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About OGC 2023

The big leaps in optoelectronic technology and academia have drawn increasing attention from the industry community which is always in searching of innovative solutions. Optoelectronics Global Conference (OGC) was created to pave the way to connecting optoelectronic academia and industry as well as connecting China and the rest of the world.

The 8th Optoelectronics Global Conference (OGC 2023) will be held in Shenzhen, China, from September 5 to 8, 2023, which will be held concurrently with the 24th China International Optoelectronic Exposition (CIOE). OGC 2023 is sponsored by IEEE Photonics Society Guangdong Chapter, hosted by Department of Electrical and Electronic Engineering, Southern University of Science and Technology, co-hosted by Nanjing University of Science and Technology.

The conference aims to promote interaction and exchange of various disciplines among professionals in academia and industry at home and abroad. In addition, it also serves to turn technologies into industrial applications.

OGC will be an ideal platform for scholars, researchers and professionals to exchange insights and discuss the development of the optoelectronics industry. It will be a perfect gathering to learn about new perspectives, technologies and trends which might push the boundaries of the technology and eventually creates a broader future for optoelectronics applications.

10 symposia are being arranged in the conference with the topics covering precision optics, optical communications, lasers, infrared applications, and fiber sensors. Welcome the professionals, experts, managements and students from the universities, research institutions, military enterprises, and optoelectronic companies to attend the conference.

Symposia

- Laser Technology
- Optical Communication and Networks
- Near-infrared, Mid-infrared and Far-infrared Technologies and Applications
- Quantum Optics and Information
- Fiber-Based Technologies and Applications
- Optoelectronic Devices and Applications
- Biophotonics and Optical Biomedicine
- Data Center Optical Interconnects and Networks
- Silicon Photonics
- Computational Imaging

Special Sessions

- Emerging Technologies for Wide Bandgap Semiconductors and Information Displays
- Topological Photonics
- Terahertz Wave Technologies and Applications
- Liquid Crystal Photonics

Workshops

- Optical Fiber Upgrade
- Optoelectronics Sustainable Development
- Metaphotonics and Planar Optics

Conference Committee

Honorary Chairs

Qikun Xue	Southern University of Science and Technology, China
Xiancheng Yang	Chairman of China International Optoelectronic Exposition Organizing Committee Office, China

General Chairs

Perry Shum	Southern University of Science and Technology, China
John Dudley	Université de Franche-Comté, France
Qihuang Gong	Peking University, China
Chennupati Jagadish	Past President, IEEE Photonics Society, USA
David Neil Payne	University of Southampton, UK

Program Chairs

Zhenggang Lian	Yangtz Optical Electronics Co. Ltd., China
Sze Y. Set	The University of Tokyo, Japan
Anna Peacock	University of Southampton, UK
Ken Oh	Yonsei University, South Korea
George Humbert	CNRS, France
Neil Broderick	Auckland University, New Zealand
Xiang Zhou	Google, USA

Local Organizing Committee Chairs

Huanhuan Liu	Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, China
Hai Yuan	Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, China
Zhaohui Li	Sun Yat-Sen University, China
Yunxu Sun	Harbin Institute of Technology, Shenzhen, China
Songnian Fu	Guangdong University of Technology, China
Changrui Liao	Shenzhen University, China

Publication Chairs

Yiyang Luo	Chongqing University, China
Yating Wan	King Abdullah University of Science and Technology, Kingdom of Saudi Arabia
Lisong Yan	Huazhong University of Science and Technology, China

Sponsorship Chairs

Zhengji Xu	Sun Yat-sen University, China
Tianxun Gong	University of Electronic Science and Technology of China, China
Lei Han	Inner Mongolia Agricultural University, China

Special Session Chair

Tianye Huang	China University of Geosciences (Wuhan), China

Workshop Chair

Dongmei Huang	The Hong Kong Polytechnic University, China

Publicity Chairs

Nan Zhang	JPT, China
Howard Lee	University of California, Irvine, USA
Chao Wang	University of Kent, UK
Shuyan Zhang	Institute of Bioengineering and Bioimaging, Singapore

Treasurer

Gina, Jinna Chen	Southern University of Science and Technology, China

International Advisory Committee

Songhao Liu	South China Normal University, China
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Shuisheng Jian	Beijing Jiaotong University, China
Dianyuan Fan	Shenzhen University, China
Lijun Wang	Changchun Institute of Optics and Fine Mechanics and Physics, Chinese Academy of Sciences, China
Wenqing Liu	Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, China
Shaohua Yu	China Information Communication Technologies Group Corporation, China
Ying Gu	The General Hospital of the People's Liberation Army, China

Symposia Chairs

S1. Laser Technology

Dingyuan Tang	Shenzhen Technology University, China
Guoqiang Xie	Shanghai Jiao Tong University, China
Rich Mildren	Macquarie University, Australia
Chen Yung-Fu	National Yang Ming Chiao Tung University, China

S2. Optical Communication and Networks

Lei Deng	Huazhong University of Science and Technology, China
Xiaodan Pang	KTH Royal Institute of Technology, Sweden
Junwen Zhang	Fudan University, China
Jianping Li	Guangdong University of Technology, China
Qi Yang	Huazhong University of Science and Technology, China
Xijia Zheng	Google LLC, Sunnyvale, CA, USA

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

Longqing Cong	Southern University of Science and Technology, China
Guixin Li	Southern University of Science and Technology, China
Guoxing Zheng	Wuhan University, China
Yuanmu Yang	Tsinghua University, China
Benfeng Bai	Tsinghua University, China

S4. Quantum Optics and Information

Ming Ding	Beihang University, China
Qiang Zhou	University of Electronic Science and Technology of China, China
Yong-Chun Liu	Tsinghua University, China
Xuejian Wu	Rutgers University-Newark, USA

S5. Fiber-Based Technologies and Applications

Xia Yu	Beihang University, China
Yuwen Qin	Guangdong University of Technology, China
Lei Wei	Nanyang Technological University, Singapore
Youngjoo Chung	Gwangju Institute of Science and Technology, South Korea

S6. Optoelectronic Devices and Applications

Ke Xu	Harbin Institute of Technology, Shenzhen, China
Hongwei Chen	Tsanghua University, China
Yu Yu	Huazhong University of Science and Technology, China
Chao Xiang	University of Hong Kong, China

S7. Biophotonics and Optical Biomedicine

Gina, Jinna Chen	Southern University of Science and Technology, China
Linbo Liu	Nanyang Technological University, Singapore
Junle Qu	Shenzhen University, China
Haoyun Wei	Tsinghua University, China
Guanghui Wang	Nanjing University，China

S8. Data Center Optical Interconnects and Networks

Qunbi Zhuge	Shanghai Jiao Tong University, China
Yongli Zhao	University of Posts and Telecommunications, China
Jianqiang Li	Kuaishou Technology, China
Minggang Chen	Tencent, China
Xian Zhou	University of Science and Technology Beijing, China

S9. Silicon Photonics

Mingbin Yu	Shanghai Institute of Microsystem and Information Technology, China
Zeng Li	Huawei Technologies CO.，LTD., China
Xiao Xi	National Information Optoelectronics Innovation Center, CICT, China
Di Liang	Hewlett Packard Labs, USA

S10. Computational Imaging

Fucai Zhang	Southern University of Science and Technology, China
Chao Zuo	Nanjing University of Science and Technology, China
Liangcai Cao	Tsinghua University, China

Special Sessions Chairs

T1. Emerging Technologies for Wide Bandgap Semiconductors and Information Displays

Samuelson Lars	SUSTech, China / Lund Univ, Sweden
Weitao Song	Beijing Institute of Technology, China
Yifan Peng	Hong Kong University, China
Pai Liu	Southern University of Science and Technology, China

T2. Topological Photonics

Zhen Gao	Southern University of Science and Technology, China
Yihao Yang	Zhejiang University, China
Xiaodong Chen	Sun Yat-sen University, China
Zhen Gao	Southern University of Science and Technology, China

T3. Terahertz Wave Technologies and Applications

Zhen Tian	Tianjin University, China
Shengjiang Chang	Nankai University, China
Chunmei Ouyang	Tianjin University, China
Chongzhao Wu	Shanghai Jiao Tong University, China

T4. Liquid Crystal Photonics

Dan Luo	Southern University of Science and Technology, China
Lujian Chen	Xiamen University, China
Yanjun Liu	Southern University of Science and Technology, China
Wei Hu	Nanjing University, China
Zhigang Zheng	East China University of Science and Technology, China

Workshops Chairs

W1. Optical Fiber Upgrade

Zhenggang Lian	Yangtze Optical Electronics Co., China
Xian Feng	Jiangsu Normal University, China
Meisong Liao	Shanghai Institute of Optics and Fine Mechanics, CAS, China
Chong Hou	Huazhong University of Science and Technology, China

W2. Optoelectronics Sustainable Development

Xiaohui Wei	Huizhou University, China
Perry Shum	Southern University of Science and Technology, China
Dan Luo	Southern University of Science and Technology, China

W3. Metaphotonics and Planar Optics

Liangcai Cao	Tsinghua University, China
Guixin Li	Southern University of Science and Technology, China

Special Events Chairs

C1. Optoelectronics Innovation Challenge

Qizhen Sun	Huazhong University of Science and Technology, China
Lei Wei	Nanyang Technological University, Singapore
Jiajia Chen	Chalmers University of Technology, Sweden
Fei Luo	FLT Inc. USA
Xin Gong	FemtoFiberTec GmbH, Germany

Invited Speakers

(Ranking is not in any particular order/排名不分先后)

S1. Laser Technology

Bowen Liu
The University of Tokyo, Japan

Chunyu Guo
Shenzhen University, China

Dongmei Huang
The Hong Kong Polytechnic University, China

Hongyan Fu
Tsinghua University, China

Junqing Zhao
Shenzhen Technology University, China

Mohammed Zahed Mustafa
King Abdullah University of Science and Technology, Saudi Arabia

Qian Li
Peking University Shenzhen Graduate School, China

Xiaosheng Xiao
Beijing University of Posts and Telecommunications, China

Yudong Cui
Zhejiang University, China

S2. Optical Communication and Networks

Chen Chen
Chongqing University, China

Ehab Awad
King Saud University, Saudi Arabia

Kangping Zhong
The Hong Kong Polytechnic University, China

Oskars Ozoliņš
Riga Technical University, Sweden

Shaohua Hu
University of Electronic Science and Technology of China, China

Xiaosong Yu
Beijing University of Posts and Telecommunications, China

Xueyang Li
Peng Cheng Laboratory, China

Yixiao Zhu
Shanghai Jiao Tong University, China

Yongli Zhao
Beijing University of Posts and Telecommunications, China

Zhi Liu
Changchun University of Science and Technology, China

Tao Yang
Beijing University of Posts and Telecommunications, China

Zuqing Zhu
University of Science and Technology of China, China

Yang Yue
Nankai University, China

Xun Guan
Tsinghua Shenzhen International Graduate School, China

Jinlong Wei
Peng Cheng Laboratory, China

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

Baile Chen
ShanghaiTech University, China

Can Huang
Harbin Institute of Technology, Shenzhen, China

Chuantao Zheng
Jilin University, China

Song Han
Zhejiang University, China

Yuanmu Yang
Tsinghua University, China

Yumeng Yang
ShanghaiTech University, China

Lei Wang
Jilin University, China

Cheng Wang
ShanghaiTech University

S4. Quantum Optics and Information

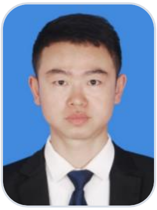
Jin Wang
Innovation Academy for Precision Measurement Science and Technology, CAS, China

Feng Li
Xi'an Jiaotong University, China

Yong-Chun Liu
Tsinghua University, China

Yongmin Li
Shanxi University, China

S5. Fiber-Based Technologies and Applications



Boyao Li
Dongguan University of Technology, China

Changyuan Yu
The Hong Kong Polytechnic University, China

Huanhuan Liu
Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, China

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

Shiying Xiao
Beijing Jiaotong University, China

Yunqi Liu
Shanghai University, China

Huizi Li
Shanghai Institute of Microsystem and Information Technology, China

Yanhua Luo
Shanghai University, China

Ting Mei
Northwestern Polytechnical University, China

Jianzhong Zhang
Harbin Engineering University, China

Zhengyong Liu
Sun Yat-sen University, China

S6. Optoelectronic Devices and Applications

Changzheng Sun
Tsinghua University, China

Jianan Duan
Harbin Institute of Technology (Shenzhen), China

Jiu-an Lv
Westlake University, China

Mengyuan Ye
China University of Geosciences, China

Qiancheng Zhao
Southern University of Science and Technology, China

Ruijun Wang
Sun Yat-sen University, China

Dan Wu
Shenzhen Technology University, China

Wenjun Ni
South-Central University for Nationalities, China

Xiaolong Chen
Southern University of Science and Technology, China

Yingjie Liu
Yanshan University, China

Yu Zhou
Harbin Insitute of Technology (Shenzhen), China

Liangcai Cao
Tsinghua University, China

Yating Wan
King Abdullah University of Science and Technology, Kingdom of Saudi Arabia

Zhaoyu Zhang
The Chinese University of Hong Kong, Shenzhen, China

S7. Biophotonics and Optical Biomedicine

Anhui Liang
Shandong University of Science and Technology, China

Haoyun Wei
Tsinghua University, China

Quan Liu
Nanyang Technological University, Singapore

Xiaojun Yu
Northwestern Polytechnical university, China

Yuemei Luo
Nanjing University of Information Science and Technology, China

Yi Li
Southern University of Science and Technology, China

Yuchao Li
Jinan University, China

S8. Data Center Optical Interconnects and Networks

Lijing Zhu
Xidian University, China

Yongcheng Li
Soochow University, China

S9. Silicon Photonics

Jianji Dong
Huazhong University of Science and Technology, China

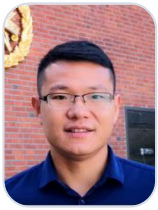
Li Shen
Huazhong University of Science and Technology, China

Xiaochuan Xu
Harbin Institute of Technology, Shenzhen, China

Ching Eng Png
Agency for Science Technology and Research, Singapore

Yu He
Shanghai Jiao Tong University, China

Zejie Yu
Zhejiang University, China



Ping Zhao
Chalmers University of Technology, Sweden

Jindong Wang
Chongqing University, China

S10. Computational Imaging

Jindong Tian
Shenzhen University, China

Ping Su
Tsinghua University, China

Qilin Sun
The Chinese University of Hong Kong, Shenzhen, China

T2. Topological Photonics

Biao Yang
National University of Defense Technology, Singapore

Cuicui Lu
Beijing Institute of Technology, China

Jiawei Wang
Harbin Institute of Technology Shenzhen, China

Yihao Yang
Zhejiang University, China

Xudong Liu
Shenzhen University, China

Wenjie Chen
Sun Yat-sen University, China

Ruo-Yang Zhang
Hong Kong University of Science and Technology, China

Biye Xie
The Chinese University of Hong Kong, China

Zhen Gao
Southern University of Science and Technology, China

Yongquan Zeng
Wuhan University, China

T3. Terahertz Wave Technologies and Applications

Shuting Fan
Shenzhen University, China

Xueqian Zhang
Tianjin University, China

W1. Optical Fiber Upgrade

Meisong Liao
Shanghai Institute of Optics and Fine Mechanics, China

Tonglei Cheng
Northeastern University, China

Chaotan Sima
Huazhong University of Science and Technology, China

Wang Du
Wuhan University, China

Yibo Wang
Wuhan Changjin Photonics Technology Co., LTD, China

Shun Wu
Wuhan Institute of Technology, China

Fei Yu
Shanghai Institute of Optics and Fine Mechanics, CAS, China

W3. Metaphotonics and Planar Optics

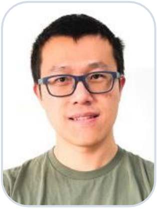
Connie Chang-Hasnain
Berxel Photonics Co., Ltd., China

Xianping Li
Jinan University, China

Qinghua Song
Tsinghua Shenzhen International Graduate School, China

Qinghai Song
Harbin Institute of Technology, Shenzhen, China

Dangyuan Lei
City University of Hong Kong, China



Yi Yang
University of Hong Kong, China

Jianwen Dong
Sun Yat-sen University, China

Conference Venue

Shenzhen World Exhibition & Convention Center | 深圳国际会展中心

Venue Address

No.1 Zhancheng Road, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

广东省深圳市宝安区福海街道展城路 1 号

Transportation

01 Airport

- **Shenzhen Airport/深圳宝安国际机场:** Take the Metro Line 11 to Airport North, then change to Line 20 to Shenzhen World Station(国展站).

02 Highspeed Train Station

- **Shenzhen North Station/深圳北站:** Shenzhen North Station: Take the metro Line 5 (Chiwan direction/赤湾方向) to Lingzhi Station(灵芝地铁站), then change to Line 12 to Shenzhen World Station (国展站).
- **Futian Station/福田站:** Take metro Line 11 (Bitou direction/碧头方向) to Airport North Station (机场北地铁站), then change to Line 20 to Shenzhen World Station (国展站).

03 Intercity Railway

- **Airport North Station/机场北站:** Take the intercity railway to Airport North Station, then change to metro Line 20 direct to Shenzhen World Station (国展站).

04 Bus

- **Qiaotou Zonghechang Station/桥头综合场站:** Take the City Bus B892 to Shenzhen World Station.
- **Fuyong Weisheng Jiandusuo Station/福永卫生监督所站:** Take the City Bus M515 to Shenzhen World Station.

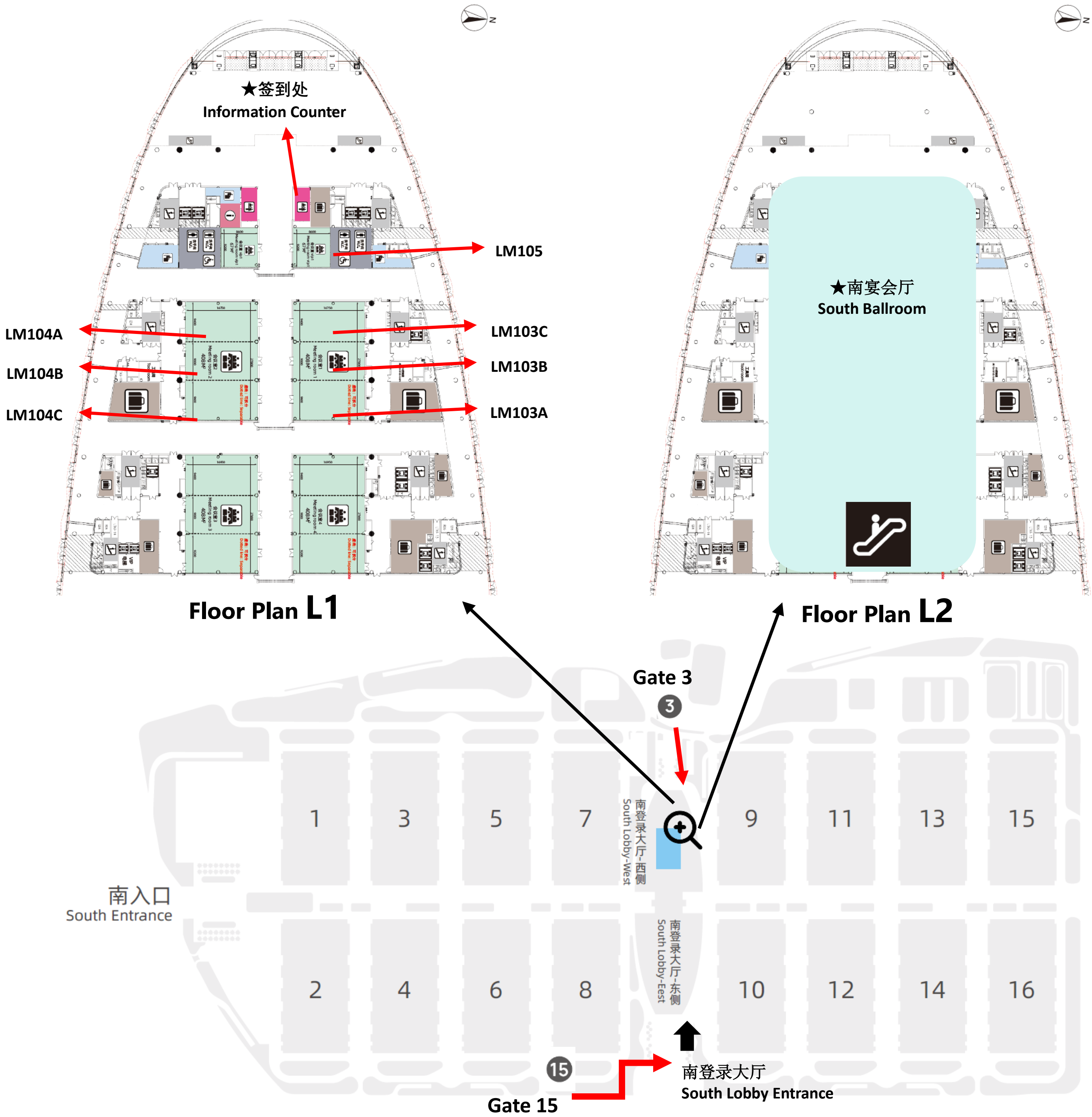
Scan the QR code to learn more about the traffic

可扫码获取更多关于交通和场馆信息

Scan the WeChat Mini App to learn more about the venue

可扫码深圳国际会展中心小程序了解更多功能

Floor Plan



Information Counter	**Outside LM105 @ 1F |** 南登录大厅一楼
Conference Rooms	**LM103A&B&C; LM104A&B&C; LM105 @ 1F |** 南登录大厅一楼
Opening Ceremony	**South Ballroom @ 2F |** 南登录大厅 2 楼南宴会厅
Lunch Restaurant	**1-12 Building, 3rd floor (dine-in) |** 1-12 号馆 3 楼餐饮区（堂食） **1-12 Building, 2nd floor (takeout area) |** 1-12 号馆 2 楼外带区

Guidelines

Oral Presentation

For Invited Speech

•The duration of a speech slot is 30 minutes. Please target your lecture for a duration of about 25 minutes for the presentation plus about 5 minutes for questions from the audience.

For Oral Presentation

- The duration of a presentation slot is 15 minutes. Please target your lecture for a duration of about 12 minutes for the presentation plus about 3 minutes for questions from the audience.
- A projector & computer will be available in every session room for regular presentations.
- We suggest you bring a backup PDF-version of your presentation.

Poster Presentation

- A0 size (1189mm x 841mm, height > width) in Portrait mode.
- We expect that at least one author stands by the poster for (most of the time of) the duration of the poster session, answering to the viewers who are interested in it.

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

- Delegates, speakers, exhibitors and staff are required to wear their name badge at all conference activities. Only registered representatives are allowed to enter the conference.

Conference Agenda Overview

Sept. 05, 2023 | Tuesday

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

Sept. 06, 2023 | Wednesday

Time	Activities *(Venue: South Ballroom | 2F)*
	Opening Ceremony
09:30-10:00	**CIOE Opening Ceremony** (In Mandarin)
10:00-10:15	**OGC Opening Speech: Perry Shum**, Southern University of Science and Technology
	Presiders: Aaron Ho, The Chinese University of Hong Kong & Huanhuan Liu, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences
	Plenary Speech
10:15-10:50	**Speaker: Zhong-can Ou-yang**, Institute of Theoretical Physics of the Chinese Academy of Sciences **Presider:** Kai Wang, Southern University of Science and Technology
10:50-11:25	**Speaker: Din Ping TSAI**, City University of Hong Kong **Presider:** Longqing Cong, Southern University of Science and Technology
11:25-12:00	**Speaker: Ping-kong Alexander Wai**, Hong Kong Baptist University **Presider:** Dongmei Huang, The Hong Kong Polytechnic University

Sept. 07, 2023 | Thursday

Time	Activities	Venue
09:00-10:30	**TS01:** Laser Technology-A	LM103-A
09:00-10:30	**TS02:** Optical Communication and Networks-A	LM103-B
09:00-10:15	**TS03:** Fiber-Based Technologies and Applications-A	LM103-C
09:00-10:30	**TS04:** Optoelectronic Devices and Applications-A	LM104-A
09:00-10:30	**TS05:** Biophotonics and Optical Biomedicine-A	LM104-B
09:00-10:15	**TS06:** Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-A	LM104-C
09:00-10:00	**TS07:** Quantum Optics and Information-A	LM105
	Coffee Break	
10:45-12:15	**TS08:** Laser Technology-B	LM103-A
10:45-12:00	**TS09:** Optical Communication and Networks-B	LM103-B
10:45-12:00	**TS10:** Fiber-Based Technologies and Applications-B	LM103-C
10:45-12:00	**TS11:** Optoelectronic Devices and Applications-B	LM104-A
10:45-12:15	**TS12:** Topological Photonics-A	LM104-B

10:45-12:15	**TS13:** Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-B	LM104-C
10:45-12:00	**TS14:** Quantum Optics and Information-B	LM105
	Lunch	
13:30-15:30	**TS15:** Laser Technology-C	LM103-A
13:30-15:30	**TS16:** Optical Communication and Networks-C	LM103-B
13:30-15:00	**TS17:** Fiber-Based Technologies and Applications-C	LM103-C
13:30-15:15	**TS18:** Optoelectronic Devices and Applications-C	LM104-A
13:30-15:30	**TS19:** Biophotonics and Optical Biomedicine-B	LM104-B
13:30-14:50	**W1-A:** Optical Fiber Upgrade-A	LM104-C
13:30-15:00	**W3-A:** Metaphotonics and Planar Optics-A	LM105
	Coffee Break	
16:00-17:15	**TS20:** Silicon Photonics-A	LM103-A
16:00-17:45	**TS21:** Optical Communication and Networks-D	LM103-B
16:00-17:45	**TS22:** Fiber-Based Technologies and Applications-D	LM103-C
16:00-17:15	**TS23:** Optoelectronic Devices and Applications-D	LM104-A
16:00-17:30	**TS24:** Computational Imaging	LM104-B
15:10-16:10	**W1-B:** Optical Fiber Upgrade-B	LM104-C
15:30-17:30	**W3-B:** Metaphotonics and Planar Optics-B	LM105
15:30-18:00	**Poster Session**	Lounge (1F)
	Banquet	

Sep. 08, 2023 | Friday		
09:00-10:15	**TS25:** Silicon Photonics-B	LM103-A
09:00-10:15	**TS26:** Fiber-Based Technologies and Applications-E	LM103-C
09:00-10:15	**TS27:** Optoelectronic Devices and Applications-E	LM104-A
09:00-10:30	**TS28:** Topological Photonics-B	LM104-B
09:00-10:30	**TS29:** Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-C	LM104-C
	Coffee Break	
10:45-12:15	**TS30:** Silicon Photonics-C	LM103-A
10:45-12:00	**TS31:** Optical Communication and Networks-F	LM103-B
10:45-12:00	**TS32:** Data Center Optical Interconnects and Networks & Emerging Technologies for Wide Bandgap Semiconductors and Information Displays	LM103-C
10:45-12:00	**TS33:** Optoelectronic Devices and Applications-F	LM104-A
10:45-12:45	**TS34:** Topological Photonics-C	LM104-B
10:45-12:00	**TS35:** Terahertz Wave Technologies and Applications	LM104-C

Plenary Speech

Presider: Kai Wang, Southern University of Science and Technology

Time 10:15-10:50 | September 6   **Venue** South Ballroom (2F)

Zhong-can Ou-yang

Institute of Theoretical Physics of the Chinese Academy of Sciences

Academician Ouyang graduated from the Department of Automatic Control at Tsinghua University in 1968 and was assigned to work at Lanzhou Chemical Company; In 1978, he was admitted to Tsinghua University as a graduate student and obtained master's and doctoral degrees successively; In 1985, he entered the Institute of Theoretical Physics of the Chinese Academy of Sciences to engage in post doctoral research after graduating from the doctoral program; In 1986, he won the Humboldt Scholarship in West Germany and went to Free University of Berlin for research; After returning to China in 1988, he worked in the Institute of Theoretical Physics of the Chinese Academy of Sciences; Promoted to Associate Researcher in 1989; Promoted to researcher in 1992; In 1997, he was elected as an academician of the CAS Member; From 1998 to 2007, he served as the director of the Institute of Theoretical Physics of the Chinese Academy of Sciences; Elected as an academician of the Academy of Sciences for Developing Countries in 2003; Appointed as the Dean of the School of Physics at the University of Science and Technology of China from 2009 to 2020; In 2020, he was employed as the director of the Department of Physics of University of Science and Technology of China. Academician Ouyang is the chief expert of Jihua Laboratory and a leader in the field of new displays.

Speech Title

Global Development Trends and Suggestions for New Display Technologies

Abstract: As an important port for information exchange, the new display industry has developed into the foundation of strategic high-tech and the most dynamic electronic information industry. New display technologies continue to iterate and upgrade, and innovative display technologies such as flexible display, transparent display, laser display, Micro LED display, and light field display are in a competitive situation with different application scenarios. This speech will introduce various major display technologies and the development trend of this technology between China and other major developed countries, thereby proving that new display technologies have become an important part of national competition. In addition, we will also discuss the main challenges of China's new display technology and how to solve the problems of "large but not strong" and "bottleneck".

Plenary Speech

Presider: Longqing Cong, Southern University of Science and Technology

Time 10:50-11:25 | September 6 **Venue** South Ballroom (2F)

Din Ping TSAI

City University of Hong Kong

Din Ping Tsai is currently Chair Professor of the Department of Electrical Engineering, City University of Hong Kong. He is an elected Fellow of AAAS, APAM, APS, AAIA, COS, EMA, IAE, IEEE, JSAP, NAI, OSA, SPIE, and TPS, respectively. He is the author and co-author of 362 SCI papers. He was granted 69 patents in the USA (19), Japan (3), Canada (3), Germany (2), etc., for 45 innovations. Twenty of his patents have been licensed to 5 different companies. He was invited as an invited speaker for international conferences or symposiums more than 340 times (26 Plenary Talks, 62 Keynote Talks). He received more than 40 prestigious recognitions and awards, including "Global Highly Cited Researchers," Web of Science Group (Clarivate Analytics) in 2020 and 2019, respectively; China's Top 10 Optical Breakthroughs in 2020 and 2018, respectively; "Mozi Award" from International Society for Optics and Photonics (SPIE) (2018); etc.

