# The 19th International Conference on Optical Communications and Networks (ICOCN 2021)

August 23-27 2021

Shangri-La Hotel, Qufu, Shandong, China

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# Welcome to the 19th International Conference on Optical Communications and Networks

It is a great pleasure to invite you to participate in the 19th International Conference on Optical Communications and Networks (ICOCN2021) and share the latest news in communications and photonics science, technology and innovations from leading universities, research laboratories and companies throughout the world. ICOCN has been held annually tracing back to 2002. It is now one of the largest international conferences on optical communications, photonics and relevant technologies.

The ICOCN2021 technical conference features a full suite of plenary, invited, and contributed talks given by international academic and industrial researchers who are leaders in their respective fields. This year's conference will feature the following topics: Optical fibers and fiber-based devices; Optical transmission systems, subsystems and technologies; Networks architectures, management and applications; Optoelectronic integration and devices; Optical signal processing and microwave photonics; Optical measurements and imaging; Ultrafast photonics and nonlinear optics; Space communications, navigation & tracking; Optoelectronics based on organic and nanostructured materials; Machine learning for photonics and communications; 2D-materials based photonics; Electronic technologies and communications. With a conference program of broad scope and of the highest technical quality, ICOCN2021 provides an ideal venue to keep up with new research directions and an opportunity to meet and interact with the researchers who are leading these advances. We have over 510 presentations scheduled, including 3 keynotes and 222 invited talks made by many of the world's most prominent researchers from academia and industry. We thank all the contributors and authors for making ICOCN2021 a truly unique, outstanding global event.

There will be 58 regular technical sessions, and two post-deadline paper sessions. Our conference highlight is the Plenary Session scheduled on the morning of Tuesday, 24 August. Three distinguished speakers will give presentations: Prof. Ren Xiaomin from Beijing University of Posts and Telecommunications will give a talk on novel fundamental concepts beneath quantum photonics. Prof. He Zuyuan from Shanghai Jiao Tong University will give a review on optical fiber distributed acoustic sensors. Finally, Dr. Li Liangchuan from Huawei Technologies will share his insight on trends and challenges of intergenerational evolution of optical fiber communication.

Young Scientist Awards sponsored by Light: Science & Applications will be given to 5 young researchers with the age no more than 40 by the conference date who made outstanding contributions and present on our conference. In addition, 10 Best Student Paper Awards and 15 Best Poster Awards will be selected by the Technical committee or expert panel during the conference. All these awards will be presented during the conference banquet on the evening of Wednesday, 25 August. In addition to the technical program, there will be an impressive range of exhibitions from the relevant industries, publishers and professional organizations.

We have also prepared a rich social program to facilitate meeting and networking with colleagues from so many universities and cities. On the evening of Wednesday, 25 August, the Banquet and Awards Ceremony will be held for all conference registrants. Lucky-draw will be carried out for those who help us select the Best Poster Award by submitting the ticket.

It is an enormous task to organize a conference and it is impossible to succeed without the dedicated efforts of many supporters and volunteers. We are indebted to the entire Technical Program Committee and the Subcommittee Chairs who have worked persistently throughout the whole year to invite speakers, solicit and review papers, organize the technical sessions which results in the excellent technical program. We thank the staff and volunteers from Qufu Normal Univ., Shandong Univ., Guangdong Univ. of Technology and China Jiliang Univ. We also thank the IEEE Photonics Society, IEEE Photonics Society Singapore Chapter and Guangdong Chapter for sponsoring the event.

Sincerely,

Perry Ping Shum
*Southern Univ. of Sci. Tech., China*
*General Chair*

Weiping Huang
*Shandong Univ., China*
*General Chair*

Yunjie Xia
*Qufu Normal Univ., China*
*General Chair*

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Weiping Huang, Shandong Univ., China

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Chongqing Wu, Beijing Jiaotong Univ., China

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Yiping Wang, Shenzhen Univ., China

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Han Zhang, Shenzhen Univ., China

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Mingjiang Zhang, Taiyuan Univ. of Tech., China

Wentao Zhang, Inst. of Semiconductors, CAS, China

Yong Zhao, Northeastern Univ., China

Guiyao Zhou, South China Normal Univ., China

Pu Zhou, National Univ. of Defense Tech., China

Tao Zhu, Chongqing Univ., China

**Track 2: Optical transmission systems, subsystems and technologies**

Jian Chen, Nanjing Univ. of Posts and Tel., China, **Chair**

Songnian Fu, Guangdong Univ. of Tech., China, **Chair**

Jian Wu, Beijing Univ. of Posts and Tel., China, **Chair**

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Tianwai Bo, Beijing Institute of Technology, China

Jiangbing Du, Shanghai Jiao Tong Univ., China

Shanguo Huang, Beijing Univ. of Posts and Tel., China

Alan Pak Tao Lau, HK Polytech. Univ., China

Borui Li, Huawei Technologies Co., Ltd., China
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Zhengxuan Li, Shanghai Univ., China
Bo Liu, Nanjing Univ. of Information Sci. & Tech., China
Ning Liu, Huawei Technologies Co., Ltd, China
Yong Liu, Univ. of Electronic Sci. and Tech. of China, China
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Lianshan Yan, Southwest Jiaotong Univ., China
Qi Yang, Huazhong Univ. of Sci. and Tech., China
Xingwen Yi, Sun Yat-sen Univ., China
Yang Yue, Nankai Univ., China
Fan Zhang, Peking Univ., China

**Track 3: Networks architectures, management and applications**

Jiajia Chen, KTH, Royal Inst. of Tech., Sweden, **Chair**
Gangxiang, Steven Shen, Soochow Univ., China, **Chair**
Jie Zhang, BUPT, China, **Chair**
Zuqing Zhu, Univ. of Sci. and Tech. of China, China, **Chair**
Bowen Chen, Soochow Univ., China
Huaxi Gu, Xidian Univ., China
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Wenda Ni, Azure Networking, Microsoft, Canada
Jelena Pesic, Nokia Bell Labs, France
Houman Rastegarfar, Univ. of Arizona, USA
Jesse Simsarian, Nokia Bell Labs, USA
Elaine Wong, Univ. of Melbourne, Australia
Wei Xu, Tsinghua Univ., China
Yongli Zhao, Beijing Univ. of Posts and Tel., China
Min Zhu, Southeast Univ., China

**Track 4: Optoelectronic integration and devices**

Haoshuo Chen, Nokia, USA, **Chair**
Jianguo Liu, Inst. of Semiconductors, CAS, China, **Chair**
Liu Liu, South China Normal Univ., China, **Chair**
Yikai Su, Shanghai Jiao Tong Univ., China, **Chair**
Xinlun Cai, Sun Yat-sen Univ., China
Po Dong, Nokia Bell Lab, USA
Xuetao Gan, Northwestern Polytechnical Univ., China
Wenhua Gu, Nanjing Univ. of Sci. and Tech., China
Ran Hao, Zhejiang Univ., China
Ho Pui Aaron HO, Chinese Univ. of Hong Kong, HK
Yong-Zhen Huang, Chinese Academy of Sci., China
Yuqing Jiao, Eindhoven Univ. of Tech., Netherlands
Mingyu Li, Zhejiang Univ., China
Ting Mei, Northwestern Polytechnical Univ., China
Xiaodong Pi, Zhejiang Univ., China
Minhao Pu, Technical Univ. of Denmark, Denmark
Wei Shi, Laval Univ., Canada
Yaocheng Shi, Zhejiang Univ., China
Junqiang Sun, Huazhong Univ. of Sci. and Tech., China
Xiankai Sun, Chinese Univ. of Hong Kong, Hong Kong China
Yunxu Sun, Harbin Inst. of Tech. Shenzhen Graduate School, China
Jianwei Wang, Peking Univ., China
Jin Wang, Nanjing Univ. of Posts and Tel., China
Qijie Wang, Nanyang Technological Univ., Singapore
Kevin Williams, Eindhoven Univ. of Tech., Netherland
Yang Xu, Zhejiang Univ., China
Lin Yang, Inst. of Semiconductor, CAS, China
Yu Yu, Huazhong Univ. of Sci. and Tech., China
Linjie Zhou, Shanghai Jiao Tong Univ., China
Zhiping Zhou, Peking Univ., China

**Track 5: Optical signal processing & microwave photonics**

Hongwei Chen, Tsinghua Univ., China, **Chair**
Jianji Dong, Huazhong Univ. of Sci. and Tech., China, **Chair**
Shiming Gao, Zhejiang Univ., China, **Chair**
Shilong Pan, Nanjing Univ. of Aeronautics and Astronautics, China, **Chair**
Amol Choudhary, Univ. of Sydney, Australia
Peucheret Christophe, Univ. of Rennes, France
Xinhuan Feng, Jinan Univ., China
Zhanghua Han, Shandong Normal Univ., China
Chaoran Huang, Princeton Univ., USA
Ming Li, Inst. of Semiconductors, CAS, China
Xuejin Li, Shenzhen Univ., China
Christina Lim, Univ. of Melbourne, Australia
Zhixin Liu, Univ. College London, UK
Arnan Mitchell, RMIT Univ., Australia
Tigang Ning, Beijing Jiaotong Univ., China
Chester Shu, The Chinese Univ. of Hong Kong, China
Dawn Tan, Singapore Univ. of Design Tech., Singapore

Chao Wang, Univ. of Kent, England
Jian Wang, Huazhong Univ. of Sci. and Tech., China
Lianshan Yan, Southwest Jiaotong Univ., China
Lin Yang, Chinese Academy of Sci., China
Xiaoke Yi, Univ. of Sydney, Australia
Xiaoguang Zhang, Beijing Univ. of Posts and Tel., China
Xiaoping Zheng, Tsinghua Univ., China
Qunbi Zhuge, Shanghai Jiao Tong Univ., China
Weiwen Zou, Shanghai Jiao Tong Univ., China

**Track 6: Optical measurements and imaging**

Jun Qian, Zhejiang Univ., China, **Chair**
Junle Qu, Shenzhen Univ., China, **Chair**
Kebin Shi, Beijing Univ., China, **Chair**
Xuping Zhang, Nanjing Univ., China, **Chair**
Haiwen Cai, Shanghai Inst. of Optics and Fine Mechanics, CAS, China
Yongkang Dong, Harbin Inst. of Tech., China
Hao He, Shanghai Jiao Tong Univ., China
Wing-Cheung Law, Hong Kong Polytechnic Univ., China
Peng Li, Zhejiang Univ., China
Bin Liu, National Univ. of Singapore, Singapore
Linbo Liu, NTU Singapore , Singapore
Liwei Liu, Shenzhen Univ., China
Tongyu Liu, Laser Inst. of Shandong Academy of Sci., China
Fake Lu, State Univ. of New York, USA
Yiqing Lu, Macquarie Univ., Australia
Huilian Ma, Zhejiang Univ., China
Keiichi Nakagawa, Univ. of Tokyo, Japan
Tymish Y. Ohulchanskyy, Shenzhen Univ., China
Yingquan Peng, China Jiliang Univ., China
Anna Wang, Zhejiang Univ., China
Dongning Wang, China Jiliang Univ., China
Zhuyuan Wang, Southeast Univ., China
Peng Xi, Peking Univ., China
Xiaobo Xing, South China Normal Univ., China
Qing Yang, Zhejiang Univ., China
Yuanhong Yang, Beihang Univ., China
Baoli Yao, Xi'an Inst. of Optics and Precision Mechanics, CAS, China
Zhen Yuan, Univ. of Macau, China
Wenjun Zhou, Univ. of California Davis, USA

**Track 7: Ultrafast photonics and nonlinear optics**

Minglie Hu, Tianjin Univ., China, **Chair**
Jianfeng Li, Univ. of Electronic Sci. and Tech. of China, China, **Chair**
Xueming Liu, Zhejiang Univ., China, **Chair**
Jianrong Qiu, Zhejiang Univ., China, **Chair**
Shengping Chen, National Univ. of Defense Tech., China
Xianfeng Chen, Shanghai Jiao Tong Univ., China
Jae-Hoon Han, Korea Inst. of Sci. and Tech., Korea
Wei Ji, National Univ. of Singapore, Singapore
Qian Li, Peking Univ. Shenzhen Graduate School, China
Weiwei Liu, Nankai Univ., China
Xiaofeng Liu, Zhejiang Univ., China
Zhichao Luo, South China Normal Univ., China
Zhongqi Pan, Univ. of Louisiana Lafayette, USA
Mark Pelusi, Univ. of Sydney, Australia
Guanshi Qin, Jilin Univ. , China
Sze Y. Set, Univ. of Tokyo, Japan
Zhi Wang, Nankai Univ., China
Fengqiu Wang, Nanjing Univ., China
Jun Wang, Chinese Academy of Sci., China
Xiaoyong Wang, Nanjing Univ., China
Kan Wu, Shanghai Jiao Tong Univ., China
Min Xiao, Nanjing Univ., China
Yun-Feng Xiao, Peking Univ., China
Peiguang Yan, Shenzhen Univ., China
Zhijun Yan, Huazhong Univ. of Sci. and Tech., China
Zuxing Zhang, Nanjing Univ. of Posts and Tel., China
Luming Zhao, Huazhong University of Science and Technology, China
Quanzhong Zhao, Shanghai Inst. of Optics and Fine Mechanics, CAS, China
Haiming Zhu, Zhejiang Univ., China

**Track 8: Space communications, navigation & tracking**

Bo Cong, China Satellite Maritime Tracking and Control Department, China, **Chair**
Nan Chi, Fudan Univ., China, **Chair**
Tianshu Wang, Changchun Univ. of Sci. and Tech., China, **Chair**
Jing Xu, Zhejiang Univ., China, **Chair**
Xiaoshu Bai, China Satellite Maritime Tracking and Control Department, China
Ming Chen, Beijing Research Inst. of Telemetry, China
Guangxi E, Southwest China Inst. of Electronic Tech., China
Guijun Hu, Jilin Univ., China
Xianqing Jin, Univ. of Sci. and Tech. of China
Deyong Kang, China Satellite Maritime Tracking and Control Department, China
Diqing Li, China Academy of Space Tech., China
Jing Li, Commercial Aircraft Corporation of China, China
Jianfei Liu, Hebei Univ. of Tech., China
Lilin Liu, Sun Yat-Sen Univ., China
Junshan Mu, China Satellite Maritime Tracking and Control Department, China

