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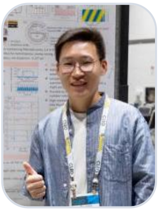
Deputy Secretary General	Yi Xie, Wenda Peng
Secretariat Office	Cythia Li, Emma Mu, Sharon Qin, Hank Zhang

Invited Talks

S1. Laser Technology

Aiping Luo
South China Normal University, China



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Dongmei Huang
The Hong Kong Polytechnic University, China

Feng Li
Xi'an Jiaotong University, China

Junqing Zhao
Shenzhen Technology University, China

Mohammed Zahed M. Khan
Anglia Ruskin University, UK

Xiaosheng Xiao
Beijing University of Posts and Telecommunications, China

Zinan Wang
University of Electronic Science and Technology of China, China

Min Lin
Shenzhen University, China

S2. Optical Communication and Networks

Yixiao Zhu
Shanghai Jiao Tong University, China

Xiansong Fang
Peking University, China

Kangping Zhong
The Hong Kong Polytechnic University, China

Xiaosong Yu
Beijing University of Posts and Telecommunications, China

Zhi Liu
Changchun University of Science and Technology, China

Shikui Shen
China Unicom Research Institute, China

Tao Yang
Beijing University of Posts and Telecommunications, China

Xueyang Li
Peng Cheng Laboratory, China

S3. Near-infrared, Mid-infrared and Far-infrared Technologies and Applications

Chunqi Jin
Changchun Institute of Optics, Fine Mechanics and Physics, CAS, China

Liang Liu
Shanghai Jiao Tong University, China

Mengyao Li
Tsinghua Shenzhen International Graduate School, China

Quan Li
Tianjin University of Technology and Education, China

Shuhui Bo
Minzu University of China, China

Yongzheng Wen
Minzu University of China, China

S4. Quantum Optics and Information

Keyu Xia
Nanjing University, China

Anhui Liang
Ningbo Micro-color Optical Communication Limited, China

Xian Zhang
Zhejiang Sci-Tech University, China

Xiaoqing Zhou
Westlake University, China

Yong-Chun Liu
Tsinghua University, China

S5. Fiber-Based Technologies and Applications

Chunying Guan
Harbin Engineering University, China

George Y. Chen
Shenzhen University, China

Lei Wei
Nanyang Technological University, China

Wei Ding
Jinan University, China

Chenxu Lu
Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou), China

Sumin Bian
Westlake University, China

Yuchao Li
Jinan University, China

S6. Optoelectronic Devices and Applications

Changzheng Sun
Tsinghua University, China

Dan Wu
Shenzhen Technology University, China

Yingjie Liu
Yanshan University, China

Yu He
Southern University of Science and Technology

Nannan Li
Shenzhen Technology University, China

Lan Li
Westlake University, China

Tianxun Gong
University of Electronic Science and Technology of China, China

Xiaolan Zhong
Beihang University, China

S7. Biophotonics and Optical Biomedicine

Jiajie Chen
Shenzhen University, China

Linbo Liu
Guangzhou National Laboratory, China

Xun Guan
Tsinghua Shenzhen International Graduate School, China

Si Chen
Eye Valley, Eye Hospital of Wenzhou Medical University, China

Yu Chen
Fujian Normal University, China

Hongbao Xin
Jinan University, China

S8. Data Center Optical Interconnects and Networks

Jiaohao Huo
University of Science and Technology Beijing, China

Yuan Cao
Nanjing University of Posts and Telecommunications, China

Yanfu Yang
Harbin Institute of Technology (Shenzhen), China

Hexun Jiang
ZTE Corporation, China

Meng Xiang
Guangdong University of Technology, China

Yongcheng Li
Soochow University, China

Xin Wang
Beijing Information Science and Technology University, China

Bowen Chen
Soochow University, China

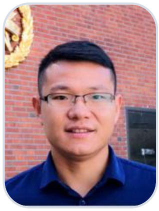
Wei Wang
Beijing University of Posts and Telecommunications, China

S9. Silicon Photonics

Jiang Xu
Hong Kong University of Science and Technology (Guangzhou), China

Jiawei Wang
Harbin Institute of Technology Shenzhen, China

Yu He
Shanghai Jiao Tong University, China



Ping Zhao
Sichuan University, China

Qiancheng Zhao
Southern University of Science and Technology, China

Wei Jiang
Nanjing University, China

Jinyu Mo
POET Technologies, Singapore

Jiaqi Wang
Shenzhen University, China

S10. Computational Imaging

Peng Gao
Xidian University, China

Peng Li
University of Science and Technology of China, China

Shijie Feng
Nanjing University of Science and Technology, China

Shu-Feng Lin
Beijing University of Technology, China

Yang Yue
Xi'an Jiaotong University, China

Wei Yin
Nanjing University of Science and Technology, China

Wen Chen
The Hong Kong Polytechnic University, China

Cheng Liu
Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China

T1. Emerging Technologies for Wide Bandgap Semiconductors and Information Displays

Christoph Ebner
Graz University of Technology, Austria

Kai Wang
Southern University of Science and Technology, China

T2. Topological Photonics

Bingyi Liu
Hefei University of Technology, China

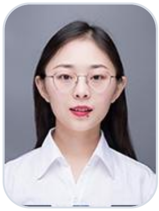
Yu-Gui Peng
Huazhong University of Science and Technology, China

Dezhuan Han
Chongqing University, China

Feng Wu
Guangdong Polytechnic Normal University, China

Fuxin Guan
The Hong Kong University, China

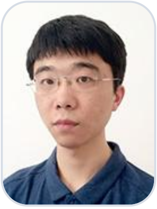
Hong-Wei Wu
Anhui University of Science and Technology, China



Kejing Ran
Chongqing University, China

Mudi Wang
The Hong Kong University of Science and Technology, China

Qiang Wei
Zhengzhou University, China



Ruoyang Zhang
Hong Kong University of Science and Technology, China

Satoshi Aya
South China University of Technology, China

Shaojie Ma
Fudan University, China

Shaolin Ke
Wuhan Institute of Technology, China

Shi-Qiao Wu
Foshan University, China

Wei Wang
Harbin Institute of Technology (Shenzhen), China

Weiyuan Tang
The University of Hong Kong, China

Zhen Gao
Southern University of Science and Technology, China

Zhenzhen Liu
Shantou University, China

Yan Meng
Dongguan University of Technology, China

Yangjie Liu
Hubei University, China

Yuanfeng Xu
Zhejiang University, China

T3. Terahertz Wave Technologies and Applications

Liang Wu
Tianjin University, China

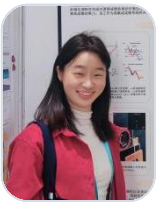
Yingxin Wang
Tsinghua University, China

W1. Optical Fiber Upgrade

Chaotan Sima
Optics Valley Laboratory, China

Jing Zhang
China University of Geosciences (Wuhan), China

W2. Metaphotonics and Planar Optics



Chen Chen
Nanjing University, China

Wei Li
Changchun Institute of Optics, Fine Mechanics and Physics, CAS, China

Conference Venue

OGC Location: South Lobby Conference Area (1st Floor) | 会场区域：一楼南登会议区（南登录大厅西侧）

Rooms: LM101-B; LM103-A&B&C; LM104-A&B&C; LM105

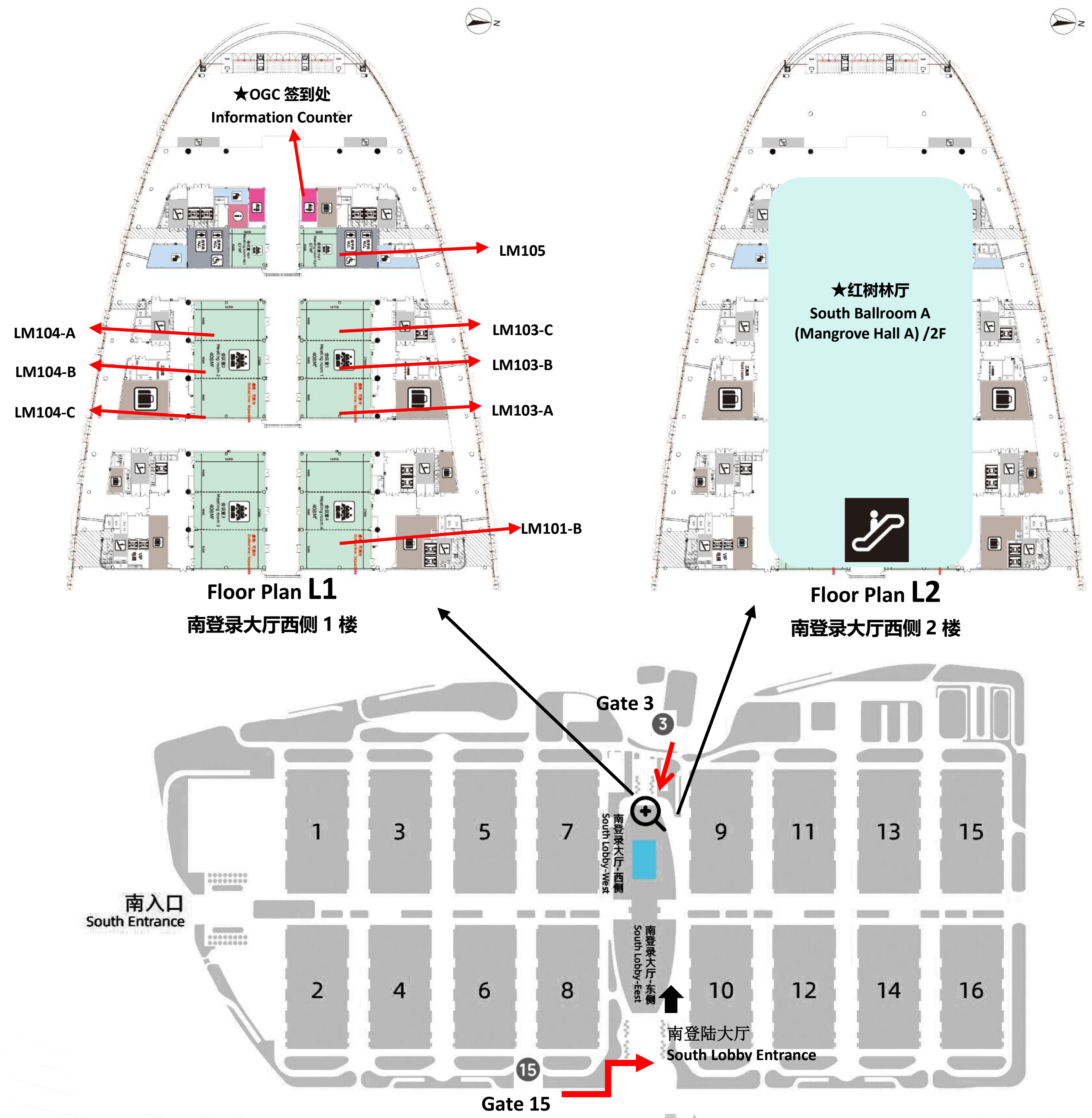
Information Counter: Outside LM105 /1F | 南登录大厅西侧一楼 LM 会议区域处

Opening ceremony: South Ballroom A (Mangrove Hall A) /2F | 二楼红树林厅

Lunch: Hall 5, 2nd Floor, Rooms 5D and 5E | 5 号馆 2 楼 5D、5E 会议室

Banquet: DeKing Multifunction Room@2F, DeKing Convention International Hotel | 深圳德金会展国际酒店 2 楼德金多功能厅

Please inquire at the information counter and collect your daily meal voucher | 请于签到台咨询并领取当日餐券



Conference Guideline

Oral Presentation

- The duration of an Invited Speech is 30 minutes, for normal presentation slot is 15 minutes. Please target your lecture for a duration of about 13 minutes for the presentation plus about 2 minutes for questions from the audience.
- Your punctual arrival and active involvement in each session will be highly appreciated.
- Get your presentation PPT or PDF files prepared and backed up.
- Laptops, projector & screen, laser sticks will be provided by the conference organizer.

Poster Presentation

- It's expected that at least one author stands by the poster for (most of the time of) the duration of the poster session. This is essential both to present your work to anyone interest in it and to make sure that your presence is verified by committee.

Security

- Please ensure that you take your belongings with you at all times when leaving a room. Do not leave bags or laptops unattended.

Name Badge

- For security purposes, delegates, speakers, exhibitors and staff are required to wear their name badge to all sessions and social functions. Entrance into sessions is restricted to registered delegates only. If you misplace your name badge, please replace at the registration counter.

Conference Agenda

Sept. 10, 2024 | Tuesday

Time	Activities	Venue
10:00-17:00	Sign-in & Materials Collection	Outside LM105 /1F

Sept. 11, 2024 | Wednesday

Time	Activities
Opening & Awards Ceremony EMCEE: Huanhuan Liu, Shenzhen Institute of Advanced Technology, CAS, China & Yu Zheng, Southern University of Science and Technology, China	
Venue: South Ballroom A (Mangrove Hall A) /2F	
10:00-10:05	Opening Remarks ***Opening Speaker:*** *Perry Ping Shum, Southern University of Science and Technology, China*
10:05-10:15	Awards Ceremony
Plenary Speeches	
Venue: South Ballroom A (Mangrove Hall A) /2F	
10:15-10:50	**Kei May Lau** IEEE Fellow, OSA Fellow, Hong Kong Academy of Engineering Sciences Fellow, CSR Fellow Hong Kong University of Science & Technology, China **Speech Title:** A New Paradigm for Photonic Integration – Direct Lateral III-V Growth on SOI for Lasers and More
10:50-11:25	**René-Jean Essiambre** Bell Labs Fellow, Past-President of the IEEE Photonics Society (2022-2023) **Speech Title:** Technologies Approaching Capacity and Sensitivity Limits of Optical Communication Systems
11:25-12:00	**Che Ting Chan** Hong Kong University of Science & Technology, China **Speech Title:** Photonic Crystals as a Platform for Exploring New Frontiers in Physics
CIOE Exhibition	
Venue: Hall 1-Hall 12	

Sep. 12, 2024 | Thursday

Time	Activities		Venue
09:00-10:30	TS01	Laser Technology-A	LM103-A
09:00-10:30	TS02	Topological Photonics-A	LM103-B
09:00-10:00	TS03	Biophotonics and Optical Biomedicine-A	LM103-C
09:00-10:30	TS04	Computational Imaging-A	LM104-A
09:00-10:30	TS05	Silicon Photonics-A	LM104-B
09:00-10:15	TS06	Fiber-Based Technologies and Applications-A	LM104-C
09:00-10:15	TS07	Data Center Optical Interconnects and Networks-A	LM105
09:00-10:30	W1	Optical Fiber Upgrade-A	LM101-B
		Coffee Break	
10:45-11:45	TS08	Laser Technology-B	LM103-A
10:45-12:15	TS09	Topological Photonics-B	LM103-B
10:45-12:15	TS10	Biophotonics and Optical Biomedicine-B	LM103-C
10:45-12:00	TS11	Computational Imaging-B	LM104-A
10:45-12:15	TS12	Silicon Photonics-B	LM104-B
10:45-12:15	TS13	Optical Communication and Networks-A	LM104-C
10:45-12:15	TS14	Optoelectronic Devices and Applications-A	LM105
10:45-12:00	W1	Optical Fiber Upgrade-B	LM101-B
		Lunch	
13:30-15:15	TS15	Laser Technology-C	LM103-A
13:30-15:30	TS16	Topological Photonics-C	LM103-B
13:30-15:30	TS17	Optoelectronic Devices and Applications-B	LM103-C
13:30-15:45	TS18	Computational Imaging-C	LM104-A
13:30-15:00	TS19	Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-A	LM104-B
13:30-14:45	TS20	Fiber-Based Technologies and Applications-B	LM104-C
13:30-15:30	TS21	Data Center Optical Interconnects and Networks-B	LM105
13:30-15:15	TS22	Terahertz Wave Technologies and Applications-A	LM101-B
		Coffee Break	
16:00-18:00	TS23	Topological Photonics-D	LM103-B
16:00-18:00	TS24	Optoelectronic Devices and Applications-C	LM103-C

16:15-18:00	TS25	Computational Imaging-D	LM104-A
16:00-17:45	TS26	Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-B	LM104-B
16:00-17:30	TS27	Optical Communication and Networks-B	LM104-C
16:00-18:00	TS28	Data Center Optical Interconnects and Networks-C	LM105
16:00-17:15	W2	Metaphotonics and Planar Optics	LM101-B
		Banquet	

Sep. 13, 2024 | Friday

Time	Activities		Venue
09:00-10:30	TS29	Topological Photonics-E	LM103-B
09:00-10:15	TS30	Optoelectronic Devices and Applications-D	LM103-C
09:00-11:00	TS31	Quantum Optics and Information-A	LM104-A
09:00-10:30	TS32	Silicon Photonics-C	LM104-B
09:00-11:00	TS33	Fiber-Based Technologies and Applications-C	LM104-C
		Coffee Break	
10:45-12:15	TS34	Topological Photonics-F	LM103-B
10:45-12:00	TS35	Biophotonics and Optical Biomedicine-C	LM103-C
10:45-11:30	TS36	Silicon Photonics-D	LM104-B
10:45-12:15	TS37	Optical Communication and Networks-C	LM103-A
		Lunch	

Plenary Speakers

Presider: Zhaojun Liu, Southern University of Science and Technology, China

Time 10:15-10:50 **Venue** South Ballroom A (Mangrove Hall A) /2F

Kei May Lau

- IEEE Fellow, OSA Fellow, Hong Kong Academy of Engineering Sciences Fellow, CSR Fellow
- Hong Kong University of Science & Technology, China

Kei May Lau is a Research Professor at the Hong Kong University of Science & Technology (HKUST). She received her degrees from the University of Minnesota and Rice University and served as a faculty member at the University of Massachusetts/Amherst before joining HKUST in 2000. Lau is an elected member of the US National Academy of Engineering, a Fellow of IEEE, Optica (formerly OSA), and the Hong Kong Academy of Engineering Sciences. She was also a recipient of the IPRM award, IET J J Thomson medal for Electronics, Optica Nick Holonyak Jr. Award, IEEE Photonics Society Aron Kressel Award, and Hong Kong Croucher Senior Research Fellowship. She was an Editor of the IEEE Transactions on Electron Devices and Electron Device Letters, an Associate Editor for the Journal of Crystal Growth and Applied Physics Letters.

Lau's research focuses on the development of monolithic integration of semiconductor devices and systems on industry-standard silicon substrates. She was an early explorer of this approach. Her group was the first to demonstrate the highest mobility and millimeter-wave III-V transistors lattice-matched to InP grown directly on Si. She also led the development of the first 1.5 μm room-temperature electrically pumped III-V quantum dot lasers epitaxially grown on CMOS-standard (001) Si substrate by MOCVD. Recently, her group developed the lateral aspect ratio trapping (LART) technique to grow III-V active devices in the same plane as the Si layer enabling efficient coupling with Si-based passive components on silicon-on-insulator (SOI).

A New Paradigm for Photonic Integration – Direct Lateral III-V Growth on SOI for Lasers and More

Abstract: In addition to the speed and bandwidth advantages, sending data via photons instead of electrons can be much more energy efficient. Silicon photonics is being developed to extend integrated photonics adopting the highly successful Si IC infrastructure for tele/data- communications, and sensing.

In our laboratory, we have taken various approaches and developed high-quality III-V on silicon for lasers and photodetectors by direct hetero-epitaxy, including blanket and selective growth. The crystalline quality of these epitaxy has been verified by various material characterizations and successfully adopted for laser and other active device applications. For monolithic integration of Si photonics, efficient coupling of light between active and passive components is essential. We developed a novel lateral aspect ratio trapping (LART) technique to grow lasers and high-speed photodetectors on patterned commercial SOI substrates for integrated Si photonics. Multimode and single-mode lasing from lateral quantum wells (QWs) as the gain media using LART have been achieved in the 1433 -1630 nm band with varying dimensions of lasers. High-performance PDs coupled to Si tapers were also constructed on the monolithic InP/SOI platform with laterally grown PIN structures. This talk will describe these technologies in our toolbox.

Plenary Speakers

Presider: Allan Zhenggang Lian, Yangtze Optical Electronics Co., China

Time 10:50-11:25 **Venue** South Ballroom A (Mangrove Hall A) /2F

René-Jean Essiambre

•Bell Labs Fellow

•Past-President of the IEEE Photonics Society (2022-2023)

René-Jean Essiambre received his Ph.D. in Physics from Laval University, Québec City, Canada, and pursued post-doctoral studies at the Institute of Optics, University of Rochester, NY. In 1997, he joined Bell Laboratories, then part of Lucent Technologies (now Nokia). Dr. Essiambre's research has spanned fiber lasers, optical fiber nonlinearity, advanced modulation formats, coherent detection, information theory applied to optical fibers, and space-division multiplexing. His current focus is on high-sensitivity quantum detection. With an extensive knowledge of fiber-optic communication systems, Dr. Essiambre has contributed to the design of numerous installed commercial systems. He has delivered over 100 invited talks, including the 2018 Physics Nobel Prize Lecture of Arthur Ashkin. His service includes chairing several conference committees for OFC, ECOC, CLEO, and IPC. He was program and general co-chair of CLEO Science & Innovation in 2012 and 2014, respectively. Dr. Essiambre's accolades include the 2005 Engineering Excellence Award from OSA and the distinction of Distinguished Member of Technical Staff (DMTS) at Bell Labs. He is a Fellow of the IEEE, OSA, Bell Labs, and the Institute of Advanced Studies of Technical University of Munich (IAS-TUM) in Germany. He also serves as an Ambassador of TUM. Dr. Essiambre recently completed his term as President of the IEEE Photonics Society for 2022 and 2023.

Technologies Approaching Capacity and Sensitivity Limits of Optical Communication Systems

Abstract: The advent of optical communication has enabled an unprecedented level of global connectivity. Over the past few decades, a series of optical and digital technologies have been developed and integrated into commercial communication systems to achieve this feat. Current fiber-optic communication systems operate near the practical limits of nonlinear fiber transmission, digital coherent detection, and error-correction coding. However, future optical communication systems demand even greater capacity, necessitating further innovations. This presentation will start with a brief historical overview of wired communication, focusing on how it relates to modern optical communication. We will clarify how signal power is limited in optical fibers and the application of Shannon information theory to establish limits on the rate of transmission of information over single-mode fibers. The presentation will then focus on new fiber designs for space-division multiplexing, which aim to overcome single-mode fiber capacity limits while remaining in a single fiber strand. The potential benefits of emerging optical fibers, such as the hollow-core fiber, will also be discussed. Finally, we will highlight a few optical quantum technologies based on single-photon quantum detectors and demonstrate how it can improve detection sensitivity.

Plenary Speakers

Presider: Longqing Cong, Southern University of Science and Technology, China

Time 11:25-12:00 **Venue** South Ballroom A (Mangrove Hall A) /2F

Che Ting Chan

•Hong Kong University of Science & Technology, China

C.T. Chan received his BSc degree from the University of Hong Kong in 1980 and his PhD degree from the University of California at Berkeley in 1985. He is currently serving as the Associate Vice-President for Research & Development at HKUST. He is also concurrently the Daniel C K Yu Professor of Science, Chair Professor of Physics, and the Director of Research Office of HKUST. He has been elected a Fellow of the American Physical Society and the Physical Society of Hong Kong and a member of the Hong Kong Academy of Sciences. His primary research interest is the theory and simulation of material properties.

Photonic Crystals as a Platform for Exploring New Frontiers in Physics

Abstract: Photonic crystals, materials with a periodic modulation of refractive index, offer unprecedented control over the flow of light, enabling a wide range of applications. For example, in optical communications, they function as filters, switches, and waveguides for integrated photonics. The ability to create high-quality optical cavities leads to low-threshold lasers and sensitive sensors. Their thermal management capabilities support energy-efficient buildings and radiative cooling. Integrating photonic crystals into solar cells can improve light trapping and energy conversion.

In this talk, I will focus on using photonic crystals as a versatile platform for exploring new frontiers in physics. Photonic crystals can be engineered to realize topological phenomena, leading to the emergence of robust edge states and topologically protected light propagation. This opens new avenues for designing topologically protected waveguides and optoelectronic devices. Furthermore, the introduction of non-Hermitian elements, such as optical gain or loss, in photonic crystals enables the exploration of non-Hermitian physics, leading to exceptional points and asymmetric light propagation. These unique physical phenomena not only advance our fundamental understanding of light-matter interactions but may also provide new design principles for next-generation photonic technologies.

Technical Sessions / Sept. 12

TS01. Laser Technology-A			
Time	09:00-10:30	Venue	LM103-A
Session Chair: Junqing Zhao, Shenzhen Technology University			
Invited Speech			

09:00-09:30	**Speaker:** Feng Li **Affiliation:** Xi'an Jiaotong University **Bio:** Feng Li got his bachelor's and master's degree at Tianjin University in China in 2006 and 2008. He got his PhD at CNRS and the University of Nice Sophia Antipolis in France in 2013, supported by the European Marie Curie ITN project CLERMONT4. Then he worked as a research associate at the University of Sheffield in UK from January 2014 to May 2017. Feng Li joined Xi'an Jiaotong University (China) as a professor in June 2017, with main research interest in light-matter interaction in microcavities and micro/nanostructures. **Title:** Spinoptronics in optical microcavities **Abstract:** Fabry-Perrot (FP) microcavities with metal or DBR (distributed Bragg reflector)-coated mirrors provide an excellent platform for investigating the collective behavior of confined 2-dimensional photons and polaritons. The TE-TM mode splitting in such cavities acts as an effective magnetic field, leading to photonic spin-orbit (SO) coupling effect that the pseudospin of cavity photons changes anisotropically with their momenta [1]. Such mechanism has led to interesting observations including optical spin-Hall effect, magnetic-monopole-like half solitons, spinor condensate with half-quantum circulation, and polaritonic topological insulators [2]. We report the direct measurement of the Berry curvature and quantum metric of the photonic modes of a FP cavity containing an anisotropic organic microcrystal (Perylene). Photonic spin-orbit-coupling induced by the cavity together with the anisotropy of the material results in the action of an effective gauge field on photons, which includes an effect of emergent optical activity (OA). The photonic gauge field makes emerge geometrically non-trivial bands containing two gapped Dirac cones with opposite topological charges [3]. The same cavity structure with a DPAVBi microcrystal allows the observation of Voigt exceptional point at which the quantum metric is demonstrated to be divergent [4]. We also predict that in fully confined systems the eigenstates of the second excited manifold under TE-TM splitting are degenerate skyrmions which can be manipulated by the non-Hermitian properties[5].
09:30-10:00	**Speaker:** Aiping Luo **Affiliation:** South China Normal University **Bio:** Ai-Ping Luo received the Ph.D. degree in optical engineering from the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Shanghai, China, in 2004. Since 2004, she has been with the School of Information and Optoelectronic Science and Engineering, South China Normal University, Guangzhou, China, where she is currently a Professor. From 2007 to 2008, she was

	an academic visitor at the École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland. She is the author or coauthor of more than 150 international journal and conference papers. Her current research interests include fiber-based devices, fiber lasers, and nonlinear fiber optics. **Title:** Spatiotemporal dual-periodic soliton pulsation in a multimode fiber laser **Abstract:** Due to the increase of the transverse mode freedom, the spatiotemporal mode-locked (STML) fiber laser becomes a new platform for investigating complex multi-dimensional nonlinear phenomena. In this work, we report spatiotemporal dual-periodic soliton pulsation (SDSP) in an STML fiber laser. It is found that in the SDSP, the long-period pulsations (LPPs) of different transverse modes are synchronous, while the short-period pulsations (SPPs) are asynchronous. Further, the numerical simulation confirms the experimental results and reveals that the proportion of transverse mode components can manipulate the periods of the LPP and SPP but does not affect the synchronous and asynchronous pulsations of different transverse modes. The obtained results reveal the mode characteristics of the spatiotemporal dissipative soliton pulsation, contributing to further understanding the complex spatiotemporal dynamics in STML fiber lasers and discovering new dynamics in high-dimensional nonlinear systems.
10:00-10:30	**Speaker:** Min Lin **Affiliation:** Shenzhen University **Bio:** I am currently working as Associate Researcher at the Nanophotonics Research Center at Shenzhen University, and I have received my Ph.D degree from the Department of Physics at the Chinese University of Hong Kong. My research focuses on the manipulation and characterization of near-field optical spin textures. I have published several papers in prestigious international journals such as Applied Physics Reviews, ACS Photonics and Advanced Science, and I have managed a program supported by the Young Scientists Fund of the National Natural Science Foundation of China, and a general program supported by Natural Science Foundation of Guangdong. **Title:** Manipulation and characterization of photonic skyrmion **Abstract:** In past decades, skyrmions have been discovered in a wide range of fields and garnered significant attention. As ultracompact and topologically-stable nanoparticle-like objects, skyrmions have been proposed as novel information carriers in high-density information storage and transfer devices. Recently, photonic counterparts of the magnetic skyrmions have been constructed in diverse forms of optical fields, exhibiting sophisticated topological properties such as the spin-momentum locking in evanescent fields, and fascinating deep-subwavelength characteristics with potential applications in picometre metrology and magnetic domain detection. However, in the previous research, the experimental realization of photonic skyrmion relied on stringent excitation conditions that only support a single spin texture type on a specific structure, and the position control of spin textures has not yet been realized. Here, we demonstrate the manipulation of the photonic skyrmion, including the wavelength-tuned transformation between photonic skyrmion and meron spin lattices on the same metallic meta-surface, and the precise position control of photonic skyrmion with the use of a phase profile imposed by spatial light modulator. In addition, the existing near-field optical characterization techniques of photonic skyrmion typically utilized the nanoprobe to point scan the

	near-field light field, which was difficult to avoid the problems of long scanning time, error by the external vibration, and the vulnerability of the nanoprobe and the sample. Here, we build a scanning-less complex-amplitude-resolved near-field optical microscopy based on the four-wave mixing effect, which is aimed to solve the problems of the existing near-field optical characterization techniques.

