework specifically designed for LiDAR sensing data. The proposed architecture integrates a bilateral convolution module that performs spatial - feature dual-path interaction, guided by dynamically weighted kernels constrained by geometric consistency and feature similarity, effectively preserving fine structural boundaries in sparse LiDAR scans. Additionally, a channel - spatial attention mechanism and cross-layer dynamic fusion strategy are incorporated to enhance both local detail capture and global contextual reasoning. Extensive experiments on three representative LiDAR benchmarks - SemanticKITTI, Semantic3D, and S3DIS - demonstrate consistent mIoU improvements of 3.9%, 2.6%, and 3.6%, respectively, while maintaining real-time performance. These results highlight the effectiveness and deployment potential of EFE-PCSS in real-world LiDAR-based perception systems.

ACP2025-0731-62

ADDIN CNKISM.UserStyleInvestigation of Internal Thermal Distribution in Pouch Lithium-ion Batteries during Charging and Discharging

Quan Xu[1,2], Min Zhang[3], Mengmeng Chen[1,3*], Ye Chen[4], Shaohua Guo[3], Fei Xu[3]
1.Nanjing Xiaozhuang University, China; 2.Hanjiang No.1 High School Of Yangzhou, China; 3.Nanjing University, China; 4.Nanjing University of Aeronautics and Astronautics, China

A coupled electrochemical-thermal model based on the pseudo-two-dimensional (P2D) structure of lithium-ion batteries was established using Multiphysics to simulate and analyze the spatial and temporal distribution of temperature during battery operation. Based on the simulation results, critical locations that comprehensively represent the thermal characteristics of the battery were selected for temperature monitoring. Accordingly, a temperature sensing system based on fiber Bragg grating (FBG) was designed and implemented. FBG sensors were embedded at the anode, cathode, and the central symmetry axis of pouch-type lithium-ion batteries to collect and analyze internal temperature data. Temperature monitoring was carried out under various current conditions for batteries equipped with embedded FBG sensors. Experimental results revealed a characteristic double-peak fluctuation in internal temperature during a full charge-discharge cycle—rising, then falling, and again rising before finally decreasing, reaching its maximum at the cycle's end. Long-term operational tests demonstrated that the FBG sensors, while ensuring normal charge and discharge cycles, reliably provided real-time, high-precision measurements of internal temperatures. These findings are consistent with results obtained from simulation analysis. The proposed methodology offers robust technical support for the optimization and advancement of lithium-ion batteries, significantly enhancing research and maintenance efficiency.

ACP2025-0731-64

Study on the SNR and demodulated phase precision of Φ-OTDR with Pre-amplification

Qian Zhang[1], Xinyu You[1], Caixiao Ouyang[2*], Zhisheng Yang[1], Xiaobin Hong[1], Jian Wu[1]
1.Beijing University of Posts and Telecommunications, China; 2.Wuhan Vocational College of Software and Engineering, China

The SNR and demodulated phase precision in heterodyne-detection pre-amplification Φ-OTDR is modelled and experimentally demonstrated. Results show that Φ-OTDR does not always benefit from the pre-amplification scheme, depending on the noise condition of the photodetector.

ACP2025-0731-77

High-performance Vibration Sensing Based on Subband Phase-Shift Transform in Integrated Sensing and Communication System

Yan Zuo[1,2], Wu Liu[1,2*], Yafeng Cheng[3], Xiang Li[3], Ming Luo[1,2]

1.National Key Laboratory of Optical Communication Technologies and Networks, China; 2.China Information and Communication Technologies Group Corporation, China; 3.School of Mechanical Engineering and Electronic Information, China University of Geosciences, China

We experimentally propose a high-performance ISACsystem which suppresses interference fading in Φ-OTDR, achieving a 82.8 pε/sqrt (Hz)strain sensitivity and a 10 m spatial resolution, while simultaneously supporting 100 Gbps DP-QPSK transmission. Hz

ACP2025-0801-139

Fibre Vibration Sensing and Localization with Cross-Correlation based Neural Network in a Practical Bidirectional Optical Transmission System