Chao Wang, China Academy of Space Tech., China
Yan Xia, Hunan Univ., China
Wenge Yang, Equipment Academy, China
Yifei Yang, Jiangsu Univ. of Sci. and Tech., China
Baokang Zhao, National Univ. of Defense Tech., China
Jie Zhong, Zhejiang Univ., China
Weigang Zhu, Equipment Academy, China

**Track 9: Quantum photonics and applications**

Xianmin Jin, Shanghai Jiao Tong Univ., China, **Chair**
Zhongxiao Man, Qufu Normal Univ., China, **Chair**
Xifeng Ren, Univ. of Sci. and Tech. of China, China, **Chair**
Shengwang Du, Hong Kong Univ. of Sci. and Tech., China
Guoping Guo, Univ. of Sci. and Tech. of China, China
Myungshik Kim, Imperial College London, UK
W. Steve Kolthammer, Imperial College London, UK
Jiaming Li, Shanghai Jiao Tong Univ., China
Tiefu Li, Tsinghua Univ. , China
Yanqing Lu, Nanjing Univ., China
Feng Mei, Shanxi Univ., China
Xiaolong Su, Shanxi Univ., China
Lin Tian, Univ. of California Merced, USA
Guoyong Xiang, Univeristy of Sci. and Tech. of China, China
Man-Hong Yung, Southern Univ. of Sci. and Tech., China
Lijian Zhang, Najing Univ., China
Qiang Zhang, Univeristy of Sci. and Tech. of China, China
Wei Zhang, Tsinghua Univ., China

**Special session 1: Optoelectronics based on organic and nanostructured materials**

Wei Huang, Northwestern Polytechnical Univ., China, **Chair**
Zugang Liu(China Jiliang Univ., China, **Chair**
Michele Muccini, National Research Council, Italy, **Chair**
Pavel Brunkov, Ioffe Inst., Russia
Fred Chen, Shine Materials Technolgy Co., China
Guanglu Ge, National Center for NanoSci. and Tech., China
Xiaojun Guo, Shanghai Jiaotong Univ., China
Yizheng Jin, Zhenjiang Univ., China
Rongyin Kuang, Najing Tech., China
Zhen Li, Wuhan Univ./Tianjin Univ., China
Dongge Ma, South China Univ. of Tech., China
Hong Meng, Peking Univ., China
Junbiao Peng, South China Univ. of Tech., China
Nigel Pickett, Nanoco Technologies, UK
Lei Qian, TCL, China
Xiaowei Sun, Southern Univ. of Sci. and Tech., China
Jinshan Wang, Watrp International, USA
Lei Wang, Huazhong Univ. of Sci. and Tech., China
Guohua Xie, Wuhan Univ., China
Rongjun Xie, Xiamen Univ., China
Xuyong Yang, Shanghai Univ., China
Haibo Zeng, Nanjing Univ. of Sci. and Tech., China
Haizheng Zhong, Beijing Inst. of Tech., China
Fushan Li, Fuzhou Univ., China
Lixiang Wang, Changchun Inst. of Applied Chemistry, China
Changqi Ma, Suzhou Institue of Nano-Tech and Nano-Bionics, China
Yiqiang Zhang, Zhengzhou Univ., China
Tao Song, Soochow Univ., China

**Special session 2: Machine learning for photonics and communications**

Qunbi Zhuge, Shanghai Jiao Tong Univ., China, **Chair**
Yongli Zhao, Beijing Univ. of Posts and Tel., China, **Chair**
Yanni Ou, Nokia Bell Labs, Germany, **Chair**
Shuangyi Yan, Univ. of Bristol, UK
Zilong Ye, California State Univ., Los Angeles, USA
Sabidur Rahman, UC Davis, USA
Yu Wu, Google, USA
Jianqiang Li, Alibaba Group, USA
Nan Hua, Tsinghua Univ., China
Xiaosong Yu, Beijing Univ. of Posts and Tel., China
Xiaoning Zhang, Univ. of Electronic Sci. and Tech. of China
Danish Rafique, ADVA, Germany

**Special session 3: 2D-materials based photonics**

Weida Hu, Shanghai Inst. of Technical Physics, CAS, China, **Chair**
Kaihui Liu, Peking Univ., China, **Chair**
Hongtao Lin, Zhejiang Univ., China, **Chair**
Hua Zhang, City Univ. of Hong Kong, China
Juejun Hu, Massachusetts Inst. of Tech., USA
Anlian Pan, Hunan Univ., China
Han Zhang, Shenzhen Univ., China
Deep Jariwala, Univ. of Pennsylvania, USA
Xiaomu Wang, Nanjing Univ., China
Zhipei Sun, Aalto Univ., Finland
Baicheng Yao, Univ. of Electronic Sci. and Tech. of China, China
Yaqing Bie, Sun Yat-Sen Univ., China
Zhengqian Luo, Xiamen Univ., China
Qiaoliang Bao, Monash Univ., Australia

**Special session 4: Electronic technologies and communications**

Lu Zhang, China Agricultural Univ., China, **Chair**
Xin Chen, Inst. of Electronic Engineering, China Academy of Engineering Physics, China
Yinsheng Chen, Harbin Univ. of Sci. and Tech., China
Dong Guo, Liaoning Univ. of Tech., China
Shujie Mu, Yingkou Inst. of Tech., China
Bin Shen, Heilongjiang Univ. of Sci. and Tech., China
Yongyi Sun, Liaoning police academy, China
Xuemei Zheng, Northeast Electric Power Univ., China

# General Information

Conference Venue: Shangri-La Hotel, Qufu
会议地点：曲阜香格里拉大酒店

Address: 3 Chunqiu Road, Qufu, Shandong China
酒店地址：山东省曲阜市春秋中路 3 号

## Accessibility

A modern sanctuary in a land of historical beauty Shangri-La Qufu awaits guests in the heart of this city, within walking distance to the Temple of Confucius and the Mansion of Confucius. Designers have created distinctly Chinese architecture that features a group of buildings, high and low, with exquisite roofs of grey tiers of flying eaves. The Hotel offers spacious and pleasant accommodation with its 322 well-appointed guest rooms and suites.

- The hotel is about 15 minutes' drive from Qufu East Station
- About 15 minutes walking distance to the Temple of Confucius and the Mansion of Confucius

## Registration

*Location: Lobby of Shangri-La Hotel, Qufu*

**Hours:**

| | |
|---|---|
| 14: 00-22: 00 | Monday, 23 August |
| 08: 00-18: 00 | Tuesday, 24 August |
| 08: 00-18: 00 | Wednesday, 25 August |
| 08: 00-13: 00 | Thursday, 26 August |

## Speaker Preparation

All oral presenters should check in at the corresponding session room at least ten minutes prior to their scheduled talk to upload and check their presentation. **No shows of the oral presentation will be reported to Conference management and these papers will not be published.**

## Poster Preparation

Authors should prepare their poster before the poster session starts. The poster must not exceed the boundaries of the poster board and **A0 (0.9m Width * 1.2m Height)** size is recommended. Authors are required to be standing by their poster for the duration of their allocated session to answer questions and further discuss their work with attendees. **No shows will be reports to Conference management and these papers will not be published.**

*Poster Board Size – 1m (Width) * 2m (Height)*
*Location: 2F, Shangri-La Hotel, Qufu*

| | |
|---|---|
| Poster Session 1 | 15:30-16:00, 24 August |
| Poster Session 2 | 10:00-10:30, 25 August |
| Poster Session 3 | 15:30-16:00, 25 August |
| Poster Session 4 | 10:00-10:30, 26 August |

## Transportation

### From Qufu East Railway Station（曲阜东站）

By Taxi: 10km driving to Shangri-La Hotel, Qufu (about RMB 25)
By Bus (route 9/route K01): from Qufu East Railway Station to Shangri-La Hotel, Qufu (about 55 minutes, RMB 1).

### From Jining Qufu Airport（济宁曲阜机场）

By Taxi: 89km driving to Shangri-La Hotel, Qufu (about RMB 178).

### From nearby cities

1. **Jinan (济南)**: There are 6 high-speed trains per day travelling from Jinan East Railway Station（济南东站）to Qufu East Railway Station（曲阜东站）with the shortest travelling time of 1 hour.

2. **Taian (泰安)**: There are 21 high-speed trains per day travelling from Tai'an Railway Station（泰安站）to Qufu East Railway Station（曲阜东站）with the shortest travelling time of 19 minutes.

3. **Qingdao(青岛):** There are 17 high-speed trains per day travelling from Qingdaobei Railway Station（青岛北站）to Qufu East Railway Station（曲阜东站）with the shortest travelling time of 2 hours and 36 minutes.

## Exhibition

The ICOCN2021 Exhibition is open to all attendees.

Location: *Public area, 2F, Shangri-La Hotel, Qufu*

**Hours:**

| | |
|---|---|
| 09: 00-18: 00 | Tuesday, 24 August |
| 09: 00-18: 00 | Wednesday, 25 August |
| 09: 00-16: 00 | Thursday, 26 August |

## Conference Materials

ICOCN2021 Technical Digest will be provided in a USB drive and not available in print form. The ICOCN2021 Technical Digest material is composed of the 3-page summaries of invited and accepted contributed papers. The Technical Digest material is included with a technical conference registration and can be found in your registration bag. The Digest will be available on IEEE Xplore Digital Library (http://www.ieee.org/web/publications/xplore/) after the conference. IEEE Xplore Digital Library is archived and indexed by INSPEC R and EI Compendex, where it will be available to the international technical community.

## Lunches & Dinner

Three-day buffet lunches and dinner (Aug. 24-26) in Shangri-La Hotel, Qufu are included in the registration fee for all registered delegates. And lunch & dinner tickets are provided within the badge.

Location: *Zhanxiang Hall, 2F, Shangri-La Hotel, Qufu*

| | |
|---|---|
| 18:00-20:00 | Monday, 23 August |
| 12:00-13:30 | Tuesday, 24 August |
| 18:00-20:00 | Tuesday, 24 August |
| 12:00-13:30 | Wednesday, 25 August |
| 12:00-13:30 | Thursday, 26 August |

## Tea & Coffee Breaks

| | |
|---|---|
| 15:30-16:00 | Tuesday, 24 August |
| 10:00-10:30 | Wednesday, 25 August |
| 15:30-16:00 | Wednesday, 25 August |
| 10:00-10:30 | Thursday, 26 August |
| 15:30-16:00 | Thursday, 26 August |

## Social Events

### Welcome reception

All participants are cordially invited to the Welcome Reception. It will be a great opportunity to develop a broad, deep and diverse network of personal connections with participants from all over the world. Complimentary food and beverages will be offered by Organizing Committee of ICOCN'2021. It is free to all the registered participants.

*Location: Zhanxiang Hall, 2F, Shangri-La Hotel, Qufu*

Time: 18: 00-20: 00, 23 August

### Conference Banquet and Awards Ceremony

All participants are cordially invited to the banquet. We will announce the winners of Young Scientist Awards, Best Student Paper Award and Best Poster Award. The winners will receive their certificates and awards at the ceremony. Participate in our Lucky Draw during the banquet, you may be one of the lucky winners! At the same time, you will enjoy delicacies foods. It will be an unforgettable Banquet that you will always remember with a smile.

The Banquet is included in the registration fee for all register delegates. The ticket is provided within the badge.

*Location: QILU Grand Ballroom, 2F,* Shangri-La Hotel

Time: 18: 30-21: 00, 25 August

# Conference Highlights

## Plenary Presentations

Time: 09:30-11:45, Tuesday, 24 August
*Venue: QILU Grand Ballroom, 2F*

ICOCN2021 will feature three plenary presentations. The presentation will be preceded by an Opening Ceremony from 9:00-9:30. More information appear below.

### Novel Fundamental Concepts beneath Quantum Photonics

09:30-10:15, Tuesday, 24 August

**Xiaomin Ren**
*Beijing University of Posts and Telecommunications, China*

**Biography:** Xiaomin Ren, IET Fellow, COS Fellow, CIE Fellow, Professor of Beijing University of Posts and Telecommunications (BUPT), Director of the State Key Laboratory of Information Photonics and Optical Communictions of China, Executive Director of Alferov Russian-Chinese Joint Laboratory of Information Optoelectronics and Nanoheterostructures, Vice President of Chinese Optical Society (COS), and the Chairman of ACP Conference Steering Committee. He had also been a Vice President of BUPT (1996-2017). He worked as a Senior Visiting Scholar in Centro Studi E Laboratori Telecomunicazioni, Turin, Italy, and then as a Visiting Senior Research Fellow in the Microelectronics Research Center, University of Texas at Austin, USA, during 1994 to 1996. He had been awarded with the title of Outstanding Young Scientist of China by NNSFC (1996). He had been a Vice Head of the Optoelectronic Expert Group under the National 863 Program for many early years and the Chief Scientist of the relevant research projects of the National 973 Program twice from 2003 to 2014. He has worked on information optoelectronic technologies and nanoheterostructure physics, mainly including semiconductor lasers, photodetectors, silicon-based III-V optoelectronic integration, novel low-dimensional heterostrucutures and devices, photonic crystal fibers, etc. He has also worked on fundamental physics since 2012 and proposed the concept of energy-level divergence, the theory of fractional dimensionality electron-states architecture in semiconductors, the Bivergentum Theory going to unify the classical and quantum mechanics together and extend the Einstein's high speed special theory of relativity to a quite new one, i.e. the full-velocity-scope special theory of relativity. He advocates that quantum mechanics must go back to Logicism (in contrast with Instrumentalism) and believes that there does exist an amazing super-low speed 'world'.

### A Review on Optical Fiber Distributed Acoustic Sensors (DAS)

10:15-11:00, Tuesday, 24 August

**Zuyuan He**
*Shanghai Jiao Tong University, China*

**Biography:** Zuyuan He received B.S. and M.S. degrees in electronic engineering from Shanghai Jiao Tong University, Shanghai, China, in 1984 and 1987, respectively, and Ph.D. degree in photonics from the University of Tokyo, Tokyo, Japan, in 1999.