TS02. Topological Photonics-A			
Time	09:00-10:30	Venue	LM103-B
Session Chair: Zhen Gao, Southern University of Science and Technology			
Invited Speech			

09:00-09:30	**Speaker:** Wei Wang **Affiliation:** Harbin Institute of Technology (Shenzhen) **Bio:** Dr. Wang received the B.S. degree in Engineering Mechanics from Northeastern University, Shenyang, China, in 2012, the M.S. degree in Mechanics from Tongji University, Shanghai, China, in 2015, and the Ph.D. degree from Mechanical, Acoustic, Electronics, and Robotics Sciences of Paris at Sorbonne University, Paris, France, 2019. He was a postdoctoral research fellow at Hong Kong Baptist University, Hong Kong, China until 2024. After that, he joined Harbin Institute of Technology (Shenzhen) as a professor. His current research interests include metamaterials, topological insulators, and non-Hermitian wave physics. **Title:** Complex-energy Anderson localization in one-dimensional non-Bloch parity-time-symmetric disordered systems **Abstract:** The interplay between Anderson localization and non-Hermiticity has attracted significant attention recently. As demonstrated in the seminal work by Hatano and Nelson [Phys. Rev. Lett. 77, 570 (1996)], extended eigenmodes can persist in the presence of real onsite disorder when subject to a constant imaginary vector potential. In this scenario, real-energy eigenmodes are localized, while complex-energy eigenmodes remain delocalized. In this work, we uncover the complex-energy Anderson localized modes (CELMs) in non-Bloch parity-time-symmetric disordered rings, challenging the above energy-localization association. The emergence of the CELMs is intricately linked to the density of states in the pristine ring and the non-Bloch parity-time phase transition in the pristine open chain. Our findings indicate that non-Hermitian degrees of freedom open new avenues for manipulating wave transport in disordered media, with potential applications in acoustics and photonics.
09:30-10:00	**Speaker:** Hong-Wei Wu **Affiliation:** Anhui University of Science and Technology **Bio:** Dr. Hong-Wei Wu is a professor at Anhui University of Science and Technology. His research focuses on spoof plasmonic structures, acoustic metamaterials. He received the Ph. D. degree in optical physics in physical school of Nanjing University, Nanjing, China. He has published 40 papers on

	Advanced Science, Physical Review B, Physical Review Applied, and Applied Physics Letters and so on. **Title:** Manipulation of acoustic topological quasi-particles in acoustic metastructures **Abstract:** Topological textures which refer to a nontrivial distribution of physical vector field on real space arouse great interests in different physical branches with various configuration, such as vortices, skyrmion, meron and hopfion. Skyrmion is a prominent topological texture, which characterized by a real-space topological number (i.e., skyrmion number). The nontrivial topology of skyrmion texture protect the vector field distribution against the structure defect and intrusion. With the advanced topological property, in magnetic materials, skyrmions have grown into a large research field and derivate various topological textures, including Néel type, Bloch type, anti-type, and so on. Recently, acoustic skyrmions have been explored by tailoring velocity vectorial near-field distributions based on the interference of multiple spoof surface acoustic waves, provide new dimensions for advanced sound information processing, transport and data storage. Here, we theoretical investigate and experimental demonstrate that a deep-subwavelength spiral metastructure can also generate the acoustic skyrmions configuration. Furthermore, we theoretically propose and experimentally demonstrate that the vector field configuration of Néel type skyrmionic modes can be locally manipulated by gradient grooves in a deep-subwavelength three-dimensional multilayers cylinder structure. Tuning the gradient of groove depths along structure radius, we experimentally observe that the skyrmionic modes can be contracted or expanded to manipulate the distribution of the velocity vectors, which is robust against the structure deformations and defects. The real-space acoustic skyrmions topology may open new avenues for designing ultra-compact and robust acoustic devices, such as acoustic sensors, acoustic tweezers, and acoustic antennas.
10:00-10:30	**Speaker:** Zhenzhen Liu **Affiliation:** Shantou University **Bio:** Dr. zhenzhen Liu obtained his Ph.D. from Harbin Institute of Technology (Shenzhen) in 2021, specializing in physical electronics. Following his doctoral studies, he embarked on a postdoctoral fellowship to explore the frontiers of photonics research. His research interests lie at the topological photonics, micro-nano photonics, and metamaterials. He has contributed to several studies in these areas, focusing on the development and application of innovative photonic structures to manipulate light at the microscopic scale. **Title:** Wannier function featured second-order topological insulator **Abstract:** The concept of electric polarization, i.e., dipole moment, is essential in describing insulating materials and is at the core of our understanding of topological phases of matter. The bulk polarization P is expressible through Berry's phase, which in turn can lead to the quantization of the bulk polarization. The bulk polarization encodes the positions of the spatially-resolved Wannier functions, so-called "Wannier centers", which further facilitates establishing the bulk-boundary-corner correspondence for polarization in crystals. Wannier bands featured by combined components (P_x^m,P_y^n) in nonsymmorphic insulators are physically meaningful. This is because the physical manifestations of spatially-resolved Wannier functions can be well-defined by the hybridization of the constituent Wannier functions. This leads to the emergence of different types of second-order

	topological phases, which host different type of corner states localized around the corner truncated by perfect electric conductor.

TS03. Biophotonics and Optical Biomedicine-A			
Time	09:00-10:00	Venue	LM103-C
Session Chair: Linbo Liu, Guangzhou National Laboratory			
Invited Speech			
09:00-09:30	**Speaker:** Jiajie Chen **Affiliation:** Shenzhen University **Bio:** Jiajie Chen obtained a Bachelor's degree in Optoelectronic Science from Nankai University and a Ph.D. in Engineering from The Chinese University of Hong Kong (CUHK). He later conducted postdoctoral research at CUHK and the University of California, San Diego (UCSD). He also held positions as a Senior Optical Engineer at the Hong Kong Applied Science and Technology Research Institute and Precise Group Limited. In 2019, he joined Shenzhen University as an Assistant Professor and a Research Fellow. He is also a mentor for graduate students at Shenzhen University. He serves as a Youth Committee Member of the Biomedical Photonics Professional Committee of the Chinese Optical Society and has been recognized as a young talent in Guangdong Province. His research focuses on exploring new methods, phenomena, and structures in nanoscale optothermal tweezers, SPR biosensing, and super-resolution imaging. **Title:** Optothermal Tweezers for Diverse Bio-Nanoparticles Manipulation and DNA Identification **Abstract:** Optothermal manipulation technology, which utilizes temperature fields, presents significant benefits such as improved energy efficiency and an expanded range of manipulation for particles. This innovative approach has surpassed traditional methods of optical manipulation and has made substantial progress in the fields of optical tweezers and biomedical research in recent years. By leveraging optothermal effects to create temperature gradients, we have pioneered the development of a cutting-edge nano-tweezing system that operates through these fields. Our latest contribution to this field is the introduction of a highly adaptable optothermal nanotweezer (HAONT), which is capable of trapping, sorting, and assembling a wide variety of nanoparticles. These particles can differ in material composition, shape, and size, ranging from 10 nm to 1000 nm. The HAONT system takes advantage of the combined effects of thermophoresis, thermo-osmotic flow, and other mechanisms, allowing for a broad spectrum of manipulations and identifications of bio-nanoparticles. In addition to its standalone capabilities, we have successfully integrated the HAONT with CRISPR biosensing systems. This integration has led to the development of an optothermal strategy that enhances CRISPR-based single-nucleotide polymorphism (SNP) detection at the single-molecule level. Furthermore, we have introduced a novel CRISPR methodology for visualizing nucleotide cleavage events. These advancements have been documented in our recent publications, including ""Advanced		

	Materials, 2024, 36(9): 2309143" and "Light: Science & Applications, 2023, 12, 273". We are confident that the ongoing refinement of this technology will not only facilitate the capture and detection of biomolecules at ultra-low concentrations but also enable in-situ single-molecule analysis. These capabilities are expected to make a significant impact on the advancement of biomedical research and its practical applications, furthering our understanding and ability to manipulate biological systems at the nanoscale.
Oral Presentation	
09:30-09:45	**#** 6891 - Establishment and Analysis of an Infrared Spectroscopic Database for Respiratory Viral Proteins **Presenter:** Zhouzhuo Tang, Beihang University **Abstract:** Revealing the protein structures of respiratory viruses is crucial for elucidating viral mechanisms. Infrared (IR) spectroscopy serves as a robust tool for characterizing protein secondary structures, offering the advantage of enabling protein conformational analysis in aqueous solutions over a wider concentration range. In this work, we establish and analyse a comprehensive IR spectroscopic database for respiratory viral proteins using attenuated total reflection-Fourier transform infrared spectroscopy (ATR-FTIR). A standardized protocol from experimental processes to data analysis is developed to ensure data repeatability and scalability. Using the spike (S) proteins of Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), Middle East Respiratory Syndrome Coronavirus (MERS-CoV), and SARS-CoV-2 as examples, we investigate the different secondary structures of various viral proteins within the same viral family. Our study demonstrates the utility of IR spectroscopy in reliably analyzing protein secondary structures and conducting conformational analyses.
09:45-10:00	**#** 1943 - Mid-infrared Laser Spectroscopy for Ultra-Low Concentration Protein in Quartz Hollow Waveguide **Presenter:** Zihao Liu, School of Instrumentation and Optoelectronic Engineering Beihang University Beijing, China **Abstract:** Protein analysis is of significant importance in the biomedical field. Mid-infrared absorption spectroscopy offers advantages such as non-invasiveness, label-free detection, and real-time monitoring, making it highly beneficial for studying protein concentrations and conformational changes. However, current mid-infrared absorption spectroscopy systems for protein analysis face challenges like complex equipment, high costs, and low sensitivity, which greatly limit research capabilities. In this work, we present a method using a quartz hollow waveguide as a microfluidic reaction vessel, combined with biotin-functionalized gold nanoparticle-based materials that provide Surface-enhanced infrared absorption (SEIRA) effects and streptavidin capture capabilities. This approach achieves ultra-low detection limits for streptavidin in the ng/mL range at the amide I and II bands. Additionally, the quartz hollow waveguide offers advantages such as low cost and compact size, showing great potential for integration into protein analysis spectrometers.

TS04. Computational Imaging-A			
Time	09:00-10:30	Venue	LM104-A
Session Chair: Chao Zuo, Nanjing University of Science and Technology			
Invited Speech			
09:00-09:30	**Speaker:** Peng Gao **Affiliation:** Xidian University **Bio:** Prof. Dr. Peng Gao, studied Physics and received his Ph.D. at the Xi'an Institute of Optics and Precision Mechanics (XIOPM), CAS, in 2011. He was a "Humboldt Fellow" in University Stuttgart (2012-2014) and Marie-Curie Fellow (IEF) in KIT (2014-2018). He is currently a PI at Xidian University. His group focuses on developing quantitative phase microscopy and super-resolution optical microscopy techniques for biology. So far, he has authored over 100 peer-reviewed papers published in journals, including Nat. Photonics, Adv. Opt. Photon. Some of his publications were highlighted by tens of international media, such as Science Daily, Physics News, and so on. He is currently one of the associate editors of Optics and Laser Technology (OLT) and Frontiers in Physics, **Title:** Quantitative phase contrast microscopy and tomography **Abstract:** In this talk, quantitative phase contrast microscopy (QPCM) and tomography (QPCT) for observing subcellular organelles inside live cells will be presented. Both QPCM and QPCT utilize oblique illuminations and spectrum modulation by a spatial light modulator (SLM) to realize high spatiotemporal quantitative phase imaging. QPCM utilizes the illumination from 24 LEDs on a ring simultaneously and a phase ring to retarder the un-diffracted frequency components of the object wave for 0, $\pi/2$, π and $3\pi/2$, allowing for 2D quantitative phase imaging with a spatiotemporal resolution of 220 nm and 150 FPS. QPCT cycles the illumination from 24 LEDs one by one and acquires the quantitative phase image for each illumination using the same concept of QPCM. Eventually, a 3D tomographic phase map is obtained by using the algorithm of optical diffraction tomography (ODT). We demonstrated the application of QPCM and QPCT with 2D/3D imaging of sub-organelles inside COS7 cells, showing their great potential in life science.		
09:30-10:00	**Speaker:** Cheng Liu **Affiliation:** Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, **Bio:** Professor at Shanghai Institute of Optics and Fine Mechanics. Mainly engaged in research in optical imaging and detection. Research work has been supported by the National Natural Science Foundation, the Chinese Academy of Sciences, the National Major Science and Technology Project, and has won a number of provincial and ministerial science and technology awards. He has trained 12 doctoral students and more than 20 master's students, and published more than 120 SCI papers as the first author and corresponding author. **Title:** Research and application of multiplexed encoding phase imaging in single-shot ultrafast measurements **Abstract:** Single-shot ultrafast measurements have important applications in real-time detection of		

	extreme physical phenomena and spatiotemporal coupling measurement of ultrashort pulses. Multiplexed encoding phase imaging, as a lensless coherent diffraction imaging method, can achieve single-shot multi-frame high-resolution ultrafast imaging with spatiotemporal multiplexing. This report mainly introduces the measurement applications of encoding phase imaging in real-time detection of ultrafast phenomena such as laser-induced damage, optical Kerr effect, and plasma generation. It mainly uses a high signal-to-noise ratio beam-coded average phase imaging method and a time deflection phase imaging method combined with the streak camera. In addition, this report introduces the application of encoding phase imaging in the direction of spatiotemporal coupling measurement, including the use of coherent modulation imaging combined with FROG to achieve spatiotemporal coupling measurement of femtosecond pulses, and the combination of electro-optical crystals to achieve spatiotemporal measurement of nanosecond pulses. Multiplexed encoding phase imaging can distinguish multiple modes of different wavelengths, angles, and phase distributions in the intensity of a single diffraction pattern. As a lensless phase imaging method, it has important application prospects in special wavelengths such as X-rays, extreme ultraviolet, and terahertz. In combination with multiplexed imaging methods, it is of great significance to the research on the spatiotemporal detection of broadband spectral attosecond pulses.
10:00-10:30	**Speaker:** Edmund Lam **Affiliation:** The University of Hong Kong **Bio:** Edmund Y. Lam received the B.S. degree (with distinction) in 1995, the M.S. degree in 1996, and the Ph.D. degree in 2000, all in electrical engineering from Stanford University. He was the 49th Ph.D. graduate of Prof. Joseph W. Goodman. At Stanford, he conducted research for the Programmable Digital Camera project in the Information Systems Laboratory. He also consulted for industry in the areas of digital camera systems design and algorithms development. After brief stints in Silicon Valley start-ups, he joined the Reticle and Photomask Inspection Division (RAPID) of KLA-Tencor Corporation in San Jose, CA, as a senior imaging engineer. He was primarily involved in the design of defect detection tools for the core die-to-die and die-to-database inspections. The product received a Semiconductor International Editor's Choice Best Product Award, in addition to capturing a substantial market share. He is now a Professor in Electrical and Electronic Engineering, Professor in Computer Science (by courtesy), Associate Head (Research and Innovation), Director of the Computer Engineering program, and the founding director of the Imaging Systems Laboratory at the University of Hong Kong. A recipient of the IBM Faculty Award, he is also a Fellow of Optica (formerly OSA), the Society of Photo-optical Instrumentation Engineers (SPIE), the Institute of Electrical and Electronics Engineers (IEEE), the Society for Imaging Science and Technology (IS&T), the Institute of Physics (IOP), as well as the Hong Kong Institution of Engineers (HKIE). During the 2010–11 academic year, he was invited to teach at the Department of Electrical Engineering and Computer Science at Massachusetts Institute of Technology as a Visiting Associate Professor. He has broad research interests around the theme of computational optics and imaging, from algorithms design to applications. For his research work, he was presented the Outstanding Young

	Researcher Award of the University of Hong Kong in 2008, being the only recipient in engineering, and the Outstanding Researcher Award in 2019. With regards to teaching, he has taught at all levels of the departmental courses, and devoted considerable efforts in reshaping the first course in the electrical and electronic engineering curriculum. He was given an engineering Best Teacher Award in 2011, and the university-wide Outstanding Teaching Award (team award) in 2012, and an engineering Outstanding Teaching Award (team award)] in 2019. Besides his involvement within the university, he is also active in professional organizations. He was the Chair of the OSA Image Sensing and Pattern Recognition Technical Group. In addition, he has served two terms as a topical editor of the Journal of the Optical Society of America A; currently, he is an associate editor of the IEEE Transactions on Biomedical Circuits and Systems, and a senior area editor of the IEEE Signal Processing Letters. He has also been active in conference organizations, serving as committee or chair of several conferences over the years. These include OSA's Signal Recovery and Synthesis and Computational Optical Sensing and Imaging meetings, the IS&T / SPIE conference on Image Processing: Machine Vision Applications, the ACM/IEEE International Conference on Distributed Smart Cameras, and the IEEE International Conference on Imaging Systems and Techniques. To date, he has published over 400 articles, and graduated more than 30 students. A couple of his papers were given best paper awards, including the First ASML/Cymer Best Student Paper Award in the SPIE Lithography Asia conference and the best paper award in the IEEE International Conference of Advanced Learning Technologies. One of his papers on digital holography was selected among the 10 "Editor's Picks" in the 50th anniversary of Applied Optics that reflect the progression in this area over the journal's history. **Title:** Harnessing Noise for Materials Differentiation in Computational Neuromorphic Imaging **Abstract:** Event cameras are emerging neuromorphic devices with more attractive properties than conventional ones, which asynchronously capture per-pixel luminance changes. However, event cameras are specifically designed for changes and motion measurement, it is generally assumed that nothing can be detected in static scenes. Hence, event generation in static scenes is treated as useless noise and is typically deemed detrimental to computational neuromorphic imaging (CNI) applications. Here, we show that event noise carries useful information that can be extracted and harnessed for material differentiation. We analyze the generation of event noise and evaluate the impact through experiments with real data. The results confirm the applicability of the proposed method for material differentiation in the CNI framework. Owing to the informative nature of events in static scenes, harnessing noise can serve as a flexible tool for specific high-dimensional imaging tasks and extend the imaging scenes with the CNI paradigm.

TS05. Silicon Photonics-A			
Time	09:00-10:30	Venue	LM104-B
Session Chair: Qiancheng Zhao, Southern University of Science and Technology			

Invited Speech	
09:00-09:30	**Speaker:** Jiawei Wang **Affiliation:** Harbin Institute of Technology Shenzhen **Bio:** Wang Jiawei is currently a professor in the School of Integrated Circuits, Harbin Institute of Technology (Shenzhen). He received his bachelor and PhD degrees from the School of Physics and Engineering of Sun Yat-sen University and the School of Electronic and Computer Engineering, Hong Kong University of Science and Technology in 2011 and 2016, respectively. From 2016 to 2020, he was engaged in post-doctoral research at the Leibniz IFW Dresden, Germany. From 2017 to 2020, he was also a research associate of the Department of Electronics and Information Engineering at Chemnitz University of Technology, Germany. The current main research interests include silicon photonics, nanophotonics, and applications in optical sensing and optical manipulation. He has published 50+ papers in journals such as Nature Photonics, Science Advances, Laser & Photonics Reviews, Nano Letters, ACS Nano, and participated in more than 20 international and domestic well-known conferences and forums such as CLEO, SPIE Photonics West, and FiO+LS. **Title:** Integrated Optical Microresonators with Strong Mode Chirality **Abstract:** Chirality, one of the universal phenomena in physics, forms the playground for fascinating phenomena in modern electromagnetism and industrial applications. Within the rapidly advancing technologies of integrated optoelectronic and all-optical devices, controlling the light flow on a chip using optical chiral modes emerges as a crucial topic, which implies numerous counterintuitive chiroptical effects. However, studies on chiral modes based on whispering gallery mode (WGM) microcavities often rely on precise post-fabrication adjustments or external tuning methods. To address this challenge, I will introduce spiral-shaped microring as an on-chip integrable resonator framework. Primarily, the spiral shape with a broken rotational symmetry allows for free manipulation of non-Hermiticity around exceptional points. Secondly, I will discuss the experimental realization of spiral rings with strong mode chirality using standard silicon photonics foundry processes. An integrated phase shifter enables electrical reconfiguration of chirality. Thirdly, strain-engineering of deposited silicon nitride membranes enables precision shape control of microtubes as 3D spiral-shaped microresonators. The coherent light emission or lasing can be controlled with deterministic mode chiralities and directionalities. In summary, the spiral resonator design framework is of great significance for its emerging applications, ranging from sensing to optical interconnects, and quantum photonics.
09:30-10:00	**Speaker:** Wei Jiang **Affiliation:** Nanjing University **Bio:** Wei Jiang is a professor in the department of quantum electronics and optical engineering, college of engineering and applied sciences at Nanjing University (NJU). He serves as an associate director of Optical Communications Systems & Network Engineering Research Center of Jiangsu Province, and associate director of Precision Photonics Integration & System Application Research Center of Ministry of Education of China. Prior to working at NJU, he was an associated professor in the department of electrical and computer engineering at Rutgers, the State University of New Jersey,

	USA. Prof. Jiang's research interests include silicon photonics, photonic crystals, nanophotonics, and their applications in optical interconnects, optical communications, sensing, and optical computing. He proposed a waveguide superlattice and demonstrated high-density low-crosstalk waveguide integration with half-wavelength pitches, which have potential applications in high-density space division multiplexing, high-performance chip-scale optical interconnects, compact spectrometers, as well as optical phased arrays. Further theoretical and experimental efforts from his group recently demonstrated a half-wavelength pitch optical phased array based on a waveguide superlattice, with potential application in solid-state LIDARs and wireless optical communications. He contributed to the fundamental understanding of silicon electro-optic and thermo-optic devices, slow light, superprism effects, and photonic crystal interface properties, and is an inventor of the slot photonic crystal waveguide. In 2007, the first high-speed photonic crystal modulator was demonstrated on silicon through one of his research projects. He has served on IEEE Photonics Standards Committee, program committees for CLEO, ACP, IEEE Optical Interconnect Conference, SPIE Photonics West, and other international conferences, and was a guest editor for a special issue on Optical Interconnects for IEEE/OSA Journal of Lightwave Technology. He has also served as Chair of Photonics Chapter of IEEE Princeton and Central Jersey Section (PCJS). **Title:** Silicon-based optical phased arrays: independent multiple beams and fast beam response **Abstract:** Optical phased arrays (OPAs) can provide advanced functionality for beam steering and beam forming, which have promising applications in light detection and ranging (LiDAR) and wireless optical communications. In last 15 years or so, optical phased arrays integrated on silicon photonic chips have been studied. They have shown advantages of compact size, high performance, and growing functionality. We will review several key advances in chip-scale silicon optical phased arrays, including wide steering angle, fast beam response, and independent multi-beam capability, which will be discussed in pertinent application scenarios. Shortly after the discovery of a pathway to half-wavelength emitter pitch OPA, a wide range of work appeared in this direction, which eventually led to wide angle steering and eliminated dependent secondary beams (grating lobes). Furthermore, independent multiple beams have recently been generated with optical phased arrays, which is important for handling multiple objects (e.g. cars, pedestrians) in LiDAR. Lastly, OPAs with fast beam response have shown promise for mobile wireless optical communications and reconfigurable wireless networks.
10:00-10:30	**Speaker:** Ping Zhao **Affiliation:** Sichuan University **Bio:** Ping Zhao received the B.Sc. and Ph.D. degrees in Optical Engineering from Huazhong University of Science and Technology (Wuhan, China) in 2009 and 2014, respectively. He worked as a senior research engineer of high-speed optical communication in Huawei for five years after doctoral graduation. Presently, he is a Staff Researcher at Chalmers University of Technology (Gothenburg, Sweden). His research fields cover integrated waveguide devices, nonlinear optics, optical parametric signal amplification/processing and optical communications. To date, he has published 26

	peer-reviewed scientific papers in journals and conferences, which includes OFC 2021/CLEO 2021/ACP 2023 postdeadline papers. Besides, he is a Guest Editor and Topical Adviser of Micromachines and received several distinct awards such as Leading Talent of China Electronics Technology Group Corporation (2022), Huawei Network President Award (2017) and Excellent Doctoral Thesis Prize of Hubei Province (2015). **Title:** Low-loss Dispersion-engineered Silicon Nitride Integrated Parametric Waveguides for All-optical Signal Processing **Abstract:** Silicon Nitride nonlinear integrated photonic waveguides enable continuous-wave parametric processing, including optical amplification beyond conventional amplifiers and ultra-fast wavelength conversion, and attract vast interest in communication, sensing, metrology and spectroscopy. In this talk, we will present our recent progress in ultra-low-loss dispersion-engineered silicon nitride nonlinear integrated photonic waveguides which are compatible with CMOS fabrication processes and their applications in optical signal processing such as amplification and wideband spectral translation for optical communication.

TS06. Fiber-Based Technologies and Applications-A			
Time	09:00-10:15	Venue	LM104-C
Session Chair: Xia Yu, Beihang University			
Invited Speech			

09:00-09:30	**Speaker:** George Y. Chen **Affiliation:** Shenzhen University **Bio:** Dr. Chen graduated with a 4-year MEng (Bachelor's and Master's joint degree) from Imperial College London (QS World University Ranking #6) in 2009, in the field of electronics and electrical engineering with computer science. He completed his PhD from the Optoelectronics Research Centre at the University of Southampton in 2013. He worked in an industrial research lab as a postdoctoral research fellow for SPI Lasers Ltd. (owned by Trumpf Group) from 2013 to 2015. He joined the University of South Australia as a research fellow in 2015, and played a critical role in establishing the Laser Physics and Photonic Devices Laboratories and a Joint Research Lab between the University of South Australia and Shandong Academy of Sciences. He joined Shenzhen University as a Professor in 2021, with a focus on the research of super-long-range distributed vibration sensing technologies and communication-sensing integration. He currently serves as the deputy director of the Shenzhen Key Laboratory of Ultrafast Laser Micro-Nano Manufacturing Science and Technology. He has co-authored a book chapter published by CRC Press. He has published 38 journal papers as first/corresponding author, with 10 invited talks. He has led and participated in various projects, with a total funding of $1.5M AUD and 49.5M RMB. He has been on the technical program committee of one of the largest conferences in his field (OFS) between 2018-2021. He is an editorial board member of Scientific Reports (Nature), and Optica / IEEE Senior Member. **Title:** Long distance distributed vibration sensing using forward transmission of light

	Abstract: Distributed fiber-optic vibration sensing is widely used for infrastructure and environment monitoring. However, existing methods require inline optical amplification, which raises the complexity and requirements of the system. We present recent progress on the research of forward transmission distributed sensing, which can reach single-span sensing distances beyond 200 km with sub-meter spatial resolution.
09:30-10:00	**Speaker:** Lei Wei **Affiliation:** Nanyang Technological University **Bio:** Dr. Lei Wei is an Associate Professor at Nanyang Technological University (NTU) in Singapore. His main research interests are fiber-based devices, multifunctional fibers, bio-fiber interfaces, in-fiber energy generation and storage, and smart fabrics. He serves as the Director of the Centre for Optical Fibre Technology (COFT) at NTU. He is also the Chair of the Optica Singapore Section. **Title:** Semiconductor Fibers for Flexible Optoelectronics **Abstract:** The combination of insulating, semiconducting, and metallic elements in well-defined geometries and prescribed sizes, while forming intimate interfaces, is essential to the realization of all-fiber optoelectronics. Here, we present the development of optoelectronic fibers, from the fundamentals to in-fiber device demonstration. Especially, the integration of semiconductor materials into fiber geometries provides a unique route to introduce new optoelectronic functionality into the existing glass fiber technologies. Firstly, multi-material fibers made of semiconductor materials such as silicon, germanium, and compound semiconductors are developed, which offer unique advantages in terms of the materials, geometries and waveguiding properties. Then, three main fabrication approaches to producing these fibers are summarized, in which the first approach is based on traditional drawing tower technique, the second approach involves laser processing, and the third approach takes advantage of in-fiber fluid instability phenomenon. Finally, prospects and applications of this new class of fibers are discussed.
10:00-10:15	**#** 8778 - High Speed Temperature Monitoring based on Large-capacity and High-density UWFBG Array **Presenter:** Xiukang Huang, Huazhong University of Science and Technology **Abstract:** We proposed a large-capacity of 1160 and high-density of 10cm ultra-weak fiber Bragg grating (UWFBG) array interrogation system, in which the temperature measuring accuracy is 0.2 ℃ and the interrogation rate is 10Hz. This system can be used for Quasi-distributed fiber temperature sensing.

TS07. Data Center Optical Interconnects and Networks-A			
Time	09:00-10:15	Venue	LM105
Session Chair: Meng Xiang, Guangdong University of Technology			
Invited Speech			
09:00-09:30	**Speaker:** Bowen Chen		

	Affiliation: Soochow University **Bio:** Bowen Chen received the Ph.D. degree from Beijing University of Posts and Telecommunications, Beijing, China, in 2014. He is currently an associate professor in the School of Electronic and Information Engineering, Soochow University. He is the author/coauthor of over 70 refereed technical papers. His current research interests include optical network design, network survivability, optical network virtualization, and edge-cloud computing networks. **Title:** Resource optimization offloading in cloud-edge elastic optical networks **Abstract:** In the context of the rapid deployment of IoT, 5G, and cloud computing, numerous emerging applications demand efficient networked computing capacity for task offloading from mobile and IoT users. We focus on the resource optimization offloading and the reduction of end-to-end (E2E) latency. To address this problem, we formulate the problem into an integer linear programming (ILP) model as an initial solution. Additionally, we propose several heuristic approaches to achieve the resource optimization offloading. Our results demonstrate that the proposed resource optimization offloading approach closely approximates the optimal solutions obtained by the ILP model. Moreover, the proposed resource optimization offloading approaches reduce the E2E latency and blocking probability, and resource efficiency in cloud-edge elastic optical networks.
09:30-10:00	**Speaker:** Yuan Cao **Affiliation:** Nanjing University of Posts and Telecommunications **Bio:** Yuan Cao received the Ph.D. degree from the Beijing University of Posts and Telecommunications, China, in 2021. From June 2018 to August 2018, he was an Academic Visitor with the KTH Royal Institute of Technology, Sweden. From June 2019 to August 2019, he was an Academic Visitor with the University of Southampton, U.K. He is currently an Assistant Professor with the Nanjing University of Posts and Telecommunications, China. His research focuses on quantum communications and networking. **Title:** Large-scale quantum key distribution networking: on the road to the Qinternet **Abstract:** Quantum Key Distribution (QKD) networks are regarded as the primary stage in the development of the quantum Internet. In recent years, more and more QKD networks have been deployed worldwide, while key resources have become the core resources of QKD networks to support service security and confidentiality. From the perspectives of key storage, key relay, key supply, and key service, this report introduces the pivotal technologies of QKD networking, such as flexible key pool construction, cost-optimized relay deployment, efficient multi-tenant provisioning, and software-defined intelligent service techniques. It also provides an outlook on the multi-protocol QKD network to meet the requirements of large-scale networking.
Oral Presentation	
10:00-10:15	**# 9360 - Flexible-Rate Direct-Detection PON with Efficient FEC-Free Clipping Noise Cancellation Under Peak-Power Constraint** **Presenter:** Lina Man, State Key Laboratory of Advanced Optical Communication System and Networks Shanghai Jiao Tong University

	Abstract: We propose and experimentally demonstrate a low-complexity clipping noise cancellation algorithm for flexible-rate PON under the peak power constraint. At the 14% HD-FEC threshold, the optimal clipping ratios are reduced by 2 dB for 16/64/128-QAM, and 3 dB for 32-QAM, respectively. Compared with the clipping only, the CNC algorithm can further improve the received optical power sensitivity by 0.3, 0.8, 1.3, 0.8, 0.7 dB, and 5.5 dB for 4/8/16/32/64/128-QAM signals after 10-km standard single-mode fiber transmission, respectively. With the FEC-free CNC algorithm, we achieve a wide-range flexible-rate PON from 28 to 98 Gb/s with a maximal power budget of 39.1 dB.

W1. Optical Fiber Upgrade-A			
Time	09:00-10:30	Venue	LM101-B
Session Chair: Zhenggang Lian, Yangtze Optical Electronics Co., China			
Invited Speech			

09:00-09:30	**Speaker:** Jing Zhang **Affiliation:** China University of Geosciences, Wuhan **Bio:** Jing Zhang received her B.E. degree in optical engineering from Huazhong University of Science and Technology (China) in 2012, her master's degree from Paris-Sud University (France) in 2015, and her Ph.D. degree from Nanyang Technological University (Singapore) in 2019. In December 2020, she joined the School of Mechanical Engineering and Electronic Information at China University of Geosciences (Wuhan) as a professor. Her main research interests are advanced multi-functional multi-material fiber, fiber-shaped optoelectronic devices, and functional. She has been the PI for over 5 grants including projects from the National Natural Science Foundation of China. **Title:** Advanced Optical Fiber Sensing and Its Geoscience Applications **Abstract:** TBA
09:30-10:00	**Speaker:** Chaotan Sima **Affiliation:** Optics Valley Laboratory **Bio:** Dr. Chaotan Sima is an Associate Professor at Huazhong University of Science and Technology and adjunct professor in Optics Valley Laboratory, Hubei. He obtained the Ph.D. degree in the University of Southampton, UK in 2013 and joined HUST in 2014, and received the Marie-Curie Fellowship in 2019. His research interests include photoacoustic sensing and applications. He has (co)authored over 50 technique publications, 10 patents and been the PI for over 10 national-level grants including projects from NSFC and National Key R&D Project. He serves as an editorial member of Optical and Quantum Electronics and guest editors of Sensors and Photonics. He is a senior member of IEEE and CSOE, as well as TPC members of several international conferences. **Title:** Ultra-sensitive monolithically-integrated optical fiber tri-axial accelerometer **Abstract:** An ultra-sensitive monolithically-integrated tri-axial photonic accelerometer based on uniform silicon micromachining with modified spring beams is presented. The optical fiber-based Fabry-Perot interferometer is utilized to retrieve the acceleration signal by demodulating optical phase

	change, achieving the noise level of nano-g at 1-80Hz and tri-axial coherence with minor crosstalk.
10:00-10:30	**Speaker:** Fanchao Meng **Affiliation:** Jilin University **Bio:** Fanchao Meng is currently a Professor at the College of Electronic Science and Engineering of Jilin University. Before joining Jilin University in 2022, he worked as an "Ideas of Excellence" postdoctoral researcher at the University of Bourgogne-Franche-Comté and the CNRS in France. He previously received his B.E. degree in 2012, M.E. degree in 2014, and D.E. degree in Optical Engineering in 2018, all from Tianjin University, China. His current research interests include real-time measurements, artificial intelligence in photonics, instabilities in dissipative soliton lasers, and nonlinear optics in gas-filled hollow fibers. In recent years, he has published academic papers in Nature Communications, Light: Science & Applications, Photonics Research, and other journals. **Title:** Real time measurements of ultrafast instabilities in a dissipative soliton system **Abstract:** Understanding dynamical complexity is one of the most important challenges in science. Dissipative soliton laser systems are ideal platforms for studying complex nonlinear dynamics. Recent years have seen significant progress in revealing various transient dissipative soliton dynamics by use of real-time measurement techniques such as dispersive Fourier transform (DFT) and time-lens methods. A particularly complex regime of dissipative soliton systems is associated with noise-like pulse multiscale instabilities, where sub-picosecond pulses with random characteristics evolve chaotically underneath a much longer envelope. We report real-time measurements of instability dynamics in a broadband noise-like pulse laser and the characterization reveals that intracavity extreme events satisfy statistical rogue wave criteria.