Speech Title

Meta-Devices: From Sensing and Imaging to Quantum Optical Chip

Abstract: Meta-devices using meta-surfaces composed of artificial nanostructures can manipulate the electromagnetic phase, polarization, and amplitude at will. The fundamental principle, design, fabrication, and applications of the novel optical meta-devices are reported in this talk. Meta-lens have been considered as the top 10 emerging technologies in World Economic Forum recently. Design principles and application prospects of meta-lens will be addressed from classical to quantum optics. The prospects of the demanded meta-devices for metaverse will be discussed as well.

Plenary Speech

Presider: Dongmei Huang, The Hong Kong Polytechnic University

Time 11:25-12:00 | September 6 **Venue** South Ballroom (2F)

Ping-kong Alexander Wai

Hong Kong Baptist University

Professor Ping-kong Alexander Wai is the President and Vice-Chancellor of Hong Kong Baptist University. Professor Wai received the Bachelor of Science (Hons) degree from the University of Hong Kong, and his Master and PhD degree from the University of Maryland, College Park. His research interests include theory of solitons, nonlinear optics, fiber lasers, simulations of integrated optical devices, fiber optic communications, and network theory. Prof. Wai is an active contributor to the technical field, having over 500 international publications. He participated in the organization, served as invited speakers, and keynote speakers in many international conferences. With the approval of the State Ministry of Science and Technology, he is also listed as one of the experts in the National Science and Technology Programme Expert Database. He has been elected as Fellow of the Optical Society of America (OSA), Fellow of the Institute of Electrical and Electronic Engineers (IEEE) and Fellow of Hong Kong Academy of Engineering Sciences (HKAES).

Speech Title

Swept Lasers and the Applications

Abstract: Swept lasers with their wide output spectrum, a narrow instantaneous linewidth and deterministically varying carrier wavelengths, have wide applications including optical coherence tomography, optical sensing, LiDAR, and laser metrology. The fundamental principle, key technology, and the applications of a variety of swept lasers including conventional short cavity swept laser, MEMS-VCSEL, Fourier domain mode locked (FDML) laser and time stretched swept laser will be reported in this talk. The main challenges and prospects of the swept lasers will be discussed as well.

Workshop 1

W1-Optical Fiber Upgrade-A	
Date: September, 7	**Venue:** LM104-C
Presider: Zhenggang Lian, Yangtze Optical Electronics Co.	

13:30-13:50	Invited Speech

Speaker: Meisong Liao
Affiliation: Shanghai Institute of Optics and Fine Mechanics
Title: Regulation of Nonlinear Optical Properties of Specialty Optical Fibers and the Applications
Bio: Meisong Liao. Ph.D. Professor. Now he is the Director of High Power Laser Components Laboratory of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences. He has more than 270 publications in international journals or conferences. His research interests include photonic crystal fibers, energy transmission fibers, soft glass microstructure fibers, nonlinear optical fibers and components, mode-locked fiber lasers and supercontinuum lasers.
Abstract: Nonlinear characteristic is an important property of special fibers. In some specific occasions such as laser energy transmission, it is necessary to suppress the nonlinear effect of optical fiber. In other applications, such as the supercontinuum generation, the nonlinearity of optical fiber needs to be improved. We control the nonlinear effect of optical fiber from the composition and structure of optical fiber, and obtain special optical fibers with different nonlinear characteristics. Among them, the SBS threshold of the energy transmission fiber, which suppresses the nonlinear effect by tailoring the core component to control the sound field and light field distribution, is increased by about 8 times compared with ordinary optical fibers. In addition, the nonlinearity coefficient of photonic crystal fibers with small core diameter and high numerical aperture is more than an order of magnitude higher than that of ordinary single-mode fibers. Combining the high nonlinearity of this fiber with the appropriate dispersion characteristics, the supercontinuum spectra in various forms were demonstrated under pulsed laser pumping.

13:50-14:10	Invited Speech

Speaker: Tonglei Cheng
Affiliation: Northeastern University
Title: Microstructured Optical Fibers and Their Applications
Bio: Tonglei Cheng received the Ph.D. degree in optical engineering from Tianjin University, Tianjin, China, in 2010. Since 2011, he has been a JSPS Postdoctoral Fellow at the Toyota Technological Institute, Nagoya, Japan. In 2016, he became an assistant professor at the Toyota Technological Institute. And in 2017, he joined Northeastern University as a Full Professor. His research interests include optical fiber sensors, nonlinear optics, optical fibers, and soft glasses, etc.
Abstract: Microstructured optical fibers were fabricated by the rod-in- tube drawing technique. A high-sensitivity temperature sensor was fabricated based on a tellurite MOF sandwiched between two standard silica single mode fibers to form a single mode-multimode-single mode fiber structure. An optical fiber curvature sensor was proposed based on dual-core MOF that was spliced between single mode fiber.

14:10-14:30	Invited Speech
Speaker: Chaotan Sima	

Affiliation: Huazhong University of Science and Technology
Title: Advanced Photoacoustic Gas Sensing and Applications
Bio: Dr. Chaotan Sima is an Associate Professor and Ph.D. supervisor in School of Optical and Electronic Information at Huazhong University of Science and Technology (HUST), China. In 2006, he graduated from HUST with the bachelor degree. In 2013, He obtained the Ph.D. degree in optoelectronics at the ORC in the University of Southampton, UK. After the temporal industry experience, he joined HUST in 2014, and received the Marie-Curie Fellowship in 2019. His research interests include photoacoustic sensing, advanced optical gas sensing, planar integrated devices and special optical fiber. He has authored over 50 technique publications, 10 pantents and been the PI for over 10 grants including projects from NSFC and National Key R&D Project. He serves as an editorial member of Optical and Quantum Electronics and guest editor of Photonics. He is a senior member of IEEE, member of Optica and CSOE, and a frequent reviewer of technical journals such as PR, TMTT, JLT OE and OL etc., as well as TPC members of several international conferences including CLEO and POEM.
Abstract: This talk will introduce and discuss recent achievements of optical gas sensing and applicaitons based on photoacoustic spectroscopy.

14:30-14:50	**Invited Speech**

Speaker: Wang Du
Affiliation: Wuhan University
Title: Ultrafast Imaging and Quantitative Measurement Based on Optical Time-Stretch Femtosecond Laser Pulses
Bio: Prof. Wang Du started his carrier as a Research Associate at Research Center of Laser Fusion of CAEP. He obtained the Degree of Dr.-Eng from Huazhong University of Science and Technology in 2013. His research area is lasers and their applications, including high power CO2 lasers, terahertz lasers, laser processing and ultrafast imaging based on femtosecond lasers. His research achievements have won a number of scientific and technological progress awards.
Abstract: Time-resolved ultrafast optical imaging is crucial for understanding light-matter interactions. Based on the dispersion Fourier transform of optical fibers and mapping measured targets' dynamics onto femtosecond laser pulses, we capture phenomena spanning femtoseconds to milliseconds, such as heating, plasma formation, and shockwaves. Our methods include Time-Series All Optical Mapping Photography (STAMP) for ultrafast single-shot imaging and Single Pixel Time-Domain Stretching (OTS) for continuous nanosecond-level photography. These technologies offer high spatial resolution, dual-mode operation, and applicability in various fields like inertial confinement fusion and laser material processing.

W1-Optical Fiber Upgrade-B

Date: September, 7	**Venue:** LM104-C
Presider: Honggu Jiang, NewPion Photonics	

15:10-15:30	**Invited Speech**

Speaker: Yibo Wang
Affiliation: Wuhan Changjin Photonics Technology Co., LTD
Title: The Latest Product Development Results of Changjin Photonics
Bio: In 2011, I graduated from Shandong University, majoring in Electronic Science and Technology. In 2016, I graduated from Huazhong University of Science and Technology, majoring in optical Engineering. From 2016 to 2018, I did postdoctoral work in Huazhong University of Science and Technology. In 2018, I joined Wuhan Changjin Laser

Technology Co., LTD.

Abstract: Wuhan Changjin Photonics Technology Co., Ltd. is a high-tech enterprise focusing on the design, manufacturing and application of special optical fiber. The company has a united, dedicated and enterprising team of talents, who master all the core technology from preform fabrication, drawing to fiber test, and have the mass production capacity of special optical fiber with high quality and lot-to-lot consistency. In addition, 12 doctors and 4 masters form the base of scientific research group, focusing on the international frontier in this field, and continuously improving the company's technical strength. This report will introduce the latest product development results of Changjin Photonics.

15:30-15:50	**Invited Speech**

Speaker: Shun Wu

Affiliation: Wuhan Institute of Technology

Title: Fiber-based Optical Frequency Comb Stabilized to a Gas-filled Hollow-core Fiber

Bio: Shun Wu received her Bachelor's degree in physics from Beijing Normal University and a Ph.D. in Physics from Kansas State University (KSU) in 2014. At KSU, she worked in the James R. Macdonald - atomic, molecular and optical physics laboratory and studied on developing optical frequency reference based on portable optical fiber frequency comb. After graduation, she was a joint post-doctoral researcher in Prof. Dan Stamper Kurn's group at the University of California, Berkley. She joined Wuhan Institute of Technology in Dec. 2017 to work as a full-time faculty. Her work at Wuhan Institute of Technology focuses on using the Nobel-Prize-Winning technology of optical frequency combs to study light-matter interactions in Doppler-free atomic/molecular systems, comb related spectroscopy and fiber sensing.

Abstract: Portable optically referenced combs demonstrate superior short-term instability that surpass the conventional RF reference - Global Positioning System (GPS), and thus have many potential on-site industrial and military applications in precision measurement. We investigate an all-fiber compact Erbium-doped optical frequency comb based on optical reference. Comb stabilization is achieved by simultaneously locking the repetition rate to an RF reference and an optical comb tooth to a molecular transition from a gas-filled hollow-core fiber. In particular, we investigate two different absorption transitions: P(16) overtone transition line of 13C2H2 and P(13) of 12C2H2. The comb was able to achieve a short-term fraction instability of 6.56 ×10−10 and 1.66 ×10−12 at 1 s gate time, respectively. Our approach of acetylene-stabilized fiber comb offers a feasible and compact solution to help fiber combs move from laboratory to outdoors applications based on fiber sensing, laser stabilization and spectrum analysis.

15:50-16:10	**Invited Speech**

Speaker: Fei Yu

Affiliation: Shanghai Institute of Optics and Fine Mechanics, CAS

Title: Update of Antiresonant Hollow-core Fiber for Laser Delivery

Bio: Fei Yu received the Ph.D. degree from the University of Bath, Bath, U.K., in 2014. He was a Postdoc Researcher with the University of Bath, until 2018. In 2018, he joined the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Shanghai, China, supported by CAS Pioneer Hundred Talents Program. He is currently a Full Professor. His research interests include optical fiber design and applications.

Abstract: We report the latest development of antiresonant hollow-core fiber for high-power and high-field laser delivery. Design, fabrication and characteriztation of low-loss multimode and large-core birefringent antiresonant hollow-core fibers are reported. The application of multimode antiresonant hollow-core fibers in the delivery of laser beam of medium grade beam quality is demonstrated.

Workshop 3

W3-Metaphotonics and Planar Optics-A	
Date: September, 7	**Venue:** LM105
Presider: Liangcai Cao, Tsinghua University	

13:30-14:00	Invited Speech

Speaker: Connie Chang-Hasnain
Affiliation: Berxel Photonics
Title: Recent Advances of VCSELs for Communications and Sensing
Bio: Connie Chang-Hasnain is the Chairperson of Berxel Photonics Co. Ltd. and Whinnery Chair Professor Emerita at the University of California Berkeley. She is member of the US National Academy of Engineering and National Academy of Inventors.
Dr. Chang-Hasnain was Associate Dean of College of Engineering (2014-2019), Chair of the Nanoscale Science and Engineering Graduate Group at UC Berkeley (2006-2017). She has been honored with many awards including the Okawa Prize (2018), UNESCO Medal For the Development of Nanoscience and Nanotechnologies (2015), IEEE David Sarnoff Award (2011), and the OSA Nick Holonyak Jr. Award (2007). She was the Editor-in-Chief of Journal of Lightwave Technology 2007-2012. She was the 2021 President of Optica (formerly OSA).
Abstract: Vertical cavity surface emitting lasers (VCSELs) are low-cost enabling laser sources for many applications including optical communications, 3D sensing and optical imaging. In this talk I will review Berxel's recent advances and commercialization of high-speed 106 Gbps PAM4 VCSELs for datacom applications and high efficiency VCSEL arrays for 3D sensing applications.
I will review recent results of high contrast grating (HCG) VCSELs. With a fixed, high selection ratio in polarization, we show a novel polarization structured light 3D sensor with high depth accuracy in scenes with multiple reflecting surfaces. We show that HCG VCSELs exhibit fewer modes, enabling 3~5 times transmission distance over OM3 multimode fibers for 106G PAM4 modulation signal. Finally, I will also discuss future prospects for advanced applications.

14:00-14:30	Invited Speech

Speaker: Xiangping Li
Affiliation: Jinan University
Title: Planar Optics: From Polarization Imaging to Polarized Light Source
Bio: Prof. Xiangping Li completed his PhD at Swinburne University of Technology in 2009. His research is focused on nano-optics, metasurface and optical data storage. Dr. Li has published over 120 internationally referred journal publications including Science, Nature Photonics, Nature Nanotechnology and Nature Communications. Dr. Li is a recipient of a number of prestigious awards including the Australian Postdoctoral Fellow funded by Australian Research Council in 2011, Swinburne's Vice Chancellor Award for early career researcher in 2012, Victoria Fellowship in 2013, Discovery Early Career Researcher Award by Australian Research Council in 2014, China's Young 1000 talents Award in 2015 and Distinguished Young Scholars from National Natural Science Foundation of China in 2015. He joined the Institute of Photonics Technology in Jinan University as a full professor and principle investigator in nanophotonic devices group in 2015.
Abstract: As a fundamental property of light, polarization plays an important role in light-matter interactions and

associated photonic applications. Planar metasurfaces composed of arrays of subwavelength artificial meta-atoms offer completely new paradigm for light field control in full freedom. In this talk, we will introduce the recent progress of multi-freedom light field control metasurface design, as well as using this principle for integrated polarization imaging and nanoscale highly-polarized light sources.

14:30-15:00	Invited Speech

Speaker: Qinghua Song
Affiliation: Tsinghua Shenzhen International Graduate School
Title: Topological Metasurfaces Based on Bound States in the Continuum and Exceptional Points
Bio: Qinghua Song is an Assistant Professor at Shenzhen International Graduate School, Tsinghua University, China. His past and present research has involved the development and application of novel artificial optical materials and devices, including optical metamaterials and metasurfaces, plasmonics, photonic crystals, and topological optics. He has published more than 20 papers, including Science, Science Advances, Light: Science & Applications, Nature Communications, etc.
Abstract: In this talk, we will present some recent progresses on the topological metasurfaces based on bound states in the continuum (BICs) and exceptional points (EP). Arbitrarily polarized BIC can be obtained by breaking σ z-symmetry of the PhCS. It exhibits elliptical polarization states with constant ellipticity angle at every point in momentum space within the vicinity of BIC. We show that the topological features are also observed in optical forces within the vicinity of BIC, around which the force vectors wind in the momentum space. Furthermore, we introduce an additional degree of freedom to address optical phase engineering by exploiting the topological features of non-Hermitian matrices operating near their singular points. Choosing metasurface building blocks to encircle a singularity following an arbitrarily closed trajectory in parameter space, we engineered a topologically protected full 2pi-phase on a specific reflected polarization channel. Our findings may open up new avenues for applications in structured light, quantum optics and twistronics for photons.

W3-Metaphotonics and Planar Optics-B

Date: September, 7	**Venue:** LM105
Presider: Guixin Li, Southern University of Science and Technology	

15:30-16:00	Invited Speech

Speaker: Qinghai Song
Affiliation: Harbin Institute of Technology, Shenzhen
Title: Mode Control in Micro- & Nano-cavities
Bio: Qinghai Song joined the faculty at Harbin Institute of Technology, Shenzhen in 2012. He is the director of Guangdong Provincial Key Laboratory of Semiconductor Optoelectronic Materials and Intelligent Photonic Systems. His research interests include fabrication, characterization and fundamental understanding of advanced nano/micro photonic devices with outstanding performances or unprecedented ability in mode control. Over the past five years, Qinghai Song has authored more than 100 papers on high profile journals including 3 papers on Science.
Abstract: Chiral quasi-BIC is an emerging topic for the micro- and nano-systems. In this talk, we will present our recent progress on chiral emission and chiral splitting. These results should be essential for optical and quantum information processing, as well as chiral detection.

16:00-16:30	Invited Speech

Speaker: Dangyuan Lei

Affiliation: City University of Hong Kong

Title: Probing Spin-forbidden Dark Excitons with Plasmonic Approaches

Bio: Dangyuan LEI received his PhD degree in Physics from Imperial College London, UK. He is Professor of Materials Science and Engineering at the City University of Hong Kong and Provost’s Visiting Professor of Physics at Imperial College London. His research interest centers on plasmonics nanophotonics and low-dimensional quantum materials, with particular interest in the nanoscale cavity-matter interaction and applications in miniaturized photonic and optoelectronic devices for on-chip optical sensing and imaging, quantum information processing and encryption as well as energy harvesting, conversion, storage and saving. He has co-authored 210 publications, received 11000 citations and an h-index of 60 (Google Scholar as of August 2023), and given 6 keynote speeches and >100 invited talks. His major publications include 8 Nature Communications, 2 Science Advances, 5 NPG Light: Science & Applications, 4 Physical Review Letters, 25 Nano Letters and ACS Nano, and 25 Advanced (Functional/Energy/Optical) Materials etc. He is an elected member of Hong Kong Young Academy of Sciences, an Optica Senior Member, a member of SPIE and IOP, and a National Science and Technology Expert of MOST.

Abstract: The breaking of inversion symmetry and the strong spin−orbit coupling in monolayer transition metal dichalcogenides (TMDCs) induces a conduction band spin splitting of about a few tens of millielectronvolts, giving rise to the so-called spin-allowed, bright and spin-forbidden, dark excitons. Their transition dipole orientations are orthogonal to each other, and the latter has a lifetime significantly longer than the former due to the spin-flip. Such unique characteristics of dark excitons have great potential in implementing coherent two-level systems for quantum information processing and Bose−Einstein condensation. However, optical selection rules dictate that only spin-preserved electronic transitions are optically active, making these dark excitons optically inactive at room temperature.

In this talk, I will first discuss how to employ plasmon-exciton coupling spectroscopy to probe the presence of dark excitons in monolayer MoS2 and WS2 by examining their temperature-dependent bright-exciton-plasmon coupling strength with single Au@Ag core-shell nanocuboida (ACS Photonics 2019, 6(2), 411-421). Following this, I will illustrate the important role of dark excitons in the temperature-dependent photoluminescence intensity of monolayer WS2 and show that the temperature-dependent emission energy can be well described with the Varshni formula (Nanoscale Horizons 2019, 4(4), 969-974). Finally, I will show that coupling the spin-forbidden dark excitons to a metal nanoparticle-on-mirror cavity leads to plasmon-induced resonant emission with signal intensity comparable to that of the spin-allowed bright excitons (Nano Letters 2022, 22(5), 1915-1921). A three-state quantum model combined with full-wave electrodynamic calculations reveals that the radiative decay rate of the dark excitons can be enhanced by nearly 6 orders of magnitude through the Purcell effect, therefore compensating its intrinsic nature of weak radiation. Our nanocavity approach provides a useful paradigm for understanding the room-temperature dynamics of dark excitons, potentially paving the road for employing dark exciton in quantum computing and nanoscale optoelectronics.

16:30-17:00	Invited Speech

Speaker: Yi Yang

Affiliation: University of Hong Kong

Title: Free-electron–light Interactions in Nanophotonics

Bio: Dr. Yi Yang is an assistant professor in the Department of Physics at The University of Hong Kong. He obtained his bachelor’s and master’s degrees at Peking University, and PhD degree at Massachusetts Institute of Technology. He continued his postdoctoral research in the Research Laboratory of Electronics at Massachusetts Institute of

Technology before joining the University of Hong Kong in 2022. Dr. Yi Yang works on optics and photonics and his research focuses on the interaction of light with materials, free electrons, and synthetic gauge fields. With collaborators, Dr. Yang put forward an electromagnetic framework for quantum optical responses at the extreme nanoscale, introduced an upper limit and a flatband scheme to spontaneous free-electron-light interaction, and synthesized non-Abelian gauge fields in real space. Dr. Yi Yang is a recipient of MIT Technology Review's Innovators Under 35 China, Asian Young Scientist Fellowship, and Excellent Young Scientists (Hong Kong and Macau).

Abstract: When impinging on optical structures or passing in their vicinity, free electrons can spontaneously emit electromagnetic radiation, a phenomenon generally known as cathodoluminescence. Free-electron radiation comes in many guises: Cherenkov, transition, and Smith–Purcell radiation, but also electron scintillation, commonly referred to as incoherent cathodoluminescence. While those effects have been at the heart of many fundamental discoveries and technological developments in high-energy physics in the past century, their recent demonstration in photonic and nanophotonic systems has attracted a great deal of attention. Those developments arose from predictions that exploit nanophotonics for novel radiation regimes, now becoming accessible thanks to advances in nanofabrication. In general, the proper design of nanophotonic structures can enable shaping, control, and enhancement of free-electron radiation, for any of the above-mentioned effects. Free-electron radiation in nanophotonics opens the way to promising applications, such as widely tunable integrated light sources from x-ray to THz frequencies, miniaturized particle accelerators, and highly sensitive high-energy particle detectors.

17:00-17:30	Invited Speech

Speaker: Jianwen Dong

Affiliation: Sun Yat-sen University

Title: Optical Metasurface and Its Applications of Near-Eye 3D Display and AI Imaging

Bio: Jian-Wen Dong is a professor in School of Physics at Sun Yat-sen University. He won the Youth Science Award 2020 of the Ministry of Education and the Top Ten China Optics Award 2017, was supported by Cheung Kong Young Scholar Program 2016 and National Outstanding Youth Foundation 2015. He has carried out basic and application research on (1) topological nanophotonics and PIC devices and (2) AI-based metasurface and light field imaging/display. He has published > 130 academic papers, including 5 Nature series journals such as Nature Materials, 6 Physical Review Letters, 1 National Science Review and 4 Light Science & Applications. He has also published 7 review papers including 30-page long review in Laser & Photonics Reviews. Among the research works, there are 7 papers selected as ESI highly cited papers.

Abstract: In the field of a new generation of display and imaging, near-eye 3D display and AI imaging make the interaction and recording between people and the world closer to the real and have attracted widespread attention. Among them, light control elements have a great influence on its performance. Optical metasurfaces, with the capabilities of breaking through the limitations of traditional material properties to achieve rich optical behaviors, are especially suitable for planar display and imaging devices with high performance, multifunction, miniaturation and composition. Here, we have developed metalens modules in the applications of true 3D near-eye display without VAC conflict, ultrawide FOV color imaging with AI transformer network. These results have important scientific significance and practical applications in the field of next-generation integrated systems, including 3D light field display, VR/AR, microendoscope, computational optical imaging, 3D sensing.

Technical Session

TS01-Laser Technology-A	
Date: September, 7	**Venue:** LM103-A
Presider: Yiyang Luo, Chongqing University	

09:00-09:30	Invited Speech

Speaker: Dongmei Huang
Affiliation: The Hong Kong Polytechnic University
Title: Ultrafast Time Stretched Swept Lasers and the Applications
Bio: Dr Dongmei Huang received her B.Eng. from Huazhong University of Science and Technology (HUST), 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 a research assistant professor in the Department of Electrical Engineering, The Hong Kong Polytechnic University. Her research focuses on fundamental physics including mode locked lasers, swept lasers, nonlinear optics, integrated optics, and applications of photonics including biomedical imaging, high resolution measurement and LiDAR, and 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 50 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.
Abstract: Swept laser interferometer method can capture the full interference fringes with a single shot chirped pulse, which is adopted in most spectral detection applications including swept source optical coherence tomography and laser measurement. In this talk, we will introduce the key technologies to realize ultrafast swept lasers with more than 100 MHz sweep rate and 100 nm broadband sweep range. The ultrafast time stretched swept lasers in the applications of swept source optical coherence tomography and ultrafast timing jitter measurements will also be discussed.

09:30-10:00	Invited Speech

Speaker: Junqing Zhao
Affiliation: Shenzhen Technology University
Title: Cavity and Local Modal Birefringence Based Pulse Manipulations in Fiber Lasers and Amplifiers
Bio: Junqing Zhao received the Doctor of Engineering degree in Optical Engineering from Shenzhen University, Shenzhen, China, in 2014. 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, School of Physics and Electronic Engineering, Jiangsu Normal University, Xuzhou, China. He is currently with the Key Laboratory of Advanced Optical Precision Manufacturing Technology of Guangdong Higher Education Institutes, College Physics Teaching and Experiment Center, Shenzhen Technology University, Shenzhen, China. He has published some 70 scientific articles. He was ranked among the world's top 2% scientists released by Stanford University in 2021 and one of the winners of OGC 2022 Young Scientist Award in 2022. He is a Senior Member of IEEE and Life Member of OPTICA.
Abstract: In this talk, I will present some of our results regarding optical pulse manipulations through the adjustment

of the accumulative intra-cavity modal birefringence and/or the local modal birefringence at some specially designed/conditioned fiber devices. I will reveal that our mostly adopted modal-birefringence-based techniques in manipulation of the pulse evolving dynamics or the pulse envelope itself can actually be seen as an accumulative effect. Mathematically, this can be dealt as an averaged intra-cavity modal birefringence. On the other hand, our recent several results show that some quite different pulse-manipulating effects can be realized if the local modal birefringence at a particular site of the fiber cavity is varied even slightly. Such a local modal birefringence contributes almost nothing to the averaged intracavity modal birefringence, but it can indeed induce some significant pulse-manipulating effect. Besides these intra-cavity effects, I will also show that the modal birefringence in fiber amplifiers should be handled carefully if one expects to eliminate the related modal latencies arising from birefringence mismatching, which can modify the propagated pulses both temporally and spectrally.

10:00-10:30	**Invited Speech**

Speaker: Chunyu Guo
Affiliation: Shenzhen University
Title: High-power Mid-infrared Ultrafast Fiber Lasers
Bio: Chunyu Guo is currently a Professor at College of Physics and Optoelectronic Engineering, Shenzhen University. He was a visiting scholar of Optoelectronics Research Centre (ORC), University of Southampton. The main interests of his research are near-infrared and mid-infrared fiber lasers. He has been granted 11 invention patents (one has been transferred) and presides over many national scientific research projects, school-enterprise cooperation projects, and industrialization projects. He was selected for the outstanding young teacher cultivation projects in Shenzhen University, the high-level talent in Shenzhen, and the outstanding young teacher cultivation projects in Guangdong province.

Abstract: High-power femtosecond Mid-infrared pulses are of great interest for many scientific and industrial applications. Here we report a high-power Mid-infrared ultrafast laser system consisting of a fluoride fiber mode-locked oscillator and a two-stage fluoride fiber amplifier. The oscillator is based on nonlinear polarization rotation technique. In the pre-amplifier, a backward pumping scheme is employed to simultaneously realize pulse amplification and self-compression. The input signal polarization is optimized to suppress the Raman effect. In the main amplifier, a large-mode-area Er^{3+}-doped fluoride fiber is used as the gain fiber to further boost the average power under a bi-direction pumping scheme. The gain fiber has a core diameter of 30 μm (NA=0.12), which supports 6 spatial modes. Fiber coiling method is utilized to suppress the high-order modes. Until now, high-beam-quality pulses with an average power of 8.12 W and a pulse duration of 148 fs have been obtained. This constitutes the highest average power for femtosecond pulses generated from a Mid-infrared fiber laser system to date. Besides, by using a home-made end-pump silica-fluoride fiber combiner, an all-fiber 2.8 μm ultra-short pulse master-oscillator power amplifier (MOPA) system was demonstrated. This all-fiber laser source delivers ultra-short pulses with an average power of 3.42 W, a pulse width of 115 fs and a pulse energy of 45.4 nJ. This is the first watt-level all-fiber 2.8 μm femtosecond laser. Moreover, high-power tunable femtosecond mid-infrared (MIR) pulses are of great interest for many scientific and industrial applications. Here we demonstrate a compact fluoride-fiber-based system that generates single solitons tunable from 3 to 3.8 μm.

The system is composed of an Er: ZBLAN fiber oscillator and amplifier followed by a fusion-spliced Dy: ZBLAN fiber amplifier. The Er: ZBLAN fiber amplifier acts as a power booster as well as a frequency shifter to generate Raman solitons up to 3 μm. The Dy: ZBLAN fiber amplifier transfers the energy from the residual 2.8 μm radiation into the Raman solitons using an in-band pumping scheme, and further extends the wavelength up to 3.8 μm. Common residual pump radiation and secondary solitons accompanying the soliton self-frequency shift (SSFS) are recycled to amplify Raman solitons, consequently displaying a higher output power and pulse energy, a wider shifting range and an excellent spectral purity. Stable 252 fs pulses at 3.8 μm with a record average power of 1.6 W and a pulse energy of

23 nJ are generated. This work provides an effective way to develop high-power widely-tunable ultrafast single-soliton MIR laser sources, and this method can facilitate the design of other SSFS-based laser systems for single-soliton generation.