Wanxin Zhao[1,2], Sen Shen[2], Vaigai Yokar[2], Xiaoguang Zhang[1], Lixia Xi[1], Shuangyi Yan[2], Dimitra Simeonidou[2]

1.Beijing University of Posts and Telecommunications, China; 2.University of Bristol, United Kingdom

We present a CC-CNN localization algorithm for vibration detection over Bristol's urban fibre network, achieving an 8-km spatial resolution and outperforming pure cross-correlation methods in accuracy and robustness. High-precision time synchronization over the fibre link with aroud 200-ns jitter enables precise localization.

ACP2025-0801-170

Helium Ion Irradiation Testing of a Photonic Charge Sensor

Wataru Takahama[1], Ayumi Ishihara[1], Yuta Kanemaru[1], Rikuto Ichinose[1], Kohtaku Suzuki[2], Yasushi Takahashi[3*]

1.Osaka Metropolitan University, Japan; 2.The Wakasa Wan Energy Research Center, Japan; 3.Okayama University, Japan

To evaluate its feasibility for use in space, we investigated the optical response of the photonic charge sensor when exposed to helium ions. The optical output from the sensor decreased in proportion to the helium ion dose. Even after exposure to a helium ion dose equivalent to more than 1000 years of radiation in low Earth orbit, the sensor maintained its functionality.

ACP2025-0801-184

Ultrasensitive Detection of Extracellular Vesicles Using a Microbubble Resonator

Yu Zhang, Songyi Liu, Xiaoying He*, Daquan Yang*

Beijing University of Posts and Telecommunications, China

We present a label-free microbubble resonator (MBR) biosensor for ultrasensitive extracellular vesicles (EVs) detection, which has a quality factor of ~10^6 and achieves a detection limit of 6 particles/mL, enabling rapid and sensitive EV analysis.

ACP2025-0801-53

Development of AGF-OFDR-based Distributed Temperature Measurement Technology for Flexible Pouch Sodium-Ion Battery Cell

Zhi Wang, Yinan Ma, Dan Li, Guo Zhu, Junxian Hou*, Fei Liu, Xian Zhou*

University of Science and Technology Beijing, China

This study employs OFDR and AGF for high-resolution thermal monitoring of sodium-ion batteriy, revealing internal resistance differences and enhancing thermal research.

ACP2025-0801-54

Integrated Reconstructive Spectrometer Based on a Si_3N_4-Si dual-layer Platform

Lin Xiao

Harbin Institute of Technology, China

We propose and numerically investigate a dual-layer Si_3N_4-Si integrated spectrometer with 40 pm resolution spanning the 1500-1600 nm wavelength range. The device is implemented in a 29 × 29 μm^2 footprint with 300 sampling channels.

ACP2025-0811-7

High-Precision Micro-Displacement Measurement Based on F-P Interferometer with Improved Quadrature Demodulation Algorithm

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In this work, a high-precision micro-displacement measurement based on F-P interferometer is proposed and experimentally demonstrated. Combined with the improved orthogonal algorithm, the system achieves 23-pm resolution and 9-nm precision.

ACP2025-0812-8

Implementation of Medical Monitoring Duplex System based on SLIPT

Huilin Ni, Jizhou Zhuang, Yan Zhao, Lipeng Qiu, Yihong Wen, Shaolong Wu
Sochow University, China

This paper presents the design and implementation of a dual-mode medical monitoring system, achieving simultaneous visible light information and power transmission in the downlink and infrared heart rate data transmission in the uplink.

ACP2025-0813-14

Plasmonic-Enhanced Annular Fiber Grating for Simultaneous Refractive Index and Temperature Sensing

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This study introduces a plasmonic-enhanced annular fiber grating biosensor that simultaneously excites Bragg and cladding resonances for dual temperature/RI sensing. The AuNP-functionalized design enhances RI sensitivity through nanoscale plasmonic effects, enabling precision environmental monitoring.