TS08. Laser Technology-B			
Time	10:45-11:45	Venue	LM103-A
Session Chair: Min Lin, Shenzhen University			
Invited Speech			

10:45-11:15	**Speaker:** Junqing Zhao **Affiliation:** Shenzhen Technology University **Bio:** Junqing Zhao received the Doctor of Engineering degree from Shenzhen University, Shenzhen, China, in 2014, for research on pulsed fiber lasers. Since then, his research has covered device, system, and application aspects of fiber lasers, fiber amplifiers, and nonlinear optics, successively with the Shenzhen Key Laboratory of Laser Engineering, Shenzhen University, China, the Optoelectronics Research Centre (ORC), University of Southampton, U.K., and the Jiangsu Key Laboratory of Advanced Laser Materials and Devices, Jiangsu Normal University, China. He is currently with the Key Laboratory of Advanced Optical Precision Manufacturing Technology of Guangdong Higher Education Institutes, Shenzhen Technology University, Shenzhen, China. He has published more than 80 academic papers, was authorized 8 patents, and written and translated 1 book chapter, respectively. He has also led 6

	research projects. He is a senior member of IEEE, senior and life member of Optica (formerly OSA), and one of the winners of OGC Young Scientist Awards in 2022. **Title:** Mid-infrared optical parametric conversion via high power fiber sources pumped nonlinear devices **Abstract:** In this talk, mid-infrared optical parametric sources pumped by employing different near-infrared fiber laser systems and different nonlinear devices will be demonstrated, which can consequently deliver varied parametric radiations yet always restricted to the general quasi-phase-matching conditions. Especially, single-frequency widely tunable and picosecond ultrafast parametric conversions within 3-4 μm spectral region will be discussed in detail.
11:15-11:45	**Speaker:** Bowen Liu **Affiliation:** The University of Tokyo **Bio:** Bowen Liu's research interests include exploration of novel ultrafast fiber laser configurations, extension of their tunability for potential applications. Bowen obtained his bachelor degree from Huazhong University of Science and Technology in 2013. He continued his master study in a joint program in laser photonics at Huazhong in China and Nanyang Technological University in Singapore. Then, he received PhD degree at the University of Tokyo. In 2023, he moved briefly to the University of Cambridge as a selected delegate for Ignite Project in Judge Business School and Clare Hall Visiting Programme. Bowen also participates in voluntary contributions to the research community and served as the president of the U-Tokyo OPTICA chapter till 2023. So far he has published 50 journal and conference papers as a leading and co-author, and has been authorized 6 patents. **Title:** Novel Fiber Lyot Filter and Its Application in Tunability-Enhanced All-Polarization-Maintaining Mode-Locked Fiber Lasers **Abstract:** Attributing to the pivotal advancement in generating ultrashort and high peak-power pulses, mode-locked fiber laser (MLFL) serves as a significant playground across a wide range of applications. From a demand perspective, controlling multiple properties of a MLFL would be highly practical, although a device for arbitrary pulse generation has yet to be developed. Particularly, tunable MLFL play an increasingly important role in the development of functionalized seed light sources, relying on high-performance fiber filters with high tuning efficiency, accuracy, and robustness, while maintaining simplicity and low cost. Lyot filtering, based on a segment of Hi-Bi fiber and a few polarizers, offers an ideal solution due to its simple structure, ease of manufacture, and flexibility in design to achieve customized filtering performance. It's inherently suited for all-PM configuration, providing excellent stability against the random polarization crosstalk typical in single-mode fiber systems. However, current research on all-PM fiber Lyot filters employs only single tuning mechanisms, leading to rigid setups that cannot adapt flexibly to different filtering requirements. This rigidity makes accurate initial filter settings challenging, limiting the full utilization of MLFL's tuning potential. Additionally, its expanded applications beyond wavelength tuning have been overlooked. A Lyot filter is essentially a polarization-mode interferometer, mapped in the

	time-frequency domain by phase relationships. This implies that Lyot filtering may open new possibilities for tunable MLFL by extending tuning capabilities from the optical spectrum to additional parameters such as pulse duration and repetition rate.

TS09. Topological Photonics-B			
Time	10:45-12:15	Venue	LM103-B
Session Chair: Yan Meng, Dongguan University of Technology			
Invited Speech			

10:45-11:15	**Speaker:** Yu-Gui Peng **Affiliation:** Huazhong University of Science and Technology **Bio:** Yu-Gui Peng received his B.S. and Ph.D. degrees in Physics from Huazhong University of Science and Technology in 2014 and 2019, respectively. He is currently an associate professor at Huazhong University of Science and Technology. His research interest includes acoustic/thermal functional and topological metamaterials. **Title:** Topological acoustics induced by orbital interactions **Abstract:** In this talk, we concentrate on the topological states and phase transitions induced by orbital-interactions. The introduction of acoustic orbitals enables counterintuitive orbital-dependent topological edge states and versatile corner states, opening avenues for exploring orbital-related topological physics and sound-wave interaction.
11:15-11:45	**Speaker:** Yuanfeng Xu **Affiliation:** Zhejiang University **Bio:** Prof. Xu obtained his Ph.D. degree from the Institute of Physics, CAS in 2019 (supervisors: Xi Dai and Hongming Weng). From 2019 to 2022, he worked as a postdoctoral researcher at the Max Planck Institute of Microstructure Physics in Germany and Princeton University in the United States (Advisor: B. Andrei Bernevig). In 2022, he was selected into the National Overseas High-Level Talents Program and joined the Center for Correlated Matter of Zhejiang University. His research interests focus on theoretical and computational condensed matter physics, through the development of universal topological band theory to realize the high-throughput classification and calculation of new topological (magnetic and flat-band) quantum materials, through the development of many-body numerical calculation methods to study the strongly correlated electrons systems. Prof. Xu has published more than 30 papers, including 3 in Nature, 1in Science, 4 in Nat. Phys., 3 in Nat. Comm., 5 in PRL/PRX, and 2 in Adv. Mats. **Title:** Classification of band topologies in crystalline materials **Abstract:** I'll introduce the development of magnetic topological quantum chemistry (MTQC) which is a complete, real-space theory of band topology in magnetic and nonmagnetic crystalline solids. Using MTQC, we derived the complete set of symmetry-based indicators of electronic band topology, based on which we performed the first high-throughput calculations for magnetic topological materials. In

	MTQC, the topology of a gapped band structure can be classified as topological or trivial. While, the topologically trivial insulators can still come in two kinds: atomic insulator, where the Wannier charge centers are localized on the atoms, and obstructed atomic insulators, where the Wannier charge centers are located away from atoms. In the second part, I'll introduce the three-dimensional real space invariants (3D RSI) that derived from MTQC and its applications to the high-throughput screening of obstructed atomic insulators. In the last part, I'll further introduce the application of MTQC in phononic crystals and in the general construction and topological classification of flat bands in crystalline materials.
11:45-12:15	**Speaker:** Zhen Gao **Affiliation:** Southern University of Science and Technology **Bio:** Zhen GAO is an Associate Professor of Southern University of Science and Technology (SUSTech). He received PhD in 2018 from School of Physical and Mathematical Sciences in Nanyang Technological University, Singapore, following his B.S. degree in 2009 and M. S. degree in 2012 from Zhejiang University in Hangzhou, all majored in Electrical Engineering. His current research interests include electromagnetic wave theory and applications, photonic crystals, spoof plasmonics, metamaterials, topological photonics/phononics/circuits, and terahertz photonics. As the first author or corresponding author, he has published more than 30 papers on Nature, Nature Communications, Physical Review Letter and Advanced Materials. He received National Distinguished Youth Expert in 2020, the Chinese Government Award for Outstanding Self-financed Student Award in 2016, Ten Major Advances in Chinese Optics in 2019 and The National-level Talent in Shenzhen. **Title:** Realization of a topological one-way photonic crystal fiber **Abstract:** Recently, topological one-way fiber based on the second Chern number in the four-dimensional parameter space has been theoretically proposed in a three-dimensional (3D) magnetic Weyl photonic crystal. Here we report the first experimental realization of a topological one-way photonic crystal fiber by inducing a screw dislocation defect in a 3D magnetic photonic crystal. Using direct field measurements, we map out the dispersion of the one-way photonic crystal fiber mode and demonstrate nonreciprocal and robust photonic propagation along arbitrary curved paths in 3D space. This work demonstrates a unique application of topological defects and high-dimensional topological physics in three-dimensional robust photonic manipulations.

TS10. Biophotonics and Optical Biomedicine-B			
Time	10:45-12:15	Venue	LM103-C
Session Chair: Jiajie Chen, Shenzhen University			
Invited Speech			
10:45-11:15	**Speaker:** Hongbao Xin **Affiliation:** Jinan University **Bio:** Hongbao Xin is currently a professor, Vice Dean of College of Physics & Optoelectronic		

	Engineering, and vice director of the Institute of Nanophotonics, Jinan University, Guangzhou, China. He received both his BS degree and Ph.D degree at Sun Yat-sen University. After graduation, he continued his research at the University of California, Berkeley and the National University of Singapore. He joined Jinan University in 2018. His research interests focus on biophotonics, such as optical tweezers for bio-manipulation and nanoplasmonics for molecular detection, etc. He has published more than 60 peer-reviewed journal articles, including Nature Photonics, Nature Reviews Materials, Nature Communications, Light: Science & Applications, Advanced Materials, Nano Letters, etc. He was elected as Young Changjiang Scholar from Ministry of Education, China, and the Distinguished Young Scholar by the Natural Science Foundation of Guangdong Province. He serves as the Associate Editor of Optics Express, Early Career Editorial Advisory Board Member of APL Photonics, Fundamental Research, Chinese Journal of Lasers. **Title:** Precision cell stimulation and modulation based on optical manipulations **Abstract:** Precision single cell stimulation and modulation is of great importance for the control of cellular function toward a designated state, which will provide new clues for precision medicine. Optical manipulation techniques, such as optical tweezers, provide a non-invasive approach for single cell manipulation, however, controllable cell stimulation and modulation with high precision remains a big challenge. In this talk, I will share our recent work on precision cell stimulation and modulation based on optical manipulation. Using optical manipulation techniques, we are able to stimulate and modulation the function of a single cell, which results in the creation of cell-based multifunctional microrobots. In addition, optical manipulation techniques also enable neural stimulation and modulation at sub-cellular precision.
11:15-11:45	**Speaker:** Linbo Liu **Affiliation:** Guangzhou National Laboratory **Bio:** Liu Linbo received B.Eng in Precision Instrument and M. Eng. in Optical Engineering from Tianjin University, China. He received PhD in Bioengineering from National University of Singapore before his postdoctoral training in Wellman Center in Photomedicine, Harvard Medical School (HMS) and Massachusetts General Hospital (MGH). He joined the School of Electrical and Electronic Engineering, Nanyang Technological University as an assistant professor, and was promoted to associate professor with tenure in 2019. He is now with Guangzhou National Laboratory. His research interests are mainly focused on development and validation of non-invasive, cellular and sub-cellular resolution imaging methods for respiratory disease diagnosis and basic research. **Title:** Functional microanatomic imaging of mucociliary clearance with Micro-OCT **Abstract:** Due to disease heterogeneity, diagnosis of chronic repiratory airway diseases requires endoscopic imaging and functional assessment at the sub-cellular level noninvasively in vivo. Unfortunately, such a diagnostic imaging technology is absent. We have developed micro-optical coherence tomography (μOCT) to address this unmet need. μOCT has been established as subcelluar resolution imaging tool as well as an accurate method for assessment of mucociliary clearance in the airways ex vivo and in vivo. The talk will be focused on the existing approaches to achieve 1-2 micrometer spatial resolutions and technical challenges towards endoscopic applications in vivo.

	Endobronchial applications of uOCT through a fiber microprobe could therefore open up new opportunities for management of chronic repiratory diseases.
11:45-12:15	**Speaker:** Yu Chen **Affiliation:** Fujian Normal University **Bio:** Dr. Yu Chen received his BS from Peking University in 1997 and his PhD from the University of Pennsylvania in 2003. After postdoctoral training at MIT, he joined the University of Maryland (College Park) in 2007 as an Assistant Professor, and was promoted to Associate Professor in 2014. He moved to the University of Massachusetts (Amherst) in 2019, and was promoted to Professor in 2023. He is currently a Professor at the Fujian Normal University, China, and serves as the Executive Deputy Director of the Minister of Education Key Laboratory of Optoelectronic Science and Technology for Medicine. Dr. Chen has published over 110 peer-reviewed journal publications. He received the National Science Foundation CAREER Award. He has been an associate editor of IEEE Transactions in BME, and an Editorial Board member of Scientific Reports. His research area is the development of optical techniques for biomedical applications including cancer detection and transplant organ evaluation. **Title:** Evaluation of Transplant Kidney Viability using Optical Coherence Tomography (OCT) **Abstract:** There is a critical need to develop new modalities to assess pre-transplantation kidney viability. In this talk, we will introduce the recent progresses in developing robot-assisted OCT device that enables automatic wide field-of-view imaging. In addition, we utilized polarization-sensitive optical coherence tomography (PS-OCT) to assess tissue fibrosis information. Our results indicated that wide-field PS-OCT was capable of imaging kidney microstructures and fibrosis non-invasively, thereby providing a comprehensive score map covering nearly the entire surface of a kidney, which promises to assess the quality of individual donor kidney more precisely.

TS11. Computational Imaging-B			
Time	10:45-12:00	Venue	LM104-A
Session Chair: Xin Yuan, Westlake University			
Invited Speech			
10:45-11:15	**Speaker:** Renjie Zhou **Affiliation:** The Chinese University of Hong Kong **Bio:** Renjie Zhou is an Associate Professor in the Department of Biomedical Engineering at the Chinese University of Hong Kong (CUHK), where he directs the Laser Metrology and Biomedicine Laboratory (LAMB). He received PhD degree in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign in 2014 and undertook postdoctoral training at MIT before joining CUHK in 2027. His research interest is in developing optical precision instruments for various research and industrial applications. He has published over 100 journal and conference papers and filed over 10 US/China patents with several licensed to industry. He has been involved in organizing > 20		

	international conferences as co-chairs/committee members, delivered >40 conference invited talks and seminars/colloquiums, and reviewed for >30 international journals. He is currently serving on the editorial boards of JOSA A, IEEE Photonics Technology Letters, and International Journal of Extreme Manufacturing. He is a Senior Member of Optica and SPIE. In 2019, He received the Croucher Innovation Awards in 2019 from the Croucher Foundation and the Young Scientist Award in 2023 from the Electromagnetics Academy. **Title:** Coherence-gated diffraction tomography for label-free volumetric imaging of thick tissues **Abstract:** Optical diffraction tomography (ODT) has recently become an important imaging modality for volumetric imaging of living cells and intracellular organelles by revealing their three-dimensional (3D) refractive-index distributions. However, resolving 3D morphological features in thick specimens remains a significant challenge for conventional angle-scanning ODT. We report a new coherence-gated diffraction tomography approach that uses dynamic speckle illumination to achieve imaging of thick biological specimens with around 0.5 μm transverse resolution and around 1 μm axial resolution in a reflection-mode geometry. In SDT, multiplescattering background is rejected through spatiotemporal gating provided by dynamic speckle-field interferometry, while depth-resolved refractive index maps are reconstructed by developing a comprehensive inverse-scattering model that also considers specimen-induced aberrations. Benefiting from the high-resolution and full-field quantitative imaging capabilities of SDT, we successfully imaged red blood cells and quantified their membrane fluctuations behind a turbid medium with a thickness of 2.8 scattering mean-free paths. Most importantly, we performed volumetric imaging of cornea inside an ex vivo rat eye and quantified its optical properties, including the mapping of nanoscale topographic features of Dua's and Descemet's membranes that had not been previously visualized without dissection.
11:15-11:45	**Speaker:** Peng Li **Affiliation:** University of Science and Technology of China **Bio:** I did my PhD with Prof. John Rodenburg on coherent diffraction imaging at University of Sheffield, UK. After PhD, I moved to Institute Fresnel, France, developping x-ray Bragg ptychography. Before working at I13-1 Diamond Light Source as a beamline scientist, I shortly worked at ESRF as a postdoc. My research mainly focuses on the developments of ptychography related imaging techniques, like ptychographic tomography and Bragg ptychography. **Title:** Multislice ptychographic tomography **Abstract:** Ptychography is a form of Coherent Diffractive Imaging, where diffraction patterns are processed by iterative algorithms to recover an image of a specimen. Although mostly applied in two dimensions, ptychography can be extended to produce three dimensional images in two ways: via multi-slice ptychography or ptychographic tomography. Ptychographic tomography relies on 2D ptychography to supply projections to conventional tomographic algorithms, whilst multi-slice

	ptychography uses the redundancy in ptychographic data to split the reconstruction into a series of axial slices. Whilst multi-slice ptychography can handle multiple-scattering thick specimens and has a much smaller data requirement than ptychographic tomography, its depth resolution is relatively poor. In this talk, I will present an imaging modality that combines the benefits of the two approaches, enabling isotropic 3D resolution imaging of optically thick specimens with a reduced number of angular measurements.
Oral Presentation	
11:45-12:00	# 6701 - LUCK: Lighting Up Colors in the Dark **Presenter:** Yaping Zhao, The University of Hong Kong **Abstract:** Low-light imaging is challenging, especially in scenarios like nighttime or dim indoor environments, where images often suffer from color distortion and noise. Traditional RGB cameras with Bayer filters face limitations such as low photon capture rates and quantum efficiency, leading to darker images. When compensated by longer exposure times or higher sensitivity settings, issues such as motion blur and noise amplification arise. Enhancements for RGB cameras are limited by these hardware constraints and do not address the fundamental problem of insufficient photon reception. This paper focuses on the dual-camera system that combines an RGB camera with a monochrome camera to improve low-light imaging. This system uses the color processing capabilities of the RGB camera alongside the higher photon capture rate of the monochrome camera. Specifically, we design a comprehensive computational imaging framework with feature extraction, alignment, and fusion modules to process and synthesize images from both cameras into a single high-quality output. Experimental results confirm the effectiveness of our approach, significantly enhancing image quality and achieving over a 2dB increase in PSNR compared to state-of-the-art methods. Our research demonstrates the potential of dual-camera systems in low-light settings and indicates a promising direction for future advancements in photography technology.

TS12. Silicon Photonics-B			
Time	10:45-12:15	Venue	LM104-B
Session Chair: Wei Jiang, Nanjing University			
Invited Speech			

10:45-11:15	**Speaker:** Yu He **Affiliation:** Shanghai Jiao Tong University **Bio:** Yu He received his BS degree from Nankai University, Tianjin, China, in 2015, and his PhD degree from Shanghai Jiao Tong University, Shanghai, China, in 2020. He is currently an assistant professor at Shanghai Jiao Tong University. His current research interests include integrated photonic devices, heterogeneous integrations, and metamaterials. He has published more than 60 journals and conference papers, including Light: Science & Application, Advanced Photonics, Journal of Lightwave Technology, with more than 1400 citations.

	Title: Metamaterial enabled high capacity optical interconnect **Abstract:** Driven by the data growth rate in data centers, artificial intelligence, and optical computing, the transmission capacity of optical interconnect has been continuously increasing. Parallelism is essential for achieving large scale and high capacity optical network. However, conventional multiplexing technologies are facing challenges in scalabilities and footprints. Enabled by the increasingly high resolution of advanced lithography, metamaterial has emerged as a new candidate for designing SOI-based ultra-compact multiplexing devices. Here we show the feasibility of using metamaterials in future high-capacity optical interconnects and discuss some potential applications.
11:15-11:45	**Speaker:** Qiancheng Zhao **Affiliation:** Southern University of Science and Technology **Bio:** Dr. Qiancheng Zhao is an assistant professor at the Southern University of Science and Technology. He graduated from Zhejiang University in 2012. He received his Ph.D. in Electrical and Computer Engineering at the University of California, Irvine, USA 2017. Before his appointment in SUSTech, he worked as a signal integrity engineer at Apple Inc. USA from 2017 to 2019. Then, he joined the University of California, Santa Barbara, as a postdoctoral researcher from 2019 to 2021. His research focuses on low-loss photonic integrated circuits and integrated nonlinear photonics. He has published over 50 peer-reviewed papers, including Nature Communications, Optica, Advanced Optical Materials, etc. **Title:** Tantalum Pentoxide Photonic Integrated Circuits **Abstract:** Tantalum pentoxide (Ta2O5) has garnered attention due to its excellent optical properties for linear and nonlinear optics. Tantalum pentoxide waveguides have broad applications in quantum computing, nonlinear optics, free-space optics, and rare earth ion-doped lasers. In this report, we will briefly introduce the tantalum pentoxide photonic devices, especially focusing on its low propagation loss and low thermo-optic response.
11:45-12:15	**Speaker:** Jiaqi Wang **Affiliation:** Shenzhen University **Bio:** Jiaqi Wang received a Ph.D. degree in electronic engineering from The Chinese University of Hong Kong in 2016. She is currently an Associate Professor at the College of Physics and Optoelectronic Engineering at Shenzhen University. Her research interests include silicon photonics and fiber optic sensors. **Title:** Suspended nanomembrane silicon waveguides and gas sensing applications **Abstract:** We report suspended nanomembrane silicon (SNS) waveguide devices that confine and guide the mid-IR light in a silicon waveguide with a deep-subwavelength thickness, which have low effective refractive index contrast, moderate optical loss, and giant evanescent field. Besides, we demonstrate the feasibility of gas detection using the fabricated SNS waveguide devices.

TS13. Optical Communication and Networks-A

<table>
<tr><td>Time</td><td>10:45-12:15</td><td>Venue</td><td>LM104-C</td></tr>
<tr><td colspan="4">Session Chair: Qizhen Sun, Huazhong University of Science and Technology</td></tr>
<tr><td colspan="4">Invited Speech</td></tr>
<tr><td>10:45-11:15</td><td colspan="3">Speaker: Kangping Zhong

Affiliation: The Hong Kong Polytechnic University

Bio: Dr. Zhong Kangping is an Assistant Professor in the Department of Electrical and Electronic Engineering at The Hong Kong Polytechnic University. Dr. Zhong received his PhD degree in fiber optical communications in 2014. He was appointed as the Director of Research and Development in the POET Technologies, focusing on advanced silicon photonics, PIC, hybrid electronic-photonics integration for next generation optical communications from 2020 to 2023. From 2017 to 2020, he was the principal engineer with MACOM Technologies, focusing on advanced photonics technology. Prior to that, he was a postdoctoral fellow in The Hong Kong Polytechnic University from 2014 to 2017. He was a Visiting Research Fellow at The Queen's University, Canada from 2011 to 2012.

Dr. Zhong has more than a decade of solid experience in both academia and industry, particularly in the fields of fiber communication systems and associated electronics, optical coherent communications, short reach systems, advanced digital signal processing and its hardware implementation. He is also an expert in optical module, optoelectronic device, silicon photonics, hybrid integrated PIC and high-speed electronic IC, such as CDR chip, TIA, driver and coherent and PAM4 DSP ASIC.

Dr. Zhong has published over 100 papers (citation>2400+) in top-tier journals and international conferences including one book chapter, three ESI high citation papers (top 1% most-cited paper), one invited talk in the signature conference OFC 2017 and one top scored paper in OFC 2019. He has been ranked among the world's top 2% most-cited scientists in the released metrics compiled by Stanford University in 2021&2022. He is a recipient of the first prize of Guangdong Technological Invention Award of 2020.

Title: Recent Advances of APD for Optical Interconnects

Abstract: In this talk, we will review the advances of high speed APD and its application in amplifier-less intensity modulation/direct detection (IM/DD) optical transmission systems for data centre interconnections.</td></tr>
<tr><td>11:15-11:45</td><td colspan="3">Speaker: Yixiao Zhu

Affiliation: Shanghai Jiao Tong University

Bio: Yixiao Zhu is currently a tenure-track associate professor in Shanghai Jiao Tong University. His research interest is optical access networks and short-reach optical interconnects. He has authored or co-authored more than 100 publications with > 1000 citations in Google Scholar, including 1 Nature Photonics and 8 post-deadline papers in OFC2019/2023, ECOC2022/ECOC2023, ACP2020~2023.

Title: Residual Carrier-Based Phase Tracking Enabling MHz Linewidth lasers

Abstract: There is an increasing demand for high spectral efficiency transmission to accommodate the</td></tr>
</table>

	various bandwidth-consuming applications. The underlying question is the laser phase noise in intradyne coherent detection, which prohibits the adoption of high-order modulation formats from direct detection to coherent detection. In this presentation, we first introduce the principle of residual carrier-based phase tracking technique, and showcase two application scenarios: 1) net 1-Tb/s PS-256-QAM transmission with 3-MHz DFB for inter-DCI; 2) 1.0-Pb/s coherent digital-analog radio-over-fiber transmission for fiber-wireless-converged optical networks.
11:45-12:15	**Speaker:** Tao Yang **Affiliation:** Beijing University of Posts and Telecommunications **Bio:** Tao Yang, received the Ph. D. degree in Information and Communication Engineering from the Beijing University of Posts and Telecommunications (BUPT), in 2019. He is currently an associate professor with state key laboratory of information photonics and optical communications, BUPT. His research interests include high-speed optical optical access network, digital signal processing, intelligent optical network monitoring. **Title:** Key technologies for next-generation ultra-high-speed PON systems **Abstract:** The report aims to summarize the current status of ultra-high-speed PON systems and analyze the key technical challenges of next-generation single-wavelength 200G PON systems. It outlines the 200Gbps PON system scheme proposed by the group, and analyzes and discusses the results of conducting simulations and experimental verification.

TS14. Optoelectronic Devices and Applications-A			
Time	10:45-12:15	Venue	LM105
Session Chair: Xun Guan, Tsinghua Shenzhen International Graduate School			
Invited Speech			
10:45-11:15	**Speaker:** Xiaolan Zhong **Affiliation:** Beihang University **Bio:** Xiaolan Zhong, a professor at the School of Physics, Beihang University. She obtained her Ph.D. from the Institute of Physics, Chinese Academy of Sciences in 2014. From January 2014 to May 2017, she conducted postdoctoral research at the University of Strasbourg in France. She joined Beihang University in June 2017. Her main research areas are nano photonics. She has published more than 80 SCI articles, including Nature Nanotechnology, Nature Photonics, Angewandte Chemie International Edition and so on, with a total of 3658 citations in Google Scholar, an h-index of 32, and a maximum of 442 citations per article. The first/corresponding authors articles include 36 articles. She received more than 10 funding supports, including National Natural Science Foundation of China, Beijing Natural Science Foundation of China. She received the second prize of Science and Technology of Chinese Photoreceptor Society (ranking: 3/6, 2021). Her current research interests include nanophotonics, plasmonics, electrochromic/photochromic materials, and so on. **Title:** Miniaturized On-chip Spectrometer Enabled by Electrochromic Modulation		

	Abstract: There is a considerable demand for compact, lightweight, and economical miniaturized on-chip spectrometers, applicable in areas like portable optical sensing and lab-on-chip systems. Commonly, these miniaturized spectrometers are founded on engineered spectral response units and make use of algorithms to reconstruct unknown spectra. Nevertheless, the restricted size of computational on-chip spectrometers constrains the retrieved spectral resolution, which is limited by the quantity of integrated spectral response units/filters. Hence, it is a challenge to boost the spectral resolution without augmenting the number of employed filters. In this presentation, we present a computational on-chip spectrometer that utilizes electrochromic filter-based computational spectral units. These units can be electrochemically modulated to enhance the effective sampling number for a higher spectral resolution. These filters are directly integrated onto the photodetector pixels, and the spectral modulation of the filters is a consequence of redox reactions during the dual injection of ions and electrons into the electrochromic material. We experimentally demonstrate that the spectral resolution of the proposed spectrometer can be effectively enhanced as the number of applied voltages rises. The average disparity between the peak wavelengths of the reconstructed and reference spectra reduces from 14.48 nm to 2.57 nm. We also show that the proposed spectrometer can function with only four or two filter units, with the aid of electrochromic modulation. Furthermore, we illustrate that the electrochromic filter is easily adaptable for hyperspectral imaging due to its uniform transparency. This method offers a novel way to enhance the performance of miniaturized spectrometers with tunable spectral filters for high-resolution, low-cost, and portable spectral sensing. It also stimulates the exploration of other stimulus responses, such as photochromic and force-chromic, on computational spectrometers.
11:15-11:45	**Speaker:** Nannan Li **Affiliation:** Shenzhen Technology University **Bio:** Dr. Nannan Li is an assistant professor in Collage of Integrated Circuits and Optoelectronic Chips, Shenzhen Technology University (SZTU). His research interest includes nanophotonics, vortex beams, optoelectronic chips, and semiconductor lasers. He got his PhD degree in Physics from The Chinese University of Hong Kong (CUHK) in 2019. He has worked as a postdoctoral researcher in CUHK and Shenzhen University from 2020 to 2023. He joined SZTU as an assistant professor in 2024. Dr. Nannan Li has published 16 papers in SCI journals, which include Photonics Research, Advanced Optical Materials, Nanoscale Horizons and ACS Photonics. The total citation of these papers is more than 300. One of the papers is selected as the Wiley Top Cited Article in 2020-2021. He has won C N Yang Scholarships in 2019. He has won Best Poster Award twice. He has won the Dr. Barbara Kwok Young Postdoctoral Researcher Travel Grants in 2020. He is the project leader of several research foundations. **Title:** On-chip sorting of vortex beams using optical devices **Abstract:** Owing to their unique optical properties and new degrees of freedom, orbital angular momentum (OAM) beams have been applied in various fields. Detection of the topological charges (TCs) of OAM beams is the key step for their applications. However, on-chip sorting of OAM beams with large TCs still remains a challenge. In my first research work, Bloch surface wave (BSW) structures with five semi-ring shaped nanoslits are modeled. A spatial separation of 135 nm on the chip is

	obtained between two neighboring OAM states. OAM beams with TCs up to 35 can be successfully sorted by the BSW structures, which is much larger than that using metallic structures (only seven). BSW structures exhibit better OAM sorting performances than metallic structures. We systematically show how the lower attenuation of BSW structures leads to far superior separation ability compared to surface plasmons propagating on metallic structures. In my second research work, metallic structures with six periodic circular nanoslits are designed and fabricated. When the metallic structures are illuminated by the OAM beams form the bottom, there is a focal point on the top surface. The position of the focal point will rotate clockwise when the TCs of the incident OAM beams increase. A rotation angle of 7.1° on the device is obtained between two neighboring OAM states. OAM beams with TCs up to 12 can be successfully sorted by the metallic structures. To our knowledge, this is the first report which achieve the rotation of the focal point on the device surface. In conclusion, our results reveal that BSW structures and metallic structures could be excellent options for OAM sorting with large TCs, which is beneficial for applications in integrated on-chip devices and optical communications.
11:45-12:15	**Speaker:** Xun Guan **Affiliation:** Tsinghua Shenzhen International Graduate School **Bio:** Xun Guan received his Ph.D. in Information Engineering from The Chinese University of Hong Kong in 2016. Subsequently, he conducted research at the Center for Optics, Photonics and Lasers (COPL) at Laval University in Canada, serving as a postdoctoral researcher and later as a research scientist. Since 2022, he has joined Tsinghua Shenzhen International Graduate School and Tsinghua-Berkeley Shenzhen Institute as an Assistant Professor. His main research areas include optical communications, optoelectronic integration, and signal processing. **Title:** Cuffless blood pressure monitoring based on monolithically integrated flexible optoelectronic sensors and single-shot transfer learning **Abstract:** Optoelectronic sensor has advantages such as high precision, low electromagnetic radiation, insensitivity to electromagnetic interference, low cost, and high integration. A monolithic integrated optoelectronic sensor based on a gallium nitride (GaN) platform can integrate the light source and photodiode on the same chip, achieving a more compact and stable sensing unit. This structure can be used for micro-force sensing and, in turn, for monitoring physiological indicators. Among all indicators, blood pressure (BP) and other related indicators are crucial for the early detection and treatment of cardiovascular diseases. Therefore, it is necessary to develop a wearable and precise sensor that can non-invasively and conveniently monitor pulse around the clock. Due to the diversity of individual physiological characteristics, cuffless blood pressure measurement methods require extensive calibration and have low accuracy. We have developed an optical pulse sensing patch that includes a monolithically integrated GaN optoelectronic device and a micro-nano structured polydimethylsiloxane (PDMS) film. This sensing patch combines enhanced transfer learning and a one-dimensional convolutional neural network (1D-CNN) model, allowing for accurate blood pressure measurement using only a set of training data from new users. This compact, intelligent, and flexible sensing system shows great potential in the prevention and monitoring of cardiovascular diseases.

