Best Student Paper Award

13:30-15:30 • November 05, 2023 • Sunday
Best Student Paper Award I
Presider: Jianji Dong, Huazhong University of Science and Technology, China

13:30-13:45 • ACPPOEM-0728-11
Integration of III-V Quantum Dot Lasers and Silicon Waveguides on SOI
Bo Yang
Institute of Physics, CAS, China
We embedded InAs QD lasers on trenched SOI, enabling monolithic integration with butt-coupled waveguides. High-performance lasers with max output power of 6.8 mW and -6.7 dB coupling efficiency achieved.

13:45-14:00 • ACPPOEM-0728-15
Joint Self-Homodyne Coherent Transmission and Distributed Vibration Detection Using a (1+8) Multicore Fiber
Haoze Du[1], Mingming Zhang[1], Zhiyong Zhao[1], Siqi Yan[1], Chen Yang[2], Ming Tang[1]
1.National Engineering Laboratory for Next Generation Internet Access System, School of Optical and Electronic Information,Huazhong University of Science and Technology, China; 2.State Key Laboratory of Optical Fiber and Cable Manufacture Technology, Yangtze Optical Fiber and Cable Joint Stock Limited Company (YOFC) R&D Center & Optics Valley Laboratory, China
The self-homodyne coherent transmission and distributed vibration detection are realized simultaneously on a (1+8) MCF, which is characterized by 1 polarization-maintaining central core and 8 side cores. The effect of the continuous wave light power used for polarization detection on the signal is also discussed.

14:00-14:15 • ACPPOEM-0729-10
Design and Fabrication of a Seven-mode Mode-mismatching Photonic Lantern for Mode Purification from Multi-mode Pump Sources
Tiecheng Jin, Yan Li, Jifang Qiu, Xiaobin Hong, Hongxiang Guo, Jian Wu
State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China
Pump light is the energy source for Er-doped Fiber Amplifiers (EDFAs) and an essential component for long-distance fiber optic communication systems. We have designed a Mode-Mismatching Photonic Lantern (MMPL) in the 980nm band, to achieve low-loss coupling from a single-channel, multi-mode pump source to a multi-channel, single-mode pump source, providing a multi- channel source for EDFAs. Through experiments, we have demonstrated the feasibility of the design.

14:15-14:30 • ACPPOEM-0729-3
O-band TOSA enabled 100 Gbaud PAM-8 Transmission over 2 km SSMF with FFE
Hailin Yang[1], Meng Xiang[1], Ruitao Wu[1], Wenzhuo Cheng[1], Qin Li[1], Gai Zhou[1], Li Zhang[2], Songnian Fu[1], Yuwen Qin[1]
1.Guangdong University of Technology, China; 2.High Speed and High Frequency Lab, Huawei Technologies Co. Ltd, China
We experimentally demonstrate 100 Gbaud PAM-8 signals intensity modulation and direct detection (IM-DD) transmission over 2 km standard single-mode fiber (SSMF), based on self-developed O-band transmitter optical sub-assembly (TOSA) with a 3dB bandwidth of 60 GHz. Considering the threshold of 20% soft-decision forward error correction (SD-FEC), a photonic data-center interconnection with net bit-rate of 250 Gbit/s is achieved by only feed-forward equalizer (FFE).

14:30-14:45 • ACPPOEM-0731-151
Field Trial of Privacy-preserving Resource Allocation in Multi-domain Optical Networks Based on Federated Reinforcement Learning
Xiaoya Zhang, Rentao Gu, Jiangshan Dong, Jiyan Chen, Weijing Sang, Chuang She
Beijing University of Posts and Telecommunications, China
We propose and demonstrate federated reinforcement learning enabled multi-domain optical networks resource allocation in China's national network across over 2420 km, saving 30% decision time and obtaining even better optimal configuration without sensitive information disclosure.