TS02-Optical Communication and Networks-A

Date: September, 7	**Venue:** LM103-B
Presider: Kangping Zhong, The Hong Kong Polytechnic University	

09:00-09:30	**Invited Speech**

Speaker: Chen Chen

Affiliation: Chongqing University

Title: Performance Enhancement Techniques for Bandlimited Underwater Optical Wireless Communication Systems

Bio: Chen Chen received the B.S. and M.Eng. degrees from the University of Electronic Science and Technology of China, Chengdu, China, in 2010 and 2013, respectively, and the Ph.D. degree from Nanyang Technological University, Singapore, in 2017. He was a Post-Doctoral Researcher with the School of Electrical and Electronic Engineering, Nanyang Technological University, from 2017 to 2019. He is currently a Research Professor with the School of Microelectronics and Communication Engineering, Chongqing University, Chongqing, China. His research interests include optical wireless communication, optical access networks, Internet of Things, and machine learning.

Abstract: Underwater optical wireless communication (UOWC) systems using light-emitting diodes (LEDs) or laser diodes (LDs) are naturally bandlimited, and hence it is of practical significance to address the band limitation issue of UOWC systems. In this speech, two techniques will be proposed to enhance the performance of bandlimited UOWC systems. One is efficient usable bandwidth extension using OFDM with interleaved subcarrier number modulation, and the other is spatial division transmission with pairwise coding.

09:30-10:00	**Invited Speech**

Speaker: Xueyang Li

Affiliation: Peng Cheng Laboratory

Title: Advanced Direct Detection Systems for Short-reach Optical Interconnects

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 27 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.

Abstract: We review recent progress in advanced direct detection systems utilizing phase-, polarization-, and space-diversity for high speed short-reach optical interconnects.

10:00-10:30	**Invited Speech**

Speaker: Xun Guan

Affiliation: Tsinghua Shenzhen International Graduate School

Title: Radio-over-Fiber Transmission with Push-Pull Microring Modulators

Bio: Xun Guan received the B.Eng. degree from the Huazhong University of Science and Technology, China, in 2012, and the Ph.D. degree in information engineering from The Chinese University of Hong Kong, Hong Kong, China, in 2016. From 2017 to 2022, he was a Postdoctoral Fellow and then a Research Scientist in Center for Optics, Photonics and Lasers (COPL), Université Laval, Quebec, Canada, where he still holds adjunct professorship. He is now an assistant professor in Tsinghua Shenzhen International Graduate School, Tsinghua University, China. His research interest lies in optical fiber communications, optical wireless communications and signal processing in photonics and optics.

Abstract: The continuous soar of data rate in access networks has spurred the need of high-speed optical modulators in delivering radio services through radio-over-fiber. Silicon photonic modulator can find its role in such a scenario because of its low cost, compactness, low power consumption and CMOS compatibility, on which microring modulator demonstrate even more superiority. In this work, we try to tackle a few of the remaining challenges: by using push-pull structure, frequency chirp is relieved; and by single sideband modulation, transmission length is increased.

TS03-Fiber-Based Technologies and Applications-A

Date: September, 7	**Venue:** LM103-C
Presider: Yunqi Liu, Shanghai University	

09:00-09:30	**Invited Speech**

Speaker: Huizi Li
Affiliation: Shanghai Institute of Microsystem and Information Technology
Title: Novel Design of Yb-doped Fiber and Anti-reflection Hollow Core Fiber for Lasing and Sensing Application
Bio: Dr. Huizi Li is an associate researcher of Shanghai Institute of Microsystems (Chinese Academy of Sciences), and a leading Overseas Young talent in Shanghai. She received her bachelor's degree from Huazhong University of Science and Technology, and her doctorate from Nanyang Technological University, Singapore. Her research expertise includes optical waveguide theoretical design, doping process and system construction. Focus on achieving high stability and high beam quality under high power operation, efficient integration of micro-structure fiber waveguide into high power laser system, and the expansion of working wavelength of high power laser system.

Abstract: In recent decades, special optical fiber is playing an essential role in lasing and sensing fields. Optical fibers with special sturctures and special materials have made great contribution to boost the performance and expand the application boundries of fiber laser and fiber sensor. In this speech, novel design and manufacturing of Yb-doped fiber and anti-reflection hollow core fiber for achieving good beam quality and three level lasing system will be introduced and the prospect of hollow core fiber in sensing field will be discussed.

09:30-10:00	**Invited Speech**

Speaker: Yanhua Luo
Affiliation: Shanghai University
Title: Recent Development of 3D Printing Photonic Fibre Technology
Bio: Yanhua Luo received his B.E and PhD degrees from University of Science and Technology of China (UTSC) in 2004 and 2009, respectively. After his postdoctoral work at USTC, he worked as a deputy director of Photonics & Optical Communications at University of New South Wales (UNSW). Since 2022, he has moved on from UNSW to Shanghai University. Currently, he is a full professor at the Key Laboratory of Specialty Fiber Optics and Optical Access Networks, Shanghai University, China. His research interests focus on the specialty optical fiber technologies for Smart Information Network. So far he has held 2 China patents and co-authored over 140 refereed journal papers, 100 conference papers and 11 book chapters on these subjects.

Abstract: Targeting to the next generation specialty optical fibre with diverse structures and materials for future intelligent information network, 3D printing photonic fibre technology has been proposed. In this talk, the recent development and applications of 3D printed optical fibre will be overviewed.

10:00-10:15	Paper ID: 2865

Author(s): Jindong Ma, Huanhuan Liu, Nan Zhang and Perry Ping Shum
Affiliation: Southern University of Science and Technology
Title: Sub-50fs GHz Pulse Burst with Average Power Beyond 20 W
Abstract: We report a high power pulse burst polarization-maintaining fiber amplification system that enables 22 W, 1MHz pulse bursts with sub-pulse duration of ~41 fs and repetition rate of ~1 GHz. The seeded GHz pulses are generated from GHz mode-locked fiber laser, and its power is further boosted by a hybrid scheme combining chirped-pulse amplification and self-similar amplification. Because the common double-cladding Yb3+-doped fiber is used as gain fiber, the simple fusion operation makes the system more compact and reliable.

TS04-Optoelectronic Devices and Applications-A

Date: September, 7	**Venue:** LM104-A
Presider: Cuicui Lu, Beijing Institute of Technology	

09:00-09:30	Invited Speech

Speaker: Yating Wan
Affiliation: King Abdullah University of Science and Technology
Title: Integrated Silicon Photonics with Quantum Dot on-chip Lasers
Bio: Yating Wan is an assistant professor at KAUST. Before that, she was a postdoctoral research associate at University of California, Santa Barbara, John Bowers' group. Her ongoing work is dedicated to developing quantum dot based integrated Si photonic circuits for short-reach communication links and related applications. She was the recipient of 2016-17 School of Engineering PhD Research Excellence Award in HKUST, 2021 CLEO Tingye Li Innovation Prize, 2022 Rising Stars of Light, 2018 PIERS Young Scientist Award, 2021 OGC Best Young Scientist Award, etc. She has published more than 60 peer-reviewed research papers, including 36 first-author journal (24)/conference (12) papers and 8 prestigious covers.
Abstract: Integrated Si photonics has sparked a significant ramp-up of investment in both academia and industry as a scalable, power-efficient, and eco-friendly solution. At the heart of this platform is the light source, which has been the focus of research extensively. This talk tries to tackle this issue from two perspectives: monolithic integration based on direct epitaxial growth and heterogeneous integration based on wafer bonding. In monolithic integration, significant improvements in III-V/Si epitaxy have pushed quantum dot technology to the frontiers of Si photonics. Meanwhile, a heterogeneous integration platform is showing very promising results, where a synergistic relationship between the III-V and Si gives rise to superior devices exceeding what is achievable with purely III-V devices. We will talk about the current state of application-driven on-chip silicon lasers. We expect to inspire further development in incorporating photonic integrated circuits with on-chip lasers for substantial performance gains, green solutions, and mass production.

09:30-10:00	Invited Speech

Speaker: Jiu-an Lv
Affiliation: Westlake University
Title: Structured Tubular Soft Actuators
Bio: Dr. Jiu-an Lv received his B. Sc. and M.S. degrees in the department of chemistry from northwest university, China, in 2005 and 2008, respectively. After that, he served as a process engineer at the China aerospace science and technology corporation for three years. In 2011, he began to study liquid crystal polymer materials at Fudan university

and obtained Ph. D degree in 2016. Then he worked in the department of Materials at Fudan University as a postdoctoral researcher between 2016 and 2018. He joined Westlake University as an Assistant Professor in March 2018.

Abstract: Biological tubular actuators show diverse deformations, which allow for sophisticated deformations with well-defined degrees of freedom (DOF). However, synthetic tubular soft actuators largely only exhibit few simple deformations with limited and undesignable DOF. Inspired by helical fibrous architectures of tubular muscular hydrostats (elephant trunk), we created conceptually new helical-artificial fibrous muscle structured tubular soft actuators (HAFMS-TSAs) with locally tunable molecular orientations, materials, mechanics, and actuation via modular fabrication platform. Unprecedentedly, HAFMS-TSAs display 11 different morphing modes through programmable regulation of their 3D helical fibrous architectures. We demonstrate a single “living” artificial plant rationally structured by HAFMS-TSAs exhibiting diverse photoresponsive behaviors that enable adaptive omnidirectional reorientation of its hierarchical 3D structures in the response to environmental irradiation, resembling morphing intelligence of living plants in reacting to changing environments. Our methodology would be significantly beneficial for developing sophisticated 3D soft actuators with designable and tunable DOF.

10:00-10:30	**Invited Speech**

Speaker: Xiaolong Chen
Affiliation: Southern University of Science and Technology
Title: Layered Two-dimensional Materials Provide New Opportunities for Investigating Light-Matter Interactions
Bio: CHEN Xiaolong, is an assistant professor at Department of Electrical and Electronic Engineering in the Southern University of Science and Technology (SUStech). Before joining SUStech, he worked as postdoctoral researcher in University of Cambridge and Yale University. Dr. Chen is mainly engaged in the research of 2D-material-based-optoelectronics. Especially, he has done pioneer works on black-phosphorus and its applications in optoelectronics. In recent years, he has published more than 50 SCI academic papers in Light: Science & Applications, Nature Communications, Science Advances, Nano Today, ACS Nano and other journals with an H-index of 22. He also served as reviewer of Light: Science & Applications, Nature Communications and Science Advances. He was selected as Guangdong Zhujiang Young Talent Program 2019.

Abstract: Two-dimensional (2D) materials, with layered van der Waals structures and atomically-thin thickness, offer a unique platform for investigating light-matter interactions. In this talk, I will focus on our recent two representative works on light-matter interactions in 2D materials. First, I will show that light-matter interactions can provide a convenient approach to investigate the antiferromagnetic properties of micrometer-size atomically-thin semiconducting materials, which is not accessible by the conventional technology. In the second work, we constructed van der Waals edge-embedded structures utilizing the flexibility of 2D materials, in which we observe strong bulk photovoltaic effect.

TS05-Biophotonics and Optical Biomedicine-A

Date: September, 7	**Venue:** LM104-B
Presider: Yi Li, Southern University of Science and Technology	

09:00-09:30	**Invited Speech**

Speaker: Haoyun Wei
Affiliation: Tsinghua University
Title: Coherent Anti-stokes Raman Scattering Micro-spectroscopy Based on Delay Scanning

Bio: Haoyun Wei is an Associate Professor in the Department of Precision Instrument at Tsinghua University. He received his Ph.D. degree in optical Engineering from Tsinghua University in 2007. His research interests include optical interferometry, optical frequency comb, laser spectroscopy, and Raman spectroscopy. He has published more than 60 peer-reviewed papers and has won the first prize of Beijing science and technology award, the first prize of science and technology progress award of China society for measurement, etc.

Abstract: Multiplex coherent anti-Stokes Raman scattering (CARS) provides broadband spectra for molecular identification as a label-free and non-invasive approach. To achieve high-speed broadband measurement, spectral-focusing CARS (SF-CARS) and Fourier-transform CARS (FT-CARS) convert the spectral-domain measurement into the time-domain delay scanning, making the signal detectable by high-speed single-pixel detector. In this presentation, we first analyse the high-speed measurement capacity of the two delay-scanning method, and compare the different characteristics of the two methods. Subsequently, we present a dual-comb SF-CARS scheme with high acquisition rate up to 40,000 spectra/s and its applications of microfluidic monitoring and microscopic imaging. Also, we investigate the limitation of traditional FT-CARS, and propose interpulse stimulation FT-CARS method to offer flexible detection wavenumber region. A spectral intensity retrieval algorithm is also proposed to fully utilize the time-domain information of FT-CARS, providing optimized SNR and feature distinguishment.

09:30-10:00	Invited Speech

Speaker: Anhui Liang

Affiliation: Ningbo Micro-color Optical Communication Limited.

Title: Biological Optical Fiber Couplers on Human and Vertebrates Retina and Significant Hot Effects in Sleep and Alzheimer’s Disease

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.

Abstract: I first proposed there are biological optical fiber couplers on human and vertebrates retina, and I first explained why human and vertebrates have the inverted retina structures. I first proposed the temperature of the transmitter glutamate at synapses of photoreceptors may be 55 C0 at awake time, because the best temperature for enzyme activity of Glutamate decarboxylase is 55 C0. I first propose the temperature of transmitter Glycine at synapses of amacrine cells may be 50 C0 at awake time, because the best temperature for enzyme activity of Serine hydroxymethyltransferase (SHMT) is 50 C0. We first propose the temperature of transmitter ACH at synapses of neurons in hippocampus and four related cortical areas may be abound 50-54 C0 at awake time, because the enzyme activity of AChE reaches very low at 50-54 C0. We first proposed the reason for animals to sleep is reduce the temperature of synapses (including transmitters), mitochondria, chromosome and Aβ etc. significantly (by 5-30 C0). Because there are lack of sleep for a long time and other factors, the temperature of synapses (especially transmitters), mitochondria, chromosome and Aβ etc. will be kept high for too long period. The high temperature of some parts of cells will burn down the synapses (especially transmitters) at first and the whole cells later, I first proposed this reason for human to get Alzheimer’s Disease (AD), one evidence is that the transmitter ACH quantities

at synapses of neurons in hippocampus and four related cortical areas of AD patients are much lower those normal persons. I first that proposed one important role for cerebrospinal fluid is to cool down their brains when sleeping, and the reduction of blood flow into brain also help to cool down the brain when sleeping. The optimal environment temperature for human to sleep is about 17-18 C0 n, and I first proposed a new theory for this: ancient human got sleep in caves with around 17-18 C0 of temperature for a long period and they adapted to sleep at 17-18 C0 deeply.

10:00-10:30	**Invited Speech**

Speaker: Quan Liu
Affiliation: Xiamen University
Title: From Snapshot Depth Sensitive Optical Spectroscopy to A-scan Optical Sectioning Imaging
Bio: Dr. Quan Liu received a bachelor's degree in electrical engineering from Xidian University, Xi'an, China, a master's degree in electrical engineering from the Graduate School of University of Science and Technology of China in Beijing, China and a PhD degree in biomedical engineering from the University of Wisconsin, Madison, USA. He has been an assistant professor then an associate professor at Nanyang Technological University, Singapore. He is currently a full professor in the School of Electronic Science and Engineering at Xiamen University, China. His research interest is focused on biomedical optical spectroscopy and instrumentation. He has published more than seventy journal papers and held more than twenty patents/patent applications in the field of optical spectroscopy and imaging. Dr. Liu is an SPIE fellow.
Abstract: We will introduce the history of developing depth dependent optical measurement techniques from snapshot depth sensitive optical spectroscopy to A-scan optical sectioning imaging.

TS06-Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-A

Date: September, 7	**Venue:** LM104-C
Presider: Dan Wu, Shenzhen Technology University	

09:00-09:15	**Paper ID: 7403**

Author(s): Ting-Yu Chen, Shu-Pin Yu, Liang Jun Huang, **Chi-Feng Chen** and Shinn-Ying Ho
Affiliation: National Yang-Ming Chiao Tung University
Title: Low-Level Light Therapy and Cupping Therapy Applied on Skin Tissue
Abstract: This study investigates the physiological effects of low-level light therapy (LLLT) and cupping therapy (CT) on local skin tissues of the human body. For the experimental light sources of LLLT, light-emitting diodes with wavelengths of 660 nm, 810 nm, and 904 nm and Laser diode with a wavelength of 650 nm are adopted. To evaluate the effect of LLLT and CT on the human body, the changes of the temperature and muscle elasticity (stiffness) is tracking before and after those treatments. The results show that LLLT, CT, and CT followed by LLLT can relieve muscle tension and activate local muscles. Additionally, the subjects reported a reduction in local muscle tension following these treatments. Among these three treatments, CT followed by LLLT has the best effect. Among these three treatments, CT followed by LLLT has the best effect. LLLT can also effectively reduce the inflammation of pot marks and relieve post-treatment discomfort.

09:15-09:45	**Invited Speech**

Speaker: Yumeng Yang
Affiliation: ShanghaiTech University
Title: Nvolves the Generation of Backflow Nonthermal Charge Current from the Ferromagnet/dielectric Interface by Femtosecond Laser Excitation

Bio: Dr. Yang received B.Sc. degree from Sichuan University in 2011. In the same year, guided by Prof. Huaqiang Wu, he had a short internship in the Institute of Microelectronics at Tsinghua University. From 2012 to 2016, he pursued Ph.D. degree in Electrical and Computer Engineering at National University of Singapore under the guidance of Prof. Yihong Wu. Additionally, he was also co-supervised by principal scientist Dr. Kui Yao from Agency for Science, Technology and Research (A*STAR). He was the recipient of President’s Graduate Fellowship during 2014 to 2016. After that, he worked as a research engineer and research fellow. He is currently an assistant professor in the School of Information Science and Technology at ShanghaiTech University.

Abstract: The anomalous Hall effect, observed in conducting ferromagnets with broken time-reversal symmetry, offers the possibility to couple spin and orbital degrees of freedom of electrons in ferromagnets. In addition to charge, the effect also leads to spin accumulation at the surfaces perpendicular to both the current and magnetization direction. Here, we show that the spin accumulation, subsequent spin backflow, and spin–charge conversion can give rise to a different type of spin current-related magnetoresistance that has the same angular dependence as the recently discovered spin Hall magnetoresistance. We named it as anomalous Hall magnetoresistance. In addition, THz radiation can be generated in single ferromagnets as well, which involves the generation of backflow nonthermal charge current from the ferromagnet/dielectric interface by femtosecond laser excitation. Unlike spintronic THz emitters reported previously, it does not require an additional nonmagnetic layer or Rashba interface.

09:45-10:15	**Invited Speech**

Speaker: Yuanmu Yang
Affiliation: Tsinghua University
Title: Metasurface for Multidimensional Light Field Sensing
Bio: Yuanmu Yang is currently an associate professor at the Department of Precision Instrument of Tsinghua University. His research focuses on the area of meta-optics. He has published more than 40 journal articles, including 2 in Nature Photonics and 1 in Nature Physics, received over 5000 citations according to Google Scholar, and was selected as a "Highly-cited Researcher in China" by Elsevier in 2022. He has been granted over 10 China and US patents, many of which have been commercialized. He is currently the principal investigator of various research programs, including the prestigious key funding program from the National Natural Science Funding of China. His recognitions include the Jin-Guofan Young Scientist Award given by the China Instrument and Control Society as well as the Forbes China “30 under 30” in 2018.

Abstract: Optical sensors can play vital roles in emerging applications such as augmented reality and autonomous driving. Conventional optical sensors, such as the smartphone camera, can only acquire light intensity in two dimensions. In order to further obtain the depth, polarization, and spectral information of the target object, it is often required to use bulky and expensive instruments. Metasurface is composed of an array of optical antennas that can manipulate the amplitude, phase, polarization, and spectrum of light at the subwavelength scale. By replacing conventional diffractive of refractive elements with metasurfaces in imaging systems, one may be able to build optical sensors for high-performance multidimensional light sensing with a low size, weight, and power. In this talk, I will present our group’s recent effort to replace conventional camera lenses with metalenses. By leveraging the unique capability of metasurface to tailor the vectorial field of light, in combination with advanced image retrieval algorithm, we aim to build compact camera systems that can capture multi-dimensional light field information of a target scene in a single shot under ambient illumination conditions.

TS07-Quantum Optics and Information-A

Date: September, 7	**Venue:** LM105

Presider: Yu Zhou, Harbin Insitute of Technology (Shenzhen)

09:00-09:30	**Invited Speech**

Speaker: Feng Li
Affiliation: Xi'an Jiaotong University
Title: Simulators of Quantum Fluids Using Atomic Vapors
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.

Abstract: The linear and nonlinear effects in atomic vapors, such as electromagnetically induced transparency (EIT), can be used to create artificial potentials and landscapes for the probe light traveling through, by spatially modulating the refractive index with the control light beams. The dynamics of a paraxial light beam propagating along the z direction can be described by a wave equation sharing the same mathematical form of a time-dependent Schrodinger equation moving in the x-y plane, while the z presenting the time t. Such an experimental platform allows to simulate the dynamics of quantum fluid of light, a form of highly coherent quasi-particles of matter waves.

In this talk, I will report our investigations of the dynamics of the fluid of light in optically induced superlattices in Rb atomic vapors. Based the EIT effect, we establish optically-induced honeycomb lattices using an interference pattern formed by three control laser beams, and excite the pseudospin corresponding to the A or B sub-lattices to convert it into the orbital angular momentum (OAM) of the probe light. We found that the dynamics of the core of the vortices goes beyond the Dirac equation and requires a full account of the lattice properties, which can be still approximately described by an effective theory considering the phase singularities as "particles". These particles are capable of mutual interaction, with their trajectory obeying the laws of dynamics. By varying the polarization of the probe light, we demonstrate that an effective spin–orbit coupling appears as a correction to the paraxial beam equations because of the strong spatial gradients of the permittivity. It leads to the coupling of spin and angular momentum at the Dirac points of the graphene lattice. By introducing a barrier beam, we report the first experimental observation of perfect Klein transmission in the same photonic honeycomb lattice at normal incidence and measure the angular dependence. Counterintuitively, but in agreement with the Dirac equation, we observe that the decay of the Klein transmission versus angle is suppressed by increasing the barrier height, a key result for the conductivity of graphene and its analogs.

09:30-10:00	**Invited Speaker**

Speaker: Yongmin Li
Affiliation: Shanxi University
Title: The Scheme Simplification and Networking of Continuous Variable Quantum Key Distribution
Bio: Yongmin Li received the Ph.D. degree in optics from Shanxi University in 2003. Since 2003, he has been a Postdoctoral Fellow at University of Tokyo, and a Visiting Fellow at Australian National University. He is currently a Professor at Shanxi University. His research interests include quantum optics and quantum information. He has published more than 100 journal articles in this field, and currently holds 2 U.S. patents and 22 Chinese patents.

Abstract: Continuous variable quantum key distribution (CV-QKD) uses the quadratures of the quantized light field to encode the key information and measures the encoded quantum states through coherent detection technology. It has the advantages of good compatibility with the existing coherent optical communication technology and high key rate at short- and medium-distance. Here, I will introduce our recent research progress in the scheme simplification

and user expansion of continuous variable quantum key distribution. Firstly, we experimentally demonstrate the continuous variable quantum key distribution with a shared partially characterized entangled source in the middle. Then, we design and experimentally verify a discrete-modulation CV-QKD protocol with high secret key rate. Finally, we analyze the impact of homodyne receiver bandwidth and signal modulation patterns on the continuous-variable quantum key distribution.

TS08-Laser Technology-B

Date: September, 7	**Venue:** LM103-A
Presider: Xiaosheng Xiao, Beijing University of Posts and Telecommunications	

10:45-11:15 **Invited Speech**

Speaker: Mohammed Zahed M. Khan
Affiliation: King Fahd University of Petroleum and Minerals
Title: C/L-band Broadband Quantum Confined Semiconductor Lasers for Future Wideband Optical-MMW/THz Heterogeneous Networks

Bio: Dr. Mohammed Zahed Mustafa Khan received the B.E. degree in Electronics and Communication Engineering from Osmania University, India, in 2001, 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 Photonics Laboratory, KAUST. He joined the Electrical Engineering Department, KFUPM, in 2015, where he is currently an Associate Professor, and founder and director of "Optoelectronics Research Laboratory." His prior research involved developing numerical models for integrated optical device simulation. Currently, his research focuses on developing near-infrared and visible semiconductor lasers and systems for applications in optical communications and sensing. Dr. Khan is a senior member of IEEE and Optica (formally OSA) and a member of IET and SPIE.

Abstract: In recent years, the utilization of optical means for generating high-frequency millimeter-wave (MMW) and Terahertz (THz) wave carriers has emerged as a promising solution for future communication systems. Thanks to this technology's ability to seamlessly integrate with existing optical fiber networks to realize heterogeneous communication infrastructures. In this regard, InAs/InP semiconductor lasers utilizing quantum-confined active regions in the form of quantum-dashs/dots (Qdash/Qdot) are taking center stage as promising light sources due to their unique multiwavelength lasing emission, including several Fabry-Perot modes, or in other words, comb generation. Moreover, a wide wavelength tunability from the S- to U-band further strengthened this new-class of broadband laser sources potential in next-generation wideband communication networks. Intrinsic mode-locking in the C-band and injection locking in the L-band has opened a new paradigm for the possible substitution of several costly near single-wavelength laser diodes with a single multiwavelength device or multiple but identical wavelength tunable sources, thus addressing cost-effect and energy-efficient green communication. This talk will present recent progress in engaging C- and L-band InAs/InP Qdot/Qdash laser diodes in MMW and THz communication systems. Besides, the talk will emphasize showcasing the viability of these optical devices in hybrid MMW/THz communication over fiber, free space optics (FSO) and wireless channels, and their co-existence with optical networks. Lastly, very recent experiments on the performance of such networks under varying environmental conditions, such as fog, smoke, etc., will also be highlighted along with some empirical models, thus further upholding this light source's potential to achieve an energy-efficient future communication infrastructure.

11:15-11:45 **Invited Speech**

Speaker: Qian Li

Affiliation: Peking University Shenzhen Graduate School

Title: Experimental and Numerical Study of All-polarization-maintaining Linear Cavity Mode Locked Fiber Lasers

Bio: Qian Li received the Bachelor of Science degree from Zhejiang University, Hangzhou, China, in 2003, the Master of Science degree from the Royal Institute of Technology (KTH), Stockholm, Sweden, in 2005, and the Ph.D. degree from the Hong Kong Polytechnic University, Hong Kong, in 2009. After graduation she was a Visiting Scholar at the University of Washington, Seattle and Postdoctoral Fellow at the Hong Kong Polytechnic University. In 2012 she joined School of Electronic and Computer Engineering (ECE) in Peking University as an Assistant professor. Since 2013 she is Associate Professor at ECE. Her research interests include ultrafast optics, nonlinear optics, and integrated optics. She is PI of around ten research funds. Dr. Li is senior members of Institute of Electrical and Electronics Engineers (IEEE) and senior member of the Optical Society of America (OSA). From 2015 she is an advisor of OSA Student Chapter in Peking University Shenzhen Graduate School. From 2019 she is an advisor of Peking University Shenzhen Graduate School IEEE Photonics Society Student Branch Chapter.

Abstract: We have demonstrated a novel, robust and compact fiber laser mode-locked by nonlinear polarization evolution (NPE) in the all-polarization-maintaining linear cavity. The reflectivity of the artificial saturable absorber (SA) is analyzed to explain the mode-locking mechanism in the laser cavity. The suggested linear cavity fiber laser provides a competitive low-noise light source for optical applications appropriate for complex environments. Both the experimental and numerical study will be presented in this talk.

11:45-12:00	**Paper ID: 3672**

Author(s): Xingxing Ding, Suwan Sun and Hairun Guo

Affiliation: Shanghai University

Title: Generation of Soliton MIcrocomb at O-band in Chip Scale Microresonators Via Pump Modulation

Abstract: We demonstrate the generation of optical soliton microcombs at O-band in chip-scale and high-Q silicon nitride (Si3N4) microresonators, which is driven by a phase modulated single frequency pumping laser. The modulation induced pumping sideband serves to maintain thermal equilibrium in the cavity and restore the soliton accessibility. The majority of the soliton existence range is extended by a factor of 6.

12:00-12:15	**Paper ID: 8208**

Author(s): Shichao Yang, Zhaojiang Shi, He Hu and Xia Yu

Affiliation: Beihang University

Title: High Efficiency Laser-Sustained Plasma Source

Abstract: Laser-sustained plasma (LSP) featured by high radiance in the ultraviolet (UV) spectral range is found to be powerful in high resolution inspection and spectroscopy applications. In this paper, we demonstrate significant enhancement of power conversion efficiency in LSP excited by focused orthogonal laser beams. The “reservoir” boundary formed by the laser field traps the high temperature zone of the plasma. LSP with UV radiance >20% conversion efficiency has been achieved experimentally, which is the highest reported value to our knowledge. This work paves a novel way of generating high radiance UV sources by spatial manipulation of excitation laser beam.

TS09-Optical Communication and Networks-B

Date: September, 7	**Venue:** LM103-B
Presider: Hongyan Fu, Tsinghua University	

10:45-11:15	Invited Speech

Speaker: Yixiao Zhu

Affiliation: Shanghai Jiao Tong University

Title: Digital-Analog Radio-over-Fiber Enabling Cost-Effective Fronthaul

Bio: Yixiao Zhu received his B.S. and Ph.D. degrees from the School of Physics, and the Department of Electronics, Peking University, in 2014 and 2019, respectively. He is currently a tenure-track associate professor at Shanghai Jiao Tong University. He has authored or co-authored more than 90 publications in IEEE and Optica journals and conferences, including post-deadline papers in ECOC2022, and OFC2019. His research interests include data-center interconnects and optical access networks.