W1- Optical Fiber Upgrade-B			
Time	10:45-12:00	Venue	LM101-B
Session Chair: Meisong Liao, Shanghai Institute of Optics and Fine Mechanics			
Invited Speech			
10:45-11:15	**Speaker:** Fei Yu **Affiliation:** Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, **Bio:** Fei Yu received his B.S. and M.S. degrees in physics electronics from the Beijing Institute of Technology, Beijing, China, in 2008 and 2010, respectively. He received the Ph.D. degree in optics from the University of Bath, Bath, U.K., in 2014. He is currently a professor with Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences. His research interests include optical fiber design and applications. **Title:** High-Power Single-Frequency Fiber Gas Raman Lasers **Abstract:** Low-loss antiresonant hollow-core fiber (AR-HCF) featuring multiple transmission bands is demonstrated an ‘ideal’ medium for optically pumped gas-filled fiber laser. A long interaction length of tens of meters in AR-HCF could significantly reduce the threshold of various optical gas nonlinear effects. In this study, we report 25 Watt continuous single-frequency laser generation at 1.9 μm in a hydrogen-filled AR-HCF pumped by a single-frequency fiber laser at 1 μm wavelength. Up to 79 % quantum efficiency of stimulated vibrational Raman scattering is measured.		
11:15-11:45	**Speaker:** Chaoqi Hou **Affiliation:** Xi’an Institute of Optics and Precision Mechanics, Chinese Academy of Science (CAS) **Bio:** Chaoqi Hou is currently a researcher at Xi’an Institute of Optics and Precision Mechanics, Chinese Academy of Science (CAS). In 2018, he was selected as an A-level talent in the "Western Youth Scholars" program of the Chinese Academy of Sciences. In 2022, as the team leader, he was selected as a member of the "Western Light - Western Cross team" talent program of the Chinese Academy of Sciences.His current research interests lie at special functional fibers, including rare earth doped fibers, radiation resistant fibers, medical optical fiber and imaging fiber bundle. In recent years, he have presided over ten projects including National engineering projects, National key Research and Development Program, Joint Resaerch/Youth Found of National Natural Science Foundation of China, Key Deployment of the Chinese Academy of Sciences and other horizontal projects.He has published 60 academic papers in the international journals indexed by SCI and has been granted 15 invention patents. **Title:** Mechanism of radiation-induced gain attenuation and improvement of radiation resistance of erbium-doped fibers **Abstract:** Space laser communication became a research hotspot in these years because of its wide range of applications such as in deep-space exploration and satellite communications systems.		

	Er-doped fiber amplifiers (EDFA) were used on the receiver and transmitter sides in the space laser communication system, owing to their high gain performance and low noise figure. However, Er-doped fiber (EDF) as the key device in the EDFA is especially sensitive to space radiation. The exposure of EDF to the radiation environment results in significant degradation of gain performance and slope efficiency. Therefore, radiation resistant fiber is the preferred solution to solve this problem. In this work, the mechanism of radiation-induced gain attenuation in EDF have been clarified. After then, some radiation hardened methods were adopted in the preparation of EDF. Based on the above works, the EDF has a radiation-induced gain attenuation as low as 0.024dB/krad (Si). This EDF meets the requirements for applied in laser intersatellite links in satellite constellation of middle and low earth orbit and will effectively solve the problem that laser power will sharply decrease when EDF applied in space. It' s of great significance for the development of space laser communication.
Oral Presentation	
11:45-12:00	**# 5655 - Multi-Objective Optimization of Low-Loss, High Birefringence Hollow-Core Anti-Resonant Fibers Using a Proxy Model and Clustering Algorithm** **Presenter:** Zihan Liu, Shenzhen Institutes of Advanced Technology **Abstract:** This paper presents an optimized method for costly multi-modal multi-objective black-box functions using a back-propagation neural network as a surrogate model, coupled with a clustering algorithm for hollow-core anti-resonant fibers. It normalizes and weights experimental data to optimize hyper-parameters in the decision-making process. Greatly reduced the number of optimization cycles.

TS15. Laser Technology-C			
Time	13:30-15:15	Venue	LM103-A
Session Chair: Yiyang Luo, Chongqing University			
Invited Speech			
13:30-14:00	**Speaker:** Mohammed Zahed M. Khan **Affiliation:** Anglia Ruskin University **Bio:** Dr. Mohammed Zahed Mustafa Khan received M.S. and Ph.D. degrees in Electrical Engineering from King Fahd University of Petroleum and Minerals (KFUPM) and King Abdullah University of Science and Technology (KAUST), Saudi Arabia, in 2004 and 2013, respectively. From 2014 to 2015, he was a SABIC Postdoctoral Research Fellow with the Photonics Laboratory, KAUST. He joined the Electrical Engineering Department, at KFUPM, in 2015 as an Assistant Professor and was promoted to Associate Professor in 2020. He was the founder and director of " Optoelectronics Research Laboratory (ORL)" at KFUPM before joining Anglia Ruskin University as a Senior Lecturer in Electronics Engineering, at the School of Engineering and Built Environment. His research focuses on developing near-infrared and visible semiconductor lasers for applications in optical communications and sensing. Dr. Khan is a senior member of IEEE and OSA and a member of SPIE and IET.		

	Title: InAs/InP Quantum-dot/dash Semiconductor Lasers: A Potential Light Source for Nextgeneration Optical and MMW/THz Heterogeneous Infrastructures **Abstract:** Quantum-confined nanostructure-based semiconductor lasers have been taking center stage in the last few years as a potential light source for next-generation optical communications. In particular, 1550 – 1625 nm InAs/InP quantum-dashes/dots (Qdash/Qdot) semiconductor lasers, exhibiting optical comb generation as well as the ability to generate millimeter (MMW) and terahertz (THz) carriers, have opened a novel paradigm in communication infrastructures. This talk will highlight the recent progress in engaging InAs/InP Qdot/Qdash laser diodes in optical and MMW/THz communication systems. In particular, the viability of these optical sources over fiber, free space optics (FSO), wireless systems, and hybrid infrastructures will be showcased. Moreover, a very recent investigation on the generation and performance of structured light modes exploiting these light sources over varying environmental conditions will be underlined, thus further affirming this light source's potential for the next-generation green communication system
14:00-14:30	**Speaker:** Zinan Wang **Affiliation:** University of Electronic Science and Technology of China **Bio:** Professor of University of Electronic Science and Technology of China. **Title:** Study of Replica Symmetry Breaking in Raman Ran-dom Fiber Laser **Abstract:** Recently, the emergence of a novel light source, known as random fiber laser (RFL), has captured significant interest[1]. RFL diverge from traditional laser by es-chewing the standard resonant cavity, instead harnessing the stochastic Rayleigh scat-tering within the fiber for feedback. It is characterized by simple structure, high effi-ciency, good stability and flexible regulation[2], and has shown a wide range of appli-cation prospects in the field of communication, sensing and high-power laser[3][4][5]. It is also being considered as potential seed sources for future laser-driven inertial con-finement fusion (ICF) systems[6]. The distinctive feedback mechanisms and abundant nonlinear effect inherent in RFL have also established it as a vital platform for delving into the intricacies of complex systems. Our team's research delves into the phase tran-sition mechanisms of RFL, aiming to uncover their intrinsic workings to enable multi-faceted manipulation of their emission properties. This endeavor is designed to en-hance their performance within high-power laser systems. RFL, with their distinctive feedback and gain mechanisms, display complex dy-namics akin to those in spin glass systems rich in spin molecules, serving as an essen-tial element in the profound investigation of spin glass theories. With the help of phase-sensitive optical time-domain reflectometer (Φ-OTDR) with proprietary tech-nologies, we accurately measured the phase fluctuations of Rayleigh scattering in fi-bers, and proposed a Rayleigh-scattering-phase-variation model, which theoretically predicted the boundary parameter of photonic phase transition in the RFL[7]. Subse-quently, the ubiquitous mechanism of the photonic phase transition is revealed: the photonic phase variation in RFL with Rayleigh scattering mechanism keeps an analo-gy to the role of temperature and disorder in the interactions between spins in the magnetic spin glass phase. We also theoretically predict and experimentally observe a unique phase transition phenomenon-mode

	asymmetry, which expands the current un-derstanding of photonic phase transitions, providing a fresh perspective on the intrinsic mechanisms of complex systems. Furthermore, our research identified that the correla-tion of RFL is predominantly governed by the stochastic spikes scattered throughout the spectrum, which is pivotal for guiding the design, manipulation, and utilization of these lasers. Given the significance of the time-domain intensity statistics of RFL for the reli-ability of high-power laser devices, our team innovatively crafted a 1053nm narrow-linewidth RFL and explored its time-domain intensity statistics through both experi-mental and theoretical research under full bandwidth conditions[8]. It is found that the time-domain intensity statistics characteristics of the RFL is related to the pump power, observing position and the fiber dispersion. Additionally, the time-domain intensity statistics of RFL exhibit an inward deviation from the exponential distribution, signify-ing interdependencies among various frequency components within the spectrum. Building on this research, we experimentally explored the connection between the dis-persion and the time-domain intensity characteristics of the RFL. The results show that the dispersion accumulation will make the time-domain characteristics closer to the exponential distribution; on the contrary, the dispersion compensation leads to a more stable time-domain output. Leveraging these findings, we can tailor the time-domain output of random fiber lasers, with specific intensity amplitudes, to fulfill specialized application requirements. Building upon our foundational theoretical research on RFL, we have conducted preliminary exploration of its potential application in ICF laser devices[9]. RFL, char-acterized by its instantaneous broadband and multidimensional tunability, demonstrate the potential to serve as seed sources in ICF laser devices. In alignment with the gain spectrum characteristics of neodymium glass amplifiers within ICF laser devices, our team has developed a two-level Nonlinear Schrödinger Equation (NLSE) model for the design of RFL seed sources. Following this, we introduced a precision spectral control scheme with matched the amplifier gain spectrum, successfully demonstrating the generation of nanosecond random laser pulses with a 2.5nm bandwidth and an energy output of 28mJ in our experiments. This study robustly illustrates the favorable pro-spects for the application of RFL in ICF laser devices. In conclusion, our team's profound investigation into the phase transition of RFL has laid a theoretical groundwork for the precise and multidimensional manipulation of its output characteristics. This advancement paves the way for the enhanced appli-cation potential of RFL across various domains.
Oral Presentation	
14:30-14:45	**# 1165 - 10-GHz Ultra-short Optical Pulse Generation Based on Semiconductor Mode-locked Laser Diodes** **Presenter:** Defan Sun, Key Laboratory of Optoelectronic Materials and Devices Institute of Semiconductors, Chinese Academy of Sciences; Center of Materials Science and Optoelectronics Engineering University of Chinese Academy of Sciences **Abstract:** We present a 10-GHz quantum well (QW) semiconductor mode-locked laser (SMLL) with a pulse width as short as 540 fs.

14:45-15:00	**#** 5213 - Packaged and fine mechanics enabled ultra-high-Q WGM microcavities for soliton microcomb generation **Presenter:** Haiyun Yuan, Shanghai University **Abstract:** Ultra-high Q factor of optical microcavity is stabilized for 5 weeks and single soliton microcomb with smooth spectrum is successfully generated in packaged silica microcavity with high-precision coupling adjustment. In this work, the mode number of microrod cavities is controlled by CO2 laser and mode crossing is avoided successfully. Meanwhile, the proposed package scheme realizes long-term maintenance of optical frequency comb and high experimental repeatability, which has positive significance in promoting the integration and device of optical frequency microcomb.
15:00-15:15	**#** 5885 - Image Analysis Technology of the Human Standing Posture Photos and Cupping Therapy with Light Therapy Applied on Local Muscle Tissue **Presenter:** Ting-Yu Chen, National Central University **Abstract:** Habitual poor posture often leads to muscular imbalances. Such postural deficiencies often lead to musculoskeletal symptoms, including muscle stiffness or soreness, and can result in the loss of neutral spinal alignment, muscle group fatigue, and acquired joint deformity. A more worrisome issue is the lack of self-awareness that most people have regarding their unconscious adoption of improper standing postures. Therefore, developing a convenient and fast analysis tool of human standing posture (HSP) should be a topic worthy of research. Furthermore, comparing HSP could serve as a useful reference for evaluating the efficacy of physical therapy, including manual therapy, cupping therapy, and optical therapy modalities. In this study, an image analysis technology of HSP using photographs of specific poses and the cupping therapy with the light therapy applied on local muscle imbalances in the shoulder and neck areas are investigated. We developed a HSP desktop app (HSPA) using MediaPipe to detect body keypoints and calculate the deviation distances of the ears, shoulders, hips and knees, as well as the deviation angles of the ear-shoulder from the lateral plane and the right shoulder-left shoulder from the dorsal plane. A MMD-MSD containing HSP image with keypoints marked by physiotherapists was used as the HSP analysis image source to calculate value of deviation distances and angles. The results show that the results of HSPA calculation based on MediaPipe are close to the reference values calculated based on MMD-MSD keypoints. The HSPA can provide accurate deviation distances and angles and can be applied to evaluate the efficacy of a low-intensity light therapy treatment case. Comparing deviation distances and angles before and after treatment can evaluate treatment effectiveness. From the HSP analysis of one subject who received light therapy, a significant improvement in head tilt and hunchback posture was observed, demonstrating the effectiveness of light therapy and the feasibility of the HSPA. It is believed that this technology could assist in proactively adjusting standing posture and objectively quantifying the treatment of muscle imbalances.

TS16. Topological Photonics-C			
Time	13:30-15:30	Venue	LM103-B

Session Chair: Zhen Gao, Southern University of Science and Technology

Invited Speech

13:30-14:00	**Speaker:** Fuxin Guan **Affiliation:** the Hong Kong University **Bio:** PhD in Fudan Univerisity Postdoc. in HKU **Title:** Synthetic wave of complex frequency compensates optical loss **Abstract:** Superlenses made of plasmonic materials and metamaterials can image features at the subdiffraction scale. However, intrinsic losses impose a serious restriction on imaging resolution, a problem that has hindered widespread applications of superlenses. Optical waves of complex frequency that exhibit a temporally attenuating behavior have been proposed to offset the intrinsic losses in superlenses through the introduction of virtual gain, but experimental realization has been lacking because of the difficulty of imaging measurements with temporal decay. In this work, we present a multifrequency approach to constructing synthetic excitation waves of complex frequency based on measurements at real frequencies. This approach allows us to implement virtual gain experimentally and observe deep-subwavelength images. Our work offers a practical solution to overcome the intrinsic losses of plasmonic systems for imaging and sensing applications.
14:00-14:30	**Speaker:** Shiqiao Wu **Affiliation:** Foshan University **Bio:** Shi-Qiao Wu received his Ph.D. degree in Physical Electronics from South China University of Technology in 2018. Subsequenctly, he was a postdoctoral fellow at Hong Kong Baptist University and Soochow University. Since June in 2023, he has been a member of the School of Physics and Optoelectronics Engineering in Foshan University. His current research interest includes topological phononics and non-Hermitian topology. **Title:** Observation of D-class topology in an acoustic metamaterial **Abstract:** Topological materials and metamaterials opened new paradigms to create and manipulate phases of matter with unconventional properties. Topological D-class phases (TDPs) are archetypes of the ten-fold classification of topological phases with particle-hole symmetry. In two dimensions, TDPs support propagating topological edge modes that simulate the elusive Majorana elementary particles. Furthermore, a piercing of p-flux Dirac-solenoids in TDPs stabilizes localized Majorana excitations that can be braided for the purpose of topological quantum computation. Such two-dimensional (2D) TDPs have been a focus in the research frontier, but their experimental realizations are still under debate. Here, with a novel design scheme, we realize 2D TDPs in an acoustic crystal by synthesizing both the particle-hole and fermion-like time reversal symmetries for a wide range of frequencies. The design scheme leverages an enriched unit cell structure with real-valued couplings that emulate the targeted Hamiltonian of TDPs with complex hoppings: A technique that could unlock the realization of all topological classes with passive metamaterials. In our experiments, we realize a pair of TDPs with opposite Chern numbers in two independent sectors that are connected by an intrinsic fermion-like

	time-reversal symmetry built in the system. We measure the acoustic Majorana-like helical edge modes and visualize their robust topological transport, thus revealing the unprecedented D and DIII class topologies with direct evidence. Our study opens up a new pathway for the experimental realization of two fundamental classes of topological phases and may offer new insights in fundamental physics, materials science, and phononic information processing.
14:30-15:00	**Speaker:** Yan Meng **Affiliation:** Dongguan University of Technology, China **Bio:** Dr. Yan Meng is an Assistant Professor at Dongguan University of Technology since April 2024. Previously, he served as a Research Assistant Professor in the Department of Electrical and Electronic Engineering at Southern University of Science and Technology (SUSTech) from August 2021 to March 2024. Before that, he completed a postdoctoral fellowship at the Hong Kong University of Science and Technology under the supervision of Professor Jensen Li from November 2018 to July 2021. Dr. Meng earned his Ph.D. in Physics from Chongqing University in June 2018, where he also completed his undergraduate studies in June 2014. His primary research interests include topological photonics, artificial surface plasmonics, and microwave metamaterials. Dr. Meng has made significant contributions to his field, as evidenced by his 17 publications, 10 of which he is the first author, with a total citation count of 1480, including two ESI highly cited papers and two editor' s recommendations. His notable works include publications in prestigious journals such as Physical Review Letters, Nature Communications, and Science China Physics Mechanics & Astronomy. Some of his key publications are: "Spinful topological phases in acoustic crystals with projective PT symmetry" (Physical Review Letters, 2023) "Direct observation of valley-polarized topological edge states in designer surface plasmon crystals" (Nature Communications, 2017) "Non-Hermitian topological coupler for elastic waves" (Science China Physics Mechanics & Astronomy, 2022) "Topological photonics in three and higher dimensions" (APL Photonics, 2024) Dr. Meng has been actively involved in numerous national and provincial research projects, serving as the principal investigator for several grants, including projects funded by the National Natural Science Foundation of China and the Guangdong Provincial Natural Science Foundation. He has been invited to speak at multiple international conferences, including the Progress In Electromagnetics Research Symposium (PIERS) and the International Conference on Metamaterials Photonic Crystals and Plasmonics (META). In 2024, he will chair the topological photonics session at the 9th Optoelectronics Global Conference (OGC) in Shenzhen, China. Dr. Meng's expertise in constructing experimental setups such as electromagnetic wave 3D imaging systems and acoustic non-Hermitian experimental systems, coupled with his groundbreaking research,

	positions him as a leading figure in the field of topological photonics and metamaterials. **Title:** Observation of tunable topological phases of polaritons in a cavity waveguide **Abstract:** In this talk, we report the experimental demonstration of tunable topological polaritons within a cavity waveguide, achieved by modifying its width. This modification allows control over the photonic environment and the strength of light-matter interactions, enabling the realization of a topological phase transition without altering the lattice structure.
15:00-15:30	**Speaker:** Shaolin Ke **Affiliation:** Wuhan Institute of Technology **Bio:** Shaolin Ke is an Associate Professor at Wuhan Institute of Technology. He received his Ph.D. in 2017 from Huazhong University of Science and Technology. Upon completing his Ph.D., he joined Wuhan Institute of Technology. His research interests include nanophotonics, non-Hermitian physics, and topological photonics. **Title:** Non-Hermitian Aharonov-Bohm chains using photonic microrings **Abstract:** The realization of light manipulation is an important foundation for developing the next generation of integrated photonics chips, which can effectively meet the growing demands of information processing and optical communication. The combination of band theory and topology has led to the development of a new field called topological photonics. This is based on optical analogies of quantum Hall effects, quantum anomalous Hall effects, valley spin effects, etc., constructing unidirectional light transport with topological protection and robustness to perturbations, effectively reducing issues caused by fabrication defects and disorder-induced backscattering. Additionally, with the rapid development of non-Hermitian photonics in recent years, new approaches for controlling light localization and transport have been provided. However, achieving flexible control of light and disorder-immune light transport remains a challenge. Here, we construct one-dimensional (1D) and two-dimensional (2D) photonic topological insulators based on a microring resonator array, achieving various caging and skin effects in the microring lattices through flexible control of the photonic gauge potential and introduction of gain and loss. This is potentially valuable for our realization of flexible light manipulation and disorder-immune light transport for on-chip photonic devices.

TS17. Optoelectronic Devices and Applications-B

Time	13:30-15:30	Venue	LM103-C
Session Chair: Tianxun Gong, University of Electronic Science and Technology of China			
Invited Speech			
13:30-14:00	**Speaker:** Changzheng Sun **Affiliation:** Tsinghua University **Bio:** Changzheng SUN received the B.E., M.E. and Ph.D. degrees in electronic engineering from Tsinghua University, China, in 1995, 1997 and 2000, respectively. He became a faculty member of the		

	Dept. of Electronic Engineering, Tsinghua University, China, in 2000, and was promoted to full professor in 2010. His research interests include physics and fabrication technologies of high-speed photonic integrated circuits, nonlinear dynamics in semiconductor lasers and nonlinear optics in optical micro-resonators. Up to now, he is the author or co-author of over 120 scientific papers. **Title:** Suspended AlGaAs-Integrated Nonlinear Photonics **Abstract:** AlGaAs is a promising integrated nonlinear photonics material with enormous optical nonlinearity and high refractive index. In this talk, we present our recent work on nonlinear optics in suspended AlGaAs devices, including fabrication of high-Q suspended AlGaAs microring resonators, microcomb generation in near and mid- infrared regime, and octative-spanning supercontinuum generation.
14:00-14:30	**Speaker:** Tianxun Gong **Affiliation:** University of Electronic Science and Technology of China **Bio:** Tianxun Gong obtained his Ph.D degree from Nanyang Technological University on 2015. He also worked in Singapore Bioimaging Consortium, A*STAR from 2012 to 2016. Tianxun Gong is currently an Associate Professor at School of Integrated Circuit Science and Engineering, University of Electronic Science and Technology of China. His research field focused on nano sensor technology, especially applications on photodetectors and SERS detections. **Title:** Nanostructures for high-performance 2D material based Photodetectors **Abstract:** The performance of 2D material-based photodetectors can be significantly enhanced through the integration of nanostructures, which introduce electric field enhancements or surface strain, leading to increased photoresponsivity and expanded response wavelengths. Given the diverse characteristics and requirements of different photodetectors, it is essential to develop a variety of nanostructures tailored to specific applications. In this talk, I will present the design and fabrication of various types of nanostructures and explore their applications in advancing the capabilities of 2D material-based photodetectors.
14:30-15:00	**Speaker:** Yingjie Liu **Affiliation:** Yanshan University **Bio:** Yingjie Liu received the B.S. and Ph.D. degrees from Harbin Institute of Technology, Shenzhen, China, in 2018 and 2022. He is currently an associate professor with School of Information Science and Engineering, Yanshan university, Qinhuangdao, China. His research interest includes silicon photonics, photonic integrated circuits, and optical interconnects. **Title:** On-chip phase gradient meta-lens and its dynamic manipulation **Abstract:** This talk presents high-performance multimode waveguide crossing via subwavelength slot arrays with lateral gradients and on-chip electrically driven tunable meta-lens for dynamic focusing and beam steering.
15:00-15:30	**Speaker:** Satoshi Aya **Affiliation:** South China University of Technology

	Bio: Prof. Satoshi Aya received my Ph.D. degree in materials engineering from Tokyo Institute of Technology in 2014. Later, he had worked as an engineer in Hitachi High-Technologies (2014-2015) and postdoctoral researcher in RIKEN Center for Emergent Matter Science (2015-2019) in Japan. Since 2019, he joined to South China University of Technology as a principal investigator. His principal interests are the physicochemical properties of soft matters, particularly in liquid crystal physics, surface science, colloids and electro-optical aspects of materials in liquid crystal states, etc. **Title:** Highly polar nematics with enhanced dielectricity and induced polarization **Abstract:** Ferroelectricity is a spontaneous polarization state possessed by dielectrics, which generally occurs in crystalline (solid) material systems with low symmetry. Fluid or highly fluid soft matter systems usually exhibit high symmetry, contrary to the ferroelectricity requirement. The introduction of strong polarity or ferroelectricity is a strategy that has attracted much attention in new liquid crystal materials and flexible optoelectronic devices. Ferroelectric nematic liquid crystals (NF LCs) are new classes of liquid crystal states with a polarization field. In contrast to the traditional nematic liquid crystals that are apolar, the inversion symmetry is broken in the NF LC state. Due to the head-to-tail equivalence, the NF state exhibits several revolutionary electro-optic properties, such as ultra-high dielectric permittivity, spontaneous polarization, excellent nonlinear optical properties, and ultra-low electric-field driving. It provides numerous possibilities for developing novel, advanced, flexible optical and electronic devices. In this presentation, we report a new type of nematics that is highly polar with considerable polar fluctuations and improved dielectric properties.

TS18. Computational Imaging-C			
Time	13:30-15:45	Venue	LM104-A
Session Chair: Renjie Zhou, The Chinese University of Hong Kong			
Invited Speech			
14:00-14:30	**Speaker:** Xin Yuan **Affiliation:** Westlake University **Bio:** Dr. Yuan is currently an Associate Professor at Westlake University. He was a video analysis and coding lead researcher at Bell Labs, Murray Hill, NJ, USA from 2015 to 2021. Prior to this, he had been a Post-Doctoral Associate with the Department of Electrical and Computer Engineering, Duke University from 2012 to 2015, where he was working on computational imaging and machine learning. He develops compressive sensing techniques for high-dimensional imaging with applications to videos, hyperspectral, microscopy and x-ray imaging. Before joining Duke, Dr. Yuan obtained his Ph.D. from the Hong Kong Polytechnic University in 2012. He has published more than 200 journal and conference papers (with more than 10,000 citations and an H-index of 55) and holds more than 30 patents. He has been the associate editors of Pattern Recognition, Chinese Optics Letters, and the lead guest editor of IEEE Journal of Selected Topics in Signal Processing special issue “Deep Learning for High Dimensional Sensing” (2022). He has delivered invited talks in many international conferences		

	on the topic of computational imaging and machine learning. **Title:** Snapshot Compressive Imaging **Abstract:** Capturing high-dimensional (HD) data is a long-term challenge in imaging and related fields. Snapshot compressive imaging (SCI) uses a 2D detector to capture HD (>3D) data in a snapshot measurement. Via novel optical designs, the 2D detector samples the HD data in a compressive manner; following this, algorithms are employed to reconstruct the desired HD data cube. SCI has been used in hyperspectral imaging, video, holography, tomography, focal depth imaging, polarization imaging, microscopy, and so on. Inspired by artificial intelligence (AI), various deep neural networks have also been developed to reconstruct the HD data cube in spectral SCI and video SCI. This talk reviews recent advances in SCI hardware, theory, and algorithms, including both optimization-based and deep learning-based algorithms. Diverse applications and the outlook for SCI will also be discussed.
14:30-15:00	**Speaker:** Yang Yue **Affiliation:** Xi'an Jiaotong University **Bio:** Yang Yue received the B.S. and M.S. degrees in electrical engineering and optics from Nankai University, China, in 2004 and 2007, respectively. He received the Ph.D. degree in electrical engineering from the University of Southern California, USA, in 2012. He is a Professor with the School of Information and Communications Engineering, Xi'an Jiaotong University, China. Dr. Yue’s current research interest is intelligent photonics, including optical communications, optical perception, and optical chip. He has published ~300 journal papers (including Science) and conference proceedings with >12,000 citations, one book, seven edited books, two book chapters, >60 issued or pending patents, >200 invited presentations (including 1 tutorial, >30 plenary and >80 keynote talks). Dr. Yue is a Fellow of SPIE, a Senior Member of IEEE and Optica. He is an Associate Editor for IEEE Access and Frontiers in Physics, Editor Board Member for four other scientific journals, Guest Editor for >10 journal special issues. He also served as Chair or Committee Member for >100 international conferences, Reviewer for >70 prestigious journals. **Title:** Single-ToF-sensor-based Object Surface Material Optical Features Analysis and Recognition **Abstract:** In this work, a comprehensive framework for object surface material recognition using a single time-of-flight (ToF) camera is presented, leveraging diffuse reflection principles and data fusion. Through theoretical analysis and the derivation of factors influencing diffuse reflection on objects, the method concentrates on and exploits surface information. To validate the feasibility of our theoretical research, a process and identification framework for object surface material recognition using impact factors based on theoretical analysis is proposed. The depth and active infrared intensity (D-AI) data obtained from a single Time-of-Flight (ToF) camera are combined, which are robust in different light condition. The experimental results not only visually showcase the effectiveness of our proposed method in accurately detecting the positions and surface materials of targets with varying sizes and spatial locations, but also reveal that the vast majority of the sample data can achieve recognition accuracy of 94.8% or higher. We further propose an innovative object detection framework based on the artificial optical characteristics of the object material. And a slide window weight fusion (SWWF)

	method provides fuse image with two modalities to localize targets. The approach performs well on localization with a 0.778 intersection over union (IoU), and the best classification results are obtained with a 98.01% total accuracy.
15:00-15:30	**Speaker:** Shijie Feng **Affiliation:** Nanjing University of Science and Technology **Bio:** Shijie Feng is a professor at the Department of Electronic and Optical Engineering of Nanjing University of Science and Technology (NJUST). He was a research assistant at Centre for Optical and Laser Engineering, Nanyang Technological University from 2015 to 2016. He received his PhD in optical engineering at NJUST in 2017. He was a postdoctoral researcher at NJUST from 2017 to 2019. Currently, He has published more than 60 journal papers. His research interests include phase measurement, high-speed 3D imaging, fringe projection, machine learning, and computer vision. **Title:** Generalizable structured-light 3D imaging using deep learning **Abstract:** In recent years, deep learning has emerged as a powerful tool by training a deep neural network (DNN) to address problems in optics and photonics. It is currently promoting increased interest and gaining extensive attention for its utilization in the field of optical metrology. Usually, people often depend on a data-driven DNN to handle all cases once it is trained. However, we find it hard for the data-driven model to address all problems and perform well in all scenarios. Deep learning models often exhibit high variance and may fall into local loss minima during training, thus giving unreliable and inaccurate predictions. To this end, we introduce a physics-informed deep learning method for fringe pattern analysis (PI-FPA) and a cross-domain learning (CDL) framework for adaptive structured-light 3D imaging. PI-FPA is developed by integrating a lightweight DNN with a learning-enhanced Fourier transform profilometry (LeFTP) module. The LeFTP module can embed the prior knowledge in the network structure and the loss function to directly provide reliable phase results for new types of samples. Regarding the CDL framework, it can dynamically synthesize DNNs by integrating a novel mixture-of-experts (MoE) architecture with a gating neural network (GNN). The MoE architecture efficiently extracts features from fringe images across different domains, while the GNN adaptively orchestrates the synthesis of multiple expert DNNs. Our approaches provide novel and flexible solutions for generalizable structured-light 3D imaging.
Oral Presentation	
15:30-15:45	# 51 - Deep-feature-matching-based Piecewise Polynomial Transformation for Multi-domain Nonlinear Scale Distortion Image Correction Method **Presenter:** Luonan Chang, Beijing Institute of Control Engineering Science and Technology on Space Intelligent Control Laboratory **Abstract:** Images collected by linear scan cameras are stretched and compressed due to the speed regulation of targets. This condition changes the target morphology and considerably affects the accuracy of subsequent image tasks such as target detection and tracking. Affine transformation matrix is the priority in fields of image alignment, registration and correction,to solve the mapping relationship between pixels. However, in practical engineering applications such as aerospace circular scanning camera imaging, through-type scanning high-speed train body fault detection, and industrial

	circuit board assembly line fault detection, the scanning rate of linear scan camera cannot be adaptively adjusted in real time according to the target speed, resulting in deformations of various scales in the sequence image. A unified affine matrix solution for the entire image cannot solve the problem of target scales with regional differences. Therefore, a deep-feature-matching-based piecewise polynomial transformation for multi-domain nonlinear scale distortion image correction method is innovatively proposed, to achieve one-to-one correspondence between deformed images and standard images at the pixel level. First, a feature matching algorithm based on deep feature extraction, driven by big dataset, is integrated with graph convolution and optimal matching to achieve high-precision matching of two images, which performs well in illumination, weak texture, and similar features confusion. Second, an image block algorithm based on sparse feature clustering is adopted ,which applies k-means clustering to sparsely reduce the dimensionality of dense feature points to maintain a good balance between speed and accuracy. Third, a novel image correction method based on piecewise polynomial trajectory planning is proposed, which converts the multi-domain nonlinear scale distortion image correction into robot multi-segment path planning. This strategy optimizes the coordinate standardization formula of each scale-changing image block, and guarantees the continuity of pixels between adjacent image blocks, thereby achieving high-precision image mapping relationship solution. At last, a remapping method of sparse feature to dense pixel is proposed and transforms the original high-resolution deformed image to the corrected one via the calculated mapping formula. Experimental results on 5 long sequances has demonstrated the effectiveness of our methodology with an maximum 1.25% improvement , which can be expanded to remote sensing image panoramic stitching, calibration and registration.