14:45-15:00 • ACPPOEM-0731-171
Intelligent Intra- and Inter-Channel Nonlinearity Compensation for Terabit-per-lambda 16QAM Long-Haul Transmission
Xiansong Fang[1], Lingjun Zhou[1], Yixiao Zhu[2], Jiayu Zheng[1], Xiang Cai[1], Fan Zhang[1,3]
1.Peking University, China; 2.Shanghai Jiao Tong University,China; 3.Peng Cheng Laboratory, China
We experimentally demonstrate the combination of learned modified DBP and adaptive equalizer to compensate for intra- and inter-channel nonlinearity, in an 8×125Gbaud 16QAM system over 1600km SSMF, showing a 97.3% complexity reduction compared to DBP-64.

15:00-15:15 • ACPPOEM-0731-66
Exploring the Neural Organoid in High Definition: Physics-Inspired High-Throughout Super-Resolution 3D Image Reconstruction
Davit Khutsishvili, Yuanzheng Ma, Zitian Wang, Xun Guan, Shaohua Ma
Tsinghua University, China
Organoids serve as a versatile platform for biomedical research, including drug screening, disease progression, cancer,

developmental, and mechanobiology studies. However, precise 3D modeling of organoids remains a formidable challenge due to the complexity of tissue architecture, resolution limitations of confocal microscopy, and the time and labor-intensive process of acquiring data to achieve peak results. In this paper, we propose a novel strategy named LayerLink to enhance 3D structure of Neural Organoids' TUJ1 fluorescently labeled nerve fibers using neighboring layers of stacked 3D image. By leveraging the Beer-Lambert law, we link each vertical layer to its neighboring layers through a blending process, forming the input for a super-resolution diffusion model to reconstruct the entire volume. The reconstructed layers achieve 11.02% improvement over conventional deep learning method with a peak signal-to-noise ratio of 22.46. Notably, the reconstructed nerve fibers and fascicles in the vertical sections exhibit remarkable continuity. This precise modeling algorithm shows great promise for high-resolution monitoring of organoids and tissues exhibiting continuous fine structures. Furthermore, it holds potential for advancing our understanding of cell-to-tissue-to-organ interactions and advancing 3D tissue bioprinting techniques in the future.

15:15-15:30 • ACPPOEM-0731-70
Flexible and High-fidelity Concurrent Dual-band Delta-sigma Modulator for Diverse Applications Convergence
Zijun Yan, Yixiao Zhu, Yikun Zhang, Yimin Hu, Gengming Lin, Qi Wu, Ziyu Cheng, Weisheng Hu
Shanghai Jiao Tong University, China
We propose and experimentally demonstrate a concurrent dual-band delta-sigma modulation for fronthaul. The proposed modulator can flexibly adjust the center frequency of each passband with ~3.0-dB SNR improvement, supporting 2.67GHz 1024-QAM transmission over 10-km SSMF.

15:30-15:45 Coffee Break

15:45-18:30 • November 05, 2023 • Sunday
Best Student Paper Award II
Presider: Jianji Dong, Huazhong University of Science and Technology, China

15:45-16:00 • ACPPOEM-0731-90
High Resolution Millihertz Fibre-optic Strain Sensor Based on Time Delay Interferometry
Ke Ai, Cunzheng Fan, Junfeng Chen, Hao Li, Zhijun Yan, Qizhen Sun
Huazhong University of Science and Technology, China
The frequency drift of lasers is one of the most significant source of phase noise in fiber-optic sensing systems. Time delay interferometry (TDI) in gravitational wave detection mission can effectively suppress the frequency noise of laser. We applied TDI to fiber-optic sensing systems and achieved 80 dB noise floor suppression at 10 mHz and the strain resolution reached 2.39 pε/Hz^1/2@10mHzon a 100 km ultra-long SMF link. The signal to noise ratio was improved by 10 dB and 25 dB at 500 mHz and 2 Hz respectively. The proposed method has the potential to significantly improve the low-frequency response of fiber optic sensing systems such as DAS and OFDR.