Abstract: Optical access networks (OAN) are widely deployed at the edge of the Telecommunication networks to serve as 'the last mile link' connecting end nodes. Driven by emerging bandwidth-consuming services such as mixed reality (MR), the Internet of Things (IoT), and video conferences, there are continuously increasing demands for capacity scaling. Different from long-haul transmission, access networks are more cost-sensitive. In this talk, we first introduce the principle of the digital-analog radio-over-fiber (DA-RoF) technique. For higher capacity, we propose an IQ-interleaved DA-RoF scheme to reduce the peak-to-average power ratio (PAPR) under the peak power constraint (PPC). For higher fidelity, we develop a cascaded DA-RoF scheme for exponential SNR scaling. For C-band directly modulated laser with direct detection (DML-DD) link, we propose a computationally-efficient composite triple beat cancellation to address the chirp-dispersion interaction, making it suitable for mass deployment in beyond-5G/6G mobile fronthaul.

11:15-11:45	Invited Speech

Speaker: Zhi Liu

Affiliation: Changchun University of Science and Technology

Title: Progress and Trends in Laser Communication Networking Technology

Bio: Changchun University of Science and Technology, National and Local Joint Engineering Research Center of Space Optoelectronics Technology, Changchun, China. Graduated from: Bachelor's Degree: Applied Electronic Technology, Changchun Institute of Optics and Fine Mechanics (1993); Master: Changchun Institute of Optics and Fine Mechanics Test and Measurement Technology and Instruments (2001); PhD: Optical Engineering, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences (2004)

Work Experience:

1. 2018.7- Now Director of National and Local Joint Engineering Research Center for Space Optoelectronics Technology, Changchun University of Science and Technology
2. 2010.11-2018.7 Vice Dean of Graduate School, Changchun University of Science and Technology
3. 2005-01-2010.10 Deputy Director of Academic Affairs Office, Changchun University of Science and Technology
4. 2004.01-2004.12 Vice President of School of Electronic Information Engineering, Changchun University of Science and Technology
5. 2002.01-2003.12 Deputy Director of Electronic Engineering Department, School of Electronic Information Engineering, Changchun University of Science and Technology
6. 1993.07-2001.12 Teacher, Department of Electronics, Changchun Institute of Optics and Fine Mechanics

Abstract: Laser communication has advantages such as high speed, high bandwidth, small size, anti-interference, and good security. It is an advanced communication technology that is particularly suitable for communication platforms with limited payload capacity and requiring large amounts of data transmission, such as aircraft, drones, and satellites. Laser communication supports a high-speed integrated communication network between the ground and space, and is of great significance to national security and people's livelihood. The core of space laser networking is one-to-many

simultaneous communication, large-scale dynamic tracking, and duplex communication. The future development goal is to establish a high-speed information network covering the ground, space, and sea, and achieve real-time high-speed communication. This paper provides an overview of the domestic and international development of space laser communication networking technology and the latest progress. The research progress of Changchun University of Science and Technology in one-to-many space laser communication networking technology in recent years is explained, and the detailed introduction of the field demonstration of one-to-two simultaneous laser communication is presented. Finally, the future development trend of space laser communication networking technology is briefly analyzed and prospected.

11:45-12:00	Paper ID: 169

Author(s): Jiexing Lin, Jianyu Wang, Linsheng Fan, Yong Yao and Yanfu Yang
Affiliation: Harbin Institute of Technology, Shenzhen
Title: Joint Monitoring Scheme for PMD Compensation with ML-MIMO in Transceiver Hardware Impairments Scenario
Abstract: We propose a multi-layer filter architecture for compensating and monitoring impairments in transceiver, as well as polarization mode dispersion (PMD) during transmission. Through simulation, we demonstrate that our adaptive ML filter effectively compensates for impairments in Tx, Rx, and DGD while enabling their monitoring.

TS10-Fiber-Based Technologies and Applications-B

Date: September, 7	**Venue:** LM103-C
Presider: Yanhua Luo, Shanghai University	

10:45-11:15	Invited Speech

Speaker: Jianzhong Zhang
Affiliation: Harbin Engineering University
Title: Recent OLCR Based Characterization of Optical Fiber Devices
Bio: Zhang Jianzhong, received undergraduate training in semiconductor physics from Lanzhou University and got a Ph.D from Harbin Engineering University in 2007, now works as a professor at Harbin Engineering University and the executive director of Key Lab in-Fiber Integrated Optics, ministry of education, China. From 2006 to 2007 and from 2012 to 2013, he worked as visiting fellow and senior research fellow of University of New South Wales. At present, he is mainly engaged in optical fiber devices and their sensing applications in civil engineering, national grid, and ocean engineering. He has published more than 170 academic papers in refereed journals, participated in the editing of handbook of optical fiber, coauthored 5 chapters, and authorized more than 40 patents.
Abstract: Optical Low-Coherence Reflectometry (OLCR) is a non-destructive and high spatial resolution measurement system used for the characterization of optical devices. In this talk, we report the OLCR based characterization results of several optical devices, including fiber Bragg gratings (FBGs), Erbium-doped fibers, and composite laser crystals. How to improve the SNR and accuracy of OLCR based measurements is demonstrated and discussed, which could be expanded to the application range of OLCR based technology.

11:15-11:45	Invited Speech

Speaker: Changyuan Yu
Affiliation: The Hong Kong Polytechnic University
Title: Optical Fiber Sensors Based on Ring-Core and Hollow Core Bragg Fiber
Bio: Prof. Changyuan YU received his Ph.D. in Electrical Engineering from the Univ. of Southern California, USA in

2005. He was a visiting researcher at NEC Labs America in Princeton, USA in 2005. He then joined National Univ. of Singapore (NUS) in 12/2005, where he served as the founding leader of Photonic System Research Group in Dept. of Electrical and Computer Engineering till 12/2015. He was also a joint senior scientist with A*STAR Institute for Infocomm Research (I2R) in this period. And he was a visiting professor with Univ. of Melbourne, Australia in 2007. In 12/2015, he joined The Hong Kong Polytechnic Univ., where he is now a full professor in Dept. of Electronic and Information Engineering, while he also continues as an adjunct faculty member of NUS. His research focuses on photonic devices, optical fiber communication and sensor systems, and biomedical instruments. He has been the PI/co-PI/co-I of 50+ research projects with 10 million+ US dollars fund, and supervised 20+ postdocs and 40+ PhD students. He has authored/co-authored 6 book chapters and 600+ journal/conference papers (100+ keynote/invited, including OFC in USA). He served in organizing or technical program committees for 100+ international conferences, and Telecommunications Standards Advisory Committee for Singapore government. His group won 12 best paper awards in conferences and National Championship in China Innovation and Entrepreneurship Competition in 2014. He is an Optica/OSA fellow.

Abstract: We review our recent work on optical sensors based on ring-core fiber (RCF) and hollow core Bragg fiber (HCBF) for various applications, such as human breath detection, gas pressure measurement, and temperature sensing. The proposed optical fiber sensors are of all-fiber structure. In addition, taking advantage of the Vernier effect, the sensitivity of proposed fiber sensors can be significantly enhanced.

11:45-12:00	**Paper ID: 2553**

Author(s): Wei Han and Chao Wang
Affiliation: Nottingham Trent University

Title: Distributed Optical Fiber Sensing for Solid-Liquid Phase Change Detection for N-octadecane

Abstract: This paper introduces a new application of a distributed optical fiber sensor for real-time detection of phase changes in n-octadecane. The sensor array is created by splicing sections of no-core fiber between single-mode fibers, and phase changes are monitored via refractive index differences. Experimental results validate its capability to detect phase changes at different locations, showing potential for enhancing thermal energy storage systems. This study bolsters research in phase change detection and fiber sensing technology.

TS11-Optoelectronic Devices and Applications-B

Date: September, 7	**Venue:** LM104-A
Presider: Jiu-an Lv, Westlake University	

10:45-11:15	**Invited Speech**

Speaker: Wenjun Ni
Affiliation: South-Central Minzu University

Title: Fiber-membrane Composite Devices for Acoustic Sensing

Bio: Dr. Wenjun Ni, is currently an associate professor in South-Central Minzu University, Wuhan, China. He obtained the support by “Wuhan talent” program in 2021, and overseas talents of Hubei Province in 2022. He was a Postdoc (Research Fellow) in Centre of Optical Fiber Technology, Nanyang Technological University from 2019 to 2020 (Supervised by Prof. Perry Shum). Earlier, he got his Ph. D degree in Optical Engineering from Huazhong University of Science and Technology, Wuhan, China, in 2019. He works in the fields of special optical fiber device, fiber acoustic sensing and photoacoustic/photothermal spectrum in specialty fiber. He has more than 50 publications in international journals such as Optics Letters and Optics Express.

Abstract: Fiber optic broadband acoustic sensors have great potential applications in many civil and military fields, such as oil and gas pipeline leakage monitoring, high-precision photoacoustic spectrum detection, seismic wave monitoring and anti-submarine monitoring. Compared with the traditional electronic acoustic sensor, optical fiber acoustic sensor has the advantages of high sensitivity, resistant to strong electromagnetic interference, light weight, small size, resistant to corrosion and other irreplaceable advantages. The research of broadband acoustic sensor based on fiber-membrane composite devices structure has been conducted to achieve the goal of high sensitivity, high precision, fast response, ultra-wideband and small size of the acoustic sensor. Four different broadband acoustic sensors based on fiber-membrane composite devices have been designed. It can be divided into two categories: the one broadband acoustic sensor is based on the transmission-type special optical fiber device combined with membrane, and the other ultra-wideband acoustic sensor is based on the reflective EFPI structure combined with the membrane.

11:15-11:45	**Invited Speech**

Speaker: Ruijun Wang
Affiliation: Sun Yat-sen University
Title: Hybrid and Heterogeneous Photonic Integrated Circuits for Optical Communication and Sensing
Bio: Ruijun Wang is an associate professor in the School of Electronics and Information Technology at Sun Yat-sen University. Prior to this, he was a postdoctoral researcher in the Institute for Quantum Electronics at ETH Zurich. He received his PhD in 2017 in Photonics Engineering from the Ghent University-IMEC.

His research interest includes the photonics integrated circuits, semiconductor lasers and mid-infrared photonics. He has authored or co-authored over 50 refereed publications in international journals (e.g., Nature Communications, Optica, ACS Photonics, Photonics Research, IEEE JSTQE) and conferences.

Abstract: We present our recent work on the development of heterogeneously integrated III-V-on-silicon and III-V-on-lithium niobate photonic circuits. This integration approach enables large-volume, low-cost manufacturing of on-chip photonic systems for next-generation optical communication and sensing applications. It also provides a route to realize advanced semiconductor lasers.

11:45-12:00	**Paper ID: 9955**

Author(s): Ruoyun Yao, Yili Liu, Zhangwan Peng, Weiwei Pan, Xiaojun Ying and Chen Ji
Affiliation: Zhejiang University
Title: Bandwidth Optimization for InP-Based Traveling-Wave Mach-Zehnder Modulators
Abstract: We present systematic optimization on modulation bandwidth of InP Mach-Zehnder interferometer (MZI) modulators, considering electrode structure and doping concentrations to achieve beyond 100 GBaud modulation speeds in optical transmission networks.

TS12-Topological Photonics-A

Date: September, 7	**Venue:** LM104-B
Presider: Xiaodong Chen, Sun Yat-sen University	

10:45-11:15	**Invited Speech**

Speaker: Cuicui Lu
Affiliation: Beijing Institute of Technology
Title: Topological rainbow in Hermitian and Non-Hermitian Systems
Bio: Cuicui Lu is a professor in Beijing Institute of Technology, and a Young Changjiang Scholar from the Ministry of

Education. Her research interests include topological photonics and nanophotonics. She has published more than 60 papers (49 papers as the first or corresponding author), including 6 papers in Physical Review Letters, 2 papers in Nature Communications, 2 papers in Light: Science & Applications, a and one review paper in Advances in Optics and Photonics, etc. She serves as a Topical Editor of Optics Letters, a young editorial board member of Chinese Optics Letters. She obtained PIERS Young Scientist Award, and Journal of Optics Emerging Leaders.

Abstract: Topological photonics provides a new perspective for the study of light field manipulation and applications. In this talk, I will present our recent works about topological rainbow. When a perfect photonic crystal and a deformed one are pieced together, the topological photonic states can be formed at the interface; moreover, different frequencies can be obtained and localized at different positions accompanied by multiple topological states. Therefore, this contributes to the realization of topological rainbow device. As for non-Hermitian system, it is complicated and has elusive properties, and thus an effective Hamiltonian method combined by coupling coefficient fitting method has been developed. The method can be applicable for various non-Hermitian photonic crystals. These works provide new methods to the study of multi-frequency photonic devices.

11:15-11:45	**Invited Speech**

Speaker: Jiawei Wang
Affiliation: Harbin Institute of Technology
Title: Berry Phases in Optical Möbius-strip Microcavities
Bio: Wang Jiawei is currently an associate professor in the School of Electronics and Information Engineering, Harbin Institute of Technology (Shenzhen). He received his bachelor and PhD degrees from the School of Principles 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 ~40 SCI-indexed papers in Nature Photonics, Science Advances, Laser & Photonics Reviews, Nano Letters, ACS Nano, ACS Photonics and other journals, and participated in more than 20 international and domestic well-known conferences and forums such as CLEO, SPIE Photonics West, and FiO+LS.

Abstract: The Möbius strip, a fascinating loop structure with one-sided topology, provides a rich playground for manipulating the non-trivial topological behaviour of spinning particles, such as electrons, polaritons and photons, in both real and parameter spaces. For photons resonating in a Möbius-strip cavity, the occurrence of an extra phase—known as the Berry phase—with purely topological origin is expected due to its non-trivial evolution in parameter space. However, despite numerous theoretical investigations, characterizing the optical Berry phase in a Möbius-strip cavity has remained elusive. In this talk, we present the experimental observation of the Berry phase generated in optical Möbius-strip microcavities. In contrast to theoretical predictions in optical, electronic and magnetic Möbius-topology systems where only Berry phase π occurs, we demonstrate that a variable Berry phase smaller than π can be acquired by generating elliptical polarization of resonating light. Möbius-strip microcavities as integrable and Berry-phase-programmable optical systems are of great interest in topological physics and emerging classical or quantum photonic applications.

11:45-12:15	**Invited Speech**

Speaker: Xudong Liu
Affiliation: Shenzhen University
Title: Terahertz Topological Photonic Waveguide Switch for On-chip Communication
Bio: Dr. Xudong Liu received his Ph.D. in Electronic Engineering from The Chinese University of Hong Kong in 2017,

and joined Shenzhen University in 2018. His research interests include millimeter wave/terahertz modulators, millimeter wave/terahertz near-field/far-field high-speed imaging systems, terahertz time-domain spectral detection, and terahertz deep space detection. He has published tens of papers on high impact journals, including Nature Communications, Photonics Research, Advanced Optics Materials, APL Photonics, Optics Express, etc.. He has completed a Youth Program of NSFC as program supervisor.

Abstract: Terahertz (THz) topological photonic structures are promising for last-centimeter communication in intra/interchip communication systems, because they support bit-error-free THz signal transmission with topological robustness. Active and dynamically tunable THz topological photonic components have not yet been experimentally realized. Here, we experimentally demonstrate a THz topological switch (270–290 GHz) based on a valley Hall photonic crystal structured high-resistivity silicon substrate, in which the THz waves can be dynamically turned on/off by an external 447-nm continuous-wave laser. Our device exhibited an on/off ratio of 19 dB under a pumping light intensity of 240 mW/mm2. The 3-dB switching bandwidth was ~60 kHz.

TS13-Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-B

Date: September, 7	**Venue:** LM104-C
Presider: Xiaosong Yu, Beijing University of Posts and Telecommunications	

10:45-11:15	**Invited Speech**

Speaker: Chuantao Zheng
Affiliation: Jilin University
Title: On-Chip Mid-Infrared Gas Sensing Technology Using Optical Waveguide on Silicon
Bio: Dr. Chuantao Zheng is a Professor in State Key Laboratory of Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, China. He achieved the national-level young talent of the Ministry of Education of China in 2022, and the young and middle-aged leading scientific and technological innovation talents in Jilin Province in 2018. His research interests include infrared absorption spectroscopic gas sensing technology and application. In 2005, 2007 and 2010, he obtained the bachelor, master and Ph. D degree from Jilin University. In September 2013, he became an associate professor. In December 2016, he became a Ph.D supervisor. From September 2015 to September 2016, he went to Rice University as a visiting scholar. He was appointed as a full professor in September 2018. He has undertaken > 20 projects including National Natural Science Foundation of China and National Key R & D Program. As a first or corresponding author, he has published > 200 journal papers. He has been authorized 13 national invention patents and 3 software copyrights. He has published one academic monograph, and won the Jilin Natural Science Academic Achievement Award in 2014. Now he is a young editorial board member of the journal of Acta Photonica Sinica and also the journal of Acta Optica Sinica. He is a member of the Special Committee of Laser Spectroscopy of the Chinese Optical Society, a director of Jilin Detection Technology Society, a deputy director of the Spectral Branch of Jilin Analytical Testing Technology Society, a director of Jilin Optical Society and a deputy director of the Spectral Committee.

Abstract: Due to the advantages of small size, low power consumption, and light weight of on-chip integrated optical waveguide sensors, optical gas sensors have gradually developed from discrete gas sensing technology to on-chip integrated sensing technology in recent years. In terms of material platform, due to the relatively high loss of silicon dioxide (SiO2) in the mid-infrared, the commonly used silicon on insulator (SOI) is unsuitable for the mid-infrared band. It is necessary to use some transparent materials such as chalcogenide glass (ChG), germanium (Ge), and oxides to broaden the operating waveband. In terms of waveguide structure, conventional reported rectangular waveguides have low external confinement factor, resulting in weak interaction between gas molecules and infrared light, as well

as low sensitivity. Therefore, it is necessary to design new waveguide structures with high external confinement factors to improve the sensitivity of on-chip gas detection. In terms of on-chip gas sensing technology, direct absorption spectroscopy (DAS) is widely used, but this technique is susceptible to 1/f noise and laser intensity fluctuations, leading to poor stability as well as low sensitivity. Regarding the above issues, we mainly explore mid-infrared optical waveguide gas sensors based on material platforms such as SOI, polymers, chalcogenide glasses, and oxides. Rectangular, slot, and suspended waveguide structures were designed, and gas sensors were fabricated using techniques such as lift off and magnetron sputtering. Direct absorption spectroscopy, wavelength modulation spectroscopy, microcavity-enhanced absorption spectroscopy, and surface-enhanced spectroscopy were used for methane (CH4) and carbon dioxide (CO2) measurement at the absorption wavelengths of 3.3 μm, 4.2 μm and 7.6 μm, and the on-chip detection performances of the fabricated waveguide sensors were analyzed and compared.

11:15-11:45	**Invited Speech**

Speaker: Baile Chen

Affiliation: ShanghaiTech University

Title: High-speed III-V Photodetectors: From Near-infrared to Mid-infrared

Bio: Baile Chen received his bachelor degree in physics from the Department of Modern Physics at the University of Science and Technology of China in Hefei, China, in 2007. He received his master degree in physics and Ph.D degree in electrical engineering both from the University of Virginia, Charlottesville, VA, USA in 2009 and 2013, respectively. In February of 2013, he joined Qorvo Inc in Oregon as an RF product development engineer working on various RF power amplifiers and BAW filters for RF wireless communication systems. In January 2016, He joined the School of Information Science and Technology at Shanghai Tech University, where he is currently a tenured associate professor. Dr. Baile Chen has currently published 50 journal papers as the first author or corresponding author.

Abstract: The development of terahertz (THz) technology has driven the demand for high-speed and high-power photodiodes (PDs). Uni-traveling carrier photodiodes (UTC-PDs), with only electrons as the active carriers in the drift layer, are one of the most promising options for applications such as mm-wave communication and photonic microwave generation. In this talk, I will report the low dark current evanescently-coupled waveguide modified uni-traveling carrier (MUTC) photodiodes with an external responsivity of 0.18 A/W, and a 3-dB bandwidth over 220 GHz. The RF output power reaches −4.36 dBm at 215 GHz. Moreover, I will present the most recent work about the high MWIR photodiodes for free space communications as well.

11:45-12:15	**Invited Speech**

Speaker: Song Han

Affiliation: Zhejiang University

Title: Kekulé-distorted Topological Cavities: Promising Platforms for Beam-engineered Micro-nano Lasers

Bio: Dr. Song Han received his Ph.D. in Physics from Division of Physics and Applied Physics, School of Physical and Mathematical Sciences, Nanyang Technological University (NTU), Singapore in 2020. From 2020 to 2022, he worked as a postdoctoral research fellow in the School of Electrical and Electronic Engineering at NTU, then he became a research professor at Zhejiang University-Hangzhou Global Scientific and Technological Innovation Center since June 2022. His research interests focus on terahertz ultrafast physics, terahertz integrated photonics & electronics, emerging functional semiconductor lasers, metamaterials, and photonic topological insulators, based on which he has published more than 40 peer-reviewed papers on many high-impact journals, such as Nat. Commun., Light: Sci. & Appl., Adv. Mater., Laser Photon. Rev., Adv. Funct. Mater., SMALL, ACS NANO, and so on. He also applied for 2 Singapore patents.

Abstract: "It has been one of the most exciting breakthroughs in photonics since the past few years that the concept of topology has been introduced into the design of photonic devices, achieving robust photonic functionalities with high performance, as manifested in the recently invented topological lasers. Here, we demonstrate several topological cavities based on a photonic analogue of a Majorana zero mod [1] and topological bulk bound states in the continuum (BICs) [2]. We further show that these topological cavities can generate cylindrical vector (CV) beams, lateral shift of Gaussian beams, and vortex beams. Our topological cavities are promising for novel semiconductor laser devices.

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TS14-Quantum Optics and Information-B

Date: September, 7	**Venue:** LM105
Presider: Yongmin Li, Shanxi University	

10:45-11:15	**Invited Speech**

Speaker: Jin Wang

Affiliation: Innovation Academy for Precision Measurement SCience and Techonolgy, CAS

Title: The Space Cold Atom Interferometer for Testing the Equivalence Principle in the China Space Station

Bio: Jin Wang, a professor of Innovation Academy for Precision Measurement Science and Technology, CAS. He graduated from Anhui Institute of Optics and Fine Mechanics, CAS in 1999 with a doctorate degree. He was engaged in cooperative research in the Blackett Laboratory of Imperial College London in 1999, and was a senior visiting scholar at Stanford University in the United States from 2006 to 2007. He mainly engaged in the experimental research of cold atom interferometer, designed and realized a 10-meter atom interferometer and tested equivalence principle using atoms at a high level. He applied atom interferometer technology to inertial measurement, and successfully developed atom sensors. He published more than 70 SCI papers, 1 monograph, 2 chapters, and obtained 16 authorized invention patents. Abstract: We use rubidium atoms with specified mass and internal energy to carry out a joint mass-energy test of the equivalence principle (EP).

Abstract: The precision of the weak equivalence principle (WEP) test using atom interferometers (AIs) is expected to be extremely high in microgravity environment. The microgravity scientific laboratory cabinet (MSLC) in the China Space Station (CSS) can provide a higher-level microgravity than the CSS itself, which provides a good experimental environment for scientific experiments that require high microgravity. We designed and realized a payload of a dual-species cold rubidium atom interferometer. The payload is highly integrated and has a size of 460mm´ 330mm´ 260 mm. It will be installed in the MSLC to carry out high-precision WEP test experiment. In this article, we introduce the constraints and guidelines of the payload design, the compositions and functions of the scientific payload, the expected test precision in space, and some results of the ground test experiments.

11:15-11:45	**Invited Speech**

Speaker: Yong-Chun Liu

Affiliation: Tsinghua University

Title: Enhanced Sensing with Exceptional Points in Thermal Atomic Ensembles

Bio: Yong-Chun Liu is an associate professor at Department of Physics, Tsinghua University. He received his PhD degree in physics from Peking University. His research interests include quantum optics and quantum precision measurement. He has published over 70 papers, with a total citation of over 3000 and H index of 32.

Abstract: Exceptional points (EPs) in non-Hermitian systems have recently attracted wide interests and spawned intriguing prospects for enhanced sensing. However, EPs have not yet been realized in thermal atomic ensembles, which is one of the most important platforms for quantum sensing. Here we experimentally observe EPs in multi-level thermal atomic ensembles, and realize enhanced sensing of magnetic field for one order of magnitude. We take advantage of the rich energy levels of atoms and construct effective decays for selected energy levels by employing laser coupling with the excited state, yielding unbalanced decay rates for different energy levels, which finally results in the existence of EPs. Furthermore, we propose the optical polarization rotation measurement scheme to detect the splitting of the resonance peaks, which makes use of both the absorption and dispersion properties, and shows advantage with enhanced splitting compared with the conventional transmission measurement scheme. Besides, in our system both the effective coupling strength and decay rates are flexibly adjustable, and thus the position of the EPs are tunable, which expands the measurement range. Our work not only provides a new controllable platform for studying EPs and non-Hermitian physics, but also provide new ideas for the design of EP-enhanced sensors and opens up realistic opportunities for practical applications in the high-precision sensing of magnetic field and other physical quantities.

11:45-12:00	**Paper ID: 7752**

Author(s): Ching-Nung Yang, Chih-Yueh Tseng and Ming-Chan Lu

Affiliation: National Dong Hwa University

Title: Enhanced Reconciliation of Quantum Key Distribution

Abstract: Quantum key distribution (QKD) could share a secret key between two distant nodes Alice and Bob. In the presence of an eavesdropper and noisy channel, Alice's key may not be the same as Bob's key. Thus, QKD protocol has to provide not only the distribution in key agreement phase but also the integrity in key verification phase. Error reconciliation is often used in QKD to share identical keys between Alice and Bob in key verification phase. Recently, Kurt et al. introduce a reconciliation algorithm for QKD (RQKD) to prevent error propagation in some previous reconciliation algorithms. Kurt et al.'s RQKD is a block-wise operation, and uses polynomial interpolation for reconciliation. However, if the x-axis values of polynomials are the same the blocks are removed. In this paper, we propose an enhanced RQKD (ERQKD) to deal with this weakness. When using polynomial-interpolation approach for reconciliation, our ERQKD without deleting block improves the efficiency of sharing qubits.

TS15-Laser Technology-C

Date: September, 7	**Venue:** LM103-A
Presider: Boyao Li, Dongguan University of Technology	

13:30-14:00	**Invited Speech**

Speaker: Xiaosheng Xiao

Affiliation: Beijing University of Posts and Telecommunications

Title: Recent Advances in Spatiotemporal Mode-Locked Multimode Fiber Lasers

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 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, and fiber optics.

Abstract: Spatiotemporal mode-locking, i.e., simultaneously locking of multiple transverse and longitudinal modes, is a general form of mode-locking. In this Presentation, recent advances and future outlook in spatiotemporal mode-locked multimode fiber lasers will be given.

14:00-14:30	**Invited Speech**

Speaker: Yudong Cui

Affiliation: Zhejiang University

Title: Real-time Spectral Interferometry Measurement and Application for Ultrafast Fiber Laser

Bio: Dr. Yudong Cui received his Ph.D. in optical engineering from the University of Chinese academy of sciences in 2017. During 2016-2018, he conducted postdoctoral research in Zhejiang University and then joined the college of optical science and engineering of Zhejiang University. He has published more than 30 papers in high-impact academic journals, such as Physical Review Letters, Laser & Photonics Reviews, Optica and so on, with more than 2000 citations. h index is 20 Severn of these papers were selected as ESI "highly cited papers" and one was selected as "ESI Hot Papers". He has contributed to the studies on carbon-based saturable absorber for mode-locked fiber laser, nonlinear optics on XPM-induced soliton evolution, and precision measurement based on real-time interference spectroscopy. His current research interests include ultrafast laser generation, regulation and application, such as optical frequency comb, nonlinear fiber optics, and application in precision measurement and imaging.

Abstract: Ultrafast fiber laser technology has the characteristics of compact structure, good environmental stability and high conversion efficiency, and has been widely used in industrial processing, precision measurement, ophthalmic medicine and other fields. In recent years, based on dispersion-compensated fiber or other dispersive media, the dispersion Fourier transform technology has been developed, which makes it possible to measure the spectrum of ultrafast laser in real time, and greatly promotes the understanding of ultrafast fiber laser. The spectral interference of two or more ultrafast laser pulses can reflect the information in time domain, which can be perfectly combined with the dispersive Fourier transform technology, and pave a way to measure the real-time temporal features. We have studied the motion process of the dichromatic soliton breather by using the real-time spectral interferometry measurement technique, and found the novel phenomena of transient evolution and interaction. A real-time distance measurement device based on ultrafast fiber laser is established, and a data processing method based on cosine function fitting is developed to realize high-speed distance measurement with sub-nanometer accuracy, and greatly reduce the requirement of sampling bandwidth, which effectively promotes the practical application of the technology.