TS19. Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-A			
Time	13:30-15:00	Venue	LM104-B
Session Chair: Yongzheng Wen, Tsinghua University			
Invited Speech			

13:30-14:00	**Speaker:** Quan Li **Affiliation:** Tianjin University of Technology and Education **Bio:** Quan Li is currently an associate professor at the Terahertz Research Center in Tianjin University of Technology and Education, China. She received the B.S. degree in electronic science and technology from the Changchun University of Science and Technology, China, in 2010; and received both the M. S. and Ph. D. degrees in optical engineering from Tianjin University, China, in 2016. From 2013 to 2014, she was a visiting Ph. D. candidate in Oklahoma State University, USA. Her current research interests include terahertz metasurfaces and surface plasmonic wave modulators. The research results have been published on Nature Communications, Advanced Functional Materials, Carbon, etc. **Title:** Active terahertz surface plasmonic devices based on metasurfaces **Abstract:** Surface plasmonic waves (SPWs) have important application prospects in on-chip systems due to their special two-dimensional propagation properties, but there is still a lack of active devices

	for SPWs in the terahertz band. Our recent works have achieved dynamic control over the terahertz SPWs utilizing metasurfaces as the coupling sources, including single-band and dual-band active SPW excitation control based on graphene metasurfaces, and function switchable SPW control based on Ge2Sb2Te5 (GST) metasurfaces. Our results offer a route in realizing small, compact and dynamically tunable terahertz on-chip devices and systems.
14:00-14:30	**Speaker:** Mengyao Li **Affiliation:** Tsinghua Shenzhen International Graduate School **Bio:** Mengyao Li received the Ph.D. degree in physics from City University of New York, NY, USA, in 2021. She then pursued post-doctoral studies in City University of New York, NY, USA. In 2022, she joined Institute of Materials Research, Tsinghua Shenzhen International Graduate School (Tsinghua SIGS) as an Assistant Professor. Her research interest focuses on topological photonics, including Floquet topological systems, higher-order topology, topological polaritons, and photonic and acoustic metamaterials. **Title:** Metasurfaces for higher order topological photonics and topological polaritonics **Abstract:** Topological photonic systems, with their unique properties of robustness and one-way propagating boundary states protected by symmetries, have shown great potential in modern optical applications and devices, such as integrated photonic circuits and chips, light communication and computing, and topological lasers. In recent years, more and more new topological systems are emerging with interesting physics and promising application potential for infrared and more, such as photonic higher-order topological insulators. At the same time, the research of new materials such as 2D materials also boosted the field of topological photonics and polaritons, bringing the topological properties from photons to quasiparticles via light-matter interactions. A thin all-dielectric metasurface design that holds topological properties will support the propagation and observation of modes both radiative and guided, and benefit for in-plane couplings with 2D materials, inducing a lot of interesting effects such as higher order topology and topological polariton modes.
14:30-15:00	**Speaker:** Liang Liu **Affiliation:** Shanghai Jiao Tong University **Bio:** Liu Liang obtained a Doctor of Science degree from the School of Physics, Peking University. From 2016 to 2022, he conducted postdoctoral and Senior Research Fellow research at the National University of Singapore. In September 2022, he joined Shanghai Jiao Tong University as a long-term tenured associate professor. His current research interests include spintronic materials and devices, as well as charge and spin transport in topological quantum materials. His experimental techniques include epitaxial thin film growth, micro-nano device processing, and extremely low-temperature strong magnetic field electrical transport measurements. **Title:** Nonlinear Hall Effect in 3D Topological Insulators and Its Potential Applications in Microwave Rectification and THz Detection **Abstract:** We present the innovative use of the nonlinear Hall effect in 3D topological insulators for microwave rectification and terahertz (THz) detection. NLHE, a recent discovery, offers insights into

	quantum material symmetries and topology, enabling new optoelectronic devices. Our work shows that NLHE in these materials, driven by skew scattering, is strongly influenced by topological surface states. We demonstrate room-temperature microwave rectification from 0.01 to 16 GHz in thin films and bulk crystals. Furthermore, we delve into the potential of leveraging this exceptional property for the development of efficient THz detectors, highlighting the transformative impact of NLHE in topological materials on the future of optoelectronic technologies.

TS20. Fiber-Based Technologies and Applications-B

Time	13:30-14:45	Venue	LM104-C

Session Chair: Wenjun Ni, South-Central Minzu University

Invited Speech

13:30-14:00	**Speaker:** Wei Ding **Affiliation:** College of Physics & Optoelectronics Engineering, Jinan University **Bio:** Wei Ding is a Full Professor at the College of Physics & Optoelectronic Engineering, Jinan University. He received the Ph.D. degree from the University of Bath (UK) in 2007. His research areas include anti-resonant hollow-core fibers, hollow-core fiber communications, nonlinear waveguide optics, near-field optics, and micro/nano optical fibers. He has published over 60 papers in journals such as Nature Communications, Laser & Photonics Reviews, Photonics Research, etc with an H-index of 25, and holds more than 10 authorized patents. He was awarded the "Top Ten Optical Advances in China 2018" in the applied research category by Chinese Journal of Lasers. He is a Senior Member of Optica, Chief Scientist at Linfiber Technology (Nantong) Co., Ltd., and a visiting scholar at Peng Cheng Laboratory. **Title:** Anti-Resonant Hollow-Core Fiber Communication Applications and Characterization **Abstract:** As one of the most promising fiber technologies following silica glass optical fibers, anti-resonant hollow-core fibers (AR-HCFs) use air as the transmission medium and guide light by anti-resonant reflection. Compared to traditional optical fibers, their performance advantages are highlighted in the following aspects: ① ultra-low latency, ② ultra-low nonlinearity, ③ ultra-high bandwidth, and ④ lower transmission loss. These exceptional features will greatly promote the applications of optical fibers in fields such as communication, lasers, sensing, and quantum technology. This report provides a brief introduction to the new functionalities of anti-resonant hollow-core fibers developed by our research group over the past few years, as well as new characterization techniques. Specifically: 1. Utilizing the extremely low Rayleigh backscattering characteristics of anti-resonant hollow-core fibers, we achieved 12-THz C+L band co-frequency/co-time full-duplex data transmission, with a net capacity of 202.1 Tb/s in a 120-channel DP-64QAM-PCS real-time transmission system. The transmission quality is unaffected by the reverse channels, demonstrating the great potential for independent direction dimension multiplexing in fiber optic communication systems. 2. By leveraging the phase sensing capability of high-order modulation coherent transmission

	technology and the rapid acquisition of large numbers of samples, we accurately assessed the extremely low Kerr nonlinearity coefficient of anti-resonant hollow-core fibers in the optical communication band. The upper limit of the nonlinear refractive index we provided is 2<2.20×10−23 2/ , which is three orders of magnitude lower than that of silica glass and consistent with the value obtained for nitrogen at one atmospheric pressure in 800 nm ultrafast laser measurements.
14:00-14:30	**Speaker:** Yuchao Li **Affiliation:** Jinan University **Bio:** Yuchao Li is currently a director for Laboratory of Nanophotonic Manipulation in the Institute of Nanophotonics, Jinan University. His research interests lie at optical manipulation and super-resolution imaging. He has published more than 40 academic papers, including Nat. Commun., Adv. Mater., Light Sci. Appl., ACS Nano, etc. He currently serves as one of editorial board members for Journal of Biomaterials and guest editor of Biomedical Optics Express. He was awarded with the International Association of Advanced Materials Scientist Award, International Microfluidics Congress Young Scientist Award, and Guangdong Provincial First Prize of Science and Technology. Homepage: https://faculty.jnu.edu.cn/nmgzyjy/lyc/list.htm **Title:** Nano-optical manipulation and imaging using optical fiber probes **Abstract:** With observation of small objects, a precisely manipulation is also highly desirable, especially for a three-dimensional manipulation of nanoparticles or biomolecules with a size of less than 100 nm. Although optical tweezers have become powerful tools to manipulate microparticles and cells, they have limits when extended to the nanoscale because of the fundamental diffraction limit of light. The emergence of near-field methods, such as plasmonic tweezers and photonic crystal resonators, have enabled surpassing of the diffraction limit. However, these methods are usually used for two-dimensional manipulation and may lead to local heating effects that will damage the biological specimens. In this talk, I will introduce a near-field technique that uses a photonic nanojet, a highly focusing beam, from bio-microlenses to perform optical manipulation and imaging of sub-100-nm objects. With the photonic nanojet generated by a bio-microlens bound to an optical fiber probe, optical manipulation and super-resolution imaging were achieved for fluorescent nanoparticles, DNA molecules, subcellular structures and even viruses. Backscattering and fluorescent signals from the trapped targets were detected in real time with a strong enhancement. The demonstrated approach provides a potentially powerful tool for nanostructure assembly, biosensing and single-cell studies.
Oral Presentation	
14:30-14:45	"**#** 8249 - Tilted Fiber Bragg Grating Inscription in DPDS-doped polymer optical fiber Using 266 nm Solid State Laser Pulses **Presenter:** Xiangxi Zhu, Shantou University **Abstract:** We report tilted fiber Bragg grating (TFBG) manufacturing in poly (methyl methacrylate) (PMMA)-based polymer optical fibers (POFs) with a diphenyl disulfide (DPDS)-doped core by means of a 266 nm pulsed laser and the phase mask technique. The TFBGs were inscribed with a constant pulse

	energy of 2.7 mJ and a scanning speed of 0.1 mm/s. After inscription, the grating decayed. However, they were recovered by post-annealing at 80°C for 1 day, showing an even higher amplitude of the cladding modes."

TS21. Data Center Optical Interconnects and Networks-B			
Time	13:30-15:30	Venue	LM105
Session Chair: Hexun Jiang, ZTE Corporation			
Invited Speech			
13:30-14:00	**Speaker:** Qian Lv **Affiliation:** University of Science and Technology of China **Bio:** Qian Lv, Ph.D. candidate at the University of Science and Technology of China, focusing on research in filterless optical networks and optical data center networks. **Title:** Experimental Demonstration of Hitless OCS-based DCN Reconfiguration to Steer Multi-Class Traffic **Abstract:** To realize hitless optical datacenter network (ODCN) reconfiguration for improving the specific QoS of multi-class traffic flows, we propose a novel topology engineering (TPE) and traffic engineering (TE) scheme, and demonstrate its effectiveness experimentally in a real ODCN testbed.		
14:00-14:30	**Speaker:** Jiahao Huo **Affiliation:** University of Science and Technology Beijing **Bio:** Jiahao Huo received the Ph.D. degree from the University of Science and Technology Beijing (USTB), in 2019. He joined the Photonics Research Center, The Hong Kong Polytechnic University, from June 2016 to September 2019, as a Research Assistant. He is currently an associate professor in the University of Science and Technology Beijing(USTB). His research interests include high-capacity IM/DD systems for optical interconnect, optical access networks, and digital signal processing techniques. **Title:** Orthogonal offset carrier-assisted differential detection of polarization multiplexed asymmetric twin-SSB signals **Abstract:** We propose a PDM-Asymmetric-Twin-SSB CADD scheme with orthogonal offset carriers. Polarization crosstalk is mitigated by transmitting asymmetric twin-SSB signals. The results show that the proposed PDM-Asymmetric-Twin-SSB CADD can provide a feasible self-coherent detection scheme for inter-data center connections and metro networks.		
14:30-15:00	**Speaker:** Yanfu Yang **Affiliation:** Harbin Institute of Technology (Shenzhen) **Bio:** Dr. YANG Yanfu is an Associate Professor in the Department of Electronic and Information Engineering at Harbin Institute of Technology (Shenzhen). He received his BSc degree from Xi' an Jiaotong University in 2002 and his PhD degree from Tsinghua University in 2007. From 2007 to 2011,		

	he worked as a Postdoctoral Fellow in the Department of Electronic and Information Engineering at The Hong Kong Polytechnic University. His current research interests are advanced optical performance monitoring and related DSP techniques toward intelligent optical network. **Title:** Advanced DSP algorithms for high speed Data Center Optical Interconnections **Abstract:** In the era of future AI-driven computing, the capacity of optical interconnections in data centers is expected to evolve towards 1.6T and even higher rates. Concurrently, the implementation of coherent optical technology within data center internal interconnections is becoming a viable option. To address this technological trend, it is essential to develop advanced signal processing algorithms to reduce the power consumption of coherent DSPs. This report will introduce the design of low-complexity DSP algorithms for optical interconnections in data centers, as well as the latest advancements in signal processing under baud rate sampling conditions.
15:00-15:30	**Speaker:** Yongcheng Li **Affiliation:** Soochow University **Bio:** Yongcheng Li received his B.Sc. degree and Ph.D. from Soochow University, China, in 2011 and 2017, respectively. He joined Soochow University as an Assistant Researcher in 2017 and became an Associated Researcher in 2021. His research interests include network design and optimization, optical switching, and green optical networks. **Title:** Service Provisioning in WSS-based Wavelength-Convertible All-Optical Spine-Leaf (AOSL) Data Center Networks **Abstract:** We consider deploying tunable wavelength converters (TWCs) in the wavelength selective switch (WSS) based all-optical data center network with spine-leaf topology. We investigate its routing, wavelength, and time slot allocation (RWTA) optimization problem and propose different lightpath provisioning strategies. Simulations indicate that the proposed strategy can significantly reduce the overall task completion time (TCT) and the number of WSS reconfigurations.

TS22. Terahertz Wave Technologies and Applications-A			
Time	13:30-15:15	Venue	LM101-B
Session Chair: Chunmei Ouyang, Tianjin University			
Invited Speech			

13:30-14:00	**Speaker:** Liang Wu **Affiliation:** Tianjin University **Bio:** Liang Wu obtained his B.Sc. and Ph.D. in optical engineering at Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology. Now he is an associate professor in Tianjin University, and teaches College Physics and Solid-State Physics. His research interests are Terahertz, Metamaterials and AI for Science. **Title:** Meta-photonics: a bridge between physical association and digital models in photonics

	Abstract: Recently, the burgeoning field of metaverse has facilitated the convergence of digital scenarios and real world to achieve unprecedented interaction patterns. Inspired by this digital approach, we propose the concept of meta-photonics to gain insight into the photonics underlying increasingly complex phenomena, while traditional physics theory is not keeping pace with current observations. Here we are armed with different deep learning models to build intrinsic dimensions among different physical elements and bring together amplitude, phase, polarization conversion ratio, extinction ratio, unwrapping phase, surface electric field and connected domain, most of which have never been reported, on the results of the forward and inverse models. This approach reveals an opportunity to catalyze the discovery of more enigmatic associations among different concepts and paves the way for tailoring more flexible optical responses in the vibrant world of meta-photonics.
14:00-14:30	**Speaker:** Yingxin Wang **Affiliation:** Tsinghua University **Bio:** Prof. Dr. WANG Yingxin is from Department of Engineering Physics, Tsinghua University, Beijing, China. His research field is focused on terahertz photonics and optoelectronics, with particular interests in the theory, technology, and applications of terahertz detection, spectroscopy and imaging. He has authored/co-authored more than 100 papers in peer-reviewed journals and academic conferences, including Science Advances, Nano Letters, ACS Photonics (cover), etc. He served as a reviewer for several internationally renowned journals, including Nature. He received the first prize for scientific and technological progress in Beijing and the gold medal at the Geneva International Invention Exhibition. **Title:** Metasurface-encoding-assisted broadband terahertz spectroscopy **Abstract:** Terahertz range contains rich physical and chemical information such as low-energy excitations and carrier dynamics in materials, collective vibrational or torsional modes in condensed media, and rotational and vibrational transitions of molecules. These properties make terahertz spectroscopic technique have broad application prospects in basic science, new materials, biomedicine, and other fields. This talk will introduce conventional terahertz spectroscopic techniques including Fourier transform infrared spectroscopy, time-domain spectroscopy, directly tuning frequency, heterodyne mixing/photomixing, dispersive optics and narrowband filter array, and compare the performance and advantages and disadvantages of different methods. On this basis, in order to improve the real-time performance and system integration level of terahertz spectroscopy, a terahertz spectroscopic method combining metasurface wavelength encoding and computational reconstruction is proposed. High random wavelength encoding of incident terahertz waves is achieved through various spectral encoder devices with metasurface structures, and a sparse recovery algorithm based on dictionary learning is adopted to achieve spectral reconstruction. This method can provide a new approach for the development of on-chip integrated terahertz spectrometers.
14:30-15:00	**Speaker:** Jinhui Shi **Affiliation:** Harbin Engineering University **Bio:** Prof. Jinhui Shi has received his Ph.D. (Material Science, 2007) in Harbin Engineering University. From 2001 to present, he has been working in Harbin Engineering University. In 2009 and 2013, he was

	a visiting research fellow in Optoelectronics Research Center, University of Southampton, and worked with Prof. N. Zheludev. From 2011 to 2014, he was a posdoctoral researcher in State Key Lab of Millimeter Waves, Southeast University in China, and worked with Prof. Tiejun Cui. From 2016 to 2018, he was a visiting researcher in metamaterial group, School of Physics and Astronomy, University of Birmingham, and worked with Prof. Shuang Zhang. His current research interests include optical nanostructures, metamaterials, plasmonics and in-fiber devices. He has authored and co-authored over 160 published journal and conference papers including Science Advances, National Science Review, Physical Review B, Applied Physics Letters, Optics Letters, and Laser & Photonics Review. He presented over twenty invited talks in the international conferences. **Title:** Logic Calculations in programmable SSPP metamaterial **Abstract:** In this talk, a programmable plasmonic metamaterial has been proposed and logic devices have been experimentally investigated. By combining spin degrees of freedom of incident waves into digital coding SSPPs, the energy flow can be manipulated. Four SSPPs logic gates have been designed and verified by simulation and experiment. The combination of digital coding technology with photonic SHE provides a more powerful and flexible platform for controlling EM waves.
Oral Presentation	
15:00-15:15	"# 6937 - Research on mixed analyte sensing technology based on terahertz metamaterial EIT resonance **Presenter:** Yihan Xu, Tianjin University **Abstract:** Terahertz (THz) metasurface sensors have attracted much attention in the field of biosensing, providing a powerful tool for trace detection and differentiation of mixed analytes. In this paper, the designed THz metasurface was investigated for the sensing of mixed sugars based on the electromagnetic induction transparency (EIT) effect and principal component analysis (PCA). The sensor can discriminate between different ratios of mixed analytes even without introducing antibodies. Our study provides a convenient route for complex biochemical sensing."

TS23. Topological Photonics-D			
Time	16:00-18:00	Venue	LM103-B
Session Chair: Yan Meng, Dongguan University of Technology			
Invited Speech			
16:00-16:30	**Speaker:** Shaojie Ma **Affiliation:** Fudan University **Bio:** Prof. Shaojie Ma received his Ph.D. degree in Physics from Fudan University, Shanghai, China, in 2017. During 2017-2022, he did his postdoctoral research at the University of Birmingham, UK and the University of Hong Kong. He joined Fudan University in 2022 and is currently a tenure-track professor in the Department of Optical Science and Engineering. Prof. Ma was funded by Excellent Overseas Youth Fund Project, National Natural Science Foundation of China and Shanghai Leading Talents		

	Overseas Project. He is committed to the electromagnetic metamaterials and topological photonics, especially in high-dimensional and high-order topological systems, Moiré structures, and polarization/resonance control of electromagnetic metasurfaces. Prof. Ma has published 38 papers, which contain 10 papers as the first author, including Scinece, Phys. Rev. Lett., Sci. Adv., Light Sci. App., Laser Photonics Rev. etc., 2 highly cited articles, over 2800 citations in Google Scholar, H-index 24. His Academic achievements have been widely recognized by international peers. He is a reviewer of top journals such as Nature and Nature Physics, a branch organizer of international academic conferences such as PIERS, and a youth editorial board member of academic journal Photonics Insignt, etc. **Title:** Higher Dimensional Topology in Metamaterials **Abstract:** Metamaterials are artificially designed meta-crystals composed of electromagnetic resonant units, which theoretically possess arbitrary electromagnetic responses, and have a huge ability to control photons. By appropriately adjusting the constitutive relations, metamaterials can support various topological physical phenomena, such as Weyl points, Nodal lines, Dirac points, topological insulators, and so on. Furthermore, by introducing fully antisymmetric bi-anisotropic parameters to construct synthetic dimensions, three-dimensional metamaterials can serve as a good platform for studying topological structures in higher-dimensional momentum space or discussing the coupling behavior of high-dimensional topological structures and gauge fields, such as Yang monopoles and two-dimensional topological Weyl surface semimetals in five-dimension. By rotating topological structures in higher-dimensional momentum space and detecting their response in real space, we have observed linked Weyl surfaces in five-dimensional space, the corresponding nontrivial Weyl arcs on four-dimensional boundaries, and Landau chiral zero modes in high-dimensional high-order systems
16:30-17:00	**Speaker:** Ruoyang Zhang **Affiliation:** Hong Kong University of Science and Technology **Bio:** Dr. Ruo-Yang Zhang is a research assistant professor at the Hong Kong University of Science and Technology, with a PhD in theoretical physics from the Chern Institute of Mathematics, Nankai University. He has a broad range of research interests, including topological photonics, non-Hermitian physics, and the geometric foundation of electrodynamics. Dr. Zhang has published over 50 peer-reviewed journal papers, including prestigious publications in Nature, Nature Physics, and Physical Review Letters. **Title:** Gyromagnetic Double-zero-index Metamaterials Enable Ultrarobust Generation of Optical Spatiotemporal Vortices **Abstract:** Electromagnetic double-zero-index media (DZIM) have extensive applications in wave manipulation and nonlinear optics. We expand the scope of DZIMs by experimentally realizing gyromagnetic double-zero-index metamaterials (GDZIMs), which feature a null scalar permittivity and a gyromagnetic permeability tensor with a zero determinant, achieved by a magnetized photonic crystal with an unpaired spin-1/2 Dirac point occurring at the critical point of topological phase transition. GDZIMs exhibit an ultrarobust means of generating optical spatiotemporal vortex pulses with their central frequency and momentum firmly anchored at the projection of bulk Dirac point. We

	reveal that the ultrarobustness stems from a novel bulk-reflection correspondence exclusively characterizing the topological transition point hence distinct from any known bulk-boundary correspondence. Our findings uncover deep connections between zero-refractive-index photonics, topological photonics, and singular optics.
17:00-17:30	**Speaker:** Feng Wu **Affiliation:** Guangdong Polytechnic Normal University **Bio:** Feng Wu received the B.S. degree in physics from South China Normal University in 2015, and the Ph.D. degree in physics from Tongji University in 2020. He is currently working as an Associate Professor in Guangdong Polytechnic Normal University. He is currently working as an editorial broad member in the journal Physica Scripta (IOP). He is a frequent reviewer in APS, AIP, Optica and IOP. Until June 2024, he has published more than 110 peer-reviewed journal articles, including 10 ESI 1% highly cited papers. His main research interests include nanophotonics, photonic crystals, photonic band gaps, metamaterials, metasurfaces, multilayers, bound states in the continuum, subwavelength gratings, beam shifts, strong couplings, and two-dimensional materials. **Title:** Momentum-mismatch-driven bound states in the continuum and their applications **Abstract:** Recently, quasi-bound states in the continuum (quasi-BICs) have attracted rich attention due to their ultra-high Q factors. To date, researches have proposed various nanostructures to realize quasi-BICs, including photonic crystal slabs, metasurfaces, and subwavelength gratings. In this talk, we present our recent works on momentum-mismatch-driven quasi-BICs and their applications . Different from symmetry-protected and accidental quasi-BICs, Q factors of momentum-mismatch-driven quasi-BICs exhibit a superior robustness against incident angle. Empowered by the unique resonant property of momentum-mismatch-driven quasi-BICs, we achieved giant Goos-Hänchen shift, giant photonic spin Hall effect [4], ultraslow light effect [5], and ultra-sensitive refractive index sensing. This talk includes both physical mechanisms and applications of momentum-mismatch-driven quasi-BICs.
17:30-18:00	**Speaker:** Weiyuan Tang **Affiliation:** The University of Hong Kong **Bio:** Dr. Weiyuan Tang is currently pursuing her Ph.D. degree under Prof. Shuang Zhang in the department of physics at the University of Hong Kong. Her research currently focuses on studying topological physics and non-Hermitian physics in photonic and acoustic platforms. She has published 9 papers in peer-reviewed journals, including Science, Nature, Nature communications, Physical Review Letters, Light: Science & Applications, National science review. Her papers have received over 350 citations. **Title:** Magnetically Controllable Multimode Interference in Topological Photonic Crystals **Abstract:** Topological photonic insulators show promise for applications in compact integrated photonic circuits due to their ability to transport light robustly through sharp bendings. The number of topological edge states relies on the difference between the bulk Chern numbers across the boundary, as dictated by the bulk edge correspondence. The interference among multiple topological edge modes in topological photonics systems may allow for controllable functionalities that are particularly

	desirable for constructing reconfigurable photonic devices. In this work, we demonstrate magnetically controllable multimode interference based on gyromagnetic topological photonic insulators that support two unidirectional edge modes with different dispersions. We successfully achieve controllable power splitting in experiments by engineering multimode interference with the magnetic field intensity or the frequency of wave. Our work demonstrates that manipulating the interference among multiple chiral edge modes can facilitate the advancement of highly efficient and adaptable microwave devices.

TS24. Optoelectronic Devices and Applications-C			
Time	16:00-18:00	Venue	LM103-C
Session Chair: Nannan Li, Shenzhen Technology University			
Invited Speech			

16:00-16:30	**Speaker:** Dan Wu **Affiliation:** Shenzhen Technology University **Bio:** WU Dan is an Associate Professor in Shenzhen Technology University (SZTU). She received her B.E. degree in electronic science and technology from Harbin Institute and Technology (HIT), Harbin, China, in 2009; M.E. degree in optical engineering from Huazhong University of Science and Technology (HUST), Wuhan, China, in 2011; Ph.D. degree in electrical and electronic engineering from Nanyang Technological University (NTU), Singapore, 2018, respectively. She has authored/co-authored over 74 peer-reviewed journal articles in Nature, Advanced Materials, Advanced Science, etc. in her research fields. Her research interests include optical field manipulation by micro/nano-photonic structures, inverse nanophotonic optimization, perovskite/quantum dots light-emitting diodes, narrow bandwidth photodetection etc.. **Title:** Spin Quantum dot Light-Emitting Diodes Enabled by Two-Dimensional Chiral Perovskite **Abstract:** Chiral-induced spin selectivity (CISS) effect provides innovative approach to spintronics and quantum-based devices for chiral materials. Different from the conventional ferromagnetic devices, the application of CISS effect is potential to operate under room temperature and zero applied magnetic field. Low dimensional chiral perovskites by introducing chiral amines are beginning to show significant CISS effect for spin injection, but research on chiral perovskites is still in its infancy, especially on spin-light emitting diode (spin-LED) construction. In this work, the spin-QLEDs enabled by 2D chiral perovskites as CISS layer for spin-dependent carrier injection and CdSe/ZnS quantum dots (QDs) as light emitting layer are reported. The regulation pattern of the chirality and thickness of chiral perovskites, which affects the circularly polarized electroluminescence (CP-EL) emission of spin-QLED, is discovered. Notably, the spin injection polarization of 2D chiral perovskites is higher than 80% and the CP-EL asymmetric factorachieves up to 1.6 × 10-2. Consequently, this work opens up a new and effective approach for high-performance spin-LEDs.
16:30-17:00	**Speaker:** Lan Li **Affiliation:** Westlake University

	Bio: Dr. Lan Li received her B. S. degree from University of Science and Technology of China (2010) and Ph.D. degree from University of Delaware (2016). Since then she has been the postdoctoral associate at the Massachusetts Institute of Technology until Feb., 2019. She joined the School of Engineering in Westlake University as an assistant professor since Feb. 2019. Her research interest focuses on the design and fabrication of novel micro/nanophotonic materials and devices on mechanically flexible substrates as well as the application development of flexible/stretchable integrated photonic devices in the fields of wearable sensing, on-chip spectroscopy, optical communication, and biotechnology; authored and co-authored over 70 refereed journal publications; Dr. Li's work has been cited over 2600 times with an H-index of 24. **Title:** Compact Plasmonic Waveguide-integrated Optoelectronic Devices **Abstract:** With the rapid advancement of information technology, integrated optoelectronic devices are evolving to offer lower power consumption, larger bandwidth, and smaller sizes. Plasmonic waveguides, known for their strong optical localization, ultra-small dimensions, and low RC constants, are crucial for achieving high-speed, low-power optoelectronic conversion. In this talk, we will demonstrate how integrating plasmonic waveguides with new materials enhances device functionality. We leverage plasmonic slot waveguides to confine optical fields within subwavelength electrode dimensions, reducing switch voltage and enhancing the overlap of optical and electric fields for polymer-stabilized liquid crystal optical attenuation. This is demonstrated with a device that features a 10 μm length, low power consumption, and fast response, advancing liquid crystal technologies in integrated photonics for low-power, high-speed, ultra-compact optical modulation. Additionally, plasmonic slot waveguides improve absorption and shorten carrier collection channels in photoconductive detectors. We present a high-speed $PdSe_2$-plasmonic waveguide photodetector with low dark current and high responsivity, suitable for optical communication, microwave photonics, sensing, and imaging.
17:00-17:30	**Speaker:** Yu He **Affiliation:** Southern University of Science and Technology **Bio:** Dr. Yu He is a full-time researcher at the Southern University of Science and Technology, the Institute for Quantum Science and Engineering (IQSE). His research field is quantum physics and quantum computation in solid-state systems. Currently, Dr. Yu is building a team to pursue frontier quantum computing techniques combined with fundamental physics in silicon quantum devices. In total, he has published 27 peer-reviewed journal articles (2 Nature, 2 Nature Photonics, 2 Nature Nanotechnology, and 10 Physical Review letters) and 5100 citations. H-index 22. **Title:** Controlling spin qubits of dopants in silicon **Abstract:** Silicon quantum dots are among the most promising platforms for quantum computing. Over the past 20 years, substantial progress has been made with atomic qubits in silicon. The next challenge is to develop functional components for scalable quantum computing. In this talk, I will provide an overview of recent advancements in silicon quantum computing, with a focus on donor-based systems. I will discuss the control methods for spin qubits in these dopant systems and how they can be used to implement quantum computational algorithms. Finally, I will outline the

	requirements for scaling up this system.
Oral Presentation	
17:30-17:45	# 9502 - Transmission of 100 Gb/s PAM4 Data Using a Low Cost Directly Modulated DFB Laser **Presenter:** Huan Li, Institute of Semiconductors **Abstract:** We report transmission of 100 Gb/s PAM4 data using a low cost high bandwidth directly modulated DFB laser, which has a MQW based DBR feedback section. Clear eye diagrams have been obtained for BtB and up to 40Km single mode fiber transmissions.
17:45-18:00	# 8930 - Understanding Role of Different Sized Quantum Dot Hole Transport Layers in Short Wave Infrared Photodetector **Presenter:** Tao Cao, Shenzhen Technology University **Abstract:** Colloidal PbS quantum dots (QDs) show great promise for short-wave infrared (SWIR) photodetectors (PDs) and imagers, offering a significantly lower fabrication cost compared to traditional InGaAs-based technologies. To achieve optimal energy alignment in QD SWIR PDs, thiol-treated PbS QD solid films are commonly used as hole transport layers (HTLs) through a solid-state ligand exchange (SSLE) process. However, the influence of QD size on HTL performance has not been systematically studied, leaving an important gap in device development. This work investigates the charge carrier dynamics in HTLs composed of different-sized QDs and compares the resulting device performance. Our findings indicate smaller QDs exhibit fewer trap states from the {100} facets, as confirmed by photophysical studies and single charge carrier device analysis. Nevertheless, these smaller QDs are prone to forming cracks during the SSLE process, leading to dark current leakage in QD SWIR PDs. Devices with HTLs made of QDs with 850 nm exciton absorption peak demonstrate superior overall performance, external quantum efficiency reaching 40%, and dark current density below 300 nA/cm2 at -0.5 V bias, compared to other samples.