16:00-16:15 • ACPPOEM-0801-38
Experimental Demonstration of SDN-Controlled OFDM VLC System based on Adaptive Multi-user Bit and Power Loading Algorithm
Yongxin Wang, Chengju Hu, Jian Zhao
South China University of Technology, China
In this paper, we experimentally demonstrate a multi-user OFDM visible light communication system supporting software-defined-network (SDN) configuration to realize flexible resource allocation and bit/power loading for multiple users. An access point is designed based on FPGA to realize real-time generation of the OFDM signal and to interact with the SDN. Multi-user OFDM bit and power loading algorithm is implemented and configured by SDN to the real-time transmitter to flexibly allocate resources according to the demand of users and channel information. Two-user experiments with 30Mbit/s throughput show that the SDN-controlled system works properly and the bit error rate is kept below 10^{-3} as the receiving angle and the data rate ratio between users change.

16:15-16:30 • ACPPOEM-0801-53
Photonics-based Arbitrary Waveform Generator based on Time Interleaved 1-bit Delta-Sigma DAC
Jinghan Yu, Zhaoyi Wang, Shangyuan Li, Xue Xiaoxiao, Xiaoping Zheng, Bingkun Zhou
Tsinghua University, China
A 1-bit photonic digital-to-analog convertor (PDAC) based on Delta-Sigma coding and optical time interleaving is proposed. In experiment, an X-band, 2GHz bandwidth radar signal with an in-band spurious free dynamic range (SFDR) of 30.59dB is generated.

16:30-16:45 • ACPPOEM-0801-73
A Phase Recovery-Aware Algorithm for Kernel Estimation of the Manakov Equation
Astrid Barreiro, Gabriele Liga, Alex Alvarado
Eindhoven University of Technology, Netherlands
The performance of the normalized batch gradient descent (NBGD) algorithm to model nonlinear interference in the presence of phase recovery is analyzed. A modification of the underlying model's parameterisation is proposed, which reduces NBGD's penalties.

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16:45-17:00 • ACPPOEM-0801-8
A photonic integrated high-power soliton microcomb generator
Xinru Ji, Yang Liu, Zheru Qiu, Rui Ning Wang, Johann Riemensberger, Tobias Kippenberg
Swiss Federal Institute of Technology in Lausanne, Switzerland
We demonstrate a compact soliton microcomb light source. The soliton is generated from a Kerr microresonator and amplified by an erbium-implanted gain section integrated on the same photonic chip. We achieved an output power of 7.9 mW at a compact device footprint of 12.5 mm^2

17:00-17:15 • ACPPOEM-0802-2
Monolithic Single mode QD Discrete Mode Laser Epitaxially Grown on SOI
Jingzhi Huang
Chinese Academy of Science, China
We have successfully demonstrated a novel single-mode InAs/GaAs quantum dot discrete mode laser, grown directly on a silicon-on-insulator substrate with embedded silicon gratings. This regrowth-free design allows for integration with silicon-based photonic circuits, offering promising advancements in the field of integrated photonics.

17:15-17:30 • ACPPOEM-0815-111
High-accuracy Solid-state LiDAR Based on Optical Intensity Modulation and Coherent Detection
Junze Tian[1,2,3,4], Jianhao Duan[1,2,3,4], Bin Wang[1,2,3,4], Weifeng Zhang[1,2,3,4]
1.Beijing Institute of Technology, China; 2.Key Laboratory of Electronic and Information Technology in Satellite Navigation, China; 3.Beijing Institute of Technology Chongqing Innovation Center, China; 4.Chongqing Key Laboratory of Novel Civilian Radar, China
We propose and experimentally demonstrate a high-accuracy solid-state LiDAR based on optical intensity modulation and coherent detection. In the proposed system, a high-speed Mach-Zehnder modulator (MZM) is employed to perform optical intensity modulation for range detection, and a free-space optical coherent receiver constructed by an optical hybrid and four charge-coupled devices (CCDs) is used to perform coherent detection and to improve the signal-to-noise ratio. In this way, the depth information of the target objects is mapped to the grayscale images captured by the CCDs, and non-scanning 3D imaging with a high accuracy can be realized. In the experimental demonstration, the 3D image of a home-made target object is acquired by the proposed solid-state LiDAR, and the range detection accuracy is as high as 2.75 mm.