He joined Nanjing University of Science and Technology, Nanjing, China as a Research Associate in 1987, and became a Lecturer in 1990. From 1995 to 1996, he was a Research Fellow studying optical information processing in the Research Center for Advanced Science and Technology (RCAST), University of Tokyo. After receiving his Ph.D. degree in 1999, he became a Research Associate of the University of Tokyo, where he worked on the measurement and characterization of fiber optic components and systems, fiber optic reflectometry, fiber optic sensors, and multi-dimensional optical information processing. In 2001, he joined CIENA Corporation, Linthicum, Maryland, USA, as a Lead Engineer heading the optical testing and optical process development group. He returned to the University of Tokyo as a Lecturer in 2003, then became an Associate Professor in 2005 and a full Professor in 2010. Since 2012, he has been working with Shanghai Jiao Tong University as Chair Professor and Director of the State Key Laboratory of Advanced Optical Communication Systems and Networks, and he is now the Head of Department of Electronic Engineering. His current research interests include optical fiber sensors, specialty optical fibers, and optical interconnects. He co-authored more than 450 papers in peer-refereed journals and international conferences.

Dr. He is a senior member of IEEE and a senior member of OSA. He worked as an associate editor of IEEE/OSA Journal of Lightwave Technology during 2014-2020. Dr. He has served as technical program committee members in a variety of international conferences, such as Conference on Lasers and Electro-Optics (CLEO), International Conference on Optical Fiber Communications (OFC), and International Conference on Optical Fiber Sensors (OFS), and as the general chair of Asia Communications and Photonics Conference (ACP) 2014 and Asia-Pacific Optical Sensors Conference (APOS) 2016, respectively.

### Towards F6G : Trends and Challenges of Intergenerational Evolution of Optical Fiber Communication

11:00-11:45, Tuesday, 24 August

**Liangchuan Li**
*Huawei Technologies Co., Ltd, China*

**Biography:** Liangchuan Li received his PhD in electrical engineering from the Beijing University of Posts and Telecommunications, in 2007. He is currently a senior research expert with the Department of Transmission & Access Technology Research, Huawei Technologies Company, Ltd., He is currently the chief expert on the optical communications project of the Ministry of Science and Technology's key R&D program. His research interests include PON systems and algorithms, Data center fiber interconnection & switching and LH 400G/800G/1.6T optical transmission systems and digital signal processing algorithms.

## Young Scientist Awards

ICOCN2021 is pleased to announce that this year's Young Scientist Awards is sponsored by Light: Science & Applications (LSA).

**5 recipients, a certificate & a HUAWEI ultrabook for each**

To be eligible for the award, the researchers must be born after Aug.24, 1981 and the first author of the paper and register to give the oral presentation at the conference by himself/herself. The selection will be made by the TPC during the conference. Each awardee will receive a certificate of award and a HUAWEI ultrabook as prize.

## Best Poster Awards

ICOCN2021 is pleased to announce that this year's Best Poster Awards is sponsored by xxx

**15 recipients, a certificate & a HUAWEI smartphone for each**

To be eligible for the award, the paper must be submitted with choosing presentation type of "Best Poster Paper Award competition". Pre-conference shortlist will be carried out based on the peer-review results by TPC/invited reviewers. The shortlisted posters will be presented during the assigned time slot and those who win the first fifteen largest number of "Best Poster Paper Award" vote tickets will be given the Best Poster Award. Certificates and prizes (HUAWEI cellphones) will be presented to the winners in the award ceremony during the conference banquet.

## Best Student Paper Awards

ICOCN2021 is pleased to announce that this year's Best Student Paper Awards is sponsored by xxx

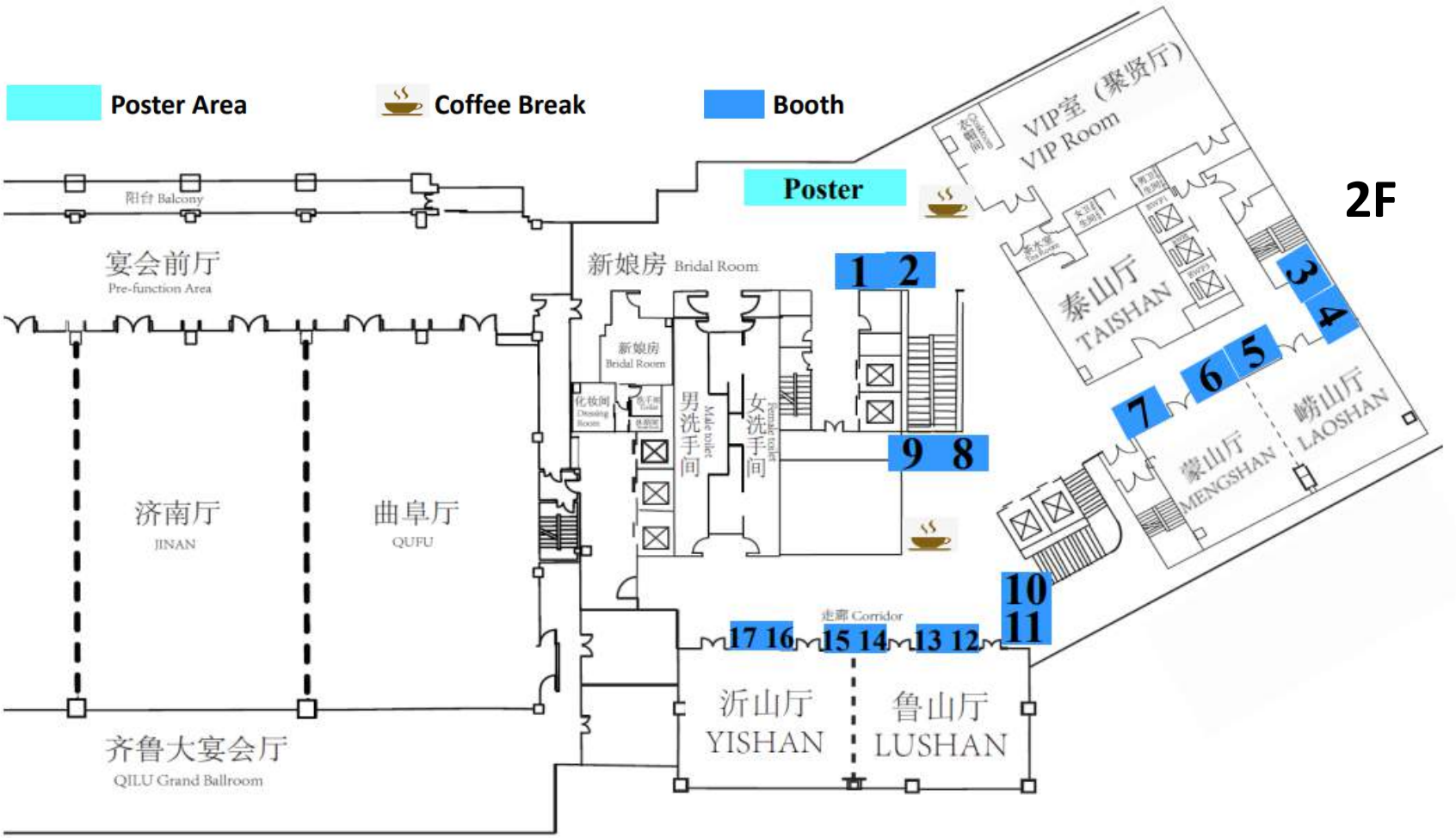
**10 recipients, a certificate & a HUAWEI Pad for each**

Any full-time research student, who is the first and presenting author of a full paper submitted with choosing presentation type of "Oral for Best Student Paper Award" will be eligible for this award competition. Ten winners will be selected by the ICOCN'2021 Technical Program Committee and invited to attend the conference banquet and award ceremony.Each awardee will receive a certificate of award and a HUAWEI Pad as prize.

## Banquet Lucky-draw

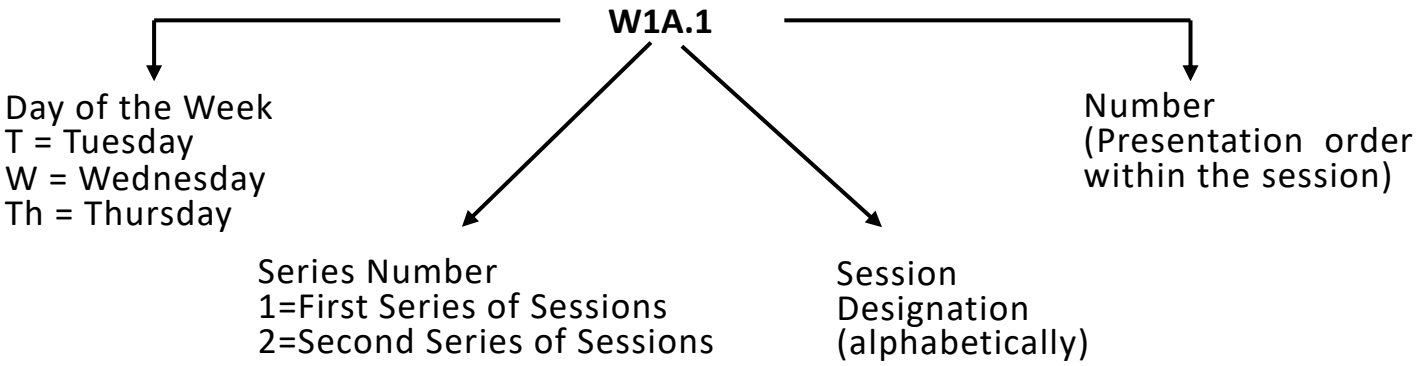
Every registered non-student participant will be given a Best Poster Award Voting Ticket at the registration desk when they collect the conference materials. Those who help us select the awardee candidates by writing down the poster numbers on the voting ticket and put it into the ticket collecting box during the first poster session time will get the chance to be lucky guy. Do help us by submitting your choice for the Best Poster.

# Conference & Exhibition Map




2 做秀信息 Aoshow Information
4 星谱光电 XI PU GUANG DIAN
5 EVERFINE 远方
6 速腾科技
7 OVLINK 光谷互连
8 LUSTER 凌云光
9 Light Science & Applications
10 皓辰 wl95.com 仪联网
12 MIKROUNA
13 YSL 安扬激光
14 红星杨科技 RED STAR YANG TECHNOLOGY
15 赛凡光电

# Explanation of Session Codes




The first letter of the code designates the day of the week (T = Tuesday, W = Wednesday, Th = Thursday). The second element indicates the session series in that day (for instance, 1would denote the first parallel session in that day). The third element continues alphabetically through a series of parallel sessions. The lettering then restarts with each new series. The number on the end of the code (separated from the session code with a period) signals the position of the talk within the session (first, second, third, etc.). For example, a presentation coded W1A.1 indicates that this paper is being presented on Wednesday (W) in the first series of sessions (1), and is the first parallel session (A) in that series and the first paper (1) presented in that session.

Plenaries are noted with Plenary

Invited papers are noted with Invited

BSPAs are noted with ☼

| Tuesday, 24 August | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Yishan Hall (沂山厅)** | **Lushan Hall (鲁山厅)** | **Mengshan Hall (蒙山厅)** | **Laoshan Hall (崂山厅)** | **Taishan Hall (泰山厅)** | **VIP Room (聚贤厅)** | **Exhibition Area** |
| 08:00-18:00 | **Registration, Lobby, *1F*** | | | | | | **Conference Exhibition** |
| 09:00-09:30 | **Opening Ceremony, *QILU Grand Ballroom （齐鲁大宴会厅）, 2F*** | | | | | | |
| 09:30-11:45 | **Plenary Session, *QILU Grand Ballroom （齐鲁大宴会厅）, 2F*** | | | | | | |
| 12:00-13:30 | **Lunch Break, *Zhanxiang Hall（展香园）, 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F*** | | | | | | |
| 13:30-15:30 | T2A<br>Novel fibers & devices I | T2B<br>Optical measurement I | T2C<br>Young Scientist Award | T2D<br>Organic & nano optoelectronics-I | T2E<br>Optoelectronics I | T2F<br>Optical transmission I | |
| 15:30-16:00 | **Poster Session I & Coffee Break, 2F** | | | | | | |
| 16:00-18:00 | T3A<br>Machine learning I | T3B<br>Optical measurement II | T3C<br>Ultrafast & nolinear optics I | T3D<br>Organic & nano optoelectronics-II | T3E<br>Optoelectronics II (BSPA) | T3F<br>Space communications I | |
| 18:00-20:00 | **Dinner Break, *Zhanxiang Hall(展香园 ), 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F*** | | | | | | |

| Wednesday, 25 August | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Yishan Hall (沂山厅)** | **Lushan Hall (鲁山厅)** | **Mengshan Hall (蒙山厅)** | **Laoshan Hall (崂山厅)** | **Taishan Hall (泰山厅)** | **VIP Room (聚贤厅)** | **Exhibition Area** |
| 08:00-18:00 | **Registration, Lobby, 1F** | | | | | | **Conference Exhibition** |
| 08:00-10:00 | W1A<br>Novel fibers & devices II (BSPA) | W1B<br>Optical measurement III (BSPA) | W1C<br>2D-materials photonics | W1D<br>Organic & nano optoelectronics-III | W1E<br>Optical networks I | W1F<br>Optical transmission II | |
| 10:00-10:30 | **Poster Session II & Coffee Break, 2F** | | | | | | |
| 10:30-12:00 | W2A<br>Novel fibers & devices III | W2B<br>Optical signal processing I (BSPA) | W2C<br>Ultrafast & nolinear optics II | W2D<br>Organic & nano optoelectronics-IV | W2E<br>Optical networks II (BSPA) | W2F<br>Optical transmission III(BSPA) | |
| 12:00-13:30 | **Lunch Break, *Zhanxiang Hall(展香园 ), 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F*** | | | | | | |
| 13:30-15:30 | W3A<br>Novel fibers & devices IV | W3B<br>Optical measurement IV | W3C<br>Ultrafast & nonlinear optics III | W3D<br>Organic & nano optoelectronics-V | W3E<br>Optoelectronics III | W3F<br>Space communications II | |
| 15:30-16:00 | **Poster Session III & Coffee Break, 2F** | | | | | | |
| 16:00-18:00 | W4A<br>Novel fibers & devices V | W4B<br>Optical measurement V | W4C<br>Ultrafast & nolinear optics IV | W4D<br>Organic & nano optoelectronics-VI | W4E<br>Optoelectronics IV | W4F<br>Optical transmission IV | |
| 18:00-21:00 | **Banquet and Awards Ceremony, *QILU Grand Ballroom（齐鲁大宴会厅）, 2F*** | | | | | | |

| Thursday, 26 August | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Yishan Hall (沂山厅)** | **Lushan Hall (鲁山厅)** | **Mengshan Hall (蒙山厅)** | **Laoshan Hall (崂山厅)** | **Taishan Hall (泰山厅)** | **VIP Room (聚贤厅)** | **Exhibition Area** |
| 08:00-13:00 | **Registration, Lobby, *1F*** | | | | | | **Conference Exhibition** |
| 08:00-10:00 | Th1A<br>Novel fibers & devices VI | Th1B<br>Optical signal processing II | Th1C<br>Quantum photonics I | Th1D<br>Organic & nano optoelectronics-VII | Th1E<br>Optical networks III | Th1F<br>Optical transmission V | |
| 10:00-10:30 | **Poster Session IV & Coffee Break, *2F*** | | | | | | |
| 10:30-12:00 | Th2A<br>Machine learning II | Th2B<br>Optical measurement VI | Th2C<br>Quantum photonics II | Th2D<br>Organic & nano optoelectronics-VIII | Th2E<br>Optical networks IV | Th2F<br>Optical transmission VI | |
| 12:00-13:30 | **Lunch Break, *Zhanxiang Hall (展香园), 1F*** | | | | | | |
| 13:30-15:30 | Th3A<br>Novel fibers & devices VII | Th3B<br>Optical measurement VII | Th3C<br>Electronic Technonolgy I | Th3D<br>Organic & nano optoelectronics-VIIII | Th3E<br>Optoelectronics V | Th3F<br>Optical transmission VII | |
| 15:30-16:00 | **Coffee Break, *2F*** | | | | | | |
| 16:00-18:00 | | Th4B<br>Optical measurement VIII | Th4C<br>Electronic Technonolgy II | Th4D<br>Organic & nano optoelectronics-X | | Th4F<br>Post-deadline | |