TS25. Computational Imaging-D			
Time	16:15-18:00	Venue	LM104-A
Session Chair: Fucai Zhang, Southern University of Science and Technology			
Invited Speech			

16:15-16:45	**Speaker:** Wei Yin **Affiliation:** Nanjing University of Science and Technology, China **Bio:** Wei Yin is an associate professor at Nanjing University of Science and Technology, China. His research interests include optical metrology, optical 3D measurement and imaging, fringe projection profilometry, speckle projection profilometry, and deep learning. He is an author of more than 20 journal papers and 10 proceedings conferences related to 3D imaging and high-level tasks directly to optical metrology. Recently, he developed real-time, high-accuracy, long-range, and miniaturized 3D sensors with a VCSEL projector array or a MEMS projector. **Title:** Real-time, high-precision, and miniaturized 3D imaging techniques and their applications based

	on structured light projection **Abstract:** Due to the merits of non-contact, high accuracy, and full-field measurement, three-dimensional (3D) measurement techniques based on structured light projection are gradually applied in emerging fields, such as intelligent manufacturing and medical plastic surgery. Common projected patterns mainly include fringe patterns and speckle patterns, which have been developed into two mainstream techniques: fringe projection profilometry (FPP) and speckle projection profilometry (SPP). For FPP, we introduce a physics-informed deep learning method for fringe pattern analysis (PI-FPA) by integrating a lightweight DNN with a learning-enhanced Fourier transform profilometry (LeFTP) module. By parameterizing conventional phase retrieval methods, the LeFTP module embeds the prior knowledge in the network structure and the loss function to directly provide reliable phase results for new types of samples. The proposed PI-FPA presents that challenging issues in optical metrology can be potentially overcome through the synergy of physics-priors-based traditional tools and data-driven learning approaches, opening new avenues to achieve fast and accurate single-shot 3D imaging. For SPP, we present a high-resolution, wide-field-of-view, and real-time 3D imaging method using spatial-temporal speckle projection profilometry (ST-SPP). A spatial-temporal matching strategy using digital image correlation is proposed to overcome the difficulty of applying speckle matching to complex surfaces, enabling high-precision and efficient subpixel disparity estimation. The proposed ST-SPP is feasible for fast 3D modeling of dynamic scenes and large-scale objects with complex shapes, further enhancing the performance of optical metrology instruments based on SPP in terms of accuracy, resolution, measurement range, and portability.
16:45-17:15	**Speaker:** Shu-Feng Lin **Affiliation:** Beijing University of Technology **Bio:** Shu-Feng Lin is an associate Professor in School of Physics and Optpelectronic Engineering, Beijing University of Technology, Beijing, China. He received his PhD. Degree in 2018 from Department of Electronic Engineering, Kwangwoon University, Seoul, Korea. During 2018 to 2021, he worked as a Postdoctoral research Fellow at the School of Instrumentation and Optoelectronic Engineering, Beihang University, Beijing, China. His present studies are mainly related in optical information processing, especially in Holography, 3D display, holographic imaging and light filed manipulation. **Title:** Hologram generation algorithm for large field of view image **Abstract:** Holographic technology has received extensive research attention because it can reproduce a 3D light field using a 2D device. Limited by the current device loading holograms, the diffraction angle and reconstructed light field size are narrow. Usually, the holograms on the SLM are multiplexed by timely, spatially, and other methods for more practical application, such as wide viewing angle, large field of view, full-color display, etc. This report introduces a new generation method for a large field of view using single SLM. Such method can take full use of the reconstruction bandwidth of the current SLM and makes it possible to generate large field-of-view images for more widely applications by using current advanced algorithms.
Oral Presentation	

17:15-17:30	"# 1434 - Computational Photography-Enhanced Fluorescence Imaging for Surgical Application **Presenter:** Franklin Yang, Lynbrook High School **Abstract:** Fluorescence Imaging is an important tool to visualize blood vessels and tissues in surgical operations. Despite the urgent, global need for this technology, the complex and proprietary optical system design makes commercial systems prohibitively expensive, and has prevented large-scale adoption of this technology, most notably in low-income regions. This work demonstrates the design of a novel medical fluorescence imaging device and its application of visualizing blood vessels and tissues. The optical system of this system utilizes off-shelf components which largely simplifies the optical structure and lowers the overall system complexity. Advanced computational algorithms are developed to enable real-time, high-quality fluorescence imaging capabilities comparable to a commercial system. Preliminary surgical application of this device is demonstrated on animal tissue samples. The device provides a 5-mm penetration depth, shown from visualizing structures beneath varying thickness of tissue on chicken samples. It also demonstrated sub-millimeter resolution from experiments involving pig coronary vessels, thus proving this prototype device's value in providing important structural information to surgeons. This new type of fluorescence imaging system featuring a simple optical design enabled by computational photography algorithms demonstrates a high potential of achieving desirable surgical and diagnostic imaging capability and opens to commercialization and deployment to benefit patients in low-income regions and to non-operating-room applications."
Invited Speech	
17:30-18:00	**Speaker:** Wen Chen **Affiliation:** The Hong Kong Polytechnic University **Bio:** Wen Chen received Ph.D. degree from National University of Singapore in Oct. 2010. Dr. Chen conducted extensive research related to computational optics and information photonics as Research Associate (2010) and Research Fellow (2011-2015) in National University of Singapore. Dr. Chen was a visiting scholar in Harvard University in 2013. Dr. Chen joined The Hong Kong Polytechnic University as an Assistant Professor in Dec. 2015. Since 1 July 2021, Dr. Chen is currently an Associate Professor at The Hong Kong Polytechnic University. Dr. Chen has authored more than 160 top-tier journal and conference papers on his field of specialization. Dr. Chen is listed among the top 2% of the world's most highly cited scientists by Stanford University. Dr. Chen serves as an Associate Editor for several academic journals (e.g., Optics and Lasers in Engineering (Elsevier), Optics Express (Optica Publishing Group)). Dr. Chen's current research interests focus on computational optics, information photonics, optical imaging, optical encoding, free-space optical data transmission, deep learning in optics and photonics. **Title:** Single-pixel imaging in dynamic scattering environments **Abstract:** Computational optics is the science and technology of light (photon) generation, illumination, manipulation, modulation, transmission and detection combined with computing platforms and advanced algorithms. Computational optics is focused on approaches, models and technologies for sensing, measurement, interpretation and visualization of information, and is widely

	studied and applied in recent years. In this invited talk, Dr. Chen will present his current research work about single-pixel imaging through dynamic scattering media. This invited talk will focus particularly on the theories, characteristics and performance of computational imaging with single-pixel detection. The applications are presented and discussed.

TS26. Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-B			
Time	16:00-17:45	Venue	LM104-B
Session Chair: Liang Liu, Shanghai Jiao Tong University			
Invited Speech			

16:00-16:30	**Speaker:** Chunqi Jin **Affiliation:** Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences **Bio:** Dr. Jin is an Assistant Professor at the Changchun Institute of Optical Precision Machinery and Physics (CIOMP), Chinese Academy of Sciences. She received her PhD from CIOMP in 2019. She then worked as a postdoctoral researcher at Tsinghua University from 2019 to 2021. Her research interests focus on nanophotonics, multidimensional light detection and analog optical computing. She has published more than 10 papers in international refereed journals such as Nature, Nature Communications, and Advanced Functional Materials. **Title:** Dispersion-assisted Multidimensional Light Field Detection **Abstract:** Intensity, polarization and wavelength are intrinsic characteristics of light. Characterizing light with arbitrarily mixed information on polarization and spectrum is in high demand. Despite the extensive efforts in the design of polarimeters and spectrometers, concurrently yielding high-dimensional signatures of intensity, polarization and spectrum of the light fields is challenging and typically requires complicated integration of polarization- and/or wavelength-sensitive elements in the space or time domains. Here we demonstrate that simple thin-film interfaces with spatial and frequency dispersion can project and tailor polarization and spectrum responses in the wavevector domain. By this means, high-dimensional light information can be encoded into single-shot imaging and deciphered with the assistance of a deep residual network. To the best of our knowledge, our work not only enables full characterization of light with arbitrarily mixed full-Stokes polarization states across a broadband spectrum with a single device and a single measurement but also presents comparable, if not better, performance than state-of-the-art single-purpose miniaturized polarimeters or spectrometers. Our approach can be readily used as an alignment-free retrofit for the existing imaging platforms, opening up new paths to ultra-compact and high-dimensional photodetection and imaging.
16:30-17:00	**Speaker:** Shuhui Bo **Affiliation:** Minzu University of China **Bio:** Bo Shuhui, PhD in Science, Professor at the School of Science, Minzu University of China, has received support from the National Talent Plan Youth Project. In 2008, I graduated with a doctor degree from the Technical Institute of Physics and Chemistry, CAS. I have been engaged in research on

	organic nonlinear optical materials and optical communication devices for a long time. As the project leader, I have been supported by 15 projects including the National Natural Science Foundation of China, Beijing Natural Science Foundation, and national defense application projects and so on. I have published 98 academic papers in this field, including 66 first/corresponding author articles, and authorized 13 invention patents. I also have been invited presentations at international academic conferences such as PIERS 2019, ICANS 29, and more. **Title:** The organic nonlinear optical materials and devices **Abstract:** Electro-optic modulators are essential to convert electrical signals to the optical domain. High performance electro-optic modulator, as the key device of integrated ultra-wideband optical system, have the potential to become a new tool in the general field of microwave photonics, making the sub-terahertz range accessible to, e.g., 5G wireless communications, antenna remoting, Internet of Things, sensing, and more. The organic-based hybrid electro-optic modulator, which makes full use of the advantages of organic second order nonlinear optical materials, such as high electro-optic coefficient, fast response speed, high bandwidth, easy processing/integration and low cost, attracts a lot of attention. Furthermore, organic nonlinear optical materials achieve electro-optic modulation through the Pockels effect, similar to lithium niobate. In this report, we introduce a series of high-performance nonlinear materials which exhibit good properties in both electro-optic activity and thermal stability. By optimizing the donor, acceptor and π-bridge structures of the chromophores, the microscopic first order hyperpolarizability can be effectively transformed into macroscopic electro-optic activity. In addition, the recent progress of high performance modulators are reviewed which combines with matrue silicon waveguides and the functional organic nonlinear materials to realize the large bandwidth and low half-wave voltage ultra-compact modulator. The high-performance integrated optical platform based on organic materials is a promising solution for high-capacity optical communication.
17:00-17:30	**Speaker:** Yongzheng Wen **Affiliation:** Tsinghua University **Bio:** Yongzheng Wen, associate professor at the School of Materials Science and Engineering, Tsinghua University, and deputy director of the State Key Laboratory of New Ceramics and Fine Processing. He is mainly engaged in the research of metamaterials, with a particular focus on exploring the basic physical mechanisms of metamaterials, the realization and application of extraordinary electromagnetic and terahertz properties. He has published more than 40 papers in international journals and conferences such as Phys. Rev. Lett., Mater. Today, NSR, Research, etc. As the project leader, he has presided over several national-level projects including the National Key R&D Program and the National Natural Science Foundation of China, and has been selected for the "Youth Talent Support Program" by the China Association for Science and Technology. He currently serves as the Deputy Secretary-General/Youth Director of the Metamaterials Society of the Chinese Society for Materials Research. **Title:** Artificial Optical Nonlinearity Generated by Metamaterial and Terahertz Applications **Abstract:** Nonlinear optics plays indispensable roles in the fields of laser, photodetection, all-optics

	communication and computing. The lack of a clear physics picture and full description of the origin of the nonlinearity makes the realization of the ambitious goal of exactly predicting, rationally designing, and precisely tailoring a nonlinear material tremendously difficult. This talk will introduce an artificial optical nonlinearity based on magnetoelectric coupling process in the metamaterial structure. Different from natural nonlinearities, the artificial nonlinearity can realize a variety of nonlinear effects including harmonic generation and photoelectric conversion without the involvement of any natural nonlinear materials, leading to an unprecedented design freedom. This novel mechanism is particularly important to the terahertz regime, where the key materials for high-performance sources and detectors severely lack. Following the theoretical guidance, we demonstrate some intriguing phenomena, including the harmonic generation at terahertz frequencies with extremely large nonlinear susceptibility, and ultrafast terahertz photoelectric detection at room temperature, and terahertz induced static magnetic field. We believe this novel mechanism would open a wide range of possibilities and bring fantastic potential to terahertz technology and metamaterials.
Oral Presentation	
17:30-17:45	# 6566 - Bidirectional Multifunctional Diffractive Deep Neural Network under Multi-order Alignment **Presenter:** Hongyi Zhou, Southern University of Science and Techology, Shenzhen, China **Abstract:** Diffractive deep neural network (D2NN) is a new type of optical computing system that can perform deep learning tasks within the propagation and diffraction of light. Its high speed and low power consumption nature has drawn much attention. However, present approaches to multifunctional D2NN systems like channel multiplexing, active modulation, and partial changeability require either extra fabrication or special material properties. In this research, we proposed an ordered bidirectional diffractive deep neural network (OB-D2NN) system, which can perform multiple tasks with the same system by simply changing the aligning order of layers and propagation direction of light, without any extra fabrication and extra channels. As the proof-of-concept, we trained and numerically tested the system with MNIST, FASHION-MNIST, and EMNIST-letter datasets, analyzed the results, and proposed some ways to improve the performance of the system. Cheeringly, our OB-D2NN system managed to merge many functions into a single system without significant loss in performance after improvement.

TS27. Optical Communication and Networks-B			
Time	16:00-17:30	Venue	LM104-C
Session Chair: Xiansong Fang, Peking University			
Invited Speech			

16:00-16:30	**Speaker:** Xueyang Li **Affiliation:** Peng Cheng Laboratory **Bio:** Dr. Xueyang Li is an assistant scientist at Peng Cheng Laboratory. He received his PhD degree in electrical engineering at McGill University under the supervision of Prof. David Plant. Prior to that, he studied at Zhejiang university (BEng & MEng), and CentraleSupelec (Dipl. Ing.). He has published 1 PCT

	patent and 39 papers in reputed journals and conferences in the field of optical communications. His research interest spans topics including self-coherent communications, data center interconnects and optical wireless communications. **Title:** Beyond throughput scaling: SDM fiber optical communication systems with converged vibration sensing **Abstract:** This talk explores system-level approaches to realizing dual-function fiber optical communication and vibration sensing systems. We highlight how SDM fiber serves as an ideal platform for this integration, allowing for high-capacity optical transmission and converged vibration sensing. Key aspects of SDM-based joint systems and their potential impact on future optical networks will be discussed.
16:30-17:00	**Speaker:** Zhi Liu **Affiliation:** Changchun University of Science and Technology **Bio:** Zhi Liu, male, born in April 1971, doctor of engineering, professor, doctoral supervisor. Currently, he is the director of the National and Local Joint Engineering Research Center of Space Optoelectronic Technology of Changchun University of Science and Technology, and the executive deputy director of the Space Optoelectronic Technology Research Institute. At present, his scientific research work is mainly carried out in the fields of space laser communication and key technologies of networking applications, testing of the optoelectronic dynamic performance of weapons and equipment. As the project host and main participant, he has participated in more than 40 scientific research projects such as the key projects of the National Natural Science Foundation of China, the National 863 Project, the Innovation Special Zone of the Military Science and Technology Commission, etc. He has made a number of scientific research achievements in the fields of space laser communication networking application, equipment performance optoelectronic dynamic testing, and local economic construction. As a main participant, he has won the 1 first prize from the Military Science and Technology Progress Award, 1 first prize from Jilin Province Technological Invention Award, 1 first prize from Jilin Province Science and Technology Progress Award, 1 second prize from National Defense Science and Technology Award, 1 second prize and 1 third prize from Jilin Province Science and Technology Progress Award. 1 first prize from Jilin Province Excellent Teaching Achievement Award. In 2008, he was awarded the honorary title of "The Seventh Batch of Outstanding Young University Graduates" in Changchun City. In 2011, he was awarded the title of the first batch of "One Hundred New Century Science and Technology Excellent Talents of Jilin Provincial Department of Education" and was awarded as a member of the "National Defense Science and Technology Innovation Team" by the National Defense Engineering Bureau. He is a member of the "National Defense Science and Technology Innovation Team" awarded by the National Defense Industry and Technology Administration, and a member of the "Huang Danian-style" teacher team awarded by the Ministry of Education. He is also a member of the "National Advanced Group of Outstanding Professional and Technical Talents" awarded by the Organization Department of the Central Committee, the Central Propaganda Department, the Ministry of Human Resources and Social Security, and the Ministry of Science and Technology. In the process of carrying out scientific research, he has published five

	academic works, published more than 100 academic papers, and authorized more than 20 national invention and utility model patents. **Title:** Research progress of space laser communication networking technology **Abstract:** Space laser communication has obvious advantages such as high data transmission rate, large communication bandwidth, small communication terminal size, and good anti-interference and confidentiality. It is especially suitable for aircraft, various unmanned platforms, satellites and other communication platforms with limited load capacity and large data transmission capacity. It is an important support for the establishment of a sky-ground integrated high-speed communication network in the future, which is of great significance to the national economy and the people's livelihood as well as to national defense and security. The main goal of the future development of laser communication technology is to establish a high-speed information network with full links between the sky, the earth and the sea, and realize "real-time high-speed dynamic communication". This report summarizes the development process and the latest progress of space laser communication networking technology at home and abroad, describes the research progress of Changchun University of Technology in the field of one-to-multi-point space laser communication networking technology in recent years, and gives a detailed introduction to the field one-to-two simultaneous laser communication demonstration and verification test, Finally, the future development trend of space laser communication networking technology is briefly analyzed and prospected.
17:00-17:30	**Speaker:** Xiaosong Yu **Affiliation:** Beijing University of Posts and Telecommunications **Bio:** Xiaosong Yu, Associate Professor at Beijing University of Posts and Telecommunications, Ph.D supervisor. He has presided over and participated in more than 30 national and provincial research projects, and won 9 international/national first-class academic association/provincial-level awards. He has published over 100 high-level academic papers in important domestic and foreign academic journals and conferences, taken the lead in formulating and participating in the formulation of 14 ITU-T international standards, 3 national industry/group standards, and published 4 academic monographs (including independent chapters in English). He has authorized more than 50 national invention patents, and submitted and adopted more than 100 international standard manuscripts. **Title:** Synergistic Multi-point Interconnected Quantum Key Distribution over Classical Optical Infrastructure for Enhancing Network Security **Abstract:** With the rapid advancement of quantum technologies, ensuring the security of information transmitted over communication networks has become increasingly critical. Quantum Key Distribution (QKD) offers a promising solution by providing secure key exchange mechanisms that can be integrated into classical optical networks. Traditionally, QKD systems have been limited to point-to-point connections. This presentation focuses on the evolution towards synergistic, multi-point interconnected QKD over existing optical communication infrastructure, highlighting how this collaboration enhances network security. The discussion begins by addressing the current threats to information security, particularly in the context of quantum technology advancements. This is followed by an overview of QKD and its coexistence with classical optical networks. The concept of

	synergy between QKD and classical optical networks is then explored, demonstrating how they can collaborate across different network layers to support multi-point connections. By leveraging the strengths of both QKD and classical communications, this synergistic networking approach ensures a secure, resilient optical network capable of meeting the demands of the quantum era. Finally, the presentation outlines future challenges and potential research directions in the ongoing development of integrated quantum-classical network security.

TS28. Data Center Optical Interconnects and Networks-C

Time	16:00-18:00	Venue	LM105

Session Chair: Yongcheng Li, Soochow University

Invited Speech

16:00-16:30	**Speaker:** Hexun Jiang **Affiliation:** ZTE Corporation **Bio:** Hexun Jiang (jiang.hexun@zte.com.cn) received his B.E. degree in 2017 and M.S. degree in 2019 from the School of Optical and Electronic Information at Huazhong University of Science and Technology. He earned his Ph.D. in Electronic Engineering from Shanghai Jiaotong University in 2023. He has focused on the . Currently, he is working at ZTE Corporation, focusing on the study of coherent optical algorithms. **Title:** Transmitter nonlinear distortions mitigation techniques in coherent optical communications **Abstract:** Transmitter nonlinear distortion is a critical bottleneck in increasing the transmission rate of single-wavelength coherent optical communications. This talk will introduce the properties of transmitter nonlinearity and discuss the techniques for its mitigation.
16:30-17:00	**Speaker:** Meng Xiang **Affiliation:** Guangdong University of Technology **Bio:** Meng Xiang is an Associate Professor at Guangdong University of Technology, China. His research interests include optical fiber communication, integrated sensing and communication, and advanced digital signal processing. **Title:** MPI Mitigation for High-speed Short-reach Data-center Interconnections **Abstract:** We review recent progress on MPI mitigation schemes for high-speed short-reach data-center interconnections.
17:00-17:30	**Speaker:** Wei Wang **Affiliation:** Beijing University of Posts and Telecommunications **Bio:** Wei Wang is currently an associate researcher at the Beijing University of Posts and Telecommunications (BUPT). He was a visiting Ph.D. student at UC Davis. He was also a software engineer in NSBU at VMware. He has published over 80 papers and been granted more than 30 patents. His research interests include optical networks and satellite networks.

	Title: Interconnecting Data Centers with Satellite-Terrestrial Integrated Optical Networks **Abstract:** In recent years, enterprises and corporations are gradually shifting their services like Web search and online gaming into cloud environments. To support these ever-increasing cloud services, a large amount of data is required to be transferred frequently between data centers or between data centers and users. The integration of satellites with ground networks, known as the Satellite-Terrestrial Integrated Optical Network (STION) has become an inevitable trend for data centers communications. The report will present optimization solutions for data center interconnection in STION from both terrestrial network and satellite network perspectives.
17:30-18:00	**Speaker:** Xin Wang **Affiliation:** Beijing Information Science and Technology University **Bio:** Xin Wang received the Ph.D. degree from the State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, Beijing, China. She is currently an Associate Professor in Key Laboratory of Information and Communication Systems, Ministry of Information Industry, and Key Laboratory of Modern Measurement & Control Technology, Ministry of Education, Beijing Information Science and Technology University, Beijing, China. Her research interests include optical/wireless access network, 6G AI RAN, Computing Power Network. **Title:** Resource Efficient Flexible Adaption Strategy for Holographic Type Communication Services in EON enabled 6G RANs **Abstract:** The emerging holographic type communication services in 6G era have imposed challenging demands of ultra-high bandwidth, ultra-low latency and synchronism that make customized resource efficient adaption in 6G RAN an imperative concern. Viewpoint rotation prediction based resource-efficient holographic type communication is investigated in EON enabled 6G RANs. CensNet enhanced PPO is used for feature extraction based DU-CU deployment, routing and spectrum allocation, with 40.1% joint objective reduction than benchmark.

W2. Metaphotonics and Planar Optics			
Time	16:00-17:15	Venue	LM101-B
Session Chair: Chenxu Lu, Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou)			
Invited Speech			

16:00-16:30	**Speaker:** Chen Chen **Affiliation:** Nanjing University **Bio:** Dr. Chen Chen is an assistant researcher at the College of Engineering and Applied Sciences at Nanjing University. She received her PhD from Nanjing University in 2021. Her research interest includes multi-dimensional light-field manipulation and metalens imaging technology. Up to date, she has published more than 20 SCI papers, including Light Sci. & Appl., Optica, Nano Lett., Photon. Insights, etc. **Title:** Metasurface empowered multi-dimensional light manipulation and applications

	Abstract: Metasurface, a new emerging flat optical device, enables thin and lightweight optical elements with precisely engineered wavefronts. Based on its unique large dispersion, we demonstrated spectral tomography and TIE-based phase imaging in a non-mechanical way. A new phase modulation mechanism with planar chiral meta-atoms for spin light is proposed, which empowered applications like pancake metalens, polarimetry, and optical encryption, etc.
16:30-17:00	**Speaker:** Wei Li **Affiliation:** Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences **Bio:** Wei Li is a professor at Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), Chinese Academy of Sciences (CAS). Before joining CAS, he did his Ph.D. and postdoc at Vanderbilt University and Stanford University, respectively. His research interests include thermal photonics, nanophotonics, and their applications in next-generation energy and information technologies. He is a Highly Cited Researcher (Clarivate), the recipient of MIT Technology Review Innovator Under 35 (TR35 Asia Pacific) and others. He is the associate editor of npj Nanophotonics and the faculty advisor of IEEE Student Chapter and the Optica Student Chapter at CIOMP, CAS. **Title:** High-dimensional photodetection assisted by dispersion **Abstract:** Intensity, polarization, and wavelength are fundamental attributes of light. Capturing high-dimensional information of intensity, polarization, and spectrum of the light fields is highly demanded but challenging, and often requires complicated integration of polarization/wavelength sensitive elements across space or time domain. In this talk, I will discuss our recent efforts along this direction. Specifically, I will show how spatial and frequency dispersive thin-film interfaces facilitate the acquisition of high-dimensional intensity-spectrum-polarization information of light in a single-shot fashion.
Oral Presentation	
17:00-17:15	"**#** 6573 - Nonlinear hyperspectral on-chip GaN microcavity photonic emitters with ZnO nanoantennae for directional control **Presenter:** Arup Neogi, University of Electronic Science and Technology of China **Abstract:** The demands in information technology have significantly accelerated the advancement of photonic integrated circuits (PICs). Structured light, produced through nonlinear optical processes on dielectric and metallic periodically patterned structures and metasurfaces, can operate in the UV- and visible wavelengths and offer additional degrees of freedom for enhanced on-chip functionality. Wide bandgap semiconductors with structured dielectric surfaces, a direct bandgap, and a noncentrosymmetric crystal structure offer higher nonlinearity than surface-enhanced or 3rd-order nonlinear effects in metallic materials for further miniaturization of PICs and expand available communication bandwidth. A hyperspectral chip-scale micro-photonic emitter with controllable beam steering and optical polarization control properties has been realized by combining GaN-based whispering gallery cavity modes with ZnO-based dielectric nano/micro antennas for tunable conversion of infrared light into the UV-Visible wavelength."

Technical Sessions / Sept. 13

TS29. Topological Photonics-E

Time	09:00-10:30	Venue	LM103-B

Session Chair: Zhen Gao, Southern University of Science and Technology

Invited Speech

09:00-09:30	**Speaker:** Bingyi Liu **Affiliation:** Hefei University of Technology **Bio:** Dr. Bingyi Liu is currently working at School of Computer Science and Information Engineering, Hefei University of Technology. He received his B.S. in Optical Information Science and Technology from Harbin Institute of Technology in 2014 and PhD in Optics from Harbin Institute of Technology in 2020. He has published/co-published over 30 journal papers. His research interests include nanophotonics, nonlinear optics, optical field manipulation, optical information processing, metasurfaces and their advanced applications in integrated photonics. **Title:** Generalized nonlinear geometric phase in thin dielectric metasurfaces **Abstract:** Metasurfaces show their great potential in manipulating light at subwavelength scale and trigger a strong research interest in both academic and industrial communities. Studies in recent years have revealed that dielectric metasurfaces could efficiently facilitate the control of nonlinear optical processes, especially the nonlinear geometric phase, which originates from the spin angular momentum coupling between light and nanostructures of designated symmetries, offers an efficient and robust technique in engineering the nonlinearity over a nanoscale footprint. In this presentation, we report our recent research results about the nonlinear geometric-phase metasurfaces operating in either transmission and reflection scenarios. Besides the verified nonlinear geometric phases that follow the selection rule, we further reveal that generalized nonlinear geometric phases also exist when symmetry of nanostructure mismatches with that of lattice. Our study gives a comprehensive understanding of the nonlinearity engineering of harmonic generation processes via the dielectric metasurfaces.
09:30-10:00	**Speaker:** Mudi Wang **Affiliation:** The Hong Kong University of Science and Technology **Bio:** Dr. Mudi Wang received his bachelor’s and doctoral degrees from the School of Physics Science and Technology at Wuhan University in 2014 and 2019, respectively. Since 2019, he has been a postdoctoral researcher in the Department of Physics at the Hong Kong University of Science and Technology. His main research area is topological states in photonic/phononic crystals. He has published multiple papers as the first author in international journals such as Physical Review Letters (4 papers), Nature Communications (2 papers), and Light: Science & Applications (2 papers). His related achievements have been selected as “Featured in Physics” and “Editor’s Suggestion” by Physical Review Letters and featured in the “Editor’s Choice” section of Science magazine.