14:30-15:00	**Invited Speech**

Speaker: Bowen Liu

Affiliation: The University of Tokyo

Title: Hybrid Tunable All-polarization-maintaining Mode-locked Fiber Laser with Enhanced Ambient Thermal Adaptivity and Sweeping Rate

Bio: Mr. Bowen Liu obtained his Bachelor and Master degree in Optoelectronic Information Science from Huazhong University of Science and Technology in 2017 and 2020. He moved to EEE of Nanyang Technological University for 1 year as a visiting student from 2019. He then joined RCAST at the University of Tokyo to continue Ph.D. study. Beginning in 2022, Bowen has served as the president of the OPTICA (Formerly OSA) U-Tokyo chapter. Curretly his research interests include exploration of novel ultrafast fiber laser configurations, extension of generation wavelength range for potential engineering applications

Abstract: Wavelength-tunable mode-locked fiber lasers have been attracting growing attention for widespread applications on all-optical signal processing, multiplexing sensing networks, precise spectroscopy and microscopy. Typically, a tunable laser depends on a certain tunable mechanism. Inherited constraints such as the use of non-fiber elements, short tunable range, poor consistency and reproductivity during tuning process, however always damaging the performance of tunable lasers. Besides, extra stabilizing assistants are usually required to realize good long-term robustness. In our lab, different all-PM fiberized Lyot-filters with compact sizes are designed, the application of which on tunable femtosecond laser sources is demonstrated. Particularly, hybrid wavelength-tuning of self-started mode-locking is enabled through combining both mechanical and non-mechanical mechanisms of stretching, twisting and heating with the use of the proposed filters. More than 40-nm free spectral space is realized with a lesser extent of adjustment compared to non-hybrid tuning. In addition, at least 2.4 times optimization with respect to the long-term robustness is achieved, which indicates an enhanced adaptability towards ambient thermal drifts. Apart from the hybrid tunable laser, high-speed wavelength sweeping is also investigated through applying an uniquely designed piezoelectric lead zirconate titanate fiber stretcher. 0.052nm/με strain sensitivity is achieved, leading to 43 times improvement than that achievable by other strain-controlled filters such as a fiber Bragg grating filter (0.0012nm/με). Wavelength-swept rates up to 500 Hz and wavelength tuning speeds up to 13,000 nm/s are also demonstrated, which is hundreds of times faster than what is attainable with conventional sub-picosecond mode-locked lasers based on mechanical tuning methods. These works explore promising solutions for advanced wavelength-tunable seed laser sources.

15:00-15:30	Invited Speech

Speaker: Hongyan Fu
Affiliation: Tsinghua University
Title: Optical Wireless Communication and LiDAR Fusion towards 6G
Bio: Dr. Fu is currently a tenured-associate professor, deputy director of Research office, and director of Nano-fabrication platform, Tsinghua Shenzhen International Graduate School (SIGS), Tsinghua University, Shenzhen, China. From 2010 to April 2017, Dr. Fu was a founding member and leading the advanced optic communications research at Central Research Institute, Huawei. His research interest focuses on integrated photonics and its related applications for communications and sensing, including optical wireless communication, LiDAR and silicon photonics, etc. He is a senior member of IEEE, Optica and life member of SPIE. He is the founding advisor of Optica/IEEE Photonics Society/SPIE Student Chapters at Tsinghua SIGS, Tsinghua University. He has authored/coauthored over 300 journal or conference papers, 3 book chapters, over 80 granted/pending China /Europe/Japan/ US patents.

Abstract: We will review our research progresses on optical wireless communication and LiDAR integration systems for 6G, with the focus on exploring and breaking through the key technologies. Efficiently integrating LiDAR and optical wireless communication enables high-speed and high-precision system.

TS16-Optical Communication and Networks-C

Date: September, 7	**Venue:** LM103-B
Presider: Jinlong Wei, Peng Cheng Laboratory	

13:30-14:00	Invited Speech

Speaker: Tao Yang
Affiliation: Beijing University of Posts and Telecommunications

Title: Optical Labeling-based WDM Optical Network Monitoring

Bio: Tao Yang (Member, OSA/IEEE) received the Ph. D. degree in Information and Communication Engineering from the Beijing University of Posts and Telecommunications (BUPT), in 2019. He is currently a lecturer with state key laboratory of information photonics and optical communications, BUPT. His research interests include high-speed optical transmission, optical interconnect and optical access network, intelligent optical network performance monitoring.

Abstract: Optical labeling-based performance and status monitoring of WDM optical networks, including optical power, OSNR, channel parameters, wavelength connection status, and optical filter impairments, will be reviewed and discussed.

14:00-14:30	**Invited Speech**

Speaker: Zuqing Zhu

Affiliation: University of Science and Technology of China

Title: Service Provisioning in Wavelength-Switched Optical Networks based on P2MP Transceivers

Bio: Zuqing Zhu received his Ph.D. degree from the Department of Electrical and Computer Engineering, University of California, Davis, in 2007. From 2007 to 2011, he worked in the Service Provider Technology Group of Cisco Systems, San Jose, California, as a Senior Engineer. In January 2011, he joined the University of Science and Technology of China, where he currently is a Full Professor and vice Dean of the School of Information Science and Technology. He has published 360+ papers in peer-reviewed journals and conferences. He is an editorial board member of IEEE Transactions on Network and Service Management, Optics Express, Optical Switching and Networking, and others. He is a Steering Committee Member of the IEEE International Conference on High Performance Switching and Routing (HPSR), a Distinguished Lecturer of the IEEE Communications Society (ComSoc), and the Chair of the Technical Committee on Optical Networking (ONTC) in ComSoc. He has received the Best Paper Awards from ICC 2013, GLOBECOM 2013, ICNC 2014, ICC 2015, and ONDM 2018. He is a Fellow of IEEE.

Abstract: We address the challenge of provisioning dynamic requests in a wavelength-switched optical network (WSON) built with coherent point-to-multipoint transceivers (P2MP-TRXs) in this work. An efficient heuristic for transceiver, routing, and spectrum assignment (TRSA) is proposed, along with a subcarrier (SC) level proactive defragmentation method that can further enhance the provisioning performance through reconfiguring the spectrum allocations of leaf P2MP-TRXs. Extensive simulations confirm the effectiveness of our proposals.

14:30-15:00	**Invited Speech**

Speaker: Shaohua Hu

Affiliation: University of Electronic Science and Technology of China

Title: Full Picture of the Field Recovery for IMDD Transmission System

Bio: Dr. Shaohua Hu got his Bachelors Degree and PhD at UESTC in 2015 and 2022. His was a visiting PhD in DSP Center of Excellence of Bangor University. He serves as the Postdoc in UESTC from 2022. Now he majors in DSP research for IMDD and coherent MIMO optical fiber systems.

Abstract: This talk presents a series of DSP progresses in optical IM/DD transmission systems for dispersion compensation. The new technique achieves better convergence perfromance and better robustness for band-limited channels.

15:00-15:15	**Paper ID: 7970**

Author(s): Muqi Liu, Jianyu Wang, Linsheng Fan, Yong Yao and Yanfu Yang

Affiliation: Harbin Institute of Technology, Shenzhen

Title: Fast and Joint Transceiver Impairments Monitoring Algorithm Based on Extended Kalman Filter

Abstract: We proposed a joint compensation and monitoring scheme for transceiver IQ imbalance, frequency offset,

phase noise, and polarization rotation based on an extended Kalman filter. Simulation results demonstrate that the scheme can compensate and monitor the imbalance accurately in a fast and joint manner, even under extreme polarization rotation conditions.

15:15-15:30	Paper ID: 6190

Author(s): Xiangyu Wan, **Bangjiang Lin**, Zabih Ghassemlooy, Tianming Huang, Jiabin Luo and Yongqi Ding
Affiliation: Chinese Academy of Sciences
Title: Experimentally Demonstration of Non-line-of-sight Optical Camera Communications based on CPWM and Convolutional Neural Network
Abstract: In this work, we propose a color pulse width modulation (CPWM) NLOS optical camera system and adopt a convolutional neural network (CNN) demodulation scheme. Experimental results show that the proposed scheme effectively mitigates the effects of diffuse reflection induced intersymbol interference, achieving a transmission rate of 7.2 kb/s on a NLOS link exceeding 2 meters.

TS17-Fiber-Based Technologies and Applications-C

Date: September, 7	**Venue:** LM103-C
Presider: Junqing Zhao, Shenzhen Technology University	

13:30-14:00	Invited Speech

Speaker: Shiying Xiao
Affiliation: Beijing Jiaotong University
Title: Polarimetric Fiber Laser Sensor with Enhanced Sensitivity by Utilizing a Hi-Bi EDF
Bio: Shiying Xiao received the Ph.D. degree in Information and Communication Engineering from Beijing Jiaotong University, Beijing, China, in 2019. She is currently an associate professor at Beijing Jiaotong University. Her research interests include optical fiber sensors, optical fiber lasers and their applications.
Abstract: We propose a polarimetric fiber laser sensor with enhanced sensitivity by utilizing a high birefringence Erbium doped fiber (Hi-Bi EDF) and beat frequency demodulation. The strain and temperature sensing tests are carried out by monitoring the frequency difference between two adjacent polarimetric mode beat frequencies. The fiber laser sensor exhibits a high temperature sensitivity of 99.61 MHz/℃ and a high strain sensitivity of 1.405 MHz/με, which are 2~3 orders of magnitude higher than those of its counterparts presented in previous literature.

14:00-14:30	Invited Speech

Speaker: Yunqi Liu
Affiliation: Shanghai University
Title: Long-Period Fiber Grating Magnetic Current Sensors
Bio: Yunqi Liu received the Ph.D. degrees in Optics from Nankai University, China, in 2000. From 2000 to 2008, he worked as a Research Fellow in School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, in School of Engineering, City University London, U.K., and in Department of Electronic Engineering, City University of Hong Kong, Hong Kong, China, respectively. He joined the School of Communication and Information Engineering, Shanghai University, China, as a full professor in 2008. He was supported by the Program for Professor of Special Appointment (Eastern Scholar) at Shanghai Institutions of Higher Learning, China. He has published more than 230 papers on fiber gratings, fiber optic sensors and optical fiber communications.
Abstract: We demonstrate the fabrication of long-period fiber gratings (LPFGs) by using focused carbon dioxide laser. The mode coupling and characteristics of the LPFGs written in the specialty fibers were investigated

experimentally. The high sensitivity magnetic current sensors are proposed based on the fabricated gratings including the LPFGs operating at the dispersion turning point, the LPFGs inscribed in thin-cladding polarization-maintaining fibers. The LPFGs could have promising application as high sensitivity optical sensors.

14:30-14:45	Paper ID: 5102

Author(s): Yihong Xiao, Huanhuan Liu, Zhiyong Zhao, Xingliang Shen, Jialong Li, Yuntian Wang, Zhengting Wu, Yutian Liu, Dajuan Lv, Hong Dang and Perry Ping Shum

Affiliation: Southern University of Science and Technology

Title: Fading Suppression and Enhanced Signal-to-noise ratio in Multicore Fiber Integrated Φ-OTDR System

Abstract: We have proposed and demonstrated the combination of space-division-multiplexing (SDM) and frequency-division-multiplexing (FDM) techniques in multicore fiber (MCF) integrated phase-sensitive optical time-domain reflectometry (Φ-OTDR) for achieving fading suppression and enhanced signal-to-noise ratio. By using spectral mainlobe and sidelobe reconstruction (SMSR) method in the 2.58-km-long MCF, the fading rate of two cores of MCF is reduced from 2.21% to 0.02%. And the disturbance at 2.55km is accurately located and restored. The obtained results show great potential in application of weak signals detection over long distances.

14:45-15:00	Paper ID: 7954

Author(s): Bowen Liu, Maolin Dai, Takuma Shirahata, Shinji Yamashita and Sze Yun Set

Affiliation: The University of Tokyo

Title: Bidirectional Polarization-Multiplexing Fiber Laser Enabling Tunable-Repetition-Rate Dual Combs

Abstract: Ultrafast laser is an ideal playground for the study of precise spectroscopy and microscopy that heavily rely on the high-performance optical frequency combs, which is the unique nature of mode-locked fiber lasers. In particular, dual-comb fiber lasers can greatly improve system performance while reducing complexity by developing self-referencing combs and coupling pulse trains with different repetition rates. Whereas the repetition rate is generally determined for a certain lasing resonator, which creates additional constraints in dual-comb applications. Here, we developed a bidirectional polarization-maintaining fiber laser, where the repetition rate of mode-locked pulse trains can be tuned continuously inside the cavity. The proposed laser outputs mutually orthogonal polarization states in opposite directions, and the maximum tuning range of the repetition rate reaches 681.6 kHz. Compared with referencing CW loop, the RF difference reaches 978.2 kHz, almost equal to 1 MHz. Meanwhile, the two directions generate pulses with nearly the same central wavelength, enabling excellent capacity in self-referencing dual-comb generation. This tunable-repetition-rate dual-comb source is promising for two-photon fluorescence microscopy, precise metrology of wavelength and synchronization of other combs based on fiber lasers with different repetition rate, etc.

TS18-Optoelectronic Devices and Applications-C

Date: September, 7	**Venue:** LM104-A
Presider: Xiaolu Zhuo, The Chinese University of Hong Kong	

13:30-14:00	Invited Speech

Speaker: Mengyuan Ye

Affiliation: China University of Geosciences

Title: Silicon Integrated Optical Phase Array with Non-uniform Antenna

Bio: Mengyuan Ye received Ph.D degree in Optical engineering from Huazhong University of Science and Technology, China. He is now an associate professor in the school of automation, China University of Geosciences. His research interests include silicon photonics, Lidar technique and optical communication.

Abstract: With the developments of autonomous driving, remote sensing and 3D imaging, light detection and ranging (Lidar) has been investigated extensively Among all kinds of Lidar technologies, silicon integrated optical phased array (OPA) is commonly regarded as the most prominent candidate by taking advantages of low-cost, high reliability and small-footprint. Here we demonstrate our resent progress on OPAs with non-uniform antenna design, in which both steering range and detection resolution could be improved significantly.

14:00-14:30	Invited Speech

Speaker: Liangcai Cao

Affiliation: Tsinghua University

Title: Pixel Super-resolution Phase Retrieval Algorithms for Digital Holography

Bio: Liangcai Cao received his BS/MS and PhD degree from Harbin Institute of Technology and Tsinghua University, in 1999/2001 and 2005, respectively. Then he became an assistant professor at Department of Precision Instruments, Tsinghua University. He is now tenured professor at Tsinghua University. He was a visiting scholar at UC Santa Cruz and MIT in 2009 and 2014. His current research interests are holographic imaging and display. He is SPIE fellow and OPTICA fellow.

Abstract: Lensless microscopy is an emerging imaging modality that overcomes the inherent limitation of conventional lens-based optics, especially in terms of imaging throughput, functionality, and cost-effectiveness. Pixel super-resolution phase retrieval serves as the key underlying technique for reconstructing high-resolution holographic images from the raw measurements. In this talk, we revisit lensless microscopy from a computational imaging perspective. A unified mathematical framework is established and the encoding and decoding mechanisms of the phase and subpixel information are analyzed. Regularization and Nesterov’s momentum techniques are introduced to speed up the data acquisition and reconstruction procedures, respectively. The proposed algorithms are verified through a proof-of-concept lensless on-chip microscope. We experimentally demonstrate the capability of pixel super-resolution phase retrieval techniques in revealing the subpixel and quantitative phase information of complex biological samples.

14:30-15:00	Invited Speech

Speaker: Dan Wu

Affiliation: Shenzhen Technology University

Title: Optical Field Manipulation Energized Perovskite Optoelectronic Devices

Bio: Dr. Dan WU, Associate Professor (permanent appointment) in Shenzhen Technology University, who was selected as the Overseas High-caliber Personnel (Level C) in Shenzhen and High-Level Talents in Nanshan District of Shenzhen. Her major research interests include optical field manipulation by micro/nanostructures and their application in the information and energy fields. Specifically, her research interests include the rational growth control over the perovskite/III-V optoelectronic materials and the kinetics and kinematics analysis; fabrication of highly efficient optoelectronic devices (photodetectors, light-emitting diodes etc.); coupled opto-electrical modeling and analysis for the optoelectronic devices. She has authored and coauthored 63 journal articles on international high level academic journals by SCI collection including Nature, Advanced Science, Advanced Optical Materials, Chemistry of Materials, Applied Physics Letters, Optics Express. There are 26 journal articles fall in the rank of Q1 SCI and 4 articles were selected as the front or back cover. The total citation is 1189 times with H-index of 22. There are 13 conference proceedings and two were selected as the best student and distinguished paper. She is currently the reviewer of Journal of Materials Chemistry A, Optics Express, Chinese Laser, Optics Letters etc..

Abstract: Organic-inorganic halide perovskites have demonstrated a great potential for optoelectronic devices. Typical optoelectronic devices possess vertical configurations with active layer sandwiched between electron

transport layer (ETL) and hole transport layer (HTL). To reduce the unwanted defects and nonradiative recombination centers, interfaces at the perovskite/HTL and perovskite/ETL are intensively investigated by researchers. To further boost the performance of the devices, our focus is put on interfacial heterojunction construction for perovskite optoelectronic devices. First of all, we will present in situ growth of high-quality all-inorganic perovskite single crystal arrays on cubic zinc oxide (c-ZnO) as an inorganic ETL via a facile spin-coating method. Moreover, we will talk about the development of in situ growth methods for the fabrication of high-quality perovskite single-crystal thin films (SCTFs) directly on HTLs. During this talk we will try to unravel the growth mechanism of large-area high-quality SCTFs with thin thickness. Finally, a general design guideline, which is applicable to both inverted and regular structures, is proposed for high-performance perovskite photodiodes through built-in electric field for efficient carrier separation and transport. The built-in electric field generated at the interface between active layer and charge transport layer far from the light incident side is critical for effective charge carrier collection to the electrodes. Manifesting the origin of the built-in electric field stems from the unintentional doping of perovskite, this optimization strategy is compatible with existing materials and device structures, and hence leads to substantial potential applications in perovskite photodiodes and other perovskite-based optoelectronic devices.

15:00-15:15	**Paper ID: 6712**

Author(s): Liu Xingtan, Zou Yue, Yan Sichang, Zhang Lihua, Yin Lu, Guo Jian and Liu Lu
Affiliation: Beijing Institute of Control Engineering
Title: Analysis of the Accuracy and Influencing Factors of Space Flexible Vibration Target Position and Attitude Measurement
Abstract: The accuracy and influencing factors of pose measurement for flexible vibration targets in space were analyzed, and pixel residuals (Pr) were studied as the key factor. Based on the theory of monocular vision measurement, a position and attitude measurement method for flexible vibration cooperative targets is proposed. Firstly, input constraints, including estimated vibration amplitude, target size envelope, and expected measurement accuracy; Then decompose the indicators under constraint conditions to design camera parameters and target configuration; Furthermore, multiple parameter combinations were used to simulate the monocular solution process and evaluate the deviation between the measured values and the true values. Finally, the impact of pixel residuals on accuracy was quantitatively analyzed, and the feasibility and economy of engineering implementation were comprehensively considered. In the example of a distance of 20m, multiple parameter design combinations with a three-axis position accuracy of better than 0.2mm and an attitude accuracy of better than 0.02° were obtained. The optimal combination was selected to verify the effectiveness of pixel residuals selection.

TS19-Biophotonics and Optical Biomedicine-B

Date: September, 7	**Venue:** LM104-B
Presider: Anhui Liang, Ningbo Micro-color Optical Communication Limited.	

13:30-14:00	**Invited Speech**

Speaker: Yi Li
Affiliation: Southern University of Science and Technology
Title: Boosting Single-Molecule Fluorescence via Slotted Gallium Phosphide Nanodisks at Anapole States
Bio: Dr. Yi Li, currently serves as Tenure-track Associate Professor of School of Microelectronics, SUSTech. He has been working on nanoplasmonics, nano-optics and biochips over his research stay in Zhejiang University (China), imec & KU Leuven (Belgium), Delft University of Technology (TUD, Netherland), Imperial College London (UK) as well as

Ludwig-Maximilians-Universität München (LMU, Germany). He has published more than 50 peer-reviewed journal articles, including first author papers on 1x Nature Communications, 4x Nano Letters, 2x ACS Nano and 1x Advanced Functional Materials.

Abstract: Chip-integrated gallium phosphide (GaP) nanostructures are proposed for directional single-emitter sources. Excited via butt-coupled waveguides, GaP nanodisks at anapole states exhibits more than 5× excitation enhancement and ~40× radiative decay rate enhancement at 550 nm.

14:00-14:30	Invited Speech

Speaker: Xiaojun Yu

Affiliation: Northwestern Polytechnical University

Title: Loss-balanced Parallel Decoding Network for Retinal Fluid Segmentation in OCT

Bio: Dr. YU received his PhD degree and postdoctoral training from nanyang technological university in 2015 and 2017, respectively, and after which he joined northwestern Polytechnical university as an associate professor. His main research interests include optical biomedical imaging, biomedical signal and image processing, and robotic control.

Abstract: We discuss about a new loss-balanced parallel decoding network, namely PadNet, for macular edema (ME) segmentation in in retinal OCT images. To improve the segmengtation efficiency, PadNet is integrated with three branches to process the label images, edge label images, and distance map pixels, respectively, and the effectiveness and efficiency of PadNet are verified with extensive experimental results as compared with those of the existing algorithms.

14:30-15:00	Invited Speech

Speaker: Yuemei Luo

Affiliation: Nanjing University of Information Science and Technology

Title: Retinopathy Classification with a Semi-supervised Learning from Optical Coherence Tomography Images

Bio: Dr. Yuemei Luo is currently an associate professor with the Institute for Artificial Intelligence in Medicine, School of Artificial Intelligence, Nanjing University of Information Science and Technology (NUIST). She received the B.Eng. degree in mechanical design, manufacturing and automation from the University of Electronic Science and Technology of China (UESTC) in 2011 and the Ph.D. degree from the School of Electrical and Electronic Engineering, Nanyang Technological University (NTU), Singapore, in 2018. Her main research focuses on the high- resolution optical coherence tomography (OCT), including the endoscopic probes for clinical applications in gastrointestinal and cardiovascular fields, automatic detection of early disease in ophthalmology and dermatology via machine learning.

Abstract: Artificial intelligence has provided an effective means for automatic detection of retinopathy from optical coherence tomography (OCT) images in clinic. However, traditional deep learning methods for retinopathy classification rely on a large amount of labeled data, while the image annotation by human experts is time-consuming and it may not be available in clinical applications. To mitigate the requirement for labeled data, we propose an image-to-classification approach of retinopathy by semisupervised deep learning built upon pre-trained VGG-16 and FixMatch via OCT images. During the model training, it only takes very few labeled OCT images and a number of unlabeled OCT images obtained with minimal human labor. In experiments, the algorithm produces artificial labels by using both consistency regularization and pseudo-labeling, and we have evaluated the proposed method on two popular datasets. With only 80 labeled OCT images, the proposed method can achieve classification accuracies of 0.956 and 0.948, specificities of 0.975 and 0.98, and AUCs (Area under the ROC Curves) of 0.997 and 0.995 on the two datasets, respectively. When comparing with human experts, the proposed method achieves expert level with 80 labeled OCT images and is capable of accurately predicting retinopathy of the input OCT images.

15:00-15:30	Invited Speech

Speaker: Yuchao Li
Affiliation: Jinan University
Title: Nano-optical Manipulation and Imaging Using Optical Fiber Probes
Bio: Yuchao Li is currently an Associate Professor in the Institute of Nanophotonics, Jinan University, and a director for Laboratory of Nanophotonic Manipulation. 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 and Journal of Innovative Optical Health Sciences. 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.
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 trandictional optical tweezers and microscopes have become powerful tools to manipulate and image 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 super-resolution imaging, biosensing and single-cell studies.

TS20-Silicon Photonics-A

Date: September, 7	**Venue:** LM103-A
Presider: Qian Li, Peking University Shenzhen Graduate School	

16:00-16:30	**Invited Speech**

Speaker: Xiaochuan Xu
Affiliation: Harbin Institute of Technology, Shenzhen
Title: Construction of Exceptional Points in an On-chip Microring Resonator
Bio: Dr. Xu received his Bachelor and Master degrees in Physical Electronics from the gifted youth program of Harbin Institute of Technology, in 2006 and 2009, respectively. He received the Ph.D. degree in Electrical Engineering from the University of Texas at Austin in 2013. He joined Harbin Institute of Technology (Shenzhen) in 2019.
Dr. Xu’s research focuses on integrated photonics and subwavelength photonics, and their applications in optical interconnect, sensing, and computing. Dr. Xu has published more than one hundred peer-reviewed papers in prestigious journals and conferences, including ACS Nano, Laser & Photonics Review, Physical Review Letters, Optics Letters, Optics Express, and Applied Physics Letters, with H-index of 26 and I-10 index of 46. He has served as the principal investigator for multiple projects supported by Air Force Office of Scientific Research (AFOSR), National Institute of Health (NIH), Department of Energy (DOE), National Aeronautics and Space Administration (NASA), etc. Dr. Xu has served as reviewer for many highly reputed journals and conferences. He is also in the proposal review panel of NSF, OSA, etc. Dr. Xu is a senior member of OSA and IEEE

Abstract: We propose a succinct approach to reach exceptional point (EP) in an integrated on-chip microring resonator merely by incorporating two nanocylinders. As a result, the evolution from non-EP to EP is experimentally observed by step-by-step tuning. The proposed structure provides a compact and elegant building block for on-chip massive and high-density integration of non-Hermitian devices.

16:30-17:00	**Invited Speech**

Speaker: Yu He
Affiliation: Shanghai Jiao Tong University
Title: Metasurface Enabled High-order Mode Division Multiplexing
Bio: Yu He received the B.S. degree from Nankai University in 2015 and the Ph.D. degree from Shanghai Jiao Tong University in 2020. He is currently working as a the post-doc at Shanghai Jiao Tong University. His research interests include silicon photonics devices and circuits, on-chip mode-division multiplexing, subwavelength grating, metamaterials.

Abstract: We show the feasibility of on-chip group velocity dispersion engineering by introducing a gradient-index metamaterial structure, which enables a robust and fully-scalable MDM process. We demonstrate a record-high-order MDM device that supports TE0~TE15 modes simultaneously. 40-GBaud 16-QAM signals encoded on 16 mode channels contribute to a 2.162-Tbit/s net data rate. Our method can effectively expand the number of channels provided by MDM technology, and promote the emerging research fields with great demand for parallelism, such as high-capacity optical interconnects, high-dimensional quantum communications and large-scale neural networks.

17:00-17:15	**Paper ID: 1916**

Author(s): Jinhua Chen, Weiwei Pan, Yu Cheng, Tao Shi, Xudong Du and Chen Ji
Affiliation: Zhejiang University
Title: Inverse Design of a Multifunctional Device Combining High-order Mode Filtering and Power Splitting

Abstract: We designed a silicon-on-insulator (SOI)-based multifunctional 1×2 multimode interference (MMI) device capable of simultaneously implementing high-order mode filtering and 3-dB power splitting. Our device is optimized by the direct-binary-search (DBS) algorithm. The incident TE0 mode is prohibited from passing through the device, while the TE1 mode is evenly split to the two output ports with low insertion loss. Simulation results show that the insertion loss of each output port of this device is <0.69 dB and the extinction ratio is >18 dB in the wavelength range from 1500nm to 1600nm.

TS21-Optical Communication and Networks-D

Date: September, 7	**Venue:** LM103-B
Presider: Xueyang Li, Peng Cheng Laboratory	

16:00-16:30	**Invited Speech**

Speaker: Kangping Zhong
Affiliation: The Hong Kong Polytechnic University
Title: C band DWDM IM/DD System for Data Center Interconnects based on Eelctronic CD Compensation Techniques
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. 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.

Abstract: In this talk, we will review and discuss different electronic chromatic dispersion (CD) compensation techniques to enable high-speed C band DWDM IM/DD transmisison system for data center interconnect applications.

16:30-17:00	**Invited Speech**

Speaker: Yongli Zhao

Affiliation: Beijing University of Posts and Telecommunications

Title: Problems to be Solved in Cloud-Network Integration Optical Networks

Bio: Yongli Zhao is a full professor at BUPT. During Jan. 2016 to Jan. 2017, he was a visiting scholar at UC Davis. Now, he is a Fellow member of IET, senior member of IEEE and OSA. His current research focuses on optical fiber networks, satellite optical communication networks, and quantum key distribution networks. Up to now, he has published more than 400 international journal and conference papers. He has granted more than 100 patents. He also participated in many international standards works, and he has submitted 90 drafts to ITU-T and IETF.

Abstract: Cloud-network integration has emerged as a pivotal technology for efficiently harnessing computational resources as the cloud computing industry thrives. Optical network possesses capabilities of high speed, high reliability, and low latency, making it an excellent foundation for data transmission in cloud-network integration. However, due to the distinct architectures and resource allocation mechanisms of cloud computing infrastructure and optical networks, traditional network control techniques cannot be directly applied to cloud-network integration optical networks. This challenge poses hurdles for the development of cloud-network integration. This talk covers topics of control architecture, routing algorithms, dynamic slicing, and survivability mechanisms of cloud-network integration optical networks.

17:00-17:30	**Invited Speech**

Speaker: Jinlong Wei

Affiliation: Peng Cheng Laboratory

Title: Intra-data Center Optical Interconnects: Challenges and Proposed Solutions

Bio: Dr. Wei is currently a research professor at Peng Cheng Laboratory, Shenzhen, China. He received a PhD from the University of Wales, UK in 2011. His research interests include optics communications, photonics switching/signal processing, advanced modulation/coding, digital signal processing, algorithms, and machine learning. He edited one book and (co-)authored over 170 peer-reviewed journal/conference papers including Nature Electronics (IF = 34.3), Photonics Research, OFC, ECOC, etc, as well as more than 20 invited. He has experimentally demonstrated a few world first real-time and offline optical communication systems for data- and Tele-communications applications, which was reported by various scientific and technical media and organizations. He holds several US/European patents. Prof. Wei is a Marie Curie fellow and a senior member of IEEE and Optica (formerly OSA).

Abstract: In the context of ChatGPT that motivates great demand of optical interconnects in computing data centers, in this invited talk, a review of technical evolution, challenges and proposed solutions of high speed Ethernet will be made, with focus on 800 Gigabit Ethernet optical module as well as relevant modulation techniques and digital signal processing. Looking ahead, 1.6 Terabit Ethernet will be discussed as well.