**14:00-18:00 Registration,** *Lobby (大厅), 1F*

**09:00-09:30 Opening Ceremony,** *QILU Grand Ballroom（齐鲁大宴会厅）, 2F*

**09:30-11:45, Plenary Session,** *QILU Grand Ballroom（齐鲁大宴会厅）, 2F*

*Presider:* ***Perry Ping Shum****, Southern University of Science and Technology, China*

**T1A.1 • 09:30** Plenary

**Novel Fundamental Concepts beneath Quantum Photonics,** Xiaomin Ren; *Beijing University of Posts and Telecommunications, China*. In this paper, five novel fundamental concepts are presented or introduced for better understanding of quantum photonics: (1) The Energy-State Divergence (or Divergity, a new word suggested by the author for emphasizing the property of divergence when it is needed) which has been leading to the establishment of an updated semiconductor physics, i.e. the divergent energy-state semiconductor physics, and the re-interpretation of the quantum tunnel effect; (2) The Permissibility Wave-Functions, instead of Born's probability wave-functions, which presents quite different interpretation of the quantum behaviors of elementary particles and photons such as the thought experiment of Schrödinger's Cat, Young Experiment of double-slit interference, Wheeler delayed choice experiment and, particularly, the quantum eraser experiment because a sudden appearance of the erasers just before the photon's arrival is suggested; (3) The Physical Spectrality of physical quantities including the spectro-correlativity between each intrinsic pair of physical-quantities which clarifies the truth behind Heisenberg's uncertainty principle while the normalization of plane wave-functions is made truly reasonable by introducing a new function, i.e. the inverse Dirac function; (4) The Entangling Spatial Divergence of Wave-Functions referring to the anisotropic spatial divergence in case of the strong coupling between two mutually entangled particles and featuring a remarkably broadened width of spatial divergence in the directions directing each other; (5) The Space-Time Duality which has been leading to the establishment of the low-speed special theory of relativity and the full-velocity-scope one (the latter is more general than both the former proposed by the author and Einstein's high-speed one and features the recently formulated full-velocity-scope space-time coordinates transformation). Finally, it should be noted that these concepts apply not only to the elementary particles but also generally to all the material matters when Planck constant is replaced with 'Planck variable'.

**T1A.2 • 10:15** Plenary

**A Review on Optical Fiber Distributed Acoustic Sensors (DAS),** Zuyuan He; *Shanghai Jiao Tong University, China*. The fiber-optic distributed acoustic sensor (DAS) is one of the most attractive and promising fiber-optic sensing technologies in the recent decade. It can simultaneously detect and retrieve multiple vibrations over a long distance and provide abundant information of the environment. This article reviews the principles involved in DAS, including reflectometries to locate the Rayleigh backscattering (RBS) along the fiber, and the methods to recover the vibration waveform by the phase or spectrum of the interference of RBS. Related technologies and recent progresses on DAS systems are introduced, and two kinds of typical applications are reviewed. Finally, possible research trends are discussed.

**T1A.3 • 11:00** Plenary

**Towards F6G：Trends and Challenges of Intergenerational Evolution of Optical Fiber Communication**, Liangchuan Li; *Huawei Technologies Co., Ltd, China*. After 20 years of rapid development, high-speed optical fiber communication systems are evolving to the sixth generation：Fiber access is moving from connected homes to connecting everything. The low-latency and high-quality requirements of new fiber access drive multiple access technologies from traditional Time division multiple access (TDMA) to new xDMA. Data center fiber interconnection has shifted from Intensity detection to coherent detection. Low power consumption and low cost are the key driving factors. Long-haul fiber transmission evolves from 400G to 800G and 1.6T, and the single-mode optical transmission capacity approaches 100T.

In the talk，we will discusses the development trend and challenges of the next-generation F6G high-speed optical fiber communication technology in terms of fiber access, data center optical interconnection, and long-haul optical transmission.

**12:00-13:30 Lunch Break,** *Zhanxiang Hall(展香园 ), 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F*

## Yishan Hall (沂山厅), Track 1

**13:30-15:30**
**T2A • Novel fibers & devices I**
*Presider: **Weihong Bi**, Yanshan University, China*

**T2A.1 • 13:30** Invited

**Flexible Microfiber Sensors for Health Monitoring**, Ye Chen[1], Heng-Tian Zhu[1] and Fei Xu; [1]*Nanjing Univ., China*. In this work, we will report our research on flexible microfiber devices with ultra-high sensitivity and miniature size, and their applications on real-time health monitoring of not only the human body but also living cell.

**T2A.2 • 13:50** Invited

**Damage monitoring of ballastless track slab based on optical fiber accelerometer**, Wentao Zhang[1], Jianxiang Zhang[1], Wenzhu Huang[1], Li Li[2] and Yanliang Du[3]; [1]*Inst. of Semiconductors, CAS, China;* [2]*Institute of Geophysics, China Earthquake Administration, China;* [3]*Shenzhen Univ., China*. A real-time monitoring for ballastless track slab damage based on optical fiber accelerometers is proposed. The field test on the Beijing-Shanghai high-speed railway in China shows that this method effectively identified the damaged track slabs.

**T2A.3 • 14:10** Invited

**Research on DAS Key Technology and Engineering Application**, Chang Wang[1]; [1]*Qilu Univ. of Tech., China*.

## Lushan Hall (鲁山厅), Track 6

**13:30-15:30**
**T2B • Optical measurement I**
*Presider: **Tuan Guo**, Jinan University, China*

**T2B.1 • 13:30** Invited

**Experimental generation and measurement of special correlated partially coherent beam**, Yangjian Cai[1]; [1]*Shandong Normal Univ. & Soochow Univ., China*. Partially coherent beam with special correlation function displays many interesting propagation phenomena, such as self-focusing, self-steering, self-splitting and self-reconstruction, and is expected be useful in optical imaging, optical encryption, optical trapping, and free-space optical communications. In this talk, I will introduce recent progress on experimental generation and measurement of special correlated partially coherent beam.

**T2B.2 • 13:50** Invited

**Improvements of resonant fiber optic gyroscopes**, Huilian Ma[1], Lu Liu[1], Weiwen Qian[1], Shuang Liu[1] and Hanzhao Li[1]; [1]*Zhejiang Univ., China*. A reciprocal modulation-demodulation technique is reported for reducing the effects of laser frequency noise and modulation imperfections, leading to achieving a navigation-grade resonant fiber optic gyroscope equipped with a 29-m-long fiber coil.

**T2B.3 • 14:10** Invited

**Super-resolution imaging and perception based on Fiber**, Qing Yang[1]; [1]*Zhejiang Univ., China*. It is highly desired to integrate multifunctional perception in a small footprint, high speed and high resolution system. Here, we present our resent results on sensing of position, temperature as well as high-resolution imaging on an optical fiber.

## Mengshan Hall (蒙山厅), YSA

**13:30-15:45**
**T2C • Young Scientist Award**
*Presider: **Dongning Wang**, China Jiliang University, China*

**T2C.1 • 13:30**
**Tapered fiber cascaded with FBG for simultaneous measurement of magnetic field and temperature**, Yuxiu Zhang[1], Shengli Pu[1], Zijian Hao[1], Min Yuan[1], Chencheng Zhang[1] and Shaokang Yan[1]; [1]*Univ. of Shanghai for Sci. and Tech., China*. A sensor based on a nonadiabatic tapered single mode fiber cascaded with FBG is proposed and experimentally demonstrated for simultaneous measurement of magnetic field and temperature. The magnetic field sensitivity can reach 1.159 nm/mT .

**T2C.2 • 13:45**
**100G PAM-8 Transmission with Direct Detection Utilizing Imbalanced Mach-Zehnder Modulator for Power Fading Suppression**, Yixiao Zhu[1], Longsheng Li[1], Xin Miao[1], Qi Wu[1], Longjie Yin[1] and Weisheng Hu[1]; [1]*Shanghai Jiao Tong Univ., China*. We theoretically and experimentally analyze three kinds of MZM imbalances including bias deviation, amplitude mismatch and time skew in dispersion-uncompensated IM-DD system. 104Gb/s PAM-8 signal 20km SSMF transmission is experimentally demonstrated enabl

**T2C.3 • 14:00**
**Distributed polarization crosstalk measurement based on optical frequency domain polarimetry**, Zhangjun Yu[1], Qinqin Zhuang[1], Tingyi Zhu[1], Mingyang Huang[1], Peijiong Li[1], Pengbai Xu[1], Kunhua Wen[1] and Jun Yang[1]; [1]*Guangdong Univ. of Tech., China*. A distributed polarization crosstalk measurement method for a polarization-maintaining device is proposed based on optical frequency domain polarimetry. It has a superior dynamic range and a much less measurement time than the conventional method.

**T2C.4 • 14:15**
**A compressive sensing single pixel imaging system using in-fiber grating**, Guoqing Wang[1], Liyang Shao[1], Dongrui Xiao[1], Fang Zhao[1], Ping Shum[1] and Chao Wang[2]; [1]*Southern Univ. of Sci. and Tech., China;* [2]*Univ. of Kent, UK*. A compressive sensing single pixel imaging system based on in-fiber grating is proposed and experimentally demonstrated. A proof-of-principle experiment is performed and data compression ratios from 5% to 20% are obtained in the proposed system.

## Laoshan Hall (崂山厅), SS 1

**13:30-15:30**
**T2D • Organic & nano optoelectronics-I**
*Presider: **Fred Chen**, Shine Materials Technolgy Co., Taiwan, China*

**T2D.1 • 13:30** Invited

**Long-lived highly efficient electron-transporting material for OLED**, Lixin Xiao[1]; [1]*Peking Univ., China*. The electron-transport material (ETM) is one of the key factors to determine the efficiency and stability of organic light-emitting diodes (OLEDs). An ideal ETM requires high ET mobility, good exciton confinement as well as feasible charge injection from the anode. Technically, a high triplet energy (T1) is necessary for good exciton confinement, which can be achieved by limited molecule conjugation structures.

**T2D.2 • 13:50** Invited

**Highly efficient and stable blue organic light-emitting diodes based on sensitization**, Dongdong Zhang[1]; [1]*Tsinghua Univ., China*.

**T2D.3 • 14:10** Invited

**Thermally Activated Delayed Fluorescence Based White OLED Lighting**, Hui Xu[1]; [1]*Heilongjiang Univ., China*. White thermally activated delayed fluorescence (TADF) materials and devices emerge rapidly. In recent years, we further realized high-performance single-EML TADF WOLEDs with the state-of-the-art efficiencies reaching the levels of white phosphorescent OLEDs.

## Taishan Hall (泰山厅), Track 4

**13:30-15:30**
**T2E • Optoelectronics I**
*Presider: **Li Pei**, Beijing Jiaotong University, China*

**T2E.1 • 13:30** Invited

**Nonlinear dynamics in a dual-mode lasing semiconductor microcavity laser due to internal mode interaction**, Yong-Zhen Huang[1]; [1]*Inst. of Semiconductors, CAS, China*. A circular-sided hexagonal microlaser was designed and fabricated for dual-mode lasing of the fundamental and first order transverse modes at an adjusted frequency interval around 10 GHz. By adjusting mode frequency interval, we demonstrated nonlinear dynamics including chaos and period-oscillations experimentally due to internal mode interaction for the microcavity laser without external perturbation for the first time.

**T2E.2 • 13:50** Invited

**Few-mode waveguide amplifier based on erbium-ytterbium co-doped polymer with tunable modal gain**, Meiling Zhang[1], Cheng Yu[1] and Guijun Hu[1]; [1]*Jilin Univ., China*. Few-mode waveguide amplifier with tunable modal gain can effectively compensate the coupling and transmission loss of on-chip mode division multiplexing system, which is of great significance to promote the characteristics of the system.

**T2E.3 • 14:10** Invited

**Integrated nonlinear photonics based on chalcogenide microresonators**, Bin Zhang[1]; [1]*Sun Yat-sen Univ., China*. Recently, We fabricated high quality and stable Ge25Sb10S65(Ge-Sb-S) ChG microring resonators with intrinsic quality of 2 million through an improved fabrication process.

## VIP Room (聚贤厅), Track 2

**13:30-15:30**
**T2F • Optical transmission I**
*Presider: **Min Zhu**, Southeast University, China*

**T2F.1 • 13:30** Invited

**Polarization effect model of fiber channel in ultra-broadband WDM optical fiber communications**, Xiaoguang Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. High symbol rate optical fiber communication systems make us to re-construct the polarization effects model in an ultra-broadband fiber channel other than in the narrow band. We establish a new temporal and spectral evolution polarization effect model including PMD and RSOP which is crucial for the systems with high symbol rate beyond 100 Gbaud.