	Title: Three-dimension non-reciprocal photonic waveguide with arbitrary shape **Abstract:** Electromagnetic wave propagation in three-dimensional space typically suffers omnidirectional scattering when encountering obstacles. In this study, we construct a heterostructure by sandwiching a large-volume waveguide between two topological materials with opposite Chern vectors, which enables three-dimensional (3D) non-reciprocal topological waveguide transport, facilitating unimpeded electromagnetic wave propagation in a single direction. The shape of the waveguide can be arbitrary in 3D space, allowing for unidirectional non-reciprocal transport of electromagnetic wave within it. By manipulating the shape of the heterostructure, we not only observe a distinctive cross-shaped field pattern and non-reciprocal energy harvesting, but also demonstrate the remarkable ability of electromagnetic wave to traverse obstacles and deformed waveguides without encountering reflections.
10:00-10:30	**Speaker:** Qiang Wei **Affiliation:** Zhengzhou University **Bio:** Qiang Wei is an assistant research fellow at the School of Physics and Laboratory of Zhongyuan Light, Zhengzhou University. He received his Ph.D. degree in Physics from Shanxi University in 2022. His research interest is mainly in the topological states and the corresponding physical properties using phonon crystals. **Title:** Acoustic pseudomagnetic field and Landau levels **Abstract:** It is well known that inhomogeneous structures can generate pseudomagnetic fields, which can produce a series of physical effect related to Landau levels. In this presentation, Dr. Qiang Wei will present recent research advances on acoustic three-dimensional quantum Hall effect, SU(3) Landau levels, and momentum-locked pseudomagnetic field-induced hybrid transports.

TS30. Optoelectronic Devices and Applications-D			
Time	09:00-10:15	Venue	LM103-C
Session Chair: Huizi Li, Shanghai Institute of Microsystem and Information Technology(CAS)			
Oral Presentation			

09:00-09:15	# 8619 - Optimization of InGaN quantum well laser diode with polarization-engineered AlInGaN electron barrier layer **Presenter:** Wenjie Wang, Microsystem & Terahertz Research Center of CAEP **Abstract:** The optimization of polarization-engineered AlInGaN electron barrier layer (EBL) in InGaN quantum well laser diode are numerically investigated. In this work, we propose that three high Al composition AlInGaN electron barrier layers with different polarization degree for the same bandgap, including polarization-reduced Al0.332In0.08Ga0.588N EBL, polarization-matched Al0.447In0.174Ga0.379N EBL and polarization-reversed Al0.58In0.277Ga0.143N EBL. The effects of these structures on device performance are evaluated by crosslight simulation software. The results show that the problem of electric field and downward bending of energy band caused by polarization

	at the interface between the last quantum barrier layer and the EBL can be greatly alleviated by using the polarization-reversed Al0.58In0.277Ga0.143N EBL, thus reducing electron leakage and improving the performance of the diode.
09:15-09:30	**#** 6760 - Dual-Mode GaN Photonic Sensor for Salinity and Temperature Monitoring **Presenter:** Zhiyong Ye, Shenzhen University **Abstract:** Accurate sensing of temperature and salinity is vital across diverse fields such as marine engineering, resource development, and environmental protection. However, developing microsensors with high sensitivity and swift response poses a formidable challenge. In this study, we propose a GaN-based sensor integrating a light-emitting diode and a photodetector on a single chip. Salinity and temperature are determined via photocurrent and forward voltage measurements, respectively. Our sensor exhibits exceptional salinity sensitivity (0.634 μA/%) across a 0-7 % salinity range with a rapid 66.8 ms response time. Additionally, it accurately detects temperature within 5-40°C with a sensitivity of 1.53 mV/°C. With its compact size and stability, this sensor holds promise for practical seawater monitoring applications.
09:30-09:45	**#** 7581 - Surface Plasmon induced Dual Enhancement Effects on Fluorescence Gas Sensing **Presenter:** Chunhui Li, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences **Abstract:** Surface plasmon-mediated fluorescence emission has been a cornerstone in various sensing applications, notably in biological sciences. Despite its prevalence, the influence of surface plasmon resonance (SPR) on the interaction dynamics between probes and analytes has been underappreciated. This study delves into the role of surface plasmons in trace gas detection via fluorescence. Our research uncovers that surface plasmons have dual effects on the sensing mechanism: firstly, the amplification of fluorescence signal collection; and secondly, the intensification of the molecular interaction between probes and analyte gases. This discovery of the dual effects is central to our investigation. We have experimentally realized highly sensitive trace gas detection at the parts-per-trillion (ppt) level, employing a straightforward and compact optical system that harnesses the power of surface plasmon mediation. Our ultra-sensitive photochemical sensor offers broad application prospects for various trace gas detection.
09:45-10:00	**#** 2462 - Optical Polarization Encoding Using Chip-Scale GaN Optoelectronic Devices **Presenter:** Yumeng Luo, Southern university of science and technology **Abstract:** In this work, a compact polarization sensing device for optical encoding is introduced by integrating a GaN-based optoelectronic chip with linear polarizing films. The GaN chip with a size of 2.1 mm2 comprises a light-emitting diode (LED) and four photodetectors (PDs) on a transparent sapphire substrate. Each PD region is affixed with a linear polarizing film oriented at distinct angles of 0°, 45°, 90°, and 135°. The light emitted from the LED passes through these on-chip polarizing films, behaving as unpolarized light. The amount of light reflected to the PDs depends on the polarization properties of the measured plane. Moreover, changes in the angle between the device and external polarizers result in variations in photocurrents of the PDs, enabling the precise measurement of

	rotational angles and validating the feasibility of the device as an optical encoder. Experimental outcomes indicate an angular resolution of 0.8° and a strong linear correlation between the rotation angle and photocurrent. The compact design, operational simplicity, and cost-effectiveness of the developed device make it suitable for practical uses in optical encoders.
10:00-10:15	# 7935 - A Single-Layer Metasurface for Narrowing Divergence Angle in Enlarging Beam Deflection **Presenter:** Zhu Ying, Shanghai University **Abstract:** We numerically demonstrate a metasurface for beam steering that minimizes divergence angle during deflection. The 940 nm-operating device integrates a deflection and collimation metasurface, composed of a-Si nanopillars on a SiO_2 substrate. It employs a quadratic phase for wide deflection and a collimating phase to reduce output beam divergence. Simulations validate the design's efficiency, with an optimized figure of merit Dfom that indicates superior performance in divergence control. The study achieves a significant reduction in Dfom from 2.07 to 1.14 when incorporating a collimating phase, compared to without it, at a 15° incidence angle. This enhancement increases the deflection efficiency to 81.96%, providing a compact solution for high-resolution beam steering applications.

TS31. Quantum Optics and Information-A			
Time	09:00-11:00	Venue	LM104-A
Session Chair: Chen Chen, Nanjing University			
Invited Speech			

09:00-09:30	**Speaker:** Anhui Liang **Affiliation:** Ningbo Micro-color Optical Communication Limited **Bio:** Professor Anhui Liang is a national high level talent. He held several positions, e.g. Chief Scientist, FiberHome Technologies; Chief Scientist, WTD; Deputy Director of University Academic Committee, Nanjing University of Posts and Telecommunications, second level professor, Shandong University of Science & Technology and Tyco Submarine Systems Ltd. in USA etc. He has published more than 100 papers and patents. He has made significant contributions in the fields of optical fiber communications, vision, biological optical AI, quantum mechanics and Chinese meridian, chromosome optical fibers and biological fibers. He is China Overseas Chinese Contribution Award recipient (2014); Yearly Person of “Scientific Chinese” (2015). He has made significant contributions in 9 questions which were among 125 questions: exploration and discovery listed by Science journal. His contributions have been well reported in famous national media. Their interview by Baidu Scholar received 160 millions of internet exposures in the first month of the video release in 2021. His research topics have been interested in by wide audiences, and there are over 700 thousands of audiences in his 8 online scientific lectures. **Title:** The Relationship Between Quantum Uncertainty and Non-locality and Its Applications in Quantum Communication, Quantum Computing and Quantum Measurement

	Abstract: One of the 125 unsolved key problems listed in "Science" magazine is: "Are there any deeper principles behind quantum uncertainty and non-locality?" We first gave a quantitative formula to measure the non-locality, and fond that the relative net energy uncertainty is equal to the relative net non-locality. In this invited talk, we first discover the relationship between the average energy and the average energy chirping, and we first discover the relationship between the average temporal position and the the average quantum group delay. In this invited talk, we shall study the applications of the new relationship in quantum communication, quantum computing, and quantum measurement.
09:30-10:00	**Speaker:** Keyu Xia **Affiliation:** Nanjing University **Bio:** Dr. Keyu Xia received his Doctorate of "Optics" in 2007 from Shanghai Institute of Optics and Fine Mechanics, CAS. Since 2017, Dr. Xia has become a professor and has been working at the College of Engineering and Applied Sciences in Nanjing University. Dr. Xia's research interest includes Cavity quantum electrodynamics, quantum information, chiral and nonreciprocal quantum optics. He has more than 60 peer-reviewed publications in the top-level journals including Science, Nature Photonics, Science Advances, PRL, PRX, etc. His academic achievements have been reported by Science Magazine, Nature Photonics and media Phys.Org etc. His representative achievements include schemes for QND measurement of a flying single photon, building magnetic-free single-photon isolators and circulators, bypassing dynamic reciprocity, and demonstrating the second mechanism for conducting chiral quantum optics—the susceptibility-momentum locking. **Title:** Nonreciprocal single-photon topological bandstructure **Abstract:** The interplay of photonic nonreciprocity, quantum information and topolgical physics can reveal rich novel fundamental physics and find ways for unconventional quantum information processing. This presentation will show a method to achieve nonreciprocal single-photon transport and topolgical properites.
10:00-10:30	**Speaker:** Xian Zhang **Affiliation:** Zhejiang Sci-Tech University **Bio:** 2013, PhD degree from Zhejiang Univesity, China; 2013-2016, postdoc at University of Florence, Italy; 2016-2023, assistant researcher at Zhejiang University; 2023-today, associate professor at Zhejiang Sci-tech University **Title:** Quantum Transport Properties of Sequential Tunneling in Driven Optical Lattices for gravity measurements **Abstract:** In the gravitational field, the dynamics of atoms in 1D optical lattices, especially the Bloch oscillation process, can be used to measure the local gravity. It can also form a cold atom gravimeter with high coherent time by combining atomic interference, Therefore, such systems have been extensively studied in recent years. Here we report quantum tunneling process in 1D vertical amplitude modulated optical lattice with

	decoherence. In such decoherence process, the expansion of atomic wave packet is suppressed and resonance spectrum is broadened, which differs from coherent tunneling. In this regime, the evolution of atomic wave packets approaches from coherent tunneling to classical diffusion as the decoherence rate L or the modulation time t increases. Our work provides a method to study the decoherence mechanism in optical lattices for quantum sensors, especially those for precision gravity measurements.
10:30-11:00	**Speaker:** Xiaoqing Zhou **Affiliation:** Westlake University **Bio:** My research interests are mainly on light-matter interactions. Previous work at EPFL and Max Planck Institute of Quantum Optics is on optomechanics. Since 2019 I started working in exciton-polaritons, looking into unconventional condensate phenomena. **Title:** Polariton condensate trapping with ion exposure **Abstract:** The possibility to engineer the lateral trapping potential landscape on sub-micrometer scale triggers many interests, e.g., simulating many-body phenomena. The coherence time of the condensates that is important for realizing simulators is enhanced by an order of magnitude as well by lateral trapping. To tailor the polariton trapping either via its excitonic part or photonic part, nanolithography provides several pathways. We focus helium-ions to stacked GaAs/AlGaAs quantum wells that embedded in a DBR mirror cavity. We demonstrate photoluminescence quenching within the ion exposed regions and lateral confinement of polariton condensates there.The spatial resolution of the confinement is on the sub-micrometers scale, and it has the potential to go to the nm-scale, with the confinement strength being tunable. With these two advantageous features, polariton condensates confinement realized by ion exposure can be further engineered to design intricate devices ranging from non-classical light sources to quantum simulators.

TS32. Silicon Photonics-C			
Time	09:00-10:30	Venue	LM104-B
Session Chair: Jiaqi Wang, Shenzhen University			
Invited Speech			

09:00-09:30	**Speaker:** Jinyu Mo **Affiliation:** POET Technologies **Bio:** Dr. Mo is a highly experienced technical and business veteran of the photonics and optoelectronics industries. Her expertise covers optical transmission system, advanced optical modulation format, tunable semiconductor lasers, DFB & FP lasers and PD/APD, optical transceiver modules and high-speed integrated advanced packaging. Dr. Mo has more than 25 years of experience spanning several companies, including MACOM Technology Solutions as CTO in Asia and GM of Shenzhen office, Bookham/ Oclaro as Senior R&D Director, Huawei as Technical Expert, I2R in Singapore and Nexvave Photonics Technology Co., which she founded and served as Chief

	Technology Officer. Dr. Mo is now with POET Technologies as the Senior Vice President, General Manager of Asia. **Title:** Semiconductorization of Photonics: 200G/Lane Products for 1.6T and Beyond **Abstract:** Optical Interposer platform offers a powerful approach for integrating opto-electronic devices at a high volume with cost efficiency. Its ability to merge electronics and photonics through wafer-level processing provides significant advantages, particularly in key growth sectors like AI, IoT, autonomous vehicles, and high-speed networking. In this talk, I will present the latest technology achievement by POET which is the fully integrated 200G/lane Tx OE and Rx OE. This pair of OE chip set makes the development of 800G 4xFR4 optical module or 1.6T optical module much easier and cost effective. This again, proves that Optical Interposers as a technology platform which can be adapted to future technologies and bandwidth demands, ensuring that data centers can continue to evolve without the need for constant infrastructure overhauls.
09:30-10:00	**Speaker:** Jiang Xu **Affiliation:** Hong Kong University of Science and Technology (Guangzhou) **Bio:** Prof. Jiang Xu received his PhD from Princeton University and worked at Bell Labs, NEC Labs, and a startup company where he developed two generations of NoC-based ultra-low power Multiprocessor Systems-on-Chip before joining the Hong Kong University of Science and Technology (HKUST). He is the Founding Department Head of Microelectronics Thrust at HKUST(GZ). He serves as the Associate Editor for IEEE TCAD and on the steering committees, organizing committees, and technical program committees of many international conferences, including OFC, DAC, DATE, ICCAD, CASES, ICCD, CODES+ISSS, NOCS, HiPEAC, ASP-DAC, etc. Prof. Xu is awarded IEEE Computer Society Distinguished Contributor as the Charter Member. He was an IEEE Computer Society Distinguished Visitor and an ACM Distinguished Speaker. He authored and coauthored more than 160 book chapters and papers in peer-reviewed international journals and conferences. Prof. Xu and his students received Best Paper Award from the International Symposium on Memory Systems in 2023, IEEE Technical Committee on VLSI Best Paper Award of ISVLSI in 2018, Best Paper Award from IEEE Computer Society Annual Symposium on VLSI in 2009, and Best Poster Award from AMD Technical Forum and Exhibition in 2010. **Title:** Rejuvenate Post-Moore's Law Computing with Photonics-Electronics Integration **Abstract:** Computing systems, from data center and HPC to smart phone and electrical vehicle, are integrating growing numbers of processors, accelerators, memories, and peripherals to meet the burgeoning performance requirements of new applications under tight cost, energy, thermal, space, and weight constraints. Silicon photonics piggybacks onto matured fabrication technologies to provide viable and cost-effective solutions. Based on our decade-long quest to transform computing systems with photonics, this talk will highlight our recent progresses on photonics-electronics integrations that can rejuvenate post-Moore's Law computing. Photonic-electronic integrations open up new opportunities to applications, architectures, design techniques, and design automation tools.

Oral Presentation	
10:00-10:15	**#** 4172 - High-resolution negative tone SNSPD fabrication **Presenter:** Evgeny Sergeev, Dukhov Research Institute of Automatics (VNIIA) **Abstract:** In the fabrication of SNSPDs, geometric factors such as nanowire edge roughness, width deviation, and design directly influence the key detection parameters. Hence, an important task is to optimize the technology throughout the entire fabrication route, especially at the steps of lithography and etching, which directly contribute to their improvement. Nowadays, both types of SNSPDs, stand-alone and waveguide-integrated, are predominantly fabricated using negative HSQ resist, which makes it possible to obtain ultrahigh-resolution lithography with enhanced plasma resistance. However, because of its high price and extremely short shelf life, it cannot be classified as a universal material for long-term use. In this paper, a comparison of three methods of fabrication for stand-alone SNSPD with positive (p-PMMA), negative tone (n-PMMA) and HSQ was performed. For the first time, n-PMMA based waveguide-integrated SNSPD was fabricated and its absorption efficiency was measured.
10:15-10:30	**#** 7703 - Electro-optical assemblies based on photonic integrated circuits with ultra-low losses in the telecommunication range **Presenter:** Sergei Avdeev, VNIIA **Abstract:** In this paper, we present universal platform for the PIC low loss edge coupling and describe its manufacturing process with the low-loss Si3N4 waveguide. For the coupling platform, we design, manufacture and characterize lithographically defined optical coupling facets using ICP dry etching.

TS33. Fiber-Based Technologies and Applications-C			
Time	09:00-11:00	Venue	LM104-C
Session Chair: Sumin Bian, Westlake University			

Invited Speech	
09:00-09:30	**Speaker:** Chunying Guan **Affiliation:** Harbin Engineering University **Bio:** Prof. Chunying Guan received her B.Sc. in Optoelectronic Technology (2001), M.Sc. in Optical Engineering (2004), and Ph.D. in Mechanical Design and Theory (2007), from Harbin Engineering University, China. From 2001 to present, she is working in Harbin Engineering University. In 2013, she was a visiting scholar in the Optoelectronics Research Centre, University of Southampton, UK. In 2016, she was a senior visiting Fellow in the School of Physics and Astronomy, University of Birmingham, UK. She is currently a full professor at the College of Physics and Optoelectronic Engineering, Harbin Engineering University, China. Her research interests focus on fiber devices, optical fiber sensors, nanophotonics and femtosecond 3D printing. She is principle investigator of 7 projects (National Natural Science Foundations of China (NSFC)). She has published over 120 journal articles and 60

	conference papers, hold over 40 patents. **Title:** All-fiber speckle spectrometer **Abstract:** We demonstrate two types of all-fiber speckle spectrometer. One of the spectrometers is composed by cascading a coreless fiber (CLF) and an all-solid photonic crystal fiber (PCF). Using a 10 cm-long fiber with 20-segment-PCF spliced elements, the spectrometer achieves a resolution of 0.03 nm over a bandwidth from 1540 to 1560 nm. The other spectrometer is realized by using the periodically tapered CLF. A remarkable spectral resolution of 0.03 nm in the near-infrared spectrum can be achieved with a 5-cm long fiber. Our compact spectrometers based on CLF promise picometer-resolution spectroscopy in portable applications, providing a new way for miniature spectrometer systems.
09:30-10:00	**Speaker:** Chenxu Lu **Affiliation:** Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou) **Bio:** Chenxu Lu received her Bachelor’ s, Master’ s and Ph.D. degrees in electronics science and engineering from Xiamen University, Fujian, China, in 2012, 2015, and 2019, respectively. Her Ph.D. research focused on the development of structural designs for special fiber optics and their applications in communication and sensors. From 2017 to 2019, she was a visiting scholar at City, University of London, UK, and Nanyang Technological University, Singapore. She worked as a postdoctoral fellow at City University of Hong Kong from 2019 to 2022, where she worked on grating-based optical waveguide interferometric devices. She joined the Southern Marine Science and Engineering Guangdong Laboratory, Guangdong, China, as an assistant professor in 2022. Her recent research interests include fast-response optical sensors and their applications in marine sensing. **Title:** Dual-Wavelength Differential Cross Multiplication Method for Fast Temperature Interrogation with Fiber-optic Fabry-Pérot Interferometers **Abstract:** This paper proposes a novel fast-response seawater temperature demodulation method employing the dual-wavelength differential cross multiplication (DWDCM) algorithm. The Fabry-Pérot interferometer-based temperature sensor probe is fabricated from a double-side-polished thin silicon plate, demonstrating the effectiveness of DWDCM demodulation for high-frequency temperature measurements. Experimental results show that our FPI temperature sensor achieves ultra-fast temperature sampling with high accuracy and rapid response time constant of ±0.0046 ℃ and 6.0 ms, respectively. These features provide competitive advantages in ocean turbulent temperature measurements, especially for mobile marine platforms with internal autonomous logging mode required.
10:00-10:30	**Speaker:** Sumin Bian **Affiliation:** Westlake University **Bio:** Sumin Bian is a research associate professor at School of Engineering, Westlake University (Hangzhou, China) and received her Ph.D. degree in Pharmaceutical Science from Katholieke Universiteit Leuven (Leuven, Belgium) in 2018. Currently, Sumin has multidisciplinary research interests in pharmaceutical science, biosensors, and organoids-on-chips for personalized medicine.

	She has authored around 30 articles with 17 as the (co-)first/(co)corresponding authorship in peer-reviewed journals (including Biosensors & Bioelectronics, J. Pharm. Anal. (Cover Paper; Best Paper Award), Vaccines, Anal. Chim. Acta and Front. Bioeng. Biotechnol.) and as a strong collaborator to many works published in ACS Nano, Clin Gastroenterol Hepatol, J Crohns Colitis and Aliment Pharmacol Ther. She additionally holds three national innovation and three PCTs as the first applicant. She is a youth editor of The Innovation (IF2022: 32.1) and Journal of Pharmaceutical Science (IF2022: 8.8). She was awarded multiple Chinese National Scholarships in recognition of her passionate pursuit of science during her educational endeavours and research scholarships from both China Scholarship Council and KU Leuven for her doctoral study. She was granted the Travel Award by United European Gastroenterology Week, the Best Poster Award in WISE, the National Silver Award in the first China Postdoctoral Innovation & Entrepreneurship Competition and Best Staff Award. She has been a core member in multiple research grants at university and provincial levels. In 2022, she was awarded a Youth Science Fund grant from the National Natural Science Foundation of China. **Title:** Optical Fiber Biosensing of Infectious Diseases and Evaluating of Vaccine Efficacy **Abstract:** Global pandemics emphasize the urgency for biosensor development to monitor outbreaks. Meanwhile, understanding antibody response to third doses of inactivated vaccines is crucial for global vaccination efforts. Optical fiber biosensors offer automated, fast, and sensitive detection, enhancing infectious disease management and precision medicine. To monitor infectious diseases, we designed an optical fiber biolayer interferometry (FO-BLI) based biosensor to detect the emerging SARS-CoV-2 antigens and the latest Monkeypox virus within 14 mins. A silica-binding protein was designed to facilitate the site-directed antibody immobilization onto silicon surfaces. This biosensor can detect multiple pandemic strains from one single sample. To evaluate the vaccine efficacy, we first reported two FO-BLI biosensors for the rapid detection of SARS-CoV-2 neutralizing antibodies (NAbs) and binding antibodies (BAbs) in human serum. NAbs and BAbs could be detected individually over 7.5 and 13 min, respectively, with a detection limit of both as low as 10 ng/mL. Integrating microsampling, we profiled NAbs in fifteen vaccinated donors, showing strong correlation between microsamples and sera. FO-BLI correlated well with pseudovirus neutralization assays, and machine learning accurately predicted antibody levels over time.
10:30-11:00	**Speaker:** Xiaosheng Xiao **Affiliation:** Beijing University of Posts and Telecommunications **Bio:** Xiaosheng Xiao received the B. E. and Ph.D. degrees from Tsinghua University, Beijing, China, in 2002 and 2007, respectively. From 2007 to 2008, he was with the Network Technology Research Centre, Nanyang Technological University, Singapore, as a Research Fellow. From 2009 to 2019, he was an assistant professor then an associate professor with the Department of Precision Instruments, Tsinghua University, Beijing, China. Since 2019, he has been an associate professor with the State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, Beijing, China. His research interests include mode-locked fiber lasers, optical fiber communications, optical sensor and imaging.

	Title: Recent progress in spatiotemporal mode-locked multimode fiber lasers **Abstract:** Spatiotemporal mode-locking, i.e., simultaneously locking of multiple transverse and longitudinal modes, is a general form of mode-locking. Spatiotemporal mode-locked (STML) multimode fiber lasers are ideal platforms for investigating high-dimensional nonlinear dynamics, in addition to their potential applications benefiting from the high pulse energy, high-dimensional output, etc. In this talk, recent progress of STML multimode fiber lasers will be reviewed.

TS34. Topological Photonics-F			
Time	10:45-12:15	Venue	LM103-B
Session Chair: Yan Meng, Dongguan University of Technology			
Invited Speech			
10:45-11:15	**Speaker:** Kejing Ran **Affiliation:** Chongqing University **Bio:** Dr. Kejing Ran received her Bachelor's degree from Chongqing University in 2014 and her Ph.D. from Nanjing University in 2019. After graduation, she worked as a Research Assistant Professor at ShanghaiTech University and was promoted to Research Associate Professor in 2022. In June 2024, Dr. Ran joined the Department of Physics at Chongqing University as a Professor. Dr. Kejing Ran specializes in the study of spin dynamics of quantum magnetic materials and the characterization of magnetic structures in 3D topological magnets. In recent years, she has achieved a series of accomplishments in the exploration of novel quantum states and 3D topological magnetic configurations. She has authored or co-authored 14 papers as the first or corresponding author in prestigious academic journals, including Physical Review Letters, Nature Communications, and Nano Letters. Moreover, she has been invited to contribute reviews on quantum spin liquids and book chapters on 3D topological magnets. **Title:** Creation and Characterization of 3D Topological Magnetic Phases **Abstract:** Topological magnetic materials, represented by magnetic skyrmions, are key systems in the fields of information storage and spintronics. These magnetic domain structures, with a vortex-like spin arrangement, exhibit topological stability and can be easily driven by external fields, making them promising candidates for next-generation data carriers. In recent years, the complex three-dimensional (3D) structures of skyrmions have gradually been discovered. Research has confirmed that 3D skyrmion structures are not simply stacked two-dimensional magnetic vortices but rather expand along the longitudinal axis, introducing an entirely new degree of freedom with more intricate fine structures. However, constructing stable and tunable 3D topological magnetic phases and characterizing such complex 3D magnetic configurations are key challenges in the current field. Here, I will introduce how interfacial coupling can be cleverly utilized to achieve stable and tunable 3D topological magnetic phases, and how to characterize these 3D magnetic configurations using a new methodology based on soft X-ray resonant elastic scattering (REXS) techniques with synchrotron		

	radiation sources: the magnetic truncation rod analysis. These efforts provide an effective strategy for the future modulation of more 3D topological phases.
11:15-11:45	**Speaker:** Dezhuan Han **Affiliation:** Chongqing University **Bio:** Dezhuan Han, professor of physics at Chongqing University. He received his BSc (2001) and his PhD (2007) degrees from Fudan University, and his Master's degree from New York University in 2003. He was a visiting scholar in the Department of Physics, Hong Kong University of Science and Technology from 2007 to 2009. He joined Chongqing University in 2013. His primary research interests include the theory and simulation of micro- and nano-photonics. He has published over 70 papers in peer-reviewed journals, including Phys. Rev. Lett., Sci. Adv., Nat. Commun., etc. **Title:** Optical bound states: Symmetry, Hamiltonian and Algorithm **Abstract:** Photonic crystal slabs can combine the advantages of energy band structure in the x-y plane and high-index guiding along the z direction. The leakage exists inside the light-cone and leads the guided-modes to guided-mode resonances. In recent years, the bound states in the continuum (BICs), as a type of isolated points in the band of guided-mode resonances, have received much research attention. We have systematically studied BICs from three different perspectives. Firstly, the topological properties of BICs in the momentum space have been fully revealed, and it has been demonstrated that a type of "general BICs" can exist at an arbitrary point besides the high-symmetry lines. Second, the formation mechanism of all the BICs in the photonic crystal slabs is classified in a unified picture based on a non-Hermitian Hamiltonian. Especially, it has been shown that the interaction between Fabry-Perot and guided-mode resonances plays a significant role. Finally, we discussed the "coherent perfect reflection" of Bloch waves and designed an algorithm to search for BICs in parameter space based on generalized waveguide conditions. A perturbative viewpoint of this theory can be applied to interpret the above-mentioned non-Hermitian Hamiltonian.
11:45-12:15	**Speaker:** Yangjie Liu **Affiliation:** Hubei University **Bio:** Liu Yangjie, works in Dept. Phys., Hubei Univ. in Wuhan. He mainly works on theoretical sides of wave optics/topological photonics. **Title:** Landau-Zener-Stuckelberg interference in edge state pumping **Abstract:** The adiabatic edge state pumping (ESP) in one dimensional model, which has important appli- cations in topological phase transition and the associated implementation of edge states in quantum simulation, has been widely performed in both theories and experiments. This phenomenon has been verified in some small physical models, yet some fundamental issues about this process have not been clarified. In this paper, we revisit this problem of ESP and pinpoint a pair of non-adiabatic points in the band levels, at which the adiabatic condition breaks down. We determine the two points using the criteria of non-adiabaticity. As a result, the oscillation of ESP as evolution time varies can be resolved in terms of Landau-Zener-Stu ckelberg (LZS) interference. Furthermore, in the presence of disorder, we show that the ESP may break down for the anticrossing between the edge and the bulk

	levels, where the non-adiabaticity diverges. Thus in a relatively long chain with weak disorder, we demonstrate the failure of the ESP. This new type of ESP unveiled in this work is readily accessible in experiment, and shall therefore lead to a down-to-earth platform for the intriguing LZS dynamics.

TS35. Biophotonics and Optical Biomedicine-C			
Time	10:45-12:00	Venue	LM103-C
Session Chair: Jinna Chen, Southern University of Science and Technology			
Invited Speech			
10:45-11:15	**Speaker:** Qiongyu Guo **Affiliation:** Southern University of Science and Technology **Bio:** Dr. Qiongyu Guo is an associate professor at the Southern University of Science and Technology, Shenzhen, China. She earned her BS degree in Polymer Science and Engineering from the University of Science and Technology of China in 2004. She obtained her PhD in Macromolecular Science and Engineering at the Case Western Reserve University in 2010. She received her postdoctoral training in Biomedical Engineering at the Johns Hopkins University. She has authored more than 40 peer-reviewed research publications and review articles. Her research focuses on engineering biomaterials through translational approaches so that the clinical use may be realized to enhance human health and well-being. She specialized in developing drug delivery systems and functional biomaterials for tissue engineering and cancer treatments. She has extensive experience on biomimetic artificial cornea, biodegradable drug-eluting stent, shape memory nanosystem, light activated cell migration and musculoskeletal regeneration. **Title:** Endovascular Photothermal Precision Embolization of Tumor Feeding Vessels for Starvation Treatment **Abstract:** Photothermal therapy has attracted enormous attention as an efficient treatment modality in cancer ablation but still encounters a major bottleneck due to the limited penetration depth of light inside tissues. To overcome the challenge of deep tissue penetration, we present a strategy of endovascular photothermal precision embolization (EPPE), which employs an endovascular optical fiber to induce local embolization only in the entrance of feeding vessels through photothermal heating for the purpose of fully blocking the blood supply of the whole tumor. We verify the feasibility of EPPE in an ex vivo organ-structure recellularized liver model and further confirm the in vivo efficacy of the photothermal treatment in a rat liver model. The photothermal treatment combining with embolization effect holds the promise to serve as an effective starvation therapy to treat tumors of varying sizes and locations.		
11:15-11:30	**Speaker:** Si Chen **Affiliation:** Eye Valley, Eye Hospital of Wenzhou Medical University **Bio:** Dr. Chen received her master's degree in ophthalmology from Peking University and her PhD from Nanyang Technological University. After graduation, she completed her postdoctoral training in		

	the Department of Ophthalmology at the National University of Singapore. She is currently a senior scientist at the Eye & Vision Innovation Center (Eye Valley) at the Eye Hospital of Wenzhou Medical University. Her research interests include optical imaging technologies for the diagnosis of ocular diseases. **Title:** Retinal angiography imaging with spectrally extend line field OCTA **Abstract:** Retinal angiography imaging plays a crucial role in clinical practice by providing detailed visualization of retinal microvasculature, essential for diagnosing and managing various ocular and systemic diseases. Optical Coherence Tomography Angiography (OCTA) is an advanced technique that non-invasively visualizes microvasculature by detecting motion contrast from flowing blood cells. However, its widespread use is constrained by limitations in field of view due to insufficient transverse sampling rate and signal-to-noise ratio (SNR). We introduce Spectrally Extended Line Field OCTA (SELF-OCTA), an innovative and costeffective technology designed to enhance transverse sampling rate. SELF-OCTA system operating at 850 nm was specifically developed for retinal imaging. Our experiments demonstrate that SELF-OCTA effectively addresses OCTA imaging challenges by expanding field of view (FOV) while maintaining high resolution of microvasculatures. It also achieves heightened sensitivity to slow flow without increasing image acquisition time or sacrificing FOV. These advancements position SELF-OCTA as a promising cost-effective tool for high-resolution retinal angiographic imaging, promising to advance our understanding and management of both ocular and systematic diseases.
Oral Presentation	
11:30-11:45	# 6600 - Retinopathy Identification in OCT Images with A Semi-supervised Learning Approach via Complementary Expert Pooling and Expert-wise Batch Normalization **Presenter:** Yuan Li, Nanjing University of Information Science and Technology **Abstract:** In the medical field, the automatic detection of retinopathy using deep learning is an important application. However, traditional deep learning techniques face two significant challenges: the need for large amounts of labeled data, which are costly and difficult to obtain, and the imbalance of OCT ocular disease categories in practical applications, which can significantly affect model performance. This paper proposes a semi-supervised deep learning method based on complementary expert pooling (CEP). This method utilizes transfer learning with pre-trained models and enhances the model's generalization capabilities through data augmentation strategies. Our approach implements a custom classification model on the VGG-16 architecture, employing CEP to model different category distributions across multiple experts and introducing Expert-wise Batch Normalization (EBN) to resolve feature distribution mismatches, thereby improving the model's accuracy in recognizing minority classes. We evaluated our method on two datasets, using only 20% of the images as labeled data. Our method achieved 96.55% and 97.78% classification accuracies on these public datasets. Moreover, our approach demonstrated superior performance compared to various supervised learning methods using all available labeled data and other semi-supervised learning methods, proving its effectiveness in OCT ocular disease detection and its potential to assist clinicians in diagnosing ophthalmic diseases.