17:30-17:45 • ACPPOEM-0815-69
Crosslink Polymer Strategy to Minimize Voltage Loss in Wide-Bandgap Perovskites for All-Perovskite Tandem Solar Cells
Xin Zheng, Xiong Li
Huazhong University of Science and Technology, China
In recent years, the photoelectric conversion efficiency (PCE) of perovskite solar cells (PSCs) has exceeded 25%. However, according to Shockley-Queisser's limitations, the maximum theoretical efficiency of a single-junction solar cell is about 33%. The room for efficiency improvement of single-junction perovskite solar cells is very limited. Therefore, the development of tandem solar cells is an important way to break the limit and further improve the efficiency of PSCs. The theoretical limit efficiency of double-junction tandem solar cells (TSCs) can reach 46%, which is much higher than that of single-junction solar cells. In practice, The efficiency of all-perovskite tandem solar cells (28%) has surpassed that of single-junction perovskite solar cells (26%). Wide-bandgap (WBG) mixed-halide perovskites show promise of realizing efficient tandem solar cells but at present suffer from large open-circuit voltage loss because of excess lead iodide and light-induced halide phase segregation. Here, a crosslink polymer strategy with high crosslinking degree and high density of functional groups is reported for finely regulating the crystal growth of $FA_{0.8}Cs_{0.2}Pb(I_{0.6}Br_{0.4})_3$, thereby obtaining high-performance PSCs. The pentaerythritol tetraacrylate (PTA) is introduced to form hydrogen bonds and strong Pb–O bonds with perovskite precursors, realizing the complete elimination of excess lead iodide. Besides, this uniformly distributed PTA crosslink polymer system passivates the defects and inhibits the photo-induced halide segregation effectively. The prepared PSCs with a band gap of 1.77 eV yield an impressive open-circuit voltage (V_{OC}) of 1.36 V, corresponding to a record lowV_{OC}-deficit of 0.41 V and an efficiency of 19.58%. With these WBG perovskite subcells, we report 27.3% monolithic all-perovskite TSCs shows an outstanding combination of a high$V_{OC}$of 2.15 V and a FF of 81.4% with improved operational stability.

17:45-18:00 • ACPPOEM-0815-91
Integrated broadband lithium niobate optical parametric amplifier
He Gao, Jizhi Zhang, Siyuan Wang, Zejie Yu, Liu Liu, Daoxin Dai
Zhejiang University, China
Here we propose and demonstrate an integrated broadband optical parametric amplifier by second-order nonlinear wavelength conversion on a TFLN platform. An optical gain of ~18.11 dB for the signal light at 1550 nm is experimentally observed.

18:00-18:15 • ACPPOEM-0815-99
Ultra-compact fiber refractive index probe based on 3D printed fiber-tip dual-ring interferometer
Jing Liu[1], Yucheng Yao[1], Zhiyong Zhao[1], Jie Yan[2], Xi Xiao[2], Ming Tang[1]
1.Huazhong University of Science and Technology, China; 2.National Information Optoelectronics Innovation Center, China
We proposed a ultra-compact refractive index probe based on a dual-ring interferometer . The sensor was 3D printed on the fiber tip. Within the refractive index range of 1.33-1.357, it has a sensitivity of 868.1nm/RIU.

18:15-18:30 • ACPPOEM-0816-7
Frequency-Hopping Signal Measurement Based on Real-time Photonic Fourier Transform
Xin Liu, Dan Zhu, Jiewen Ding, Zhouyang Pan, Tao Lu, Shilong Pan
Nanjing University of Aeronautics and Astronautics, China
A frequency-hopping signal measurement scheme based on real-time photonic Fourier transform is proposed and demon-

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strated. In the experiment, the wideband and multiple frequency-hopping signals with 100-ns frequency-hopping period and 4-40 GHz frequency range are verified.

17:30-20:00 Welcome Reception