**T2F.2 • 13:50** Invited

**Simplest DSP Enabling Coherent Data Center Interconnection**, Ming Tang[1]; [1]*Huazhong Univ. of Sci. and Tech., China*.

**T2F.3 • 14:10** Invited

**Real-time IM/DD MDM Transmission for Short-reach Applications**, Juhao Li[1]; [1]*Peking Univ., China*. Prototype system of real-time IM/DD MDM transmission with 4 LP modes over 10-km multiple-ring-core FMF is experimentally demonstrated. Scalability of the proposed system is discussed and new transmission impairment of Intra-LP-mode dispersion is evaluated.

## Yishan Hall (沂山厅), Track 1

**T2A.4 • 14:30** Invited

**Continuous Chirped-wave Phase-sensitive Optical Time-domain Reflectometry: Principles and Demonstrations**, Jialin Jiang and Zinan Wang[1]; [1]*Univ. of Electronic Sci. and Tech. of China, China*. This paper discusses the principles and experimental demonstrations of chirped continuous-wave phase-sensitive optical time-domain reflectometry, showing that it has the advantages in the scenarios of high-frequency sensing and complex acoustic signal analysis.

**T2A.5 • 14:50** Invited

**Locating BFS change at fast speed based on edge detection for BOTDA Sensing System**, Liang Wang[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. We will review our work on edge detection based ultrafast locating of the abnormal BFS change in BOTDA sensing system. The the speed of event locating has been proved by over 400 times when compared with conventional methods. We belive this method is particularly useful in urgent situations where fast locating of abnormal temperature or strain is necessary when there is emergence .

**T2A.6 • 15:10** Invited

**Applications of a hybrid BOTDR and Φ-OTDR system**, Feng Wang[1]; [1]*Nanjing Univ., China*. The principle of a hybrid BOTDR and Φ-OTDR system is explained. Sensing applications with such a system are introduced. The recognition accurancy is improved with multi-parameter measurement.

## Lushan Hall (鲁山厅), Track 6

**T2A.4 • 14:30** Invited

**Wavemeter with ultra-high resolution and broad bandwidth by using Rayleigh speckle from single mode fiber**, Xinyu Fan[1]; [1]*Shanghai Jiao Tong Univ., China*. Rayleigh speckle with random jagged pattern resulting from the interference of Rayleigh backscattering lightwave in a single-mode fiber contains the wavelength information of the incident lightwave. We propose an all-fiber wavemeter based on this relationship.

**T2A.5 • 14:50** Invited

**Trace gas detection based on quartz-enhanced spectroscopy**, Yufei Ma[1]; [1]*Harbin Inst. of Tech., China*. Due to the merits of high Q factor and narrow response frequency band, quartz tuning forks (QTF) are widely used as detectors. In this paper, QTF is adopted in laser spectroscopy field for gas sensing.

**T2A.6 • 15:10** Invited

**Machine learning in distributed optical fiber vibration sensors based on the phase-sensitive OTDR**, Huijuan Wu[1]; [1]*Univ. of Electronic Sci. and Tech. of China, China*. It is presented a review of signal processing methods based on machine learning Tech. in Φ-OTDR at UESTC. We believe that this research direction is still in its early stage. In the future, a few main trends of its signal recognition are prospected.

## Mengshan Hall (蒙山厅), YSA

**T2C.5 • 14:30**

**Commensalism of quasi-coherent noise-like and conventional soliton pulse in a simplified NPE mode-locked fiber laser**, Renlai Zhou[1], Qian Li[2] and Hongyan Fu[3]; [1]*Harbin Engineering Univ., China;* [2]*Peking Univ., China;* [3]*Tsinghua-Berkeley Shenzhen Inst., China*. We experimentally demonstrated a simplified NPE mode-locked fiber laser supporting both quasi-coherent noise-like and conventional soliton pulse emission in a single laser cavity. The dual-color pluses were separated and analyzed in detail.

**T2C.6 • 14:45**

**Passively mode-locking in 2 μm region based on Sb2Se3 saturable absorber**, Xiaohui Ma[1], Yong Zhou[1], Wei Zhang[1], Wentan Fang[1], Xiaolin Chen[1] and Weiqing Gao[1]; [1]*Hefei Univ. of Tech., China*. The nonlinear optical modulation characteristics and optical switch capabilities of Sb2Se3 were demonstrated with a 2 μm mode-locked fiber laser.

**T2C.7 • 15:00**

**Low latency-oriented Reliable Slicing for URLLC services over TDM-PON based Mobile Edge Computing enabled Cloud Radio Access Network**, Xin Wang[1], Zhan Xu[1] and Shanbao He[1]; [1]*Beijing Info. Sci. and Tech. Univ., China*. This paper proposes a mathematical model and a heuristic algorithm to tack chanllenges of Low latency-oriented Reliable Slicing for URLLC services over TDM-PON based Mobile Edge Computing enabled Cloud Radio Access Network.

**T2C.8 • 15:15**

**Integrated Wireless Communication and mmW Radar Sensing System for Intelligent Vehicle Driving Enabled by Photonics**, Mingzheng Lei[1], Aijie Li[1], Yuancheng Cai[1], Jiao Zhang[1], Bingchang Hua[1], Yucong Zou[1], Weiliang Xu[1], Jikuan Wang[1], Jianjun Yu[1] and Min Zhu[2]; [1]*Purple Mountain Laboratories, China;* [2]*Southeast Univ., China*. An integrated communication and mmW radar sensing system is proposed. A 2.3-Gbit/s BPSK signal at Ku band is generated. Besides, accurate range and velocity detection can be simultaneously realized by a frequency-doubled dual-chirp LFM signal.

**T2C.9 • 15:30**

**Colloidal quantum well light-emitting diodes**, Baiquan Liu[1], Xianbo Li[1] and Shaolin Liao[1]; [1]*Sun Yat-sen Univ., China*. A series of high-performance CQW-LEDs are developed, and the external quantum efficiency of CQW-LEDs is close to the theoretical limit of 20%.

**15:30-16:00 Poster Session 1 & Coffee Break, 2F**

## Laoshan Hall (崂山厅), SS 1

**T2D.4 • 14:30** Invited

**Rational design of anthracene-based derivatives for exceptionally efficient deep blue fluorescent OLEDs**, Runda Guo[1], Yaxiong Wang[1] and Lei Wang[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. Here, we report a new compounds 2M-pCzAnBzt, which produces saturated deep blue emissions in a non-doped electroluminescent device with an exceptionally high EQE of 10.44% and CIEx,y (0.151, 0.057).

**T2D.5 • 14:50** Invited

**Highly Efficient Blue Organic Luminescent Materials and Devices**, Jian-Yong Hu[1]; [1]*Shaanxi Normal Univ., China*. In OLEDs, the development of efficient and stable blue emitters remains a big challenge. In this presentation, we report various types of efficient blue emitters by modifying the pyrene/anthracene molecule used in blue OLEDs.

**T2D.6 • 15:10** Invited

**Organic light emitting devices based on ultrasmooth and nanostrutured electrode**, Yue-Feng Liu[1]; [1]*Jilin Univ., China*. High external quantum efficiency (EQE) of Organic light emitting devices (OLEDs) is still a challenge. In my research, I focused on the improvement of EQE using the ultrasmooth and nanostructured electrode.

## Taishan Hall (泰山厅), Track 4

**T2E.4 • 14:30** Invited

**Recent progress in quantum dot lasers for information and communication technologies**, Jianan Duan[1]; [1]*Harbin Inst. of Tech., Shenzhen, China*.

**T2E.5 • 14:50** Invited

**Photonic integrated chaotic semiconductor laser for true random number generation**, Pu Li[1]; [1]*Taiyuan Univ. of Tech., China*. Herein, we present a photonic integrated chaotic semiconductor laser (PICSL) for true random number generation. This laser chip consists of two back-to-back DFB sections in a mutually coupled structure. Under applicable conditions, we experimentally generate a broadband 7 GHz laser chaos without any TDSs. Furthermore, we demonstrates the generation of TRNs with a bit rate at 160 Gb/s utilizing the laser chaos chip as the physical entropy source.

**T2E.6 • 15:10** Invited

**Study on dynamics of spin VCSELs and its applications**, Nianqiang Li[1]; [1]*Soochow Univ., China*.

## VIP Room (聚贤厅), Track 2

**T2F.4 • 14:30** Invited

**Fiber mode multiplexing based high capacity transmission over FMF/MMF**, Jianping Li[1]; [1]*Guangdong Univ. of Tech., China*.

**T2F.5 • 14:50** Invited

**Monolithically integrable optical sideband transmitter for inter-datacenter interconnects**, Tianwai Bo[1], Hoon Kim[2] and Yi Dong[1]; [1]*Beijing Inst. of Tech., China;* [2]*KAIST, South Korea*. We will review the monolithically integrable optical single sideband (SSB) transmitters that are potentially used for inter-datacenter interconnects. Our talk will focus on the optical SSB transmitter scheme of modulating a DML and EAM simultaneously.

**T2F.6 • 15:10** Invited

**Precise Calibration of Frequency Response and IQ Skew for 100Gbaud Optical Transceiver**, Lei Deng[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. A precise optical coherent transceiver calibration method based on interleaved multi-tones signal is proposed. Without any additional devices, IQ skew and amplitude/phase frequency response of 100GBaud transceiver can be obtained simultaneously in just one measurement.

**15:30-16:00 Poster Session 1 & Coffee Break, 2F**

## Poster Session 1 (Best Poster Award, 15:30-16:00)

**P1.1**

**Ternary solar cells with polymer donor and two nonfullerene acceptors**, Xuebin Chen[1], Ting Shi[2] and Shengdong Zhang[1]; [1]*Peking Univ. Shenzhen Graduate School, China;* [2]*Shenzhen China Star Optoelectronics Semiconductor Display Tech. Co., Ltd., China*. Enhanced PCE values of 11.4% and 11.3% can be achieved for ternary solar cells with the addition of IT-2Cl and IT-4Cl,which are higher than 10.5% PTB7: 6TIC-4F binary devices.

**P1.2**

**Efficient perovskite light-emitting diodes with modified hole injection layer**, Sun Shuo[1], Si Junjie[1], Liu Zugang[1], Xu Rui[1], Du Yihang[1] and Tang Ying[1]; [1]*China Jiliang Univ., China*. We use PSSNa modified PEDOT:PSS as the hole injection layer to improve hole injection into perovskite emissive layer and inhibit the interfacial exciton quenching. The EQE of the PeLEDs is improved from 5.65% to 7.81%.

**P1.3**

**Solution-processed electron injection materials and their application to efficient inverted ultraviolet organic light-emitting diodes**, Dengli Yao[1], Yongfang Yuan[1], Dongliang Li[1], Kai Xu[1] and Xiaowen Zhang[1]; [1]*Guilin Univ. of Elec. Tech., China*. Electron injection/extraction is always highly emphasized in tailoring optoelectronic properties of organic electronic devices.Here, we develop an all solution-processed composite electron injection layer of (ZnO+PEG)/Cs2CO3 .

**P1.4**

**Predicting Effective Refractive Indices of Multimode Waveguide via Deep Learning**, Yao Tianhang[1], Huang Tianye[1], Xie Yuan[1], Wu Zhichao[1], Luo Dapeng[1], Cheng Zhuo[1] and Shum Ping[1]; [1]*China University Of Geosciences, wuhan, China*. In order to accelerate the multimode waveguide design, several regression models are employed to predict the effective refractive indices (neff) from fundamental mode to fourth-order TE mode with various waveguide geometric parameters.

**P1.5**

**Design of Dual Band Microstrip Filter Based on SIR**, Xuemei Zheng[1], Peng Gao[1] and Yaru Han[2]; [1]*Northeast Electric Power Univ., China*; [2]*China Mobile Design Inst. Co., Ltd., China.* As the core device in the field of communication, filter is developing towards miniaturization and high frequency. In this paper, a new dual frequency filter based on step impedance resonator is proposed.

**P1.6**

**A Method for Recognition of Mixed Gas Composition Based on PCA and KNN**, Wanyu Xia[1], Tingting Song[1], Zhanwei Yan[1], Kai Song[2], Deyun Chen[1] and Yinsheng Chen[1]; [1]*Harbin Univ. of Sci. and Tech., China*; [2]*Harbin Inst. of Tech.* China. This paper proposes a mixed gas component recognition algorithm based on the combination of principal component analysis (PCA) and k-nearest neighbor algorithm (KNN).

**P1.7**

**Virtual Vernier effect-based high sensitivity optical fiber humidity sensor**, Yaqi Tang[1], Chao Wang[2], Shuangchen Ruan[2], Chi Chiu Chan[2] and Xinyong Dong[3]; [1]*China Jiliang Univ., China*; [2]*Shenzhen Tech. Univ., China;* [3]*Guangdong Univ. of Tech., China.* Presents a humidity sensor which has tunable sensitivity by using virtual Vernier effect. The virtual Vernier effect is applied for data processing of the humidity sensor and the maximum achieved sensitivity is -2.875 nm/%RH.

**P1.8**

**Vector Mode Converters Based on Cascaded LPFGs in Elliptical Ring-Core Fiber**, Xiaoqian Wang[1], Hu Zhang[1], Jingxuan Yang[1], Xiaoguang Zhang[1], Lixia Xi[1], Wenbo Zhang[1] and Xianfeng Tang[1]; [1]*Beijing Univ. of Posts and Tel., China*. A broadband vector mode converter is proposed based on cascaded long-period fiber gratings in elliptical ring-core fiber. The 20-dB bandwidths of all vector mode (TE01, HEeven_21, HEodd_21and TM01) converters are around 100 nm.

**P1.9**

**Hybrid Cladding Ring-Core Fiber with Weakly Spin-Orbit Coupling for OAM Mode Division Multiplexing Transmission**, Jiaqi Wang[1], Hu Zhang[1] and Jingxuan Yang[1]; [1]*Beijing Univ. of Posts and Tel., China*. We design a hybrid cladding ring-core fiber which can transmit 22 orbital angular momentum (OAM) modes. In addition, OAM modes exhibit weak spin-orbit coupling, which will greatly reduce the complexity of MIMO at the receiver.

**P1.10**

**A Ring-Core Photonic Crystal Fiber with Hybrid Cladding Supporting High Quality Orbital Angular Momentum Modes**, Songke Fang[1], Hu Zhang[1] and Jingxuan Yang[1]; [1]*Beijing Univ. of Posts and Tel., China*. A hybrid cladding ring core photonic crystal fiber is designed to support 26 high quality orbital angular momentum (OAM) modes spanning 7 OAM mode groups with weak spin-orbit coupling and wide bandwidth (C+L band).