ACP2025-0814-33

High-order cladding mode excited by medium-period chiral fiber gratings

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Shanghai University, China

We propose the fabrication of a medium-period chiral fiber grating using an automated CO_2-laser processing system. With a grating period of 48 μm, the 22nd-order cladding mode was successfully excited.

ACP2025-0814-35

A ConvNeXt-Based Method for High-Precision Event Recognition in Φ-OTDR Sensing Systems

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This work proposes a ConvNeXt-based approach for Φ-OTDR vibration event recognition, achieving 95.1% accuracy and significantly outperforming SVM and CNN methods, demonstrating strong potential for high-performance distributed optical fiber sensing applications.

ACP2025-0814-36

Torsion Sensing Characteristics of Long-Period Fiber Grating Written in Preset Twisted Double Cladding Fiber by CO_2 Laser

Lu Chen, Siyu Chen, Xiaolong Fan, Hang Su, Chengbo Mou, Yunqi Liu[*]
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We demonstrate a torsion sensor based on a CO_2-laser-inscribed preset twisted LPFG in double cladding fiber. Experiments show that its torsion sensitivity is enhanced compared to conventional LPFG.

ACP2025-0815-104

Nanocavity Sensing Platform for WaterbornePathogen Detection: 2D Photonic Crystal Approach

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A compact and highly sensitive two-dimensionalphotonics crystal-based nanocavity optical sensor has been designedfor the detection of waterborne bacteria. The proposedsensor utilizes a C-band (1500 nm) optical source and wasnumerically analyzed for the detection of waterborne bacterialike Vibrio cholera, Escherichia coli, and Shigella flexneri,which are found in water. Numerical simulations demonstrate amaximum sensitivity of 878 nm/RIU and a high-quality factor(Q) of 956, enabling precise detection. The sensor also achievesa signal-to-noise ratio (SNR) of 40 and a response time of0.0180 ps, respectively, indicating strong performance in practicalenvironments.

ACP2025-0815-15

SPR-based PCF Internal Sensor for the Early-Stage detection of Skin Cancer

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We propose a SPR-based PCF internal sensor for the detection of skin cancer cells at an early stage. This sensor has the simplest design with circular air holes. Gold (Ag) and titanium (TiO_2) are used as plasmonic materials to increase sensitivity. The measured values are high sensor resolution (SR), which is $5\,10^{-5}$ RIU, improvised signal-to-noise ratio (SNR) of 1.429, improved sensitivity of 2000 nm/RIU and detection limit (DA) of 0.0286 nm^{-1}. Due to its exceptional detecting capabilities and simple design, the aforementioned sensor is suitable for a variety of biosensing applications, particularly the early identification of skin cancer cells.

ACP2025-0815-38

LHJA-YOLO: A Semiconductor Laser Chip Damage Detection Method Based on Lightweight Detection Head and Joint Attention Mechanism

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We propose a novel damage detection method for semiconductor laser chips.Experimental evaluations indicate that the proposed modelachievesimprovements of 0.4% in mAP@0.5 and 1.5% in mAP@0.5:0.95, while reducing time complexity by 32%.

ACP2025-0815-90

Multi-Parameter Sensor Based on Cascaded Helical Long-Period Gratings in Polarization-Maintaining Fiber

Li'ao Zuo[1], Siyu Chen[1], Xiaolong Fan[1], Yuehui Ma[1], Hang Su[1], Yunqi Liu[1*]

Shanghai University, China

We propose a multi-parameter sensor based on a cascaded helical long-period grating in polarization-maintaining fiber that can simultaneously measure temperature, surrounding refractive index, strain, and torsion.

ACP2025-0816-1

Signal Separation Using Deep Non-negative Tensor Factorization and Convolutional Reconstruction Networks in Distributed Optical Fiber Sensing

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This paper proposes a signal separation method for distributed optical fiber sensing based on deep non-negative tensor factorization and convolutional reconstruction networks. It outperforms CRNN-A and TFA-DRNN models in scale-invariant signal-to-distortion ratio and correlation coefficients.