11:45-12:00	**# 8099 - Cross-Domain Retinopathy Classification with OCT Images via Disentangling Representation and Adaptation Networks** **Presenter:** Yuan Li, Nanjing University of Information Science and Technology **Abstract:** Deep learning methods have shown significant potential in retinopathy classification using optical coherence tomography (OCT) images. However, substantial challenges arise due to domain shift issues, which are attributable to heterogeneity in data collection devices, variations in subject populations, and discrepancies in imaging protocols and parameters. To address these, we propose a novel approach leveraging Disentangling Representation and Adaptation Networks (DRANet) to enhance the robustness and generalization of retinopathy classification models across different OCT datasets. Our methodology involves developing DRANet, a specialized network architecture designed to disentangle representations of data and facilitate domain adaptation. DRANet includes components for learning invariant representations across domains through adversarial training, ensuring robustness against domain shifts. DRANet encodes individual representations of content and style from both source and target images. Then, it adapts the domain by incorporating the transferred style factor into the content factor, along with learnable weights specified for each domain. This learning framework allows bidirectional domain. After conducting extensive experiments conducted on three public datasets achieved accuracies of 88%, 90%, and 92% under three cross-domain scenarios, demonstrating the efficacy of our approach in mitigating domain shift effects and improving retinopathy classification performance.

TS36. Silicon Photonics-D			
Time	10:45-11:30	Venue	LM104-B
Session Chair: Qize Zhong, Shanghai University			
Oral Presentation			

10:45-11:00	**# 9076 - Enhancing SNSPD performance via diamond-shaped nanowire** **Presenter:** Ilia Stepanov, Bauman Moscow State Technical University **Abstract:** Today, superconducting nanowire single-photon detectors (SNSPDs) enable landmark experiments in a wide variety of fields. The current crowding effect is still one of the main factors limiting the performance of such detectors, and to overcome these limitations, we proposed the concept of diamond-shaped nanowire. In this work we provide a comparison of the key characteristics of single-photon detectors with diamond-shaped and meander nanowires. The SNSPD with diamond-shaped nanowire demonstrated a critical current 1.7 times higher, a detection efficiency 2.25 times higher, and a significantly lower dark count rate compared to the traditional meander-based SNSPD, making our proposed concept more preferable for developing high-performance single-photon detectors.
11:00-11:15	**# 6512 - FMCW LiDAR Demonstration on an Integrated Silicon Photonic Chip** **Presenter:** Yu Cheng, Zhejiang University

	Abstract: We present a demonstration of a frequency-modulated continuous-wave (FMCW) light detection and ranging (LiDAR) system utilizing a silicon photonic chip integrated with a photodetector (PD) and verify its ranging and velocimetry functions. A directly modulated distributed feedback (DFB) laser chip with frequency sweep linearization is applied to this FMCW LiDAR system.
11:15-11:30	# 4982 - Integrated electro-optical modulators based on indium tin oxide for computing photonic circuits based on silicon nitride platform **Presenter:** Lotkov Evgeniy, Bauman Moscow State Technical University (BMSTU) **Abstract:** Today, silicon nitride photonics is definitely one of the main photonic integration platforms. A key contributor to its success is the Si3N4 high transparency window, which together with its low losses opens roads to wide range of applications. However, realizing the key components of any integrated optics platform: fast electro-optic modulators remain challenging in Si3N4. One of the promising EO materials for Si3N4 based modulators is Indium Tin Oxide (ITO). Recently, ITO has been explored for electro-optic (EO) modulation using its free-carrier dispersive effect enabling strong index modulation. Photonic computations demand very dense integration of over ~ 104 optical components, where device footprint of even 100 μm2 starts to impact performance, and sub-dB per one modulator insertion loss. For such applications, ITO provides synergistic benefits when monolithically and heterogeneously integrated with low-cost Si3N4 PICs. We have previously experimentally studied ITO properties tuning and have shown that, due to process conditions, it can be selectively adapted for operation in either an n-dominant or α-dominant region defined by the level of the carrier concentration. In this presentation, we demonstrate modulators paving the way for a comprehensive platform of heterogeneous integration of ITO-based electro-optic devices into Si3N4 PICs. We compare the different designs of possible ITO Si3N4 modulators. Then, we fabricate these devices and demonstrate low insertion loss.

TS37. Optical Communication and Networks-C			
Time	10:45-12:15	Venue	LM103-A
Session Chair: Xueyang Li, Peng Cheng Laboratory			
Invited Speech			
10:45-11:15	**Speaker:** Xiansong Fang **Affiliation:** Peking University **Bio:** Xiansong Fang received his B.E. degree from University of Electronic Science and Technology of China, Chengdu, China in 2019. He is currently pursuing a Ph.D. degree in the State Key Laboratory of Advanced Optical Communication Systems and Networks in Peking University. To date, he has authored or co-authored 33 academic publications in peer-reviewed journals and prestigious conferences, including 12 refereed journal papers, 7 post-deadline papers (PDP) in ECOC/ACP/OECC, 2 top-scored papers in OFC, 1 best paper and 2 best-student papers in ACP. He received the nomination prize of the PSC Tingye Li Memorial Scholarship in 2024.		

	Title: Overcoming Laser Phase Noise with Residual Carrier Modulation for Low-Cost Coherent Optical Communication **Abstract:** Laser phase noise is one of the essential limitations to coherent optical communication. In this talk, we will review recent progress in overcoming laser phase noise for advancing low-cost coherent optical communication. We will highlight our approach involving residual-carrier modulation to enable coherent optical communication with high-order modulation and large laser linewidth, extended from our post-deadline paper in ECOC 2023.
11:15-11:45	**Speaker:** Dongmei Huang **Affiliation:** The Hong Kong Polytechnic University **Bio:** Dr Dongmei Huang received her B.Eng. from Huazhong University of Science and Technology, China in 2014, M.Sc. from Chongqing University in 2017, Chongqing, China and Ph.D. from The Hong Kong Polytechnic University in 2020, Hong Kong. She is currently an assistant professor in the Department of Electrical and Electronic Engineering, The Hong Kong Polytechnic University. Her research focuses on both fundamental physics including mode locked lasers, swept lasers, nonlinear optics, integrated optics, and applications of photonics including biomedical imaging, high resolution measurement and LiDAR, optical fiber sensing. She is the guest editor of Photonics. She served as local arrangement chairs of OECC 2021 and ACP/IPOC 2022, and a TPC member of OECC 2021. She has co-authored 70 papers including journal and conference papers, and 7 patents. She won the Young Scientist Award in Optoelectronics Global Conference (OGC) 2022 and the Best Student Paper Award in International Conference on Optical Communications and Networks (ICOCN) 2018. **Title:** High performance swept laser and its applications **Abstract:** Swept lasers are the key components in laser frequency scanning interferometers which are widely applied in spectral detection systems including optical frequency domain reflectometer, swept source optical coherence tomography, optical sensing, and LiDAR. High sweep rate, wide sweep range, and long coherence length are the most desirable features of swept lasers. This talk will introduce broadband, highly stable and coherent swept lasers including Fourier domain mode locked lasers and time stretched swept lasers. The characterization techniques for swept lasers and their applications in biomedical imaging, high resolution measurement will also be presented.
Oral Presentation	
11:45-12:00	**#** 1770 - Gaussian Mixture Model based Intelligent PON monitoring scheme **Presenter:** Ruisi Wang, Huazhong University of Science and Technology **Abstract:** We presented an intelligent passive optical network monitoring system based on a 2×4 FBG encoder scheme associated with Gaussian Mixture Model.
12:00-12:15	**#** 634 - Deep Learning Enabled Performance Monitoring of Free Space Optical Communication System **Presenter:** Mohammed Zahed M Khan, School of Engineering and Built Environment, Anglia Ruskin University, Chelmsford CM1 1SQ **Abstract:** Free space optics is a form of optical communication that uses free space instead of optical

	fibers to transmit signals. As a result, the optical signal is vulnerable to free-space channel characteristics, such as atmospheric turbulence, fog, rain, smoke, etc., that degrade its quality. Hence, optical performance monitoring seeks to assess the amount of distortion caused by these impairments from the received signals, and predicting the parameters associated with the channel condition aids in the construction of adaptive and reliable optical links. In this paper, we investigate the performance of the FSO communication system under mild to strong turbulent weather conditions. The optical intensity fluctuation at the receiver due to varying channel conditions in the form of scintillation index and the jitter variance, which dictates the turbulence and pointing errors, is first modeled using a statistical approach. Later, we exploit a convolutional neural network (CNN) to predict these parameters. Overall 25 channel scenarios corresponding to various channel conditions are successfully estimated by CNN with a normalized mean square error < -26 dB.

Poster Session

15:30-18:00, Sept. 12 | @ Lounge (1F)

345 - Droplet-based Accelerometers Incorporating Optical GaN Devices

Presenter: Yingxin Li, Southern University of Science and Technology

Abstract: In this work, the fabrication of a compact accelerometer is demonstrated. The accelerometer employs a reflective droplet as the inert unit, while the monolithic GaN chip simultaneously acts as a light source and photodetector. The deformation of droplets due to acceleration results in pronounced alteration in photocurrent. Additionally, the monolithic integration approach endows the accelerometer with remarkable properties, including miniaturization, robustness, cost-effectiveness, and suitability for mass production. Notably, the integrated device achieves a high sensing resolution of 1 mg within a range of 0.8 g, coupled with a fast response time of 0.08. The proposed optical design provides attractive features, such as resistance to electromagnetic interference, ease of integration, and the absence of mechanical fatigue, making it highly potential for measuring the motion state of objects in practical applications.

568 - Topological phase manipulation via near-field asymmetry shaping approaches

Presenter: Huizhou Wu, Harbin Institute of Technology (Shenzhen), Shenzhen 518055, China

Abstract: Optical topological phases, the transitions between them, and the resulting topologically protected localized states are of significant interest for both fundamental physics and their promising potential applications in optics and photonics. Most research to date has focused on manipulating crystal lattice symmetry directly, employing techniques such as unit cell dimmerization, geometrical anisotropy, lattice deformation, and the introduction of dislocations like disclinations [1]. However, there are numerous alternative strategies for controlling topological phases and their transitions that do not require altering the crystal lattice itself [2]. We demonstrate several instances where topological phase transitions are fundamentally induced by near-field asymmetries within plasmonic nanoparticle arrays, without the need to modify the original periodic crystal lattice. These methods include the rotation of non-spherical particles, the influence of substrate effects, and mode interference caused by layer stacking. We also showcase various topological edge and corner states that can be engineered using these approaches [3,4]. Additionally, an intriguing case of Z3-invariant topology is presented, highlighting the diversity of phenomena within this field.

1180 - Quantum optical frequency combs generated in micro-ring resonator with a 20-GHz FSR

Presenter: Zhe Deng, Institute of Fundamental and Frontier Sciences, university of Electronic Science and Technology of China

Abstract: We demonstrate the generation of quantum optical frequency combs in silicon nitride micro-ring resonator with a FSR of 20 GHz. The correlation properties of two-photon state carried by each wavelength pair are measured. Correlated photon pairs at 70 wavelength pairs are obtained in our experiment.

1625 - Application of GaN-Based Optochips in Optical Gyroscope

Presenter: Ganyuan Deng , Shenzhen University

Abstract: Abstract—Abstract—In this work, a novel GaN-based optical chip for gyroscopes is demonstrated. The device comprises a square optical chip, a cantilever beam structure, and a soft plastic semi-sphere. Light-emitting diodes and photodetectors are integrated into the sapphire substrate. The integrated sensor with a size of 20mm × 10mm × 6.5mm shows high linearity on angular velocity sensing with an R square of more than 0.998 and the angular velocity sensitivity is 6.15 μA/(100°/s) in the range from 1700°/s to 500°/s.

1808 - Single-photon 3D reconstruction based on Compressed Sensing and Matching Pursuit Sampling

Presenter: Jinglei Li, Wuhan Institute of Technology University

Abstract: Traditional single-photon 3D reconstruction is often hindered by low-light conditions and background noise, making it difficult to accurately reconstruct the target object. To address these challenges, we propose a novel single-photon imaging algorithm that leverages the Compressive Sensing Reconstruction Algorithm, specifically the Compressive Sampling Matching Pursuit (CoSaMP) algorithm. Building upon existing imaging methods, our approach exploits the sparsity of the imaging scene to calculate object depth information and filter out noise photons, thereby enhancing reconstruction accuracy. This method overcomes the limitations of traditional algorithms regarding noise and temporal resolution. We innovatively apply CoSaMP to single-photon 3D reconstruction algorithms, achieving high-precision 3D scene reconstruction under low-light conditions. MATLAB simulation results demonstrate that, in human and sunflower data models, the mean absolute error (MAE) obtained by traditional single-photon 3D reconstruction methods is approximately 35 cm, whereas our proposed method achieves an MAE of around 1.34 cm. These results indicate the feasibility of our approach in the realm of single-photon 3D reconstruction, offering new possibilities for applications in biomedical imaging and remote sensing.

2505 - PSO-SVM Model for Information Extraction and Temporal Feature Analysis of Poyang Lake Wetland

Presenter: Dongwei Yang, Nanchang Institute of Technology

Abstract: In response to the confusion in information extraction and recognition of wetlands in the Poyang Lake Basin, this paper proposes a PSO-SVM high-resolution spectral image classification method to achieve information extraction and timely feature analysis of wetlands in Poyang Lake. The research results indicate that: (1) PSO-SVM implements the optimization process of parameters, effectively improving the classification performance of the SVM model. (2) Over the course of the three-year period from 2017 to 2019, there were only minor changes in wetlands during the summer, mostly due to cloud cover while satellite images were being taken. Winter brings with it a greater variety of qualities. River basins that have dried up may differ from year to year. (3) 2019's spring and summer brought plenty of water, distinct categories for ground objects, and good prediction accuracy. Prediction accuracy is nonetheless diminished in the fall and winter due to the lack of obviousness regarding the types of exposed ground objects on the riverbank. It is expected that this work can provide sufficient reference opinions for wetland information monitoring and change patterns.

2684 - Analysis of FMCW Laser Ranging on Different Surfaces

Presenter: Jing Lin, Shenzhen Hingin Technology Co.Ltd

Abstract: This paper measures the FMCW laser ranging results on different surfaces. The measurement system is mounted on a lifting platform, and different objects to be measured are placed on the test platform. The position of the object to be measured can be accurately tracked. Experiments have shown that this method can achieve

relatively accurate position tracking results on the surfaces of different objects.

3078 - A Salinity Sensor Based on Core-offset Side Hole Fiber Structure in Fibe Ring-cavity Laser

Presenter: Xingwei Chen, Southern University of Science and Technology

Abstract: In this paper, we experimentally proposed a fiber optical salinity sensor based on large core-offset side hole fiber (SHF) structure inside laser cavity. The misaligned fusion structure of SHF forms the Mach Zehnder interferometer (MZI) working as a sensor and filter in the fiber ring laser (FRL). By modulating the effective refractive index (RI) of the MZI through external salinity, the phase of the light input to the fiber laser cavity is altered. Consequently, the wavelength of the output laser shifts with changes in salinity concentration. The sensitivity of the sensor is 0.411 nm/‰ at the concentration of 0 ‰–40 ‰. In addition, since its stimulated radiation characteristics, the sensing system has a signal-to-noise ratio (SNR) greater than 60 dB and a linewidth less than 0.1 nm. The designed sensor has certain practicality for salinity monitoring in marine environments.

3340 - Polymer Chain Modified Stacking Structure of Quantum Dot Solid for Short Wave Infrared Photodetectors

Presenter: Haibo Zhu, Shenzhen Technology University

Abstract: PbS quantum dots (QDs) offer significant potential for low-cost, high-resolution short-wave infrared imaging, owing to their tunable bandgap and solution-processability. In the active layer, QDs are typically embedded in a solid matrix composed of lead halides formed during solution-phase ligand exchange (SPLE). However, the amorphous nature of the matrix promotes QD aggregation and lead halide migration under applied bias, leading to rapid device degradation. To overcome these limitations, polymer chains were introduced during the SPLE process, effectively stabilizing the matrix structure. This approach not only enhances the hydrophobicity of the QD solid but also significantly improves its structural integrity. Consequently, the polymer-stabilized QD solid exhibits a substantial increase in external quantum efficiency and a notable reduction in dark current density, offering a robust solution for enhancing device performance.

3592 - Visible Light Communications with Image Sensors

Presenter: Shen Qian, Kanagawa University

Abstract: Visible Light Communication (VLC) is a burgeoning field within information technology, drawing considerable attention. Notably, VLC utilizing image sensors promises high security, minimal interference, and rapid data transmission capabilities, making it a prime candidate for various applications. This paper focuses on communication technologies employing LEDs and laser light sources coupled with image sensors, discussing their fundamental principles, technical challenges, and diverse applications. Additionally, the potential future developments and their market impacts are explored. The application of artificial intelligence and machine learning in VLC, enhancing communication efficiency and performance, is also examined. The paper aims to outline the evolution of VLC technology and its potential impact on research advancements and industrial realizations.

4081 - Single-axis Acceleration Sensor Based on Gallium Nitride (GaN) Optical Chip

Presenter: Ling Zhu, Shenzhen University

Abstract: An innovative wearable GaN optical single-axis acceleration sensor has been presented. This device integrates a GaN-based optical sensing chip and a PDMS elastic film coupled with a mass block. The optical chip incorporates an LED and PD on a unified GaN on sapphire epi-platform. Performance enhancements are achieved

through adjustments in PDMS layer thickness and mass block quality. The finalized device facilitates accurate 0-9g acceleration measurements, with the added benefits of compact dimensions (1*1*1cm) and exceptional repeatability (10000 times).

4246 - Generation and research of n+m-type group velocity-unlocked soliton molecules within a vector fiber cavity

Presenter: Bowen Li, China University of Geosciences (Wuhan)

Abstract: In this paper, we report on the generation of n+m-type group velocity-unlocked vector soliton molecules in a passively mode-locked fiber laser based on carbon nanotubes (CNTs) with a 2+2-type vector soliton molecule as the initial condition.We adjust the parameters of gain saturation energy, small signal gain, intracavity birefringence, and cross-phase modulation through numerical simulation, and obtain different output results successively.Our investigations demonstrate that 2+1, 3+1, 4+1, 3+2-type group velocity-unlocked vector soliton molecules can be flexibly excited. These results will significantly enhance our understanding of soliton dynamics.. They will also aid in elucidating the factors influencing the soliton distribution of vector solitons in the two orthogonal polarization directions, as well as the interactions between solitons.

4303 - Image restoration based on manifold learning initialization and ADMM framework for compressed ultrafast photography

Presenter: Haoyu Zhou, Tsinghua University

Abstract: Compressed ultrafast photography (CUP) is an ultrafast imaging technology, which can realize the imaging speed of 10^13 frames per second and the sequence depth of hundreds of frames. It can capture the whole dynamic scene's three-dimensional data cube by computational imaging method in a single snapshot, which is a powerful tool for researching the ultrafast process. However, since the number of elements in the dynamic scene is much larger than that in the acquired snapshot, the solution of the forward process is an ill-posed problem, and the introduction of noise and the accretion of compression ratios will bring more difficulty to the image reconstruction, which further reduces the image reconstruction quality and prevents the practical application of CUP. In recent years, many kinds of prior information related to deep learning have been used to improve the reconstruction quality, but most of them require a lot of training and have poor generalization. This paper combines manifold learning with alternating direction multiplier method (ADMM) framework, initializes the iterative process by manifold learning, inherits the network parameters of the last ADMM iteration in each ADMM iteration, and develops a manifold learning algorithm with ADMM framework. This method can achieve better reconstruction quality even than supervised learning algorithm without any training datasets, while the stability of the algorithm is also improved. Simulation results and nanosecond laser line pair experiments demonstrate the excellent performance of our algorithm.

4359 - Miniaturization of high-speed GaN based laser diodes

Presenter: Junfei Wang, Fudan University

Abstract: In this work, we design and fabricated a GaN based mini-laser featured with 1.8 μm width ridge and 300 μm length resonant cavity. -3 dB bandwidth of the mini-laser is around 4.8 GHz, and the -10 dB is around 5.8 GHz.

4644 - Generation of narrowband correlated photon pairs in a micro-rod resonator

Presenter: Peng Hu, University of Electronic Science and Technology of China

Abstract: We demonstrate the generation of narrowband correlated photon pairs in a micro-rod resonator with a Q factor of 7.1×10^7. Correlated photon pairs with a spectral width of 2.72 MHz are obtained in our experiment.

4975 - Study on the optoelectronic performance of monolithically integrated flip-chip GaN chips under different bias voltages

Presenter: Zhiyong Ye, Shenzhen University

Abstract: The monolithic GaN flip-chip optoelectronic device, with its innovative design integrating dual-function PN junctions, revolutionizes microsensor technology. The combined LED emits light that's reflected to the surrounding PD. Stokes shift overlap further enhances PD self-detection capabilities. Despite potential applications demonstrated, their electrical performance research lags. This study bridges the gap, analyzing PDs' optoelectronic performance across 3 different wavelengths (395, 415&535nm), and explaining the mechanisms via carrier recombination theory.

5259 - Optimized Algorithm for Optical Phased Array Beam Steering

Presenter: Jiarui Zhang, The Chinese University of Hong Kong, Shenzhen

Abstract: Silicon-based optical phased array (OPA) offer significant potential for high-density integration and flexible beam steering, making them highly promising for applications in miniaturized LiDAR and optical wireless communication. However, research into algorithms for efficient beam steering in OPA remains limited. To our knowledge, this paper is the first to explore the differences in beam deflection using various modulation algorithms under experimental conditions. In our study, we designed a uniform 64-channel OPA chip based on SOI technology, fabricated using a standard silicon photonics platform. By employing an optimized modulation algorithm, we achieved a broad steering range of 60 degrees horizontally at a wavelength of 1550 nm, with an angular resolution of 0.3 degrees.

6341 - Q-switched Nd: YVO4 laser operating at 1064 nm with NiPS3 nanoflakes onto a silica metasurface as saturable absorbers

Presenter: Zheng Zhang, South University of Science and Technology, Harbin Institute of Technology

Abstract: In this work, we show that a metasurface can be used to improve the performance of

the two-dimensional (2D) material saturable absorber in a Nd:YVO4 solid-state laser. To ourknowledge, the hybrid saturable absorber was fabricated by spraying the NiPS3 nanoflakes onto a silica metasurface for the first time. It is shown that the optical absorption, modulation depth, saturation intensity, and ultrafast recovery time of the metasurface-NiPS3 saturable absorber exhibit better performance than the 2D material control device. In a proof-of-concept experiment,the Q-switched pulses with a pulse duration of 20.5 ns, repetition rate of 4.35 MHz, output power of 2.3 W, peak power of 30.61 W, and pulse energy of 0.63 μJ were experimentally demonstrated.These findings suggest that a hybrid saturable absorber is a promising candidate for developing pulsed laser and optical modulators.

7417 - Studies On The Performance of Monolithically Integrated Flip-chip GaN Devices

Presenter: Ling Zhu, Shenzhen University

Abstract: This paper investigates the factors influencing the sensing performance of a novel flip-chip GaN integrated optical chip. The chip features homogenously integrated light-emitting diodes (LED) and photodetectors (PD) fabricated on the same GaN epitaxial layer grown on a sapphire substrate. To explore the impact of device structure and epitaxial material on the optical sensing capabilities of GaN, two types of chips were designed, manufactured, and evaluated. Initially, four distinct device configurations with varying LED and PD placements were tested through experiments and simulations. It was observed that the PD exhibited the highest photocurrent when the micro-LED was positioned in the center. Subsequently, under the optimal structural conditions, a comparative analysis was conducted on the performance of nine chip variants with different wavelength epitaxial layers. These layers spanned the purple, blue, and green spectrums, with each color band containing three distinct wavelengths at 10 nm intervals. The evaluation revealed that the purple light at 395 nm demonstrated the best sensing performance. This study offers fresh insights for further exploration of flip-chip GaN integrated optical chips.

7428 - High-Efficiency Si3N4 Grating Coupler for Visible Photonics Integrated Circuits

Presenter: Leihao Sun, Fudan University

Abstract: In this work, we design an efficient Si3N4 grating coupler for visible photonics integrated circuits (PICs). The grating coupler can maintain coupling efficiency above -5 dB in the 446-454 nm range, with a peak coupling efficiency of -3.5 dB at 450nm.

7540 - Strip-shaped GaN Optochip for Accurate Inclination Angle Monitoring

Presenter: Ganyuan Deng , Shenzhen University

Abstract: This article introduces a compact, high-precision tilt sensor utilizing GaN micro-optical chips. The sensor integrates a light emitter and detector on a single sapphire

substrate, encapsulated in a mineral oil-filled acrylic housing. With dimensions of 50 mm × 10 mm × 10 mm, it exhibits linear response to ±5° tilt in the X-axis (R^2 = 0.999), sensitivity of 9.21μA/°, and 0.01° resolution. Rapid response and recovery

times of 77.8 ms and 155.6 ms further enhance its performance. Coupled with a custom back-end circuit system, this sensor offers a reliable, portable solution for high-precision angle measurements.

7822 - Research on underwater optical fiber perimeter security intrusion location method with weighted correlation of phase derivative signal

Presenter: Jiabei Wang, Naval University of Engineering

Abstract: Underwater optical fiber perimeter security technology is of great significance for underwater defense early warning of islands and reefs. In this paper, the perimeter security system of dual Mach-Zehnder underwater fiber interferometer is established. The disturbance intrusion is applied by propeller, and the phase signal generated by intrusion is located by HB weighted generalized algorithm. The experimental results show that the phase derivative signal is obtained first during demodulation, and then integrated to obtain the phase signal. In the process of integration, the influence of low-frequency phase drift brought by environmental factors is further expanded, which reduces the positioning accuracy. Considering that the phase derivative signal before integration also contains phase information, and includes the derivative form of low-frequency phase drift, its frequency is very small. Therefore, the generalized cross-correlation calculation of phase proportional derivative signal is carried out, and the average positioning error obtained by multiple experiments is -13.66m. The research results are of great significance to the development of underwater fiber perimeter security.

7843 - Gain equalization characteristics of 3-LP mode ring-core erbium-doped fiber

Presenter: Renli Xiong, Shanghai University

Abstract: A ring-core erbium-doped fiber (RC-EDF) with low differential modal gain (DMG) was fabricated by the Modified Chemical Vapor Deposition (MCVD). Based on the RC-EDF, the amplifier is constructed experimentally. The averaged modal gain of LP01, LP11, and LP21 modes is 19.15 dB and the DMG is 0.99 dB. The low DMG RC-EDF has broad application prospect in large capacity fiber communication system.

8417 - An optimized iterative method for generating holographic mask of large space-bandwidth-product

Presenter: Angyi Lin, Southern University of Science and Technology

Abstract: The algorithm for holograms mask design plays a crucial role in determining the final quality of the reconstructed pattern in diffraction lithography or its feasibility for fabricating large-scale integrated circuits. This paper presents an approach for generating holograms masks of large space-bandwidth products (SBP), effectively reducing the computation complexity and memory requirements without necessitating additional computer power. By leveraging the GS algorithm and incorporating area division and an overlapping constraint, this method facilitates the generation of masks of large SBP, which is beneficial for use in diffraction lithography. Moreover, it can be optimized for parallel operations to reduce computation time significantly, enabling efficient generalization of diffraction masks of large SBP.

8495 - Electrophoretic Deposition of PbS QDs for SWIR Photodetectors

Presenter: Haodong Tang, Shenzhen Technology University

Abstract: PbS QDs have potential for expanding of photodetectors on short-wave infrared market. An electrophoretic technique is demonstrated that improves PbS QD film morphology. The electrophoretic prepared photoconductor achieved a high responsivity than the traditional method, highlighting the potential of the electrophoretic method for next-generation near-infrared photodetectors.

8658 - Two-way Quantum Clock Synchronization Using Non-degenerate Quantum Correlated Photon Pairs

Presenter: Jin Guo, University of Electronic Science and Technology of China

Abstract: We demonstrate a quantum clock synchronization through 20-km long fiber link with non-degenerate correlated photon pairs generated in a piece of PPLN waveguide. With a common reference clock, a synchronization stability of 0.28 ps at 1000 seconds has been achieved in the experiment.

8838 - Efficient SWIR PbS QD Photodetector Based on A Hot Spin-coating Method

Presenter: Lei Rao, Shenzhen Technology University

Abstract: PbS quantum dots are promising materials for photodetectors due to their tunable bandgap and broad absorption spectrum. Traditional fabrication methods often result in film inhomogeneity due to uneven solvent evaporation. We introduce a hot spin-coating method that heats the substrate during the spin-coating process, accelerating solvent evaporation and improving film quality. Photoconductors prepared using this method show superior performance compared to those made with conventional techniques.

9535 - Low-loss silicon arrayed waveguide grating using dual-etched waveguide aperture

Presenter: Xudong Du, Zhejiang University

Abstract: We design and experimentally demonstrate a low-loss 4-channel SOI horseshoe-shaped AWG, with a channel spacing of 400 GHz, based on dual-etched waveguide apertures. The minimum insertion loss and the crosstalk are 2.26 dB and -17.39 dB, respectively.

1000 - Synchrosqueezed transform-based wavelength calibration in coherent detection

Presenter: Hong Dang, Southern University of Science and Technology

Abstract: With the development of laser tuning technology, the time-frequency domain interference evolution between the local oscillating light and the light under test in a coherent detection system can be rich and contain more information. The prerequisite for accurately understanding this information is knowing the tuning curve of the local oscillating light. However, the time resolution and frequency resolution are constrained to each other due to the principle of immeasurability for linear time-frequency analyses. Based on a mathematical model of the coherent detection process, we found that the time-frequency profile of local oscillating light can be compressed using Synchrosqueezed transform, thus increasing the calibration resolution.

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