**P1.11**

**Research on Damage Characteristics of CFRP Based on DFB Fiber Laser**, Jianxiang Zhang[1], Wentao Zhang[1], Kaiqi Yan[2], Wenzhu Huang[1] and Yanliang Du[3]; [1]*Inst. of Semiconductors, CAS, China;* [2]*Technical Inst. of Physics and Chemistry, CAS, China*; [3]*Shenzhen Univ., China*. The DFB fiber laser can reliably detect AE signals. The proposed maximal overlap discrete wavelet transforms (MODWT) method can recognize damage characteristics of CFRP laminates during initiation, spread, and instability stages.

**P1.12**

**Random grating-array-based tunable random fiber laser with a full-open cavity**, Bing Lv[1], Wentao Zhang[1], Wenzhu Huang[1] and Fang Li[1]; [1]*Inst. of Semiconductors, CAS, China*. A full-open-cavity tunable random fiber laser with compact structure and hundreds of picometers tuning range is proposed and demonstrated. A π-FBG is used in the TRFL as a filter to turn the lasing wavelengths.

**Poster Session 1 (Best Poster Award Session) 15:30-16:00**

**P1.13**

**Development of a fluidic pressure sensor by using a surface modified fiber Bragg grating**, Junda Lao[1], Pengfei Zheng[1], Liuwei Wan[1], Qianqian Zhang[1], Chao Wang[1] and Chi Chiu Chan[1]; [1]*Shenzhen Tech. Univ., China*. An FBG fluidic pressure sensor with sensitivity of 10 nm/MPa using double flange cylinder structure is presented in this paper. The sensor has the advantages of simple fabrication, high stability, good linearity, etc.

**P1.14**

**Impact of Nonlinearity in EDFAs on High-Speed Systems**, Haixin Bi[1] and Yanling Xue[1]; [1]*East of China Normal Univ., China*. We model the nonlinear interaction of ultrashort pulse train in EDFAs in high-speed systems based on the semi-classical theory. The intra-channel crosstalk in optical comb due to the resonantly enhanced nonlinearity in EDFAs is simulated.

**P1.15**

**Distributed Quantitative Vibration Demodulation with Direct-detection based Phase-sensitive OTDR Assisted by Acousto-optic Phase Shifting Technique**, Shuaiqi Liu[1], Feihong Yu[1], Weijie Xu[1], Mang I Vai[1] and Liyang Shao[1]; [1]*Southern Univ. of Sci. and Tech., China*. Quantitative vibration demodulation is demonstrated with direct-detection based Phase-sensitive OTDR. An acousto-optic modulator is utilized for pulse generation and phase shifting simultaneously. The demodulated phase is linearly proportional to the vib

**P1.16**

**Performance Comparison of Advanced Modulation Formats for Low-bandwidth optics-based 50-Gb/s/λ PON at O-band**, Qingyi Zhou[1], Jiao Zhang, Min Zhu[1], Weiliang Xu[1], Qinru Li[1], Jikuan Wang[1], Xiang Liu[1], Yucong Zou, Bingchang Hua, Yuancheng Cai, Mingzheng Lei, Aijie Li, Weidong Tong[1] and Yingxin Wei[1]; [1]*Southeast Univ., China*. A comprehensive comparison of PAM-4, CAP-16QAM and DMT-16QAM modulations is simulated in 50-Gb/s/λ PON based on bandwidth-limited optics at O-band. The power budget, thermal noise performance and DSP complexity are discussed.

**P1.17**

**Demonstration of 200-Gb/s DMT Signal Using Entropy Loading**, Qun Liu[1], Jing Zhang[1], Shaohua Hu[1], Mingyue Zhu[1], Taowei Jin[1], Xingwen Yi[2] and Kun Qiu[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China; 2Sun Yat-sen Univ., China*. We have experimentally demonstrated a 200-Gb/s DMT signal transmission over 2-km or 10-km SSMF with bit loading or entropy loading using a 23-GHz MZM, respectively. The BER is below 20% SD-FEC threshold.

**P1.18**

**Research On Integrated Platform For Multiple Parameters Intelligent Monitoring Of Dwdm Optical Fiber Signal**, Junyu Wei[1], Shaojing Su[1], Liuxin Sun[1], Honghe Huang[1], Zhen Zuo[1], Xiaojun Guo[1] and Xiaoyong Sun[1]; [1]*National Univ. of Defense Tech., China*. An integrated platform for multiple parameters intelligent monitoring of dense wavelength division multiplexing (DWDM) optical fiber signal by utilizing the advanced telecom computing architecture (ATCA) is proposed and discussed in detail.

**P1.19**

**Spectrum-Efficient Service Provisioning in Elastic Optical Networks with Photonic Firewalls**, Ying Tang[1], Xin Li[1], Zicheng Shi[1], Lu Zhang[1] and Shanguo Huang[1]; [1]*BUPT, China*. We study the routing, modulation-level and spectrum allocation for elastic optical networks with photonic firewalls. An integer linear program and a heuristic algorithm are developed. The results show the proposed algorithm achieves spectrum-efficient ser

**P1.20**

**Subwavelength-structured high-efficiency nanophotonic coupler for air top-cladded silicon waveguide**, Yuhan Sun[1], Ting Li[1], Peiji Zhou[1] and Yi Zou[1]; [1]*ShanghaiTech Univ., China*. We propose a subwavelength structured edge coupler for efficient coupling light into/out from air top-cladded silicon waveguides. A single-step patterned coupler with 2.5dB coupling loss for the wavelength range from 1480nm to 1650nm is demonstrated.

**P1.21**

**A FBG and Magnetostrictive Alloy based Magnetic Field Sensor with the Demodulation realized by Optoelectronic Oscillator**, Dongrui Xiao[1], Liyang Shao[2], Chao Wang[3], Guoqing Wang[2], Yun Chen[2], Fang Zhao[2] and Feihong Yu[2]; [1]*Harbin Inst. of Tech., China; [2]Southern Univ. of Sci. and Tech., China; [3]Univ. of Kent Canterbury, UK.* A FBG and magnetostrictive alloy based magnetic field optical sensor is realized with the demodulation by a new dual-loop optoelectronic oscillator (OEO). The stability it is up to 0.194 ppm.

**P1.22**

**Multicore Fiber Bragg Gratings Array Shape Sensor Fabricated with an Auto-Alignment Femtosecond Laser Point-by-Point Technology**, Xunzhou Xiao[1], Jun He[1], Baijie Xu[1], Bin Du[1], Xizhen Xu[1] and Yiping Wang[1]; [1]*Shenzhen Univ., China*. We demonstrate an auto-alignment femtosecond laser point-by-point technology for fabricating multicore fiber Bragg gratings array shape sensor consisting of 140 FBGs and a maximum error per unit length of 4.51% in shape reconstruction is obtained.

**P1.23**

**Effects of Polarization on the Nonlinear Pulse Propagation in Multimode Fibers**, Hengyu Liu[1], Shuzheng Fan[1] and Xiaosheng Xiao[1]; [1]*Beijing Univ. of Posts and Tel., China*. A model is proposed for the polarization dependent nonlinear pulse propagation in multimode fiber. Based on this model, the effects of polarization on the nonlinear modal interaction, including the spatial beam self-cleaning, are analyzed.

**P1.24**

**Effect of Refractive Index Profile of Multimode-fiber on Nonlinear Beam Self-cleaning**, Shuzheng Fan[1], Xiaosheng Xiao[1], Lili Kong[2] and Xia Zhang[2]; [1]*Beijing Univ. of Posts and Tel., China; [2]Liaocheng Univ. China*. For the nonlinear ultrashort pulse propagation in multimode fiber, we find that beam self-cleaning can be achieved by optimizing the refractive index profile of the fiber to minimize the modal dispersion.

**Poster Session 1 (Best Poster Award & Poster Session) 15:30-16:00**

**P1.25**

**Design and experimental verification of integrated laser communication terminal in space-ground integrated information network**, Haifeng Yang[1], Xiaobing Xiao[1], Liangbing Liao[1], Jianping Hu[1], Li Lei[1] and Lin Chai[1]; [1]*Southwest China Inst. of Elec. Tech., China*. The space-based integrated information network is composed of three parts.The space-ground laser communication equipment is faced with integration of multiple modulation systems and the location of different places,the related problems are analyzed and verified

**P1.26**

**Fiber optic interferometer humidity sensor by using gelatin**, Yusong Zhong[1], Xinyong Dong[1] and Pengbai Xu[1]; [1]*Guangdong Univ. of Tech., China*. A fiber optic Fabry-Perot interferometer humidity sensor based on hollow core fiber and gelatin humidity sensing film was studied.

**P1.27**

**Random Tm-doped fiber laser based on random grating feedback**, Decai Zhu[1], Xinyong Dong[1] and Yaozong Hu[1]; [1]*Guangdong Univ. of Tech., China*. A 1.5m long TDF is amplified by 793nm semiconductor excitation pump, and the feedback is distributed by the random grating with the machine. It has the advantages of simple structure and stable output.

**P1.28**

**PASSIVE RADAR ANALYSIS USING DTMB SIGNAL**, Tianyun Wang[1], Bing Liu[1], Xuelin Wang[1], Xianchun Xu[1] and Qiang Wei[1]; [1]*China Satellite Maritime Tracking and Control Department, China*. Passive radar based on DTMB signal is studied. Firstly, the characteristics of spectrum and ambiguity function are analyzed. Then, a side-peak suppression method is proposed. Finally, feasibility of passive detecting for space targets is researched.

**P1.29**

**Enhancement of single-photon emission rate by plasmon induced transparency in metal-insulator-metal waveguides**, Qi Liu[1], Wei Wei[2], Xia Zhang[1] and Xin Yan[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Guangzhou Univ., China*. We propose a structure that realizes the PIT effect through MIM waveguide and T-shaped resonator. Theoretical analysis shows that the emission rate of quantum dots is nearly 900 times higher.

**P1.30**

**Simplified Radius-directed Linear Kalman Filter for Blind Polarization Demultiplexing of PDM-QPSK Signal**, Guangping Ge[1], Jiahao Huo[1] and Zongjie Wang[1]; [1]*Univ. of Sci. & Tech. Beijing, China*. We proposed a blind polarization demultiplexing scheme for PDM-QPSK signal, which reduces computational complexity but retains the tracking capability of ultra-fast RSOP by comparison with the radius-directed linear Kalman filter.

**P1.31**

**Design and Implementation of Analog Flat Bandpass Filter**, Shen Xiaoqing[1]; [1]*China Satellite Maritime Tracking and Control Department, China*. This paper discusses the design and implementation of analog flat bandpass filter. The design value of LC element is obtained, the simulation calculation and verification test of analog filter are carried out.

**P1.32**

**Temperature Monitoring System of Fiber Bragg Grating of Transformer Based on High-precision Demodulating Algorithm by Wavelet Denoising**, Chao Han[1], Binxin Hu[1], Feng Zhu[1], Hua Zhang[1], Yu Gao[1] and Guangdong Song[1]; [1]*Qilu Univ. of Tech., China*. Temperature accuracy of the temperature monitoring system can reach ±0.04℃ and the maximum standard deviation after wavelength demodulation is better than 1.67pm in the range of 70℃ to 90℃.

**P1.33**

**Detection and Analysis of disturbance signal of Cable Tunnel based on Fiber Optic Vibration Sensors**, Feng Zhu, Bingxiang Huang, Tongyu Liu, Binxin Hu, Guangdong Song, Hua Zhang, Wodong Mao, Huabin Gao, Yang Li and Huairui Su; [1]*Qilu Univ. of Tech., China*. The self-developed optical fiber microseismic monitoring equipment is used to analyze the time domain and frequency domain information of the optical fiber vibration sensor to identify the type of cable tunnel damaged by external forces.

**P1.34**

**A Groove Parameter Processing Method Based on Hierarchical Clustering Analysis**, Tao Song[1], Wei Ying[1] and Honglin Liu[1]; [1]*Hangzhou Cigarette Factory, China Tobacco Zhejiang Industry Co., Ltd., China*; [2]*China Jiliang Univ., China.* A processing based on hierarchical clustering analysis is proposedto solve the inaccurate calculation of groove parameters in the measurement of grooved filter rod. The false detection rate is reduced from 4.64% to 0.7%

**P1.35**

**Cu2+ Detecting by Using Optical Fiber Mach-Zehnder Interferometer Coated with CS/PAA**, Yanmei Tang[1], Qianqian Zhang[2], Xinyong Dong[3] and Chi Chiu Chan[2]; [1]*China Jiliang Univ., China;* [2]*Shenzhen Tech. Univ., China;* [3]*Guangdong Univ. of Tech., China*. Sensor for detecting Cu2+ coated with CS/PAA which is based on the Mach-Zehnder interferometer is proposed and experimentally demonstrated.The measurement sensitivity is 62.444 dB/mM, and the detection limit is 0.0086 mM.

**Poster Session 1 (Poster Session) 15:30-16:00**

**P1.36**

**A simple optical frequency comb generator based on the monolithic integrated dual-tone semiconductor laser subject to the gain-switching effect**, Jin Li[1], Jilin Zheng[1], Tao Pu[1], Xin Zhang[1], Yukai Chen[1], Yunkun Li[1] and Huatao Zhu[2]; [1]*Army Engineering Univ. of PLA, China;* [2]*National Univ. of Defense Tech., China*. A simple approach to generating a wider optical frequency comb based on the monolithic integrated semiconductor laser subject to the gain-switching effect compared to that through the single-section laser is experimentally demonstrated in this work.

**P1.37**

**Wide-band luminescence characteristics of PbS/PbSe co-doped silica fiber**, Haiying Zhang[1], Min Zhang[1], Gui Fang[1] and Yanhua Dong[1]; [1]*Shanghai Univ., China*. A novel PbS/PbSe co-doped fiber is fabricated by the modified chemical vapor deposition (MCVD) technology. Its absorption and luminescence characteristics are investigated.

**P1.38**

**Performance Analysis of Distributed Optical Routing Network Based on Tunable Lasers and Cyclic AWG Router**, Yinxin Wang[1], Zhuping Fan[1] and Jianjun He[1]; [1]*Zhejiang Univ., China*. This paper introduces a scalable and reconfigurable distributed optical switching/routing network structure based on tunable lasers. The performance of the proposed network is greatly improved in resource utilization and queuing delay with resource scheduling strategy.