17:30-17:45	Paper ID: 601

Author(s): Siu-Wai Ho and **Chung Shue Chen**
Affiliation: Nokia Bell Labs
Title: Visible Light Communication Based Positioning Using Color Sensor
Abstract: Based on light-emitting diode (LED) lighting and recent advances in visible light communication (VLC), we propose a new visible light-based localization scheme that uses a grid color-coding principle to develop a highly accurate localization system. By measuring the light received through the projected area on the color-coded film (for light filtering) and comparing it with a predefined color code, the system can determine the 2-dimensional position of the receiver relative to an LED, i.e., the reference point (RP). It is worth noting that the proposed solution has the following attractive features and differs from existing systems: (i) it uses only one photodiode (PD) on the user device for localization, and (ii) it can provide highly accurate indoor localization with centimeter resolution. Interesting applications include localization for unmanned ground vehicles (UGVs), advanced warehousing and logistics. Since PD or light sensor can have a response time of about 25 ms or even faster, one can also expect low latency in localization, which is especially suitable for supporting mobile users and new location-based services.Simulation results have shown that an average positioning error of less than 10 centimeters is achievable under suitable conditions.

TS22-Fiber-Based Technologies and Applications-D

Date: September, 7	**Venue:** LM103-C
Presider: Bowen Liu, The University of Tokyo	

16:00-16:30	Invited Speech

Speaker: Zhengyong Liu
Affiliation: Sun Yat-sen University
Title: Deep Learning Assisted Demodulation of Optical Fiber Sensors for Marine Information Monitoring
Bio: Zhengyong Liu received the B.S. degree in information engineering from Zhejiang University, Zhejiang, China, in 2010, and the Ph.D. degree from The Hong Kong Polytechnic University, Hong Kong SAR, China, in 2015. From 2015 to 2019, he firstly worked as a Postdoctoral Fellow for two years and then a Senior Research Fellow with The Hong Kong Polytechnic University. He is currently an Associate Professor with the School of Electronics and Information Technology, Sun Yat-Sen University. His current research includes the optical fiber sensing technology, machine learning based data analysis, fiber-optic sensing system particularly for biomedical applications and ocean environment monitoring. He has published over 100 peer-reviewed technical papers in international journals and conference proceedings, including 2 book chapters and 2 invited papers, as well as granted/applied 5 patents. He is Editorial Board member of Sensors, as well as a member of ITU/WMO/UNESCO-IOC Joint Task Force “SMART Cables”. He was selected as one of the Young Top Talents of Guangdong Province.
Abstract: This talk will introduce the design and application of optical fiber sensors for marine information sensing, including a variety of the grating or interferometry-based sensors for pressure, temperature, salinity etc. Deep learning approaches are adopted to carry out the spectral demodulation, which is promising to achieve low-cost, real-time and compact sensing system.

16:30-17:00	Invited Speech

Speaker: Boyao Li

Affiliation: Dongguan University of Technology

Title: Design and Application of Multidimensional Chiral Fiber Optic Functional Devices

Bio: Dr. Boyao Li is currently a staff at the School of Electronic Engineering and Intelligentization, Dongguan University of Technology. He received his B.E. in Tianjin polytechnic University in 2016 and PhD in South China Normal University in 2021. He has published/co-published over 20 journal papers, has been granted 3 invention patents. His research interests include Microstructured fiber functional devices, fiber lasers, sensors, etc.

Abstract: The multi-dimensional regulation of light field plays a huge role in fields such as biochemical monitoring, artificial intelligence, sensing, image super-resolution restoration, and communication. In view of this, we utilize the combination of twist and multi-core fibers to study their optical field modulation characteristics and clarify the multi-parameter regulation mechanism of the topological structure of chiral fibers in multi-dimensional conditions. Exploring and experimentally verifying the mechanism of integration, multi-channel, and simultaneous control of multiple optical quantities in flexible optical network transmission.

17:00-17:30	Invited Speech

Speaker: Haitao Guo

Affiliation: Xi'an Institute of Optics and Precision Mechanics, CAS

Title: Study of Chalcogenide Fiber and Devices for Mid-infrared Applications

Bio: Haitao Guo received the B.E. and Ph.D. degrees in material science and engineering from the Wuhan University of Technology, Wuhan, China, in 2002 and 2007, respectively. Now he is working as a Research Fellow with the Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, Xi'an, China. His major research interests include fabrication and analysis of new functional glasses, fibers and optical device, etc.

Abstract: The mid-infrared band corresponds to the atmospheric transmission window with the smallest attenuation, and covers numerous atomic and molecular absorption peaks. It has a wide range of applications in remote sensing and telemetry, atmospheric monitoring, space communication, biochemical sensing, spectral analysis, and other fields. Chalcogenide glass has advantages including of low phonon energy, large transmission range, and good chemical stability. The development of its optical fibers and fiber devices is of great significance for the development and application of infrared photonics. This report will introduce the current research status of chalcogenide glass fibers and devices in laser transmission, gain, and imaging in the mid-infrared band, as well as our team's research on low-loss fibers, hollow core anti-resonant fibers, fiber combiners, fiber gratings, and other aspects.

17:30-17:45	Paper ID: 1734

Author(s): Juan Li, Jindong Wang and Tao Zhu

Affiliation: Chongqing University

Title: A Novel Shape Restoration Algorithm for Ultra-fast Morphology Perception

Abstract: In this paper, we present a novel surface reconstruction algorithm leveraging curvatures and lengths between discrete points. By integrating this algorithm with a shape sensing system, we achieve high-speed measurement of wing shapes. The simulation and experimental results clearly demonstrate the effectiveness of our proposed algorithm in restoring preset curves. The average relative error is found to be at a remarkable level of 10-2, while the average running time remains at an impressive level of 10-2 s. Additionally, through static and dynamic shape perception performed by the shape sensing system, we observe a relative error of 4.85% when subjecting the simulated wing to uniform tension, and a relative error of 3.1% under twisted tension conditions. These findings confirm the capability of our experimental device to accomplish rapid morphological monitoring at an impressive frequency of 505 kHz.

TS23-Optoelectronic Devices and Applications-D

Date: September, 7	**Venue:** LM104-A
Presider: Zhi Liu, Changchun University of Science and Technology	

16:00-16:30	**Invited Speech**

Speaker: Changzheng Sun
Affiliation: Tsinghua University
Title: Integrated Gallium Nitride Nonlinear Photonics
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.
Abstract: In this talk, we will present our recent work on nonlinear optics in GaN-based high-Q microring resonators, including Kerr comb generation, optical parametric oscillation (OPO) and stimulated Raman scattering (SRS).

16:30-17:00	**Invited Speech**

Speaker: Jianan Duan
Affiliation: Harbin Institute of Technology (Shenzhen)
Title: Optical Feedback Sensitivity of Dual-state Lasing Quantum Dot Lasers
Bio: Jianan Duan received the Ph.D. degree in Optoelectronics from University of Paris-Saclay, France, in 2019. From 2019 to 2020, he was the Post-Doctoral Researcher with Telecom Paris, Institut Polytechnique de Paris, France. Since 2021, he has been an Assistant Professor at Harbin Institute of Technology, Shenzhen, China. His current research interests include advanced semiconductor laser, silicon photonics and laser dynamics.
Abstract: This work experimentally and theoretically demonstrates the impact of excited state lasing on the optical feedbakc sensitivity of dual-state lasing quantum dot lasers.

17:00-17:15	**Paper ID: 245**

Author(s): Haipeng Luo, Caiming Sun, Binghui Li, Ning Ding and Aidong Zhang
Affiliation: Shenzhen Institute of Artificial Intelligence and Robotics for Society
Title: Multi-Beams Forming and Steering based on Optical Phased Array
Abstract: In this work, the use of a single sparse Optical Phased Array (OPA) to achieve arbitrary multi-beams forming and steering is studied and demonstrated. This approach can be efficient and cost-effective for multiple-user Optical Wireless Communications (OWC).

TS24-Computational Imaging

Date: September, 7	**Venue:** LM104-B
Presider: Qilin Sun, Chinese University of Hong Kong, Shenzhen	

16:00-16:30	**Invited Speech**

Speaker: Jindong Tian
Affiliation: Shenzhen University
Title: Moment-Based Shape-Learning in-line Holography
Bio: Jindong Tian received the Ph.D. degree in optical engineering from Tianjin University, China in 2001. He is currently a Professor with the College of Physics and Optoelectronic Engineering, the associate director of Institute of Intelligent Optical Measurement and Detection, Shenzhen University. He is the assistant director of Guangdong Laboratory of Artificial Intelligence and Digital Economy (SZ), and the vice president of Image Science and Engineering Branch of China Instrument and Control Society. His research interests include computational optical imaging, machine vision and optical metrology.
Abstract: Compact computational in-line holography based on deep learning is an attractive single-shot approach to image microparticles dispersed in 3D volume. The particle shape contains valuable information for species classification, but the dataset acquisition process for network training suffers from labor consuming and low efficiency due to the complex and varied 2D shapes of different particle species. Herein, a moment-based shape-learning holography (MSLH) is proposed where the shape of a microparticle is mathematically characterized using varying weights of Zernike moments. Validation results show that MSLH achieves high accuracy in axial position and shape reconstruction, while maintaining good classification effectiveness. It is believed that MSLH is an easy-to-setup, efficient-to-construct, and fast-to-output approach for shape-based classifications of 3D distributed microparticles in dynamic fluid.

16:30-17:00	Invited Speech

Speaker: Qilin Sun
Affiliation: Chinese University of Hong Kong, Shenzhen
Title: End-to-end Camera Design and Industry Applications
Bio: SUN Qilin, assistant professor, The Chinese University of Hong Kong, Shenzhen, China. He has won the "2022 Shenzhen Artificial Intelligence Award". His research interests include end-to-end computational camera design, optics, depth/transient imaging, physical-based rendering and simulation, deep learning, and optimization. He has published many first-authored papers in renowned journals such as ACM TOG, SIGGRAPH, SIGGRAPH Asia, and CVPR (oral). Additionally, Professor Sun is the founder of PointSpread Technology, which aims to create a new generation of computational optics platforms. Currently, a high-end RGBD camera, which supports 100/120 FPS self-aligned multi-cam synchronization, and a real-time 4K raw domain BM3D IP core have been developed into products.
Abstract: End-to-end computational camera design tries to find the best compromise among optics, post-processing, and costs. To date, such a kind of new design method has achieved some industrial applications like depth imaging and extended depth-of-field. In the past few years, we have realized the differentiable diffractive optics model, the differentiable refractive optics, and the differentiable complex lens model based on differentiable ray tracing. Based on this, let's find the story of how to build end-to-end camera design systems and how to combine it to practical applications.

17:00-17:30	Invited Speech

Speaker: Ping Su
Affiliation: Tsinghua Shenzhen International Graduate School, Tsinghua University
Title: Lens-free On-chip Holographic Microscopy Technology
Bio: Dr. Ping Su received her doctor's degree in optical engineering from Tsinghua University, 2010, and is currently an associate professor in Division of Advanced Manufacturing, Tsinghua SIGS. She is a reserved talent of Shenzhen. She has been a visiting scholar in Nanyang Technological University, Singapore, for one year. She has published more than 50 peer reviewed papers. Her research interests include fundamentals and novel applications of diffractive optics

and holography, solar blind ultra-violet communications.

Abstract: Based on the lens-less holographic imaging principle of RGB LED, a compact and easy-to-operate lens-free on-chip holographic microscopy is designed. According to the limitations of the multi-wavelength phase retrieval on the lens-free on-chip holographic microscopy based on RGB LED, the multi-wavelength phase retrieval with multi-strategy is proposed. The multi-wavelength phase retrieval algorithm based on a variety of strategies can effectively eliminate the interference of twin images, improve the imaging contrast, and achieve a clear wide-field imaging with an area of 41.81 mm2 on the lens-less system. The influence of light source coherence on the resolution of lens-less holographic imaging was studied and analyzed. In view of the insufficient coherence of light emitted by RGB LED, a pinhole array was proposed to effectively improve the coherence of three-color light source on the lens-less holographic imaging system based on RGB LED. With the help of the pinhole array, the imaging resolution of the lens-less system is improved from 8.8μm to 2.2μm, achieving the same imaging resolution as the 10 × / 0.25NA objective lens.

TS25-Silicon Photonics-B

Date: September, 8	**Venue:** LM103-A
Presider: Yang Yue, Xi'an Jiaotong University, China	

09:00-09:30 **Invited Speech**

Speaker: Ching Eng Png
Affiliation: IHPC, A*STAR
Title: A Suite of Integrated Photodetectors
Bio: Ching-Eng Png is Director of the Electronics and Photonics Department at Institute of High Performance Computing (IHPC), A*Star, Singapore. He received his PhD degree from the University of Surrey, UK, MBA from INSEAD, France and Tsinghua University, China. Dr. Png's current research interests include quantum photonics, deep learning and electromagnetics.

Accolades won include the prestigious Royal Academy of Engineering Prize, Vebleo Scientist Award, IET Innovation Award - Software Design (highly commended), IEE Hudswell Scholarship, Skolkovo Prize, and Spring TECS Proof-of-Value grant. He serves on SPIE Photonics West technical program committee, is Founding Chair of URSI Singapore Chapter, and is passionate about mentoring and diversity in science. Dr. Png is elected Fellow of the IET and Vebleo.

Abstract: Photodetectors (PDs) are a critical workhorse in integrated photonics. We report a suit of on-chip photodetectors operating from infra-red (IR) to visible light. In particular, we also present a significant breakthrough in integrated silicon avalanche photodetector systems. Our system enables single photon detection at visible light wavelengths and is referred to as a single photon avalanche detector (SPAD). Offering a CMOS-compatible, compact solution, and operating in excess of 25 GHz, our SPAD is faster compared to bulkier and slower free space SPADs. The proposed SPAD holds immense promise for various applications in quantum photonics, sensing, and LIDAR, while facilitating seamless large-scale system integration.

09:30-10:00 **Invited Speech**

Speaker: Li Shen
Affiliation: Huazhong University of Science and Technology
Title: On-chip Broadband/multiband Integrated Devices for Polarization and Mode Manipulation
Bio: Li Shen received the B.Sc. and M.Phil. degrees from the Huazhong University of Science and Technology (HUST),

Wuhan, China, in 2009 and 2012, respectively, and the Ph.D. degree from the Optoelectronics Research Centre (ORC), University of Southampton, Southampton, U.K., in 2015. He is an Associate Professor with HUST and a Visiting Scholar with the ORC. He has authored or co-authored more than 40 peer-review journal papers. His research interests include novel semiconductor photonic devices, silicon photonics, and mid-infrared photonics.

Abstract: We review our recent progresses on integrated devices for broadband/multiband polarization and mode manipulation.

10:00-10:15	**Paper ID: 2988**

Author(s): Weiwei Pan, Zhangwan Peng, Ruoyun Yao, Jinhua Chen, Wanshu Xiong and Chen Ji
Affiliation: Zhejiang University

Title: Simulation and Analysis of Optical Neural Network Accelerators Based on Multimode Interferometers and Phase Shifters

Abstract: Optical unitary converters, which are implemented by multiport directional couplers or multimode interferometers, offer compactness and lower-power operation when performing unitary matrix operations. Multimode interferometers are particularly advantageous due to their good tolerance to fabrication errors and insensitivity to wavelength and polarization. Moreover, cascading optical unitary converters with Mach-Zehnder Interferometer arrays can achieve arbitrary matrices, which are frequently used in neural network computation. In this paper, we simulate and analyze an optical neural network accelerator based on multimode interferometers and phase shifters to perform arbitrary matrices. We compare its performance under different phase deviation conditions and evaluate its feasibility in neural network computations through convolutional operations. The simulation results demonstrate that the mean square error of the proposed accelerator is approximately -20dB and it exhibits excellent performance in realizing convolutional operations.

TS26-Fiber-Based Technologies and Applications-E

Date: September, 8	**Venue:** LM103-C
Presider: Jianzhong Zhang, Harbin Engineering University	

09:00-09:30	**Invited Speech**

Speaker: Huanhuan Liu
Affiliation: Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

Title: Vortex Beams for Optical Fiber Magnetic Field Sensing

Bio: Huanhuan Liu (Senior member, IEEE) obtained the doctorate degree from Nanyang Technological University, Singapore in 2014. In 2016, she was appointed as an Assistant Professor in Shanghai University. In 2020, she joined in Southern University of Science and Technology as Research Associate Professor. Her research interest focuses mainly on fiber sensors, fiber lasers, and lowdimensional nanomaterial optical devices. She has published more than 60 peer-reviewed SCI-indexed papers and authorized 9 national invention patents, and co-edited 1 English book. She won the Second Prize of Shanghai Science and Technology Progress Award in 2020; the Second Prize of State Grid Shanghai Electric Power Company Science and Technology Progress Award in 2019; the Shanghai Young Oriental Scholars Award in 2016, and the Shenzhen High-level Professional Talents Award in 2020.

Abstract: We have proposed and experimentally demonstrated the vortex beams including orbital angular momentum modes, cylindrical vector modes, and Poincaré beams for magnetic field sensing. Our results may contribute to the effort of exploring potential optical sensing at the onset of vortex beams.

09:30-10:00	**Invited Speech**

Speaker: Ting Mei
Affiliation: Northwestern Polytechnical University
Title: Acousto-optic Gratings in Optical Fibers and Their Novel Applications Exploiting Their Tunability and Versatility
Bio: Dr. Ting Mei is professor of School of Physical Science and Technology, Northwestern Polytechnical University, senior member of IEEE, editorial board member of Advanced Photonics. He is engaged in the research of nanophotonic technology, photonic and optoelectronic devices.
Abstract: Through the application of an acoustic flexural wave on an optical fiber, a long-period grating is formed, providing several advantages including the absence of defects resulting from manufacturing, tunable periods, and precise frequency shift. The acoustically-induced modulation effect enables well-controlled mode conversion, allowing for the acquisition of high-purity high-order modes. These high modes can be utilized in creating high-quality structured light beams, which in turn can be applied in various fields such as nanofocusing, Raman spectroscopy, and more. By incorporating acousto-optic gratings with Fiber Bragg gratings, the unique mode-conversion processes enable manipulation of optical reflection spectra. Additionally, the frequency shifting characteristics of these gratings facilitate the implementation of applications such as all-fiber heterodyne measurement systems and all-fiber frequency shifted feedback lasers. In this discussion, we will delve into these innovative uses of acousto-optic gratings and explore their intriguing applications

10:00-10:15	Paper ID: 2194

Author(s): Yutian Liu, Huanhuan Liu, Yihong Xiao, Xingliang Shen, Jialong Li, Hong Dang, Jinna Chen and Perry Ping Shum
Affiliation: Southern University of Science and Technology
Title: False Alarms Mitigation in Φ-OTDR System Using Multicore Fiber with Correlation Algorithms
Abstract: Phase-sensitive optical-time domain reflectometry (Φ-OTDR) is able to detect vibrations effectively with high sensitivity. It achieves by interrogating coherent Rayleigh backscattering (RBS) light in sensing fiber. However, backscattering light in sensing fiber undergoes fading caused by phase extinction interference or polarization mismatching. Fading will result in serious false alarms when locating real vibration events, especially in weak vibration signal detection. In order to suppress interference fading and exclude false alarms to improve localization accuracy, we propose a multi-core fiber-based Φ-OTDR system. Two cores of the multicore fiber are utilized for sensing, which detect the same vibration event simultaneously. Their backscattering signals will be demodulated for locating respectively and the locating result will pass through a mutual correlation algorithm to eliminate false alarm. As a proof of the concept, experimental results confirm a very successful false alarm reduction effect. It shows great potential in smart detection of acoustic signal, such as partial discharge detection in grid.

TS27-Optoelectronic Devices and Applications-E

Date: September, 8	**Venue:** LM104-A
Presider: Jindong Wang, Chongqing University	

09:00-09:30	Invited Speech

Speaker: Qiancheng Zhao
Affiliation: Southern University of Science and Technology
Title: Integrated Gallium Phosphide-on-Insulator Devices for Third-order Nonlinear Photonic Applications
Bio: Dr. Qiancheng Zhao is an assistant professor in the Southern University of Science and Technology. His research focuses on integrated photonic devices, specifically, in optical microresonators, laser frequency stabilization, and integrated nonlinear photonic devices.

Abstract: The exploration of new materials mediating on-chip light-matter interaction is a persistent goal in integrated nonlinear photonics. One of these materials is gallium phosphide, which offers an attractive combination of large nonlinear responses and a high refractive index, enabling strongly confined light fields, without suffering from heating due to two-photon absorption at telecommunication wavelengths. The advent of gallium phosphide-on-insulator architecture further boosts the wave-guiding capability and enhances the integration compatibility with other optoelectronic devices. In this talk, we show a gallium phosphide-on-insulator waveguide fabrication method and its potential applications in third-order nonlinear photonics.

09:30-10:00	**Invited Speech**

Speaker: Zhaoyu Zhang
Affiliation: The Chinese University of Hong Kong, Shenzhen
Title: Larger-area Single Mode Photonic Crystal Surface-emitting Light Source with High Power

Bio: Prof. Zhaoyu Zhang received his B.S. and M.S. degree in Applied Mechanics from University of Science and Technology of China, Hefei, China, in 1998 and 2001 respectively. He received Ph.D. degree from California Institute of Technology, Pasadena USA in 2007 in Electrical Engineering. From 2008 to 2011, he worked in University of California, Berkeley as a postdoctoral fellow in College of Chemistry, with a joint appointment with Lawrence Berkeley National Laboratory. From 2011 to 2015, he worked in Peking University as an Associate Professor and led a team of "Nano OptoElectronics Lab (NOEL)". In 2015, he and his team moved to Chinese University of Hong Kong, Shenzhen. In 2016, he was approved to set up Key Labortary of Semicoductor laser, Shenzhen and be the director.In 2022, he was approved to set up Guangdong Key Laboratory of Optoelectronic Materials and Chips and be the director. His main achievements including the first demonstration of red-emission photonic crystal lasers, wavelength-scale micro-lasers with physical size smaller than 1 micron, microfluidic microlasers based on dye materials, as well as the first demonstration of photonic crystal lasers directly grown on silicon substrates. He has published more than 30 referred papers on renowned journals including Nature Communications, Advanced Materials, Physics Review Letters, Optica, Photonics research, Optics Letters, Applied Physics Letters, etc.

Abstract: Photonic Crystal Surface Emission Lasers (PCSEL) is a new type of surface emission light source. Compared with other types of lasers, it has the advantages of small size, ultralow divergence angle, high efficiency, high power and high beam quality. At the same time, due to the large area coherent resonance effect of photonic crystal, PCSELs can maintain narrow beam emission and ultra-low divergence angle (< 1°) at high output power. This makes PCSELs have irreplaceable advantages in the field of Lidar and laser processing. However, most of the high-power PCSELs successfully prepared on the market now rely on selective area regrowth technology, which leads to the low success rate, high cost and long production cycle of the overall processing of PCSELs. Here, we have successfully prepared a large-area photonic crystal surface emitting laser without selective area regrowth technology with a peak power of 200mW at room temperature, which can not only maintain single-mode operation at a higher output power, but also achieve higher beam quality and ultra-low divergence angle of less than 1°, is beneficial to realize the large-scale industrialization of subsequent photonic crystal surface emitting light sources. At the same time, we further discuss the possibility of introducing photonic crystal surface emission source into silicon platform and its potential application.

10:00-10:15	**Paper ID: 5334**

Author(s): Duowei Zeng, Mengyuan Ye, Yang Chen, Hong Ma and Jie Liu
Affiliation: China University of Geosciences
Title: Wavelength Selective Mode Converter Using Grating Assisted Anti-reflection Contra-asymmetric Directional Couplers

Abstract: We propose and demonstrate a wavelength selective mode converter on silicon integrated platform. By

utilizing grating assisted anti-reflection contra-asymmetric directional couplers (CADCs), wavelength selective TE0-TE1 mode conversion could be achieved. Simulation results show that the operation wavelength is 1544.8 nm and 3 dB bandwidth is 8.3 nm. Insertion loss of the proposed device is simulated to be 0.29dB and the crosstalk is less than -50dB. The proposed device can be used in mode division multiplexing (MDM) wavelength division multiplexing (WDM) communication network.

TS28-Topological Photonics-B

Date: September, 8	**Venue:** LM104-B
Presider: Yihao Yang, Zhejiang University	

09:00-09:30	Invited Speech

Speaker: Yihao Yang
Affiliation: Zhejiang University
Title: Real Higher-order Weyl Photonic Crystal
Bio: Yihao Yang is a tenure-track professor at the College of Information Science & Electric Engineering, Zhejiang University. He received a PhD degree in Electronics Science and Technology from the Department of Information Science and Electronic Engineering, Zhejiang University, China, in 2017. His main research interests include topological photonics, and metamaterials. He has published more than 70 peer-reviewed papers in leading scientific journals. He, as first or corresponding author, has published more than 40 articles in Nature Physics、Nature Reviews Materials、Nature Communications、Science Advances、Physical Review Letters. His works were highlighted by Physics, Physics World, Physorg, IEEE Spectrum, and many others, and selected as PRL Editors' Suggestion three times. His researches were selected as China's Top 10 Optical Breakthroughs (2019), Top 10 Breakthroughs at Zhejiang University (2019). He is one of the MIT Technology Review 'Innovators Under 35 China' (2020).
Abstract: Higher-order Weyl semimetals are a family of recently predicted topological phases simultaneously showcasing unconventional properties derived from Weyl points, such as chiral anomaly, and multidimensional topological phenomena originating from higher-order topology. The higher-order Weyl semimetal phases, with their higher-order topology arising from quantized dipole or quadrupole bulk polarizations, have been demonstrated in phononics and circuits. Here, we experimentally discover a class of higher-order Weyl semimetal phase in a three-dimensional photonic crystal (PhC), exhibiting the concurrence of the surface and hinge Fermi arcs from the nonzero Chern number and the nontrivial generalized real Chern number, respectively, coined a real higher-order Weyl PhC. Notably, the projected two-dimensional subsystem with $k_z = 0$ is a real Chern insulator, belonging to the Stiefel-Whitney class with real Bloch wavefunctions, which is distinguished fundamentally from the Chern class with complex Bloch wavefunctions. Our work offers an ideal photonic platform for exploring potential applications and material properties associated with the higher-order Weyl points and the Stiefel-Whitney class of topological phases.

09:30-10:00	Invited Speech

Speaker: Biao Yang
Affiliation: National University of Defense Technology
Title: Scalar Topological Photonic Meta-crystals
Bio: Biao YANG is now a National University of Defense Technology associate professor. He got his PhD from the University of Birmingham (2018, Supervisor: Prof. Shuang Zhang) and bachelor’s degree from the National University of Defense Technology (2011). Dr Yang mainly works on photonic topological metamaterials. His publications include Science, Nature, Nature Physics, Nature Materials, Nature Communications, PRL, LSA, etc.

Abstract: Topological photonics is an emerging and rapidly expanding field. Air is the most ubiquitous background and is the ideal media for probing various electromagnetic topological surface states and implementing the corresponding device applications. However, conventional photonic surface modes have a low-quality factor in the light cone. Thus, different from electronic systems, electromagnetic topological surface modes inside the light cone can leak into the air. Here we experimentally demonstrate the concept of scalar topological photonic crystals, with surface states exhibiting skyrmion-like electric field distribution, enabling the existence of high Q-factor topological surface states inside the light cone continuum. With vector-wave eigenvectors, ideal scalar-wave-like bulk dispersion and skyrmion surface states, our system will be a conceptually advanced platform to innovate topological photonics.

10:00-10:30	**Invited Speech**

Speaker: Wenjie Chen
Affiliation: Sun Yat-sen University
Title: Antichiral Surface States in Time-reversal-invariant Photonic Semimetals
Bio: Dr. Wenjie Chen received his PhD in Physics from Sun Yat-Sen University in 2013. After graduation, he joined the Department of Physics in HKUST as a Visiting Scholar, and was then appointed as Research Assistant Professor. Prof. Chen is currently Professor in School of Physics at SYSU.His primary research interest focuses on photonic crystal, metamaterial, topological states in photonic and acoustic systems.

Abstract: Besides chiral edge states, the hallmark of quantum Hall insulators, antichiral edge states can exhibit unidirectional transport behavior but in topological semimetals. Although such edge states provide more flexibility for molding the flow of light, their realization usually suffers from time-reversal breaking. In this study, we propose the realization of antichiral surface states in a time-reversal-invariant manner and demonstrate our idea with a three-dimensional (3D) photonic metacrystal. Our system is a photonic semimetal possessing two asymmetrically dispersed Dirac nodal lines. Via dimension reduction, the nodal lines are rendered a pair of offset Dirac points. By introducing synthetic gauge flux, each two-dimensional (2D) subsystem with nonzero kz is analogous to a modified Haldane model, yielding a kz-dependent antichiral surface transport. Through microwave experiments, the bulk dispersion with asymmetric nodal lines and associated twisted ribbon surface states are demonstrated in our 3D time-reversal-invariant system. Although our idea is demonstrated in a photonic system, we propose a general approach to realize antichiral edge states in time-reversal-invariant systems. This approach can be easily extended to systems beyond photonics and may pave the way for further applications of antichiral transport.

TS29-Near-infrared, Mid-infrared and Far-infrared Technologies and Applications-C

Date: September, 8	**Venue:** LM104-C
Presider: Yongquan Zeng, Wuhan University	

09:00-09:30	**Invited Speech**

Speaker: Can Huang
Affiliation: Harbin Institute of Technology, Shenzhen
Title: Ultrafast-control and Modulation based on BIC Metasurface
Bio: Can Huang is a young professor from Harbin Institute of Technology (Shenzhen), and he is a young editorial board member of the Journal of Optics of China Laser Magazine. He has been selected for the Pengcheng Peacock B-class Talent Program and has been a researcher at the Hong Kong Institute of Asia Pacific Studies. The main research direction is all optical information processing, including optical perception, optical communication, optical computing, transient laser physics, nonlinear dynamics, etc. Currently, he has published multiple papers as the first

author or co author in journals such as Science, ACS nano, Laser&Photonics Reviews, Nano Energy, etc. He/ has won academic honors such as Guo Guangcan's Excellent Doctoral Thesis from the Chinese Optical Society, the Hundred Most Internationally Influential Academic Papers in China, and "Optics in 2020" from the American Optical Society.

Abstract: Research on utilizing metasurfaces to achieve functional optical devices has developed rapidly in recent years. However, due to the high-frequency oscillation characteristics of electromagnetic waves, most research currently focuses on the static coupling of optical modes in metasurface devices, research on ultrafast dynamic modulation of metasurface is rarely reported. Recently, we systematically studied the ultrafast modulation of mode coupling in BIC based active metasurfaces by introducing multiple pump beams to excite samples and utilizing physical variables such as relative intensity, time delay, and spatial distance between pump beams. We found that the ultrafast switching in far-field of BIC shows the phase change of the resonant mode in the metasurface, and the different resonant phases in the two resonant regions reflected the mode competition between them. These research results indicate that we can achieve phase modulation of resonant metasurfaces on the picosecond and even femtosecond time scales. We believe that these findings will contribute to a deeper understanding of non-Hermitian laser physics and its applications in ultrafast optical information processing.

09:30-10:00	**Invited Speech**

Speaker: Lei Wang
Affiliation: Jilin University
Title: Ultrafast Laser Fabrication of Subwavelength Structures for Infrared Antireflection

Bio: Lei Wang, Associated Prof., Tang Aoqing Scholar. His research is on the laser fabrication of functional subwavelength structures for antireflection, stealth dicing, and eternal optical storage. He has published 20 papers as the first author and corresponding author on Optica, Light Sci. Appl., Laser Photon. Rev. His work has been widely reported by the University of Southampton, BBC 4 channel, History channel, Microsoft Inc., and the Britain Library.

Abstract: Bio-inspired subwavelength antireflective structures (ARSs) have been proven to be an effective alternative for reducing Fresnel reflection in various applications such as optical detection, solar cells, organic light-emitting diodes, and high-power laser systems. Herein, we introduce advanced manufacturing techniques and the underlying mechanism for creating ARSs on the surface/in the bulk of sapphire and other infrared materials. Using a 3D optical far field-induced nearfield breakdown (3D-OFIB) method, we achieved a nanoscale resolution of less than 20 nm and an aspect ratio greater than 10000:1. Additionally, we implemented a scarified layer to minimize the threshold difference between the surface and the bulk. Notably, we avoided the occurrence of debris typically associated with traditional laser ablation, thus maintaining high structural quality and preserving the desired optical properties. As a result, we were able to achieve a maximum transmittance exceeding 92% or even 95% for the sapphire window.

10:00-10:30	**Invited Speech**

Speaker: Cheng Wang
Affiliation: ShanghaiTech University
Title: Mid-Infrared Laser Chaos and Chaotic Lidar

Bio: Dr. Cheng Wang is tenured Associated professor at ShanghaiTech University. He obtained his PhD degree from Insitut Naitional des Sciences Appliques (INSA), France in 2015. After a short saty in City University of Hong Kong, he joined ShanghaiTech University in 2016. His research interests include semiconductor lasers, optical computing, and optical communication.

Abstract: Interband cascade lasers are power-efficient mid-infrared laser sources. Laser chaos in the mid-infrared regime is valuable for developing long-reach secure free-space communication links and remote lidar systems, owing to the low-loss transmission window of atmosphere in the mid-infrared regime. This talk will discuss the first broadband chaos of interband cascade lasers as well as its application is a mid-infared chaotic lidar system.

TS30-Silicon Photonics-C	
Date: September, 8	**Venue:** LM103-A
Presider: Xiaochuan Xu, Harbin Institute of Technology, Shenzhen	

10:45-11:15 **Invited Speech**

Speaker: Jindong Wang

Affiliation: Chongqing University

Title: Nanoscale Precision Length Metrology using On-chip Microcomb

Bio: Jindong Wang is an assistant research fellow and a postdoctoral fellow in College of Optoelectronic Engineering, Chongqing University. He received his B. S., M.S. and Ph. D. degree in 2016, 2018 and 2021 respectively in engineering at the College of Precision Instruments and Optoelectronic Engineering, Tianjin university. Dr. Wang's research interests are in the area of on-chip soliton microcomb, FBG-based fiber sensing and precious absolute ranging. He has published more than 20 peer reviewed papers in international journals including Photonics Research、Optics Letters、IEEE Transactions on Industrial Electronics, etc.

Abstract: High-precision length metrology constitutes a vital supporting technology in various fields, notably industrial manufacturing, aerospace, aviation, maritime, and scientific research. Stringent demands have been placed on length measurement, with requirements for measurement range, accuracy, and speed continually advancing. Laser ranging technology has consistently served as the primary solution for large-scale measurements. An emerging novel chip-scale microresonator-based soliton optical frequency comb (soliton microcomb, SMC) has been gaining prominence, which exhibits compact dimensions, simple-structure, high repetition rate, and smooth spectral envelope, and thus holds the promise of significant breakthroughs in the realm of distance measurement. Here, we demonstrate a high-performance length metrology system based on a chip-scaled SMC. Combined with an auxiliary dual-frequency phase-modulated laser range finder, the none-dead-zone measurable range ambiguity is extended up to 1500 m. Within 80 m, the measurement error is less than 1 μm, and the repeatability accuracy is less than 50nm. The proposed system is experimentally implemented in both indoor and outdoor environments. In the outdoor baseline field, real-time, high-speed (up to 35 kHz) measurement of a long distance of ~1179 m is achieved with a minimum Allan deviation of 5.6 μm at an average time of 0.2 ms.

11:15-11:45 **Invited Speech**

Speaker: Jianji Dong

Affiliation: Huazhong University of Science and Technology

Title: Photonic Computing for AI Technology

Bio: Dr. Jianji Dong is a Professor of Wuhan National Laboratory for Optoelectronics (WNLO), Huazhong University of Science and Technology (HUST). His research interests include silicon photonics and photonic computing. He has published more than 100 Journal papers, including Nature Communications, Light science and applications, Physical Review Letters, etc. He was honored the Fund of Excellent Youth Scholar by NSFC, China, and honored First award of Natural Science of Hubei Province. He is the editorial member of scientific reports, and executive editor-in-chief of IET Optoelectronics. He is a Senior Member of IEEE.

Abstract: Photonic neural network has great potential in artificial intelligence benefited from its superior performances. Recent research in photonic neural network has flourished and may provide opportunities to enable applications that are unachievable at present by conventional electronic counterpart. In this talk, I will introduce some approaches to train the photonic neural network in real time, and discuss the structures of photonic hardware

accelerators. The photonic neural network structure includes Mach-Zehnder interferometer meshes and diffractive neural network chip. The accelerator applications include MIMO descrambler, optical switch, wavelength selective switch, FFT and image processing, etc.

11:45-12:15	**Invited Speech**

Speaker: Zejie Yu
Affiliation: Zhejiang University
Title: Silicon Integrated Dispersion Control Devices
Bio: Dr. Yu obtained his bachelor's degree from the College of Optical Science and Engineering of Zhejiang University and his Ph.D. degree from the Department of Electronic Engineering of the Chinese University of Hong Kong. Later, he worked as a postdoctoral fellow in the same department. In 2020, he joined the College of Optical Science and Engineering of Zhejiang University as a ZJU100 Young professor. Dr. Yu mainly works in the area of silicon-based integrated photonic devices and chips, seeking applications in optical communication, computation, and sensing.
Abstract: Dispersion control is critically important in many photonic applications, such as large-capacity and long-haul communication, nonlinear wavelength conversion, and signal processing. Various structures such as Mach-Zehnder interferometer, microring resonator, contra-directional couplers, and Bragg gratings have been proposed to manage dispersion. Integrated chirped Bragg gratings have overall good performance like broad working bandwidth and precise dispersion control among these different dispersion control schemes. In this paper, a dispersion compensator utilizing a chirped multimode waveguide grating (CMWG) on a 220-nm silicon-on-insulator platform will be introduced, a circulator can be avoided by using asymmetric waveguide grating structure that can reflect the input TE0 mode into the TE1 mode. Further, a TM-type CMWG is proposed to realize large-scale dispersion control because the CMWG is less sensitive to fabrication errors. At last, a digitally tunable dispersion controller based on CMWGs is introduced, providing a broadband and flexible dispersion management method.

TS31-Optical Communication and Networks-F

Date: September, 8	**Venue:** LM103-B
Presider: Yuemei Luo, Nanjing University of Information Science and Technology	

10:45-11:15	**Invited Speech**

Speaker: Yang Yue
Affiliation: Xi'an Jiaotong University
Title: Machine Learning-aided Multiparameter Performance Monitoring for Optical Communications Channels
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 over 260 journal papers (including Science) and conference proceedings with >10,000 citations, six edited books, two book chapters, >60 issued or pending patents, >200 invited presentations (including 1 tutorial, >30 plenary and >50 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.
Abstract: In recent years, machine learning has come to the forefront as a promising technology to aid in

multiparameter performance monitoring for optical communications channels. In this talk, we will introduce CNN-based techniques to effectively monitor multiple system performance parameters of optical channels using eye diagram measurements. Experimental results demonstrate this method achieves a prediction accuracy >98% when tasked with identifying the modulation format (QPSK, 8-QAM, or 16-QAM), as well as the optical signal-to-noise ratio (OSNR), roll-off factor (ROF), and timing skew for 32 GBd coherent channels. For PAM-based intensity-modulation direct detection (IMDD) channel eye-diagram-based CNN method maintain >97% identification accuracy for 432 classes under different combinations of probabilistic shaping (PS), ROF, baud rate, OSNR, and chromatic dispersion (CD) by each modulation format. Furthermore, we undertake on an extensive comparison of ResNet-18, MobileNetV3 and EfficientNetV2. Our designed VGG-based model of reduced layers, alongside the lightweight MobileNetV3, demonstrates enhanced cost-effectiveness while maintaining high accuracy.

11:15-11:45 **Invited Speech**

Speaker: Xiaosong Yu

Affiliation: Beijing University of Posts and Telecommunications

Title: Security Analysis for Services in Classical and QKD Integrated Optical Networks

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 8 international/national first-class academic association/provincial-level awards. He has published over 80 high-level academic papers in important domestic and foreign academic journals and conferences, taken the lead in formulating and participating in the formulation of 6 ITU-T international standards, 3 national industry/group standards, and published 4 academic monographs (including independent chapters in English). He has authorized more than 30 national invention patents, and submitted and adopted more than 80 international standard manuscripts.

Abstract: With the rapid development of optical communication networks, security has become a major concern. Quantum key distribution (QKD) provides an innovative approach to secure key distribution, which can be integrated into conventional optical networks to enhance security. This report focuses on the security analysis of services in optical networks integrated with QKD. It starts with a review of classical optical networks and QKD networks, analyzing their architectures, key protocols, and security issues. The integration architectures of classical and QKD networks are then discussed, including optical layer integration, network layer integration and application layer integration. Based on the integrated network architectures, the security threats and vulnerabilities of major services are analyzed. Corresponding countermeasures are also proposed with enhanced resource allocation/ routing control/ keys scheduling algorithms. Finally, the report summarizes the open challenges and future research directions in security provisioning for integrated classical/quantum optical networks.

11:45-12:00 **Paper ID: 2417**

Author(s): Junye Zhong, Feng Liu, Zikun Xu and Zhijian Lv

Affiliation: Shenzhen Technology University

Title: A Design of Reflective Cup at Mini-LED based VLC Transmitter

Abstract: In VLC systems, lenses are usually used to collimate the light at the transmitter. However, due to the large light emission angle of Mini-LEDs, it is difficult to collect large angle light using a lens at the transmitter. This paper proposes A design of reflective cup at mini-LED based VLC transmitter, which has been improved on the traditional reflective cup used for lighting. The corresponding parameters of the reflective cup have been specified and the reflection curve has been redesigned to make it suitable for the Mini-LED VLC system. The redesigned reflective cup can collect most of the light and emit it in parallel. It has an efficiency of approximately 87.5% at 2m, achieving higher quality signal transmission. The reflective cup has the advantages of high efficiency, low cost, and simple structure.

TS32-Data Center Optical Interconnects and Networks &

Emerging Technologies for Wide Bandgap Semiconductors and Information Displays	
Date: September, 8	**Venue:** LM103-C
Presider: Tao Yang, Beijing University of Posts and Telecommunications	

10:45-11:15	**Invited Speech**

Speaker: Yongcheng Li
Affiliation: Soochow University
Title: Service Provisioning in WSS-based Wavelength-Convertible All-Optical Spine-Leaf Data Center Networks
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 become an Associate Researcher in 2020. His research interests include network design and optimization, optical switching, and green optical 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 two different lightpath provisioning strategies, which are WSS reconfiguration first-based (WRF) and wavelength conversion first-based (WCF) strategies. We evaluate the performance of these two strategies through simulations and find that the proposed WCF strategy can significantly reduce the overall task completion time (TCT) and the number of WSS reconfigurations.

11:15-11:45	**Invited Speech**

Speaker: Lijing Zhu
Affiliation: Xidian University
Title: Optical Interconnects for Data Center Networks: Challenge and Opportunities
Bio: Lijing Zhu received the B.E. and PhD degree in Telecommunication and Information Systems from Xidian University, Xi'an, China, in 2017 and 2023, respectively. Since 2016, she has been working in the State key lab of ISN, Xidian University. At present, she is a post-doc in the School of Telecommunication Engineering, Xidian University (Xi'an, P. R. China). Her main research interests include optical interconnets for data center networks, Optical Network-on-chips, adaptive routing algorithm.
Abstract: The growing demand for high traffic and applications requires data center networks to be more efficient. This presentation will discuss the potential contribution of optical interconnects in meeting this challenge and opportunity. Optical interconnects provide higher bandwidth, lower latency, and greater energy efficiency than traditional electrical interconnects by utilizing optical for data transmission. However, there are various challenges involved in bringing optical solutions into the data center, such as compatibility with evolving architectures, optical switches, and control plane. The discussion also touches on the related work about the optical architecture and employment of optical interconnects for Data Center.

11:45-12:00	**Paper ID: 7470**

Author(s): Zhuang Miao, Sween Butler, Zhiming Wang and **Arup Neogi**
Affiliation: University of Electronic Science and Technology of China
Title: Diffractive Control of Second Harmonic and White Light Generation from GaN Pyramid-based Meta-structures
Abstract: Developing on-chip tunable light sources for integrated photonics requires wide-bandgap semiconductors not offered by conventional silicon photonics technology [1]. GaN-based wide-bandgap semiconductor microstructures with high optical nonlinearity, high damage threshold, optical transparencies in the visible wavelength, and direct bandgap emission offer an attractive platform for semiconductor-based tunable

photonic-based integrated light sources [2]. Site-controlled growth of GaN-based semiconductor microcavities [3] offers a unique integrated photonic platform to realize 3D-periodic dielectric lattice structures for directional emission that extends beyond vertical cavity surface emitting lasers due to the diffraction properties of the lattice in the lateral direction [4].

The preferential growth morphology of wurtzite GaN semiconductors on sapphire substrate enables site-selective growth of hexagonal GaN micro-pyramids with semi-polar {11(_)01} facets using SiO2 mask, as shown in Figure 1a. An array of hexagonal pyramids with 3μm height and identical basel plane can be grown with the facets oriented in any desired orientation chosen by the mask alignment (Fig. 1b). A tunable femtosecond infrared radiation (760-950nm wavelength) in a confocal illumination collection geometry was used to study the nonlinear optical characteristics of the micro pyramid-based meta-structure. The optical excitation through the tip of a single GaN pyramid enables strong nonlinear optical generation that involves the second harmonic generation, multiphoton band-band luminescence, and defect emission from the interstitial defects in GaN. The power density of the fundamental source can be used to control the efficiency of the competing linear and nonlinear optical processes within the hexagonal pyramid-based dielectric lattice or metastructure [3].

The excitation of a pyramid at 900nm results in SHG generation at the surrounding pyramids, as shown in Fig. 1c-d. The center pyramid is warm white in color, attributed to the combination of fundamental red light, green defect luminescence, and blue SHG light. The green luminescence comes from the defect emission excited by the multiphoton luminescence inside the center pyramid. The SHG light generated at the surrounding GaN pyramid that is not directly illuminated by the nanoscopic excitation source (lateral dimension ~ 500nm) is due to the scattering of the fundamental radiation scattered by the {11(_)01} facets facing each other. In summary, we design and experimentally demonstrate 3μm-sized GaN pyramid metastructures for realizing a coherent micro-array light source through the directional control of the SHG light generation. This work could inspire innovative approaches for replacing the Nipkow disk in the laser confocal microscope for multiple-dot light sources.

TS33-Optoelectronic Devices and Applications-F

Date: September, 8	**Venue:** LM104-A
Presider: Qiancheng Zhao, Southern University of Science and Technology	

10:45-11:15	**Invited Speech**

Speaker: Yu Zhou
Affiliation: Harbin Insitute of Technology (Shenzhen)
Title: Quantum Information Processing with Silicon Carbide Photonics
Bio: Professor Harbin Institute of Technology(Shenzhen), interested in quantum light sources and colour centres 、 quantum control and sensing based on solid-state systems, etc. Published 15 SCI papers (including 7 papers, including 3 papers in Nat.Commun., 1 paper in Sci.Adv., 1 paper in Phy.Rev.Applied, 1 paper in New.J.Phys., 1 paper in Adv. Opt . Mater.). serves as the youth editorial board member of Chinese Optic Letters and authorizes a total of 10 Chinese/American invention patents. The applicant has won honours such as Harbin Institute of Technology Young Top Talent, 2018 National Self-Financed Overseas Student Award, 2020 Forbes Science and Technology Elite List Under 30, etc.

Abstract: Solid-state quantum light sources are one of the central blocks for many quantum applications, including quantum computing, quantum communication, and quantum sensing. The quantum defects existing in the third-generation semiconductor materials silicon carbide and gallium nitride have unique advantages, such as telecom wavelength emission, CMOS compatible material system, complete existing industry grade wafer growth and

fabrication technology, etc. We have found high-brightness quantum light sources in the communication band at room temperature in silicon carbide and gallium nitride, respectively. Their brightness at room temperature reaches the order of MHz, and their optical properties are very stable. Combined with a high polarization degree, the material system easily integrates micro-nano and other characteristics. It is hoped to be used in quantum communication, quantum light source chips, and other fields. In addition, we have achieved high-sensitivity temperature detection by using the spin properties of SiC divacancy color centers, with a sensitivity of 205.6 mK/Hz1/2 and a spatial resolution of hundreds of nanometers. We also found that the energy level of the double vacancy formed a self-protection mechanism in the temperature detection process to resist the magnetic field noise. These characteristics greatly enhanced the applicability of the scheme. Finally, we will also briefly introduce the recent research progress in the field of silicon carbide quantum photonics.

11:15-11:45	**Invited Speech**

Speaker: Yingjie Liu
Affiliation: Yanshan University
Title: On-chip Phase Gradient Meta-lens and Its Dynamic Manipulation
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 assistant professor with School of Information Science and Engineering, Yanshan university, Qinhuangdao, China. His research interest includes silicon photonics, photonic integrated circuits, and optical interconnects.
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.

11:45-12:00	**Paper ID: 9842**

Author(s): Mengya Yu, Tianxun Gong and Xiaosheng Zhang
Affiliation: University of Electronic Science and Technology of China
Title: A Graphene/ZnO Mixed-Dimensional Schottky Junction Based on Strain Modulation For Efficient Photodetection
Abstract: Two-dimensional (2D) materials offer great potential for the integration and practical application of photodetectors due to their atomic-level thickness. However, single-layer 2D materials have limitations in terms of low optical absorption and fixed response wavelengths. A viable strategy is the fabrication of heterojunctions using appropriate materials.Additionally, strain engineering of 2D materials through substrates enables bandgap tuning. In this study, we propose a graphene/ZnO Schottky junction photodetector. ZnO nanorods and graphene builds a mixed-dimensional heterostructure. The large surface area of ZnO nanorods enhances the light absorption efficiency, while graphene facilitates the efficient transport of photogenerated carriers. By manipulating the size of the ZnO nanorod array, strain can be induced in the graphene, allowing for precise bandgap tuning of the Schottky junction. This work presents a feasible method for achieving high-efficiency photodetection.
The proposed photodetector consists of three components: ITO electrodes, ZnO nanorod arrays, and graphene. Photolithography is performed on ITO to create a template for the subsequent hydrothermal growth of the ZnO nanorod array. Graphene is transferred onto the nanorod array using a wet transfer method. Experimental results demonstrate that the photolithography template allows for precise control of the array size at the micron level. Graphene exhibits excellent strain without extensive damage and can form superior junction contact with ZnO. Electrical performance was measured using a power source and a meter (Keithley 2400) combined with an oscilloscope.
Figure 1 illustrates the schematic structure of a photodetector, consisting of graphene, ZnO nanorods, and ITO electrodes. Figure 2 characterizes the growth of ZnO. It can be observed from Figure 2(a) that ZnO exhibits a

hexagonal prism morphology when viewed from the top. The XRD characteristic diffraction peaks in Figure 2(b) correspond to the ZnO(002) crystal plane, indicating excellent crystallinity and a preferred c-axis orientation of the ZnO nanorods. Figure 2(c) shows the EDS analysis, which reveals the presence of Zn and O elements in a nearly 1:1 ratio, indicating the successful synthesis of pure ZnO through hydrothermal growth. Figure 3 demonstrates the transfer of graphene onto the ZnO nanorod array. From the SEM image, it can be observed that graphene has been successfully transferred onto the ZnO nanorod array without significant damage, achieving biaxial strain on the graphene. To verify the strain on the graphene, Raman spectroscopy was employed to measure the peak shift. In the absence of strain, graphene exhibits two characteristic peaks, namely the G peak (1582 cm-1) and the 2D peak (2680 cm-1), corresponding to in-plane vibrations of sp2 carbon atoms and the second-order intervalley scattering of phonons, respectively. The results indicate that the 2D peak undergoes a shift due to strain. In Figure 4, as the array size are 3 μm、4 μm、5 μm, the peak shift increases, indicating corresponding strain values are calculated as 0.44%, 0.68%, and 0.98%, respectively. Raman mapping reveals the scanning of the 2D peak of graphene on the ZnO nanorod array, with the strain effect being most prominent at the array edges. In the photodetection performance test shown in Figure 5, it is evident that the Graphene/ZnO Schottky device exhibits photoresponse in the visible to near-infrared range, with the best performance observed at a wavelength of 400 nm. This device provides a feasible approach for strain-based two-dimensional material photodetectors.

TS34-Topological Photonics-C

Date: September, 8	**Venue:** LM104-B
Presider: Zhen Gao, Southern University of Science and Technology	

10:45-11:15 **Invited Speech**

Speaker: Ruo-Yang Zhang
Affiliation: Hong Kong University of Science and Technology
Title: Duality Principle between Singular Optics and Non-Hermitian Physics
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 40 peer-reviewed journal papers, including prestigious publications in Nature, Nature Physics, and Physical Review Letters, etc.
Abstract: Polarization singularities (PSs) in optical field and non-Hermitian topological degeneracies are two rapidly developing frontiers of topological photonics. However, in previous studies, they were considered as two distinct directions, each with different research subjects, methodologies, and tools. In this report, I will unveil an intrinsic duality principle between the PSs in 3D optical fields and the non-Hermitian degeneracies and introduce this duality principle into the study of near-field optical PSs in the proximity of metal scatterers. By borrowing the non-Hermitian topological theory, we establish a rigorous topological classification of the circular polarization lines (C-lines) in 3D optical fields and predict a new type of symmetry-protected PS line morphologies, called C-line nexuses. Additionally, we establish two index theorems for the PSs on the metal surfaces which reveal that the nontrivial topology of metal structures ensures the birth of C-lines in the near fields. Our results bridge singular optics and non-Hermitian physics and have potential applications in chiral sensing, chiral quantum optics, and beyond photonics in other wave systems.

11:15-11:45 **Invited Speech**

Speaker: Biye Xie

Affiliation: The Chinese University of Hong Kong

Title: Disentangled Higher-orbital Bands and Chiral Symmetric Topology in Confined Mie Resonance Photonic Crystals

Bio: Prof. Biye XIE received his B.Sc. degree in Physics at the University of Science and Technology of China in 2013 and my Ph.D. degree in Physics at the University of Hong Kong (HKU) in 2017. After graduation, he worked as a postdoctoral fellow at Nanjing University (2018 - 2020) and HKU (2020 - 2022). In 2022, he joined the Chinese University of Hong Kong (Shenzhen) as a tenure-track assistant professor.

His research interests include topological physics and artificial condensed phase materials such as topological photonics, topological acoustics, non-Hermitian topological systems, artificial defect and vortex states, the dynamic effect of topological states, and emergent phenomena in artificial materials. He was also interested in applying theoretical findings in developing advanced functional devices such as novel optical cavities, topological lasers, quantum computing, etc. He has published more than 15 peer-reviewed journals such Nat. Rev. Phys., Nat. Comm., Phys. Rev. Lett., Light: Sci. & Appl., Phys. Rev. B, Phys. Rev. Research, Opt. Express.

Abstract: Topological phases based on tight-binding models have been extensively studied in recent decades. By mimicking the linear combination of atomic orbitals in tight-binding models based on the evanescent couplings between resonators in classical waves, numerous experimental demonstrations of topological phases have been successfully conducted. However, in dielectric photonic crystals, the Mie resonances' states decay too slowly as 1/r, leading to intrinsically different physics between tight-binding models and dielectric photonic crystals. Here, we propose a confined Mie resonance photonic crystal by embedding perfect electric conductors between dielectric rods, creating the chiral symmetric band structure which ideally matches tight-binding models with nearest-neighbour couplings. As a consequence, disentangled band structure spanned by higher atomic orbitals is observed. Moreover, our result provides an effective route to achieve a three-dimensional photonic crystal with a complete photonic bandgap and third-order topology. Our implementation offers a versatile platform for studying exotic higher-orbital bands and achieving tight-binding-like 3D topological photonic crystals.

11:45-12:15	**Invited Speech**

Speaker: Zhen Gao

Affiliation: Southern University of Science and Technology

Title: Three-dimensional Nonreciprocal Topological Photonics

Bio: Zhen GAO is an Associate Professor at the Southern University of Science and Technology (SUSTech). He received a Ph.D. in 2018 from the School of Physical and Mathematical Sciences at Nanyang Technological University, Singapore, following his B.S. degree in 2009 and M. S. degree in 2012 from Zhejiang University in Hangzhou, all majoring 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 Letters, and Advanced Materials. He received the 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.

Abstract: Chiral edge states that propagate oppositely at two parallel strip edges are a hallmark feature of Chern insulators which were first proposed in the celebrated two-dimensional (2D) Haldane model. Subsequently, counterintuitive antichiral edge states that propagate in the same direction at two parallel strip edges were discovered in a 2D modified Haldane model. Here we report the first experimental observations of chiral and antichiral surface states, the 2D extensions of one-dimensional (1D) chiral and antichiral edge states, by constructing a three-dimensional (3D) Haldane model and a 3D modified Haldane model in 3D magnetic photonic crystals. Using microwave field-mapping measurements, unique properties of chiral and antichiral surface states have been observed

directly, including the chiral and antichiral robust propagations, tilted surface dispersions, a single open Fermi arc connecting two projected WPs and a single surface Fermi loop that winds around the surface Brillouin zone (BZ). These results extend the scope of 3D topological photonic states and enrich the family of 3D magnetic topological insulators and magnetic Weyl semimetals.

12:15-12:45	Invited Speech

Speaker: Yongquan Zeng

Affiliation: Wuhan University

Title: Terahertz Random Lasers and Its In-plane Emission Manipulation Using ZIM

Bio: Dr. Yongquan ZENG is a professor at the School of Electronic and Information Engineering, Wuhan University, China. He graduated from University of Science and Technology of China in 2013 with a bachelor's degree in Materials Physics and from Nanyang Technological University with a Ph.D. degree in 2018. From 2018 to 2021, he was a postdoctoral researcher at the School of Electrical and Electronic Engineering, Nanyang Technological University and then joined Wuhan University. He is mainly engaged in the research of III-V infrared semiconductor lasers, and has made many innovative achievements in the frontier fields of random lasers, chaotic microcavities, and topological photonics. So far, he has published over 30 first-authored/co-authored research papers in high-impact journals, e.g. Nature, Science, Nature Communications, ACS Photonics, Advanced Optical Materials, and Photonics Research.

Abstract: In this talk, I will systematically present our work on electrically pumped random lasers at terahertz frequency range. Due to the multiple scattering nature, the random laser is featured by non-directional emission. I will also talk about our work to improve the in-plane emission directivity by using a Zero-index Material.

TS35-Terahertz Wave Technologies and Applications

Date: September, 8	**Venue:** LM104-C
Presider: Xueqian Zhang, Tianjin Univeristy	

10:45-11:15	Invited Speech

Speaker: Xueqian Zhang

Affiliation: Tianjin Univeristy

Title: Manipulating Terahertz Generation Using Nonlinear Metasurfaces

Bio: Xueqian Zhang is an associate professor at Tianjin University, China. He received his BEng degree in electronic science and technology, MEng degree in opto-electronics technology, and PhD in optical engineering from Tianjin University, China, in 2010, 2016, and 2016, respectively. He went for visiting study at University of Birmingham, United Kingdom, and at King Abdullah University of Science and Technology, Saudi Arabia, respectively, between 2013 and 2014. His main research interests are terahertz metasurfaces, surface plasmonic waves, and nonlinear plasmonics.