**P1.39**

**Design of Planar Ultra-wideband Notch Antenna**, Xuemei Zheng[1] and Xiuming Xu[1]; [1]*Northeast Electric Power Univ., China*; [2]*Harbin Engineering Univ., China.* Ultra-wideband technology determines the development trend of the future society. As the core technology of ultra-wideband technology, ultra-wideband antennas are the most important structure in the radio system.

**P1.40**

**High-Sensitivity Salinity Sensor by Using Core-Offset Based Fiber MZI**, Yi Xu[1], Shuangchen Ruan[2], Chi Chiu Chan[2] and Xinyong Dong[3]; [1]*China Jiliang Univ., China;* [2]*Shenzhen Tech. Univ., China;* [3]*Guangdong Univ. of Tech., China*. A salinity sensor is proposed based on an optical fiber Mach-Zehnder interferometer (MZI) fabricated by using a short section of single-mode fiber (SMF) with two large core-offset fusion splicing structures.

**P1.41**

**New insights into fiber-optic mode transition**, Xianxin Yang[1] and Zhihong Li[1]; [1]*Wenzhou Univ., China*. The mechanism of mode transition is obtained, showing that mode transition corresponds to the generation of phase-matched film waveguide modes including film guided modes and film cladding modes, which occurs from the last fiber mode.

**P1.42**

**An all-optical miniature soil moisture content sensor**, Jiamin Wang[1], Zhen Li[1] and Jiqiang Wang[1]; [1]*Qilu Univ. of Tech., China*. Based on the photothermal conversion effect of doped fiber and the principle of Fiber Bragg Grating (FBG) temperature measurement, an all-fiber miniature soil moisture content sensor is developed.

**P1.43**

**Routing and Wavelength Assignment Algorithm for LEO Satellite Based on Path Weight**, Mai Yang[1], Ying Tao[2], Qi Zhang[1], Xiangjun Xin[1], Dong Chen[2], Qinghua Tian[1], Feng Tian[1], Jinxi Qian[2], Chendi Feng[1] and Rongzhen Xie[1]; [1]*Beijing Univ. of Post and Tel., China;* [2]*China Academy of Space Tech., China*. A path weight calculation method based on path hops and wavelength utilization is proposed in this paper. The simulation results show that the new algorithm has lower traffic blocking rate and higher wavelength utilization rate.

**P1.44**

**Study on the performance of fiber cladding diameter to humidity sensor**, Jinlai Feng[1], Lin Zhao[1] and Changfeng Zhang [2]; [1]*Qilu Univ. of Tech., China*; [2]*National engineering research center for agriculture products logistics, China.* Reducing the diameter of FBG cladding by hydrofluoric acid can improve the sensitivity and response speed of humidity sensor, and has little effect on repeatability.

**P1.45**

**Magneto-refractive characteristics and mechanism of erbium-doped silica fiber**, Wanting Sun[1], Yanhua Dong[1], Caihong Huang[1] and Qiufan Wu[1]; [1]*Shanghai Univ., China*. The refractive index of EDF in different magnetic fields was measured. The results show that the refractive index of EDF decreases linearly with the increase of magnetic field, the sensitivity of EDF is 3.21×10^-5RI/mT.

**P1.46**

**An optical fiber temperature/strain/vibration sensing network based on UAV technology**, Hairuo Guo[1], Kun Liu[1], Zichun Zhou[1], Kang Xue[1], Yuelang Huang[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China*. This research extends the functions of FBG temperature/strain sensing system and dual Mach-Zehnder vibration sensing system. By programming the ground station of UAV, the positions of FBG sensors and intrusion events correspond to geographic coordinates.

## Yishan Hall (沂山厅), SS 2

**16:00-18:00**
**T3A • Machine learning I**
*Presider: **Qunbi Zhuge**, Shanghai Jiao Tong University, China*

**T3A.1 • 16:00** Invited

**Vital signs monitoring based on optical fiber interferometer with machine learning**, Changyuan Yu[1]; [1]*The Hong Kong Polytechnic Univ., China*. Vital signs monitoring has become a popular topic in the modern society since healthcare attracts much attention. In this paper, we review our related works about heartbeat and respiration signals monitoring based on the optical fiber interferometer with machine learning.

**T3A.2 • 16:20** Invited

**Machine learning applications for 5G and Beyond**, Shuangyi Yan[1]; [1]*Univ. of Bristol, UK*. Machine learning technologies will play a pivotal role in 5G and beyond networks. This talk will discuss application scenarios of ML in 5G networks and report our recent development of DRL-based network optimization.

**T3A.3 • 16:40** Invited

**Optical fiber transmission modeling based on machine learning**, Hongwei Chen[1]; [1]*Tsinghua Univ., China*.

## Lushan Hall (鲁山厅), Track 6

**16:00-18:00**
**T3B • Optical measurement II**
*Presider: **Xinyu Fan**, Shanghai Jiao Tong University, China*

**T3B.1 • 16:00** Invited

**Fiber-optic sensors for biomedical and renewable energy applications**, Tuan Guo[1]; [1]*Jinan Univ., China*. The sensing configuration utilizes a nanometric-scale gold-coated tilted fiber Bragg grating (TFBG) imprinted in a commercial single mode fiber core. Biomedical detection includes living cells and protein for early diagnosis of disease, together with renewable energy detection for commercialized Li-ion batteries and hydrogen storage will be discussed in detail.

**T3B.2 • 16:20** Invited

**Highly sensitive and compact fiber optic ultrasound sensors**, Qizhen Sun[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. In this talk, our recent research progress on highly sensitive and compact fiber optic ultrasound sensors are discussed, including the microfiber with large evanescent field encapsulated in PDMS for ultrasound sensing, and the reflective fiber optic probes through coating a hybrid film on the fiber end-face. Moreover, the applications of photoacoustic tomography and ultrasonic imaging were implemented, which prove excellent performaces of high resolution, deep depth and long-term stability.

**T3B.3 • 16:40** Invited

**Distributed acoustic sensor with frequency sideband modulation**, Junfeng Jiang[1]; [1]*Tianjin Univ., China*.

## Mengshan Hall (蒙山厅), Track 7

**16:00-18:00**
**T3C • Ultrafast & nolinear optics I**
*Presider: **Minglie Hu**, Tianjin University, China*

**T3C.1 • 16:00** Invited

**High energy square pulse emission via nonlinear optical loop mirror mechanism**, Xueming Liu; [1] *Zhejiang Univ., China*.The square pulse emission generates high pulse energy due to wider pulse width at the increased pump power. Square pulse emission was generated at pulse energy of ~235 nJ using nonlinear optical loop mirror mechanism..

**T3C.2 • 16:20** Invited

**Recent development on 3D nonlinear photonic crystals**, Yong Zhang[1]; [1]*Nanjing Univ., China*. I will briefly introduce the recent advances in fabrication, characterization, and applications of 3D nonlinear photonic crystals, and looks in particular at prospects for high-capacity nonlinear multiplexing holography.

**T3C.3 • 16:40** Invited

**Polarizing fiber gratings and their applications in ultrafast fiber lasers**, Chengbo Mou[1], Zinan Huang[1], Yanlv Lin[1], Qianqian Huang[1], Zhikun Xing[2], Zhijun Yan[2], Kaiming Zhou[3], Lin Zhang[3], Antreas Theodosiou[4] and Kyriacos Kalli[4]; [1]*Shanghai Univ., China;* [2]*Huazhong Univ. of Sci. and Tech., China;* [3]*Aston Univ., UK;* [4] *Cyprus Univ. of Tech., Cyprus*. We present our recent work on polarizing Brewster gratings in all-fiber lasers, including the fabrication, characterization of gratings and implementation of mode-locked fiber lasers with various operation regimes in the 1 µm and C+L wavebands.

## Laoshan Hall (崂山厅), SS 1

**16:00-18:00**
**T3D • Organic & nano optoelectronics-II**
*Presider: **Junbiao Peng**, South China University of Technology, China*

**T3D.1 • 16:00** Invited

**Printing Quantum Dot Luminescent Thin Films and Devices**, Fushan Li[1]; [1]*Fuzhou Univ., China*.

**T3D.2 • 16:20** Invited

**Electroluminescence light-emitting diodes based on Cd/Pb-free QDs**, Huaibin Shen[1]; [1]*Henan Univ., China*. In this talk, we will introduce the progress of our work on InP and ZnSe quantum dot based light-emitting devices.

**T3D.3 • 16:40** Invited

**Quantum dots/perovskite based light-emitting devices**, Lingmei Kong[1] and Xuyong Yang[1]; [1]*Shanghai Univ., China*. In this talk, we will present our latest advances in improving performance and stability of high color-purity quantum dots and perovskite light-emitting diodes(QLEDs/PeLEDs).

## Taishan Hall (泰山厅), BSPA-Track 4

**16:00-18:00**
**T3E • Optoelectronics II (BSPA)**
*Presider: **Yong-Zhen Huang**, Institute of Semiconductors,Chinese Academy of Sciences, China*

**T3E.1 • 16:00** Invited

**Research on low power photon acceleration chip**, Li Pei[1]; [1]*Beijing Jiaotong Univ., China*. The traditional electronic AI chip has encountered the dual bottleneck of uncontrollable Tech. development and processing. The photonic AI chip can be processed by the domestic mature microelectronic Tech. of 130nm, which is self controllable; The photonic chip has the advantages of high computing power, low power consumption and low delay, and can realize the localization of the whole process of design process package test,Low power photon acceleration chips have important application prospects.

**T3E.2 • 16:20** Invited

**AI-driven photonic accelerator**, Jianji Dong[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. In this talk, I will introduce the advances on artificial intelligence-driven photonic accelerator, including smart reconfigurable MZI mesh network, matrix computing, and typical applications in image processing, DFT, optical signal proccessing.

**T3E.3 • 16:40** Invited

**Photodetections based on nanophotonic manipulation**, Xiaofeng Li[1]; [1]*Soochow Univ., China*. Photodetection is one of the core technologies to realize the internet of everything and has made great progress with the development of nano-optoelectronics and low dimensional materials in recent years. Here, we provide potential solutions for above problems through the combinations of new structure, new mechanism and new materials.

## VIP Room (聚贤厅), Track 8

**16:00-18:00**
**T3F • Space communications I**
*Presider: **Jing Xu**, Zhejiang University, China*

**T3F.1 • 16:00** Invited

**Visible light communication in 6G: advances and challenges**, Nan Chi[1]; [1]*Fudan Univ., China*. Visible light communication (VLC) is expected to be an indispensable part of 6G given its high-speed transmission advantages, and will cooperate with other communication methods to benefit our daily lives. In this report, we will summarize the latest progress in VLC system including new materials and devices, advanced modulation, underwater visible light communication, and signal processing based on machine learning. The prospects and challenges of VLC in 6G will be discussed in conjunction with the latest high-speed VLC research advances.

**T3F.2 • 16:20** Invited

**Optical Wireless Communications for 6G High-speed Transmissions**, Hongyan Fu[1]; [1]*Tsinghua-Berkeley Shenzhen Inst., China*.

**T3F.3 • 16:40** Invited

**When Space meets Internet : Mega-constellations and Internet Protocols**, Baokang Zhao[1]; [1]*National Univ. of Defense Tech., China*. With the rapid development of massive LEO satellites, Space Internet has entered a new era of Mega-constellation. Internet Protocols should solve the problem of satellite addressing, which is very fundamental yet challenging issue in Mega-constellation.

## Yishan Hall (沂山厅), SS 2

**T3A.4 • 17:00** Invited

**Digital Twin-enable Optical Transmission System Modeling and Optimizing**, Danshi Wang[1]; [1]*Beijing Univ. of Posts and Tel., China*. Digital twin (DT) has become an anticipated enabling technology to promote digital transformation and intelligent evolution. This study introduces DT to optical communication for optical transmission system modelling and optimizing based on machine learning.

**T3A.5 • 17:20** Invited

**Orbital Angular Momentum (OAM) Recognition with Generative Models**, Qinghua Tian[1]; [1]*Beijing Univ. of Posts and Tel., China*. We use a transposed convolution model to simulate the adaptive optics system which extract useful features to help with the mode recognition. In addition, we apply a Generative Adversarial Network to model the wavefront distribution affected by the atmospheric turbulence, and expand the training data to improve the recognition performance.

**T3A.6 • 17:40** Invited

**Photonic Tensor Convolution Accerlator Based on Interleaved Time-Wavelength Modulation**, Wenjia Zhang[1]; [1]*Shanghai Jiao Tong Univ., China*.

## Lushan Hall (鲁山厅), Track 6

**T3B.4 • 17:00** Invited

**High-performance distributed Brillouin optical fiber sensing**, Yongkang Dong[1]; [1]*Harbin Inst. of Tech., China*. This paper reviews the recent advances on the high-performance distributed Brillouin optical fiber sensing, which include the conventional distributed Brillouin optical fiber sensing based on backward stimulated Brillouin scattering, and two other novel distributed sensing mechanisms based on Brillouin dynamic grating and forward stimulated Brillouin scattering, respectively.

**T3B.5 • 17:20** Invited

**Optofluidic laser biosensors**, Yuan Gong[1]; [1]*Univ. of Electronic Sci. and Tech. of China, China*. The recent progress in optofluidic lasers and their applications in high performance biosensing will be included. In addition to ultrahigh sensitivity, fast assay time and high disposability are highlighted.

**T3B.6 • 17:40** Invited

**All-fiber vector magnetic field sensor based on magnetic fluid**, Shengli Pu[1] and Zijian Hao[1]; [1]*Univ. of Shanghai for Sci. and Tech., China*. This presentation will introduce the progress of our works about magnetic fluid-packed fiber vector magnetic field sensors, including side-polished, bending and wedge-shaped SPR probe, which are tend to be more compact.

## Mengshan Hall (蒙山厅), Track 7

**T3C.4 • 17:00** Invited

**Saturable absorber mirrors for Mid-IR fiber laser**, Peiguang Yan[1]; [1]*Shenzhen Univ., China*. Give a brief review on the recent development of mid-IR fiber laser, and then report on our research progress on the mid-IR saturable absorber mirror, fiber grating, and the few-cycle pulse generation.