Abstract: Ultrafast terahertz (THz) generation is the forerunner technology of THz science and application. The most fomous example is the THz time-domain spectroscopy technology, which has been widely applied in material exploration, non-destructive inspection and spectral imaging. Currently, there are a variety of ultrafast THz generation methods, including photoconductive antenna, nonlinear crystal, and ferromagnetic films, etc. Though they can generate broadband THz waves well, they have less controlling ability over the generated THz waves at the same time. The recent development of THz nanophotonics provides an effective route to overcome this difficulty. By applying resonating nano structures at infarad range, the inside difference frequency generation effect can give birth to broadband THz generation with a high effective efficiency, while the designable feature of nano structures can also serve as a route for tailoring the nonlinear process at will and thus controlling the propagation property of the generated THz waves at the same time. Such nano structures are denoted as nonlinear metasurfaces here. In this talk, we will introduce several of our recent studies in THz nanophotonics for controlling THz generation using nonlinear metasurfaces, including enhanced THz generation based on epsilon-near-zero effect, broadband THz vortex beam generation based on nonlinear geometric phase, THz amplitude control based on achiral coupling, and pump-handedness-dependent THz generations based on chiral coupling, etc.

11:15-11:45	Invited Speech

Speaker: Shuting Fan
Affiliation: Shenzhen University
Title: Improving the Sensitivity and Specificity of Biosensing in the Terahertz Frequencies
Bio: Dr. Shuting Fan graduated from Tianjin University in 2011 with a B. Eng degree. She received her Ph.D. degee from the Hong Kong University of Science and Technology in 2015. She was a Research Fellow at the University of Western Australia from 2015 to 2017. She joined Shenzhen University as an Assistant Professor in 2017. Her research Interests include terahertz Time-domain Spectroscopy, terahertz biomedical applications, and terahertz data processing techniques.
Abstract: Terahertz spectroscopy, as a non-invasive, non-labeling detection technology, shows great potential in the field of biosensing. However, sensing biomolecules directly in the water environment at terahertz frequencies remains challenging due to a large amount of water absorption. Some studies have shown that the interaction between biomolecules and the surrounding water molecular network will result in an increased absorption coefficient compared to bulk water at terahertz frequencies. We used an asymmetric hexagonal open-ring metamaterial structure with adrenaline as the target molecule to achieve highly sensitive terahertz sensing at low concentrations. The minimum detected concentration reached 30 uM with good linearity up to 600 uM. As we continue to increase the concentration of target molecules, we found a nonlinear change in the absorption coefficient of the measured object on the sensor, which may be related to the "hydration shell overlap" theory reported by literatures. This talk will also explore the applicability of biomolecular-specific recognition techniques in the terahertz band, including molecular imprinting, Crispr, etc.

11:45-12:00	Paper ID: 5834

Author(s): Yuanyuan Bai, Shilei Liu, Hongyi Li, Jiajun Ma and Chunmei Ouyang
Affiliation: Tianjin University
Title: Polarization Conversion at Multiple Angles and Broadband Absorption in the Terahertz Regime
Abstract: In recent years, more and more functional devices have emerged to promote the development of terahertz technology. Here, a metasurface with the functions of multi-angle polarization conversion and broadband absorption is proposed. Under amorphous GST, when the structure is in the original position, it can realize efficient cross-polarization conversion in the range of 0.42-0.99 THz with a bandwidth of 0.57 THz, and the polarization conversion rate is greater than 0.93. If the structure rotates in the range of 0-90°, the polarization conversion at any angle from -90° to 90° can be achieved. In addition, under crystalline GST, the absorption higher than 0.81 is obtained within 0.41-1.07 THz. With wide bandwidth, high stability and multiple functions, the proposed metasurface brings more possibilities for meta-devices.

Video Session

Invited Speech **Optical Communication and Networks**

Speaker: Oskars Ozolins

Affiliation: Riga Technical University

Title: High-speed Modulators for Optical Interconnets

Bio: Oskars Ozoliņš (M'09) received the M.Sc. degree in telecommunications from Riga Technical University, Riga, Latvia, in 2009 and the Dr. Sc.Ing. (Ph.D.) degree in optical communications from Riga Technical University, in 2013 O. Ozoliņš is an Academician (foreign member) at the Latvian Academy of Science. He is also the Latvian Council of Science Expert in Committees: Engineering, Computer Science, and Physics. His research interests are in the areas of digital and photonic-assisted signal processing techniques, high-speed short-reach communications and devices, optical and photonic-wireless interconnects, and machine learning for optical network monitoring. In his professional career, O. Ozoliņš has been a guest researcher at III-V Lab (Nokia Bell Labs and Thales, France), Keysight Technologies (Böblingen Germany), DTU Fotonik (Technical University of Denmark, Denmark), IDLab (Ghent University – imec, Belgium), OFO (KTH Royal Institute of Technology, Sweden), and FOTON laboratory (University of Rennes 1, France). In total 265 days for external stays. O. Ozoliņš is coholder of a world record reported at OFC2023 conference post-deadline session: on optical amplification free highest baud rate for OOK, PAM4 and PAM6 transmitted with single integrated externally and directly modulated laser. He is the author of around 230 international journal publications, conference contributions, invited talks/tutorials/keynote/lecture, patents, and book chapters. He has more than 13 years of experience in supervising students. He has supervised 36 bachelor students, 23 master students, 5 Ph.D. students, and 3 postdocs. O. Ozoliņš was a Technical Program Committee (TPC) member of the ECOC2022, Basel Switzerland. He also was a TPC member of OFC2023, San Diego California, USA.

Abstract: Focus of this talk is on high-speed silicon photonics (SiP) ring resonator and Mach-Zehnder modulators as well on indium phosphide (InP) externally modulated and directly modulated lasers. We will also report on recent advances on high-baudrate modulators in SiP InP technologies.

Invited Speech **Optical Communication and Networks**

Speaker: Ehab Awad

Affiliation: King Saud University

Title: Nanogaps Metamaterial for Optical Amplification and Filtering

Bio: Ehab Awad has received his M.Sc. and Ph.D. in Electrical engineering from the University of Maryland College Park (UMCP), USA. He has received his B.Sc. and additional M.Sc. in Electrical engineering from Cairo University, Egypt. He is currently a Professor at the Electrical Engineering Department, King Saud University, Saudi Arabia. He worked as a postdoctoral research associate at the UMCP, USA. He is currently a senior member of the IEEE photonics society and Optica (formerly OSA, Optical Society of America). He has plenty of leading patents and publications in several international journals and conferences. He is the recipient of the Almarai award for his distinguished and innovative research work on nanoplasmonics. Several of his research works have received the spotlight through international media. He is a principal investigator with research expertise and interests in nanophotonics, optical plasmonics, optical metamaterials, silicon photonics, optical fibers, optical communications, optoelectronic devices, lasers, and infrared sensors.

Abstract: An optical metamaterial is an artificially designed array of nanoscale structures. The size of the structure unit cell is usually smaller than the interacting light wavelength. Metamaterials interact with light in unusual ways that allow them to have unique characteristics and functionalities that are different from natural conventional materials.

In this talk, I am going to start with a novel metamaterial gain waveguide. It is a structured array of alternating nano air gaps and InGaAsP gain nano stripes. This unique structure allows subwavelength spatial modulation of waveguide effective refractive index. Thus, the propagating fundamental mode can be concentrated with high intensities within the nano air gaps, while getting amplified through evanescent tails within the gain nano stripes. The gain metamaterial waveguide can be used to construct efficient traveling wave optical amplifiers and/ or nanolasers, which operate at the telecommunication wavelength of 1550nm. These devices possess an almost ideal internal quantum efficiency and compact size. They are also compatible with the integration in silicon photonics devices.

In addition, I am going to present a silicon-on-insulator metamaterial waveguide that consists of periodic nano-sized air gaps entrenched within the waveguide core. These nanogaps constitute a partial-width Bragg structure. They can nano-focus light and periodically perturb its effective index during propagation, and thus excite simultaneous zero and second order modes of waveguide. That produces a unique double-hump Bragg spectrum that is tunable within the 1-2μm wavelength range. The double-hump spectrum can be reshaped by choosing the nanogaps' width and periodicity to obtain new and distinctive spectral shapes for applications in optical communication filtering.

Invited Speech **Silicon Photonics**

Speaker: Ping Zhao
Affiliation: Chalmers University of Technology
Title: Optical Parametric Amplification with Integrated Silicon Nitride Waveguides
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 industry for five years after graduation. Presently, he is a researcher at Chalmers University of Technology (Gothenburg, Sweden). His research fields cover integrated nanophotonic devices, nonlinear optics, optical amplification and optical communications.
Abstract: With the ability of overcoming the limits in both bandwidth and noise figure of stimulated-radiation-based amplification, optical parametric amplifiers have enormous potential in various fields such as communication, sensing, metrology and laser. This talk includes our recent progresses in continuous-wave optical parametric amplification using integrated silicon nitride nonlinear photonic waveguides which are compatible with CMOS fabrication processes.

Paper ID: 3439 **Optical Communication and Networks**

Author(s): Der-Rong Din
Affiliation: Department of CSIE, NCUE, Changhua
Title: Heuristic Algorithms for Demand Provisioning in Hybrid Single/Multi-band Elastic Optical Networks
Abstract: Since upgrading the single-band EON (SB-EON) to multi-band (MB-EON) is a staged and lengthy process, fibers with SB and MB transmission capacities may coexist for an extend period. This type of network is referred to as a hybrid SB/MB EON. In this article, a family of routing, band, and spectrum allocation algorithms for hybrid SB/MB-EONs is proposed. The bandwidth blocking probability (BBP) of the proposed algorithms is simulated and compared. The proposed heuristic algorithms are also evaluated on networks with different numbers of fibers with MB transmission. The results show that the three new algorithms outperform the previous proposal method V3 on a hybrid SB/MB-EON with heavier loads. These findings are expected to contribute to the advancement of dynamic resource allocation in SB/MB-EONs and network upgrades.

Paper ID: 5596 **Optoelectronic Devices and Applications**

Author(s): Raihan Khan Akash, Tajruba Alam Orpi, Tazreen Rahman Aurpa, Sayan Singha Roy and Safayat-Al Imam
Affiliation: Ahsanullah University of Science and Technology
Title: Black Phosphorus Based SPR Biosensor for Formaldehyde Detection

Abstract: A surface plasmon resonance (SPR) biosensor implementing Kretschmann configuration is proposed to enhance performance in detecting formalin in liquid. Slight changes are done in the metal layer by varying between gold (Au) and silver (Ag) as metal layer and Black Phosphorus (BP) as 2D semiconductor layer and to observe the best performing combination. In the case of this theoretical analysis, a rigorous simulation has been done for the result and output. To achieve the most effective possible combination, BP layer thickness is altered. Among them Ag and BP with Indium Phosphide (InP) layer showed overall best performance showing maximum detection accuracy. Moreover, comparisons are made between FWHM, Sensitivity, and Figure of Merit (FoM). The combination of the materials helped to obtain better values of the performance parameters of the device. To assess the device's performance, the angular interrogation technique is employed. Transfer matrix method (TMM) is implemented to avoid prediction and obtain more accurate results. The proposed sensor will help in detecting formalin for the aqueous sensing medium more accurately.

Paper ID: 606	**Optoelectronic Devices and Applications**

Author(s): Priyank Sain and **Srinivas Talabattula**
Affiliation: Indian Institute of Science
Title: Guided Modes in LNOI Waveguide: Impact of Crystal Rotation
Abstract: In this paper, we theoretically investigated the impact of crystal rotation in Lithium Niobate on the number of guided TE modes supported by thin film LNOI waveguide. We analyze for different slab thickness and for asymmetric waveguide configuration.

Paper ID: 4290	**Optical Communication and Networks**

Author(s): Keiji Shimada, Ryosuke Matsumoto and Takahiro Kodama
Affiliation: Engineering and Design Kagawa University
Title: Constellation-Preserving Symbol Encryption with Minimal Impact on Fiber Non-linear Channels
Abstract: We showed that uniform-QAM constellation-preserving symbol encryption is below the FEC limit Q2 in any fiber transmission distance without decryption. 32Gbaud 7ch-WDM-DP-16QAM transmission experiments under the condition of fiber non-linear optics revealed no extreme degradation.

Paper ID: 1804	**Optical Communication and Networks**

Author(s): Ayumu Kariya, Keita Tanaka, Fumiya Kobori, Tomoya Ishikawa, Shogo Hayashida and Takahiro Kodama
Affiliation: Engineering and Design Kagawa University
Title: Completely Invisible Underwater Wireless Optical Communication System: Full-Duplex Transmission in 1.9 m Shallow-Water Channel with 3 m/s Wind
Abstract: Full-duplex secure underwater transmission using 850-nm near-infrared communication confirmed that the distance-adaptive real-time transceiver with solar blocking operated stably without excessive transmission-rate degradation in a 1.9-m shallow-water channel under light wind conditions of 3 m/s.

Poster Session

Time: 15:30-18:00 | September 7	**Venue:** Lounge (1F)

Paper ID: 9080

Author(s): Yiwei Ding
Affiliation: University of Science and Technology of China

Title: Construction and Calibration of a Coherent Distance Measurement Simulation System Based on Dual Optical Frequency Combs

Abstract: This study is based on a work published in Nature Photonics. To explore the feasibility of using a coherent distance measurement system based on dual optical frequency combs for deep space exploration, we constructed a laboratory simulation distance measurement system to conduct simulation experiments. In contrast to the design of the referenced paper, we separated the measurement path and reference path to avoid noise and spurious peaks caused by multiple reflecting surfaces. We adjusted the overall spatial coupling of the light path to preserve 20mW of energy from a 25mW laser input at 1550nm. After passing through a beam splitter, reference reflector, and measurement reflector, we detected a total of 5mW of energy, with each path accounting for approximately 2.5mW. By replacing the detection reflector with a mirror affixed to an electric two-axis displacement stage, we conducted simulation experiments on the distance measurement of moving objects using this setup.

Paper ID: 6354

Author(s): Weihao Lin, **Yuhui Liu**, Perry Ping Shum and Xuming Zhang
Affiliation: Southern University of Science and Technology

Title: A Simple Fiber Magnetic Field Sensor based on Peanut Shaped MZI in Fiber Ring Laser

Abstract: A peanut couple shaped Mach – Zehnder interferometer (MZI) in fiber ring laser (FRL) is proposed in this paper for high sensitivity magnetic field sensing. The designed optical fiber sensor is placed in the magnetic fluid (MF), and the magnetic field sensitivity of 0.236 nm/mT is realized.

Paper ID: 234

Author(s): Yu Pan, Yu Cheng, Houquan Liu, Shijie Deng, Chuan Xin Teng, Hongyan Yang, Hongchang Deng, Libo Yuan, Zhijun Luo, Zhenyu Li, Jianghe Xu and Zhenggang Lian
Affiliation: Guilin University of Electronic Technology

Title: Light-guiding Properties of Hollow-core Negative Curvature Fibers with Non-uniform Dielectric Capillaries in the Visible Spectrum

Abstract: In this work, we investigate the effect of non-uniform dielectric capillary on the light-guiding characteristics of hollow-core negative curvature fibers, specifically the confinement loss and mode field diameter (MFD). Our findings suggest that this effect offers considerable flexibility in the guidance band, while maintaining a consistent MFD across various wavelengths. This enables precise adjustment of the guidance band of hollow-core negative curvature fibers based on the wavelength of light, while ensuring MFD stability. These results have potential applications in communication and optical fiber sensing.

Paper ID: 3840

Author(s): Yi Hong, Wei Chen and Renli Xiong
Affiliation: Shanghai University

Title: Ultra-broadband Erbium-doped Fiber and its Gain Characteristics

Abstract: We fabricated an ultra-broadband Erbium-Doped Fiber (EDF) by the Modified Chemical Vapor Deposition (MCVD) technique. The bandwidth of EDF with gain more than 25 dB is 49.0 nm (1525.0 -1574.0 nm), the Noise Figure (NF) is less than 6.1 dB by 980 nm forward pumping. The saturated output power of EDF is 17.5 dBm. By bidirectional

pumping, the bandwidth of EDF with gain more than 25 dB is 53.4 nm (1523.3-1576.7 nm). This ultra-broadband and low-noise EDF is a promising gain medium for optical amplifiers and lasers.

Paper ID: 8090

Author(s): Yuhui Liu, Weihao Lin, Xuming Zhang and Perry Ping Shum

Affiliation: Southern University of Science and Technology

Title: Fiber Ring Laser Sensor for Temperature Measurment Based on Isopropanol filled SHF in Saganc Loop

Abstract: In this paper, we proposed a high sensitivity temperature sensor based on isopropanol filled side hole fiber (SHF) in Sagnac loop inside fiber laser. Different from ordinary optical fiber sensors, Sagnac loop is beneficial to long-distance measurement, and the temperature monitoring system based on laser structure has high signal to noise ratio (-30 dB) and narrow linewidth (-0.2 nm). The 10 cm and 15 cm Sagnac rings are compared, and the temperature sensitivity of 0.376 nm/℃ and 0.366 nm/℃ are obtained respectively. It gives great potential for long-distance practical use in many scenarios.

Paper ID: 9796

Author(s): Zhangwan Peng, Weiwei Pan, Ruoyun Yao, Qianwen Guo, Chaodan Chi and Chen Ji

Affiliation: Zhejiang University

Title: Qualitative Analysis on Bandwidth of Modified UTC-PDs under Different Optical Power Injection

Abstract: We propose bandwidth variation under different optical power density of Modified Uni-traveling-carrier photodiodes (MUTC-PDs), and analysis in detail from a physical perspective by considering the self-induced E-field effect and overshoot velocity effect.

Paper ID: 9493

Author(s): Jie Liu, Mengyuan Ye, Hong Ma, Duowei Zeng and Yang Chen

Affiliation: China University of Geosciences

Title: Polarization-independent Dual Mode Silicon Spot Size Converter Using Gradual Index Distributed Subwavelength Gratings

Abstract: We propose and demonstrate a polarization-independent dual mode spot size converter (SSC) on silicon integrated platform. By utilizing gradual index distributed subwavelength gratings (GRIN-SWG). The proposed device can be used in the chip-level PDM-MDM system.

Paper ID: 3559

Author(s): Chunyu Deng, Guangping Xie, Yingna Wu and Na Ni

Affiliation: Shanghaitech University

Title: High-precision Measurement System using Multi-laser and Multi-DOF of the Complex Surface 3D Profile

Abstract: For the measurement of complex surfaces, this paper implements a high-precision measurement system. In this system, three high-precision line laser sensors are used, which have three degrees of freedom in motion. A self-developed external calibration algorithm is used to achieve high-precision measurement of complex surfaces. Experimental results show that the precision of this method on standard gauges is less than 5um, and the actual blade measurement precision is less than 15um.

Paper ID: 1586

Author(s): Bao Jie, Zhang Chenglong, Wei Xinpeng, Liu Xingtang and Zhao Chunhui

Affiliation: Beijing Institute of Control Engineering

Title: Accuracy Analysis and Verification Method on Vision Position-pose Measurement System

Abstract: In order to realize position-pose measurement system of monocular camera, a measurement accuracy test system was established. First, we introduce the system principle, theoretical accuracy analysis, computational experiments and computational results. In order to solve the problem of obtaining the true value of high precision pose measurement and the poor accuracy evaluation results caused by accuracy of the simulated motion platform, we proposed single laser tracker with higher accuracy as the method to verify the system accuracy. By establishing the relevant coordinate system and coordinate system conversion, the absolute accuracy of the camera position-pose measurement can be accurately obtained. The result of the 16m measurement accuracy verification experiment shows that, the position measurement accuracy x and y can reach the sub millimeter level. Due to the weak distance perception of monocular camera, the orientation error of z-axis is large, on the order of tens of millimeters. The minimum accuracy of the angle measurement result is 0.2 °. Using a single laser tracker for relative measurement to evaluate the accuracy of the measurement system can effectively evaluate the measurement accuracy of the high-precision relative position and attitude measurement system under the limited laboratory conditions.

Paper ID: 986

Author(s): Hong Ma, Mengyuan Ye, Jie Liu, Duowei Zeng and Yang Chen

Affiliation: China University of Geosciences (Wuhan)

Title: Dual-polarization Dual-mode Silicon 3dB Beam Splitter based on Shallow Etched Multimode Interference Coupler

Abstract: In this paper, we propose a dual polarization dual mode 3dB beam splitter. By utilizing the shallow etched multimode interference (MMI) coupler, the proposed device can handle TE0, TE1, TM0 and TM1 modes simultaneously.

Paper ID: 2446

Author(s): Yingfei Wan, Chaodan Chi, Yili Liu, Yiti Xiong, Xiaojun Ying, Hao Wang, Kun Yin, Dan Lu and Chen Ji

Affiliation: Zhejiang lab

Title: High-power Multi-wavelength DFB Diode Laser Array for Continuous-wave Terahertz Generation

Abstract: We demonstrate a high-power multi-wavelength distributed feedback (DFB) diode laser array chip as a continuously tunable terahertz (THz) source. The maximum single mode output power of the laser array is greater than 100 mW, and through optical heterodyne method, a continuously tunable terahertz emission of 0.096~1.59 THz can be generated.

Paper ID: 3851

Author(s): Minghui Niu, Chengwei Shan, Chenlong Xue, Jiaqi Hu, Khit Si Thu, Gina Jinna Chen, Aung Ko Ko Kyaw and Perry Ping Shum

Affiliation: Southern University of Science and Technology

Title: A Simple Fabrication of Au/ZnO-Nanoflower Substrate for High-Efficiency SERS Detection

Abstract: In this study, we present a simple fabrication method of high-efficiency Au/ZnO-nanoflowers as Surface Enhanced Raman Scattering (SERS) substrates. The substrates were prepared by depositing gold on hydrothermally synthesized ZnO nanoflowers, which exhibit a significantly improved SERS performance when compared to ZnO nanoflowers alone due to the involvement of multiple physical mechanisms. This proposed fabrication approach not only enables the development of Au/ZnO-nanoflowers-based SERS substrate but also advances the exploration of the noble-semiconductor heterojunction SERS platforms. This research paves the way for the enhanced sensitivity and applicability of SERS-based analytical techniques in biomedical and other fields.

Paper ID: 3780

Author(s): Qingfeng Kong, Rui Li, Jie Ma, Pengfei Hu, Yanzheng Fan and Yitong Cheng

Affiliation: Xi'an Institute of Electromechanical Information Technology

Title: A Computational Model for the Far-field Light Intensity of a Lens

Abstract: This paper focus on the problem of spatial distribution mismatch caused by direct discrete Fourier transform of near-field light waves, study the calculation method of the focal and defocus plane light intensity of a lens, derive the discrete Fourier transform formula for calculating the focal and defocusing surface light field, and

establish a mathematical model. The experiment compares the actual light intensity distribution and the calculated light intensity distribution of the lens focal plane and the defocus plane, and the results showed that the difference between the model light field and the actual light field PV value is less than 0.19, and the rms value is less than 0.007. The experiment proves that the far field computation model used in this paper is accurate and effective.

Paper ID: 2982

Author(s): Xianjin Liu and Junjun Xiao
Affiliation: Harbin Institute of Technology (Shenzhen)

Title: Off-chip Emission Metasurfaces for Complex-amplitude Holography by Physical Model-driven Inverse Design

Abstract: Metasurface can provide unprecedented light manipulation capabilities on dimensions such as phase, amplitude, and polarization. The integration of metasurface onto slab waveguides is a new photonic integrated device that enables the conversion of bounded modes to free-space emission and has great potential applications. Here, we propose an end-to-end inverse design algorithm based on a physical driving model for guiding-mode driven metasurface optimization. Our approach directly optimizes the distribution location and geometric structure of meta-atoms on the outcoupling regions of the waveguide, enabling simultaneous control of both the phase and the amplitude for free-space emission. We demonstrated off-chip complex-amplitude holographic image projection in multiple spectral channels, with obviously reduced speckle noise compared to phase-only holograms.

Paper ID: 9477

Author(s): Junfan Chen, Jiaqi Hu, Qiaozhou Xiong, Chenlong Xue, Aoyan Zhang, Hong Dang, Dan Lu, Xiaosong Bai, Weihao Lin, Yuhui Liu, Huanhuan Liu, Liyang Shao, Gina Jinna Chen, Longqing Cong and Perry Ping Shum
Affiliation: Southern University of Science and Technology

Title: Fiber-based High-resolution Raman Endoscopic Probe

Abstract: The all-fiber endoscopic probe has attracted more and more attention in Raman spectral medical applications due to its small size and low cost. However, the resolution, size, and working distance of the endoscopy probe are mutually restricted. We propose a fiber structure and simulate the effects of different structures on the resolution and working distance. The results show that the optimal reflector angle is 43° -48° , and the optimal reflector distance is 0. The minimum spot is 7.2, and the maximum working distance is 0.25 mm. Raman fiber probes have great potential in endoscopic detection.

Paper ID: 6961

Author(s): Chenlong Xue, Jiaqi Hu, Yanqun Xiang, Junfan Chen, Junyu Wei, Jinqian Lv, Aoyan Zhang, Hong Dang, Hao He, Jie Hu, Liyang Shao, Gina Jinna Chen, Zhen Gao and Perry Ping Shum
Affiliation: Southern University of Science and Technology

Title: Cisplatin SERS Detection Based on The Binding of Sulfhydryl Groups

Abstract: Cisplatin, a first-line anti-cancer drug, is widely utilized in clinical practice. Its anti-cancer mechanism involves DNA binding in the nucleus, inhibiting cell division or induction of apoptosis. However, as heavy metal, platinum tends to accumulate in the body during metabolism and often results in nephrotoxicity, ototoxicity, and neurotoxicity. Therefore, developing an accurate cisplatin detection method is valuable for personalized treatment planning. In this study, we develop a novel p-amino thiophenol (PATP) reaction-mediated surface-enhanced Raman scattering (SERS) cisplatin detection method. A linear correlation was observed between the Raman intensity of v (C-S) and the concentration of cisplatin. This method is low-cost and convenient with high precision.

Paper ID: 9563

Author(s): Jinqian Lv, Chenlong Xue, Junfan chen, Yaofei Jiang, Jiang Du, Junyu Wei, Hong Dang, Quan Tang, Han Wang, Hu Liang, Gina Jinna Chen, Xiaojun Yu, Yanqun Xiang and Perry Ping Shum
Affiliation: Southern University of Science and Technology

Title: A Model for the Detection of Circulating Tumor Cells based on Micro-OCT imaging

Abstract: Circulating tumor cells (CTCs) escape from the primary tumor site, then shed to the circulating system and travel around the body through the bloodstream before initiating metastatic tumors. However, CTCs in the circulatory system are rare, which makes it challenging to isolate and observe. Here, we aim to provide a feasible model to observe CTCs with high-resolution Optical Coherence Tomography (μOCT) in microfluidics, simulating the blood flow in vascular. CTCs are enriched and sorted by our microfluidic system. We obtained high-resolution CTCs' OCT images with the indication of fluorescent labeling for the data collection for real-time diagnostic system construction.

Paper ID: 2163

Author(s): Chenqing Ji, Chenlong Xue, Jinna Chen, Yitong Guo, Dan Luo and Perry Ping Shum

Affiliation: Southern University of Science and Technology

Title: A Molecular Probe for Cisplatin Detection Based on Fluorescence Resonance Energy Transfer

Abstract: Cisplatin, one of the most widely used clinical medications in the field of cancer chemotherapy, which is an indispensable drug type in traditional chemotherapy. Due to the significant toxicity and side effects of typical chemotherapy medications, precise drug concentration monitoring becomes the key. However, because of individual variances, various individuals' metabolic capacities to medications varies, resulting in differences in actual blood drug concentration in the body under the same dosage. Therefore, it is imperative to create a new low-cost and rapid detection method for the concentration of serum active cisplatin, which is crucial to the chemotherapy effect and quality of life for cancer patients. In this work, based on the chemically cross-linked reaction between active cisplatin and DNA bases, as well as the high sensitivity of Fluorescence Resonance Energy Transfer (FRET), we proposed a new FRET-based technique for detecting serum active cisplatin concentration. We constructed a fluorescent molecular probe with a dumbbell shape consisting of graphene quantum dots (GQDs) functionalized with carboxylic acid groups, gold nanoparticles (AuNPs), and DNA single-strand sequences (ssDNA). The findings reveal that the molecular probe has a good linear relationship across the active cisplatin concentration range of 52-832 μM. This technique can accomplish low-cost, rapid, and simple detection of active cisplatin concentration, and the further advancements in this work can give a decision-making basis for tailored and accurate cancer treatment.

Paper ID: 107

Author(s): Zhongda Deng and Wei Yin

Affiliation: Nanjing University of Science and Technology

Title: Fast 3-D Measurement based on Spatial-temporal Speckle Projection

Abstract: Speckle projection profilometry (SPP), as a promising structured light projection technique, can achieve global unambiguous 3D measurement by projecting a single random speckle pattern. However, due to the measured surfaces with complex reflection characteristics and the perspective differences between stereo cameras, only projecting a single speckle pattern is difficult to encode a globally unique feature for every pixel in the whole measurement space, resulting in its limited measurement accuracy. To meet the high-precision measurement requirement of industrial scenes, this paper proposed a 3D measurement method based on spatial-temporal speckle projection (STSP), which obtain the depth information of the measured scene efficiently by integrating 10 speckle projection modules. Experimental results demonstrate that, within the measurement range of 0.8m-2.0m, the proposed method can achieve fast and high-precision 3D measurement with the accuracy of 0.43mm at 0.85m.

Paper ID: 9826

Author(s): Chaodan Chi, Yingfei Wan, Xiaojun Ying, Zhangwan Peng, Yili Liu, Yiti Xiong, Hao Wang, Dan Lu and Chen Ji

Affiliation: Zhejiang Lab

Title: Terahertz-wave Generation Based on Tunable DFB Laser and MUTC-PD

Abstract: Optical heterodyning using dual tunable lasers is a practical cost-efficient solution for room temperature terahertz (THz) wave generation, distributed feedback (DFB) laser and uni-traveling-carrier photodiode (UTC-PD) are two key photonic chip technologies in this approach. In this paper, we demonstrated continuous tuning THz emission from 0.116 to 0.226 THz using a DFB laser array chip and a modified uni-traveling-carrier photodiode (MUTC-PD) chip, both of which designed and fabricated in house, making this an important step in our goal of developing compact and cost-efficient room temperature continuous tuning photonic chip based THz emitter modules.

Memo