**T3C.5 • 17:20** Invited

**1.7-um ultrafast Tm-doped fiber lasers**, Zhi-Chao Luo[1]; [1]*South China Normal Univ., China*.

**T3C.6 • 17:40** Invited

**Nonlinear optical control of femtosecond fiber laser**, Wenjun Liu[1]; [1]*Beijing Univ. of Posts and Tel., China*.

**18:00-20:00 Dinner Break, *Zhanxiang Hall(展香园 ), 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F***

## Laoshan Hall (崂山厅), SS 1

**T3D.4 • 17:00** Invited

**Colloidal quantum well light-emitting diodes**, Baiquan Liu[1]; [1]*Sun Yat-sen Univ., China*. Herein, in order to further improve the performance of CQW-LEDs, different methods are used to control the distribution of charge and exciton in CQW-LEDs. The influence of charge injection and transport, morphology, material composition, device engineering, and other factors on the performance is deeply clarified. A series of high-performance CQW-LEDs are developed, and the external quantum efficiency of CQW-LEDs is close to the theoretical limit of 20%.

**T3D.5 • 17:20** Invited

**Printed Light Emitting Diodes based on Organic and Nanostructured Materials**, Zugang Liu and Hong Zhao[1]; [1]*China Jiliang Univ., China*. Updating the works in my group on printed light emitting diodes based on organic and nanostructured materials.

**T3D.6 • 17:40** Invited

**Silsesquioxanes-Based NIR Porous Polymers**, Hongzhi Liu[1]; [1]*Shandong Univ., China*. A family of organic fluorophore–silsesquioxane based NIR hybrid porous polymers with AIE-active units was prepared by Friedel-Crafts reaction of 2-(2.6-bis((E)-4-(diphenylamino)-stryryl-4H-pyran-ylidene) malononitrile (TPA-DCM) with octavinylsilsesquioxane (OVS), which could act as sensors.

## Taishan Hall (泰山厅), BSPA-Track 4

**☼T3E.4 • 17:00**

**Sideband Ampilification Injection Locking Effect in Integrated Mutual Injection DFB Laser**, Xin Zhang[1], Tao Pu[1], Jilin Zheng[1], Jin Li[1], Yunkun Li[1] and Huatao Zhu[2]; [1]*Army Engineering Univ. of PLA, China;* [2]*National Univ. of Defense Tech., China*. The sideband amplification injection locking (SAIL) effect in the integrated mutual injection laser has been researched.The microwave photonics filter, the optoelectronic oscillator and sideband modulation in ROF link are proposed and experimentally real.

**☼T3E.5 • 17:15**

**Performance of free space optical communication system based on v-cavity semiconductor laser**, Tuo Chen[1], Ming-Yu Li[1] and Zheqi Liu[1]; [1]*Changchun Univ. of Sci. and Tech., China*. This report studies the high-speed modulation performance of v-cavity tunable semiconductor laser, tests its signal transmission effect, and applies it to the free space optical communication WDM system in indoor environment for the first time.

**☼T3E.6 • 17:30**

**Ultracompct and High Performance Silicon High-order Mode Waveguide Bends**, Shanglin Yang[1], Hao Jia[1], Xin Fu[1] and Lin Yang[1]; [1]*Inst. of Semiconductors, CAS, China*. This paper demonstrates a series of high-order mode waveguide bends with an ultra-compact footprint and high performance. Gradient-based inverse design with level set method is utilized endow the device excellent critical dimension control.

**☼T3E.7 • 17:45**

**Loss Characteristics of Polymer Optical Waveguide at 1310 nm Wavelength on An Optical Printed Circuit Board**, Wei Wei[1], Xiao Lu[1], Liang Zhang[1], Heming Wei[1], Fufei Pang[1] and Tingyun Wang[1]; [1]*Shanghai Univ., China*. This paper uses UV lithography technology and ZPU-RI material to fabricate a 1310 nm low-loss optical waveguide. The experimental results show that minimal optical loss is 0.42 dB/cm as the waveguide length is 3.8 cm.

## VIP Room (聚贤厅), Track 8

**T3F.4 • 17:00** Invited

**Coherent Free-Space Optical Communications with Phase-Conjugation Compensation**, Shiming Gao[1]; [1]*Zhejiang Univ., China*.

**T3F.5 • 17:20** Invited

**Inter-satellite Optical Networking Protocol Research**, Bingli Guo[1]; [1]*Beijing Univ. of Posts and Tel., China*.

**T3F.6 • 17:40**

**Research status of typical satellite communication systems**, Yuxuan Gao[1], Yue Li[1] and Penghui Shi[1]; [1]*China Satellite Launch and Tracking Control General (CLTC), China*. Satellite communication technology plays an important role in many fields. This paper summarizes the development history and research status of typical satellite communication system, and forecasts the development trend of satellite communication system.3

**18:00-20:00 Dinner Break, *Zhanxiang Hall(展香园 ) , 1F & QILU Grand Ballroom (齐鲁大宴会厅) , 2F***

## Yishan Hall (沂山厅), BSPA-Track 1

**08:00-10:00**
**W1A • Novel fibers & devices II (BSPA)**
*Presider: **Fei Xu**, Nanjing University, China*

**W1A.1 • 08:00**
**High-resolution fiber optic Fabry-Perot seismometer for low frequency monitoring**, Huicong Li[1], Wentao Zhang[1], Wenzhu Huang[1], Ruifeng Liu[1] and Li Li[1]; [1]*Inst. of Semiconductors, CAS, China*; [2]*Inst. of Geophysics, China Earthquake Administration, China.* A high-resolution fiber optic Fabry-Perot seismometer for low frequency monitoring is presented. The noise level of the proposed seismometer is 6.74 ng/√Hz, which is better than NHNM within 0.16-50 Hz.

**W1A.2 • 08:15**
**Multi-point gas detection based on the photo-thermal effect and linear Sagnac interferometer**, Jiahua Yang[1] and Xiaopeng Dong[1]; [1]*Xiamen Univ., China*. A novel multi-point gas detection scheme based on the photo-thermal (PT) effect and a linearly Sagnac-like interferometer is proposed and a sensitivity of 55 ppm C2H2 is achieved with a unique signal processing method.

**W1A.3 • 08:30**
**Attention based Temporal convolutional network for Φ-OTDR event classification**, Manling Tian[1], Hui Dong[2] and Kuanglu Yu[1]; [1]*Beijing Jiaotong Univ., China;* [2]*Inst. for Infocomm Research, Singapore.* We designed a new attention based temporal convolutional network combined with bidirectional long short term memory model named ATCN-BiLSTM for Φ-OTDR event classification, achieving average classification accuracy of 99.6% on three types of events.

**W1A.4 • 08:45**
**Compressed sensing based on K-SVD algorithm for signal recovery in BOTDA system**, Yong Dong[1], Ya'Nan Yang[1] and Kuanglu Yu[1]; [1]*Beijing Jiaotong Univ., China*. We propose a compressed sensing method based on dictionary learning for sparse transform in Brillouin optical time domain analysis (BOTDA), which can recover original signal of 4MHz step with 15% sampling points.

## Lushan Hall (鲁山厅), BSPA-Track 6

**08:00-10:00**
**W1B • Optical measurement III (BSPA)**
*Presider: **Junfeng Jiang**, Tianjin University, China*

**W1B.1 • 08:00**
**Development of the Resonant Fiber Optic Gyroscope Prototype**, Lu Liu[1], Weiwen Qian[1], Shuang Liu[1], Junyu Tu[1], Huilian Ma[1] and Zhonghe Jin[1]; [1]*Zhejiang Univ., China*. This paper presents latest progress in the development of a resonant-fiber optic gyroscope prototype with a single semiconductor laser, which achieves a bias stability of 0.14 deg/h and an angle random walk of 0.05 deg/sqrt(h).

**W1B.2 • 08:15**
**Femtosecond Laser-Inscribed Ultra-Weak Fiber Bragg Grating Array for Distributed High-Temperature Measurements**, Baijie Xu[1], Jun He[1], Xizhen Xu[1], Xunzhou Xiao[1], Bin Du[1], Changrui Liao[1] and Yiping Wang[1]; [1]*Shenzhen Univ., China*. An identical ultra-weak fiber Bragg grating (uwFBG) array consisting of 200 uwFBGs was fabricated by using femtosecond laser point-by-point inscription for the first time and was used for realizing distributed high-temperature sensing up to 1000°C.

**W1B.3 • 08:30**
**High-Resolution Chaos Lidar Using Self-Phase-Modulated Feedback External- Cavity Semiconductor Laser-based Chaos Source**, Weizhou Feng[1], Ning Jiang[1], Jiaoyang Jin[1], Anke Zhao[1], Yiqun Zhang[1], Shiqin Liu[1] and Kun Qiu[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China*. We propose and demonstrate a high-resolution chaos lidar which supports millimeter-level ranging resolution (without range ambiguity) and excellent anti-interference capability, by using wideband chaos originated from self-phase-modulated-optical-feedback.

**W1B.4 • 08:45**
**Light Source Heated Optical Fiber Thermal Anemometer**, Jiarui Zhang[1]; [1]*Guangdong Univ. of Tech., China*. A light source heated thermal anemometer based on polymer Fabry-Perot Interferometer is proposed. High sensitivity up to -3.13 nm/(m/s) is achieved and response time is about 250 ms.

## Mengshan Hall (蒙山厅), SS 3

**08:00-10:00**
**W1C • 2D-materials photonics**
*Presider: **Hongtao Lin**, Zhejiang University, China*

**W1C.1 • 08:00** Invited

**Advances in 2D materials-based multi-wavelength ultrafast photonics**, Bo Guo[1]; [1]*Harbin Engineering Univ., China*. Here, we review the recent advances in the exploitation of these 2D materials in multi-wavelength ultrafast lasers. Interestingly, study found that, 2D materials-based nonlinear optical device is an ideal platform for nonlinear pulse dynamics study. Thus, versatile pulse patterns, including dip-type sideband pulse, and rectangular pulse, are also demonstrated. Finally, current challenges and future application opportunities of 2D materials-based multi-wavelength ultrafast lasers are presented.

**W1C.2 • 08:20** Invited

**Graphene functionalized fiber system: from comb source to sensing devices**, Baicheng Yao[1]; [1]*Univ. of Electronic Sci. and Tech. of China, China*. In this talk, we'd like to share our recent developments about a novel fiber system leveraging graphene optoelectronics, including a controllable soliton microcomb source, a graphene enhanced long-distance fiber transmission, and an ultrahighly sensitive gas detector terminal. These works may draw a picture that graphene-fiber optics steps from in-lab physics to industrial high-performance applications.

**W1C.3 • 08:40** Invited

**Graphene enabled all-optical controllable photonic devices and their applications**, Bo Dong[1]; [1]*Shenzhen Tech. Univ., China*. All-optical controllable photonic devices have attracted more and more attention for their excellent performances of all-optical controllability, without mechanical structure, high compactness, fast response speed and stable regulation. Here, we will present our recent research achievements in graphene enabled all-optical controllable photonic devices and their applications in filter and sensor.

## Laoshan Hall (崂山厅), SS 1

**08:00-09:50**
**W1D • Organic & nano optoelectronics-III**
*Presider: **Fushan Li**, Fuzhou University, China*

**W1D.1 • 08:00** Invited

**Matrix Perovskite Light-emitting Devices**, Junbiao Peng[1]; [1]*South China Univ. of Tech., China*. We introduce the results of inkjet-printing full-color perovskite LED，including full-color quasi-2D perovskite LED and full-color perovskite quantum dot LED.

**W1D.2 • 08:20** Invited

**High-Efficiency Cadmium-Free Blue Perovskite and Quantum Dot Light-Emitting Diodes**, Kai Wang[1]; [1]*Southern Univ. of Sci. and Tech., China*. High-efficiency blue perovskite LEDs have been achieved by low-order phase suppression, defects passivation and efficient energy transfer. Moreover, high-performance blue InP QLEDs were realized through facilitating carrier injection, enhancing hole hopping and extracting evanescent wave.

**W1D.3 • 08:40** Invited

**Inkjet-Printed Perovskite Light Emitting Diodes**, Tao Song[1]; [1]*Soochow Univ., China*. Here, we developed a strategy to suppress coffee-stain effect via enhancing Marangoni flow strength. An interfacial poly(vinylpyrrolidone) (PVP) layer was incorporated to tune the surface tension of the underlying hole transport layer (HTL) and enhance the perovskite crystallization. The substrate temperature was also carefully controlled to rationally tune the printing solvent evaporation rate. By optimizing the thickness of the PVP layer and the temperature of the printing stage, the coffee-stain effect was dramatically restrained.

## Taishan Hall (泰山厅), Track 3

**08:00-10:00**
**W1E • Optical networks I**
*Presider: **Lin Ma**, Shanghai Jiao Tong University, China*

**W1E.1 • 08:00** Invited

**Impact of Fiber Attenuation and Effective Area on Spectrum Efficiency of Elastic Optical Networks**, Gangxiang Shen[1]; [1]*Soochow Univ., China*. We evaluate how fiber attenuation and effective area would impact transmission performance of an optical network. Based on a lightpath OSNR estimation model, we consider different service-provisioning approaches under both incremental and dynamic traffic demands.

**W1E.2 • 08:20** Invited

**Reconfiguring Multicast Sessions in EONs Adaptively with Deep Reinforcement Learning**, Xiaojian Tian[1], Baojia Li[1] and Zuqing Zhu[1]; [1]*Univ. of Sci. and Tech. of China, China*. We proposed a deep reinforcement learning based approach to reconfigure multicast sessions in elastic optical networks adaptively. Simulation results demonstrate that our proposal maintains the optimality of light-trees with less reconfigurations and reduces blocking probability.

**W1E.3 • 08:40** Invited

**Global and Full-Spectrum Perception for Agile Optical-Wireless Converged Networks in 5G and Beyond**, Kangqi Zhu[1], Nan Hua[1], Xiaoxue Chen[1], Guchang Chen[2], Xiangzhi Xie[2], Jinghan Yu[1], Luhang Xing[1], Shangyuan Li[1], Yitang Dai[2], Xiaoping Zheng[1] and Bingkun Zhou[1]; [1]*Tsinghua Univ., China;* [2]*Beijing Univ. of Posts and Tele., China*. A system consisted of spectrum acquisition and transmission network and radio frequency channelization receiver is proposed to achieve global and full-spectrum perception, which could help the communication system make better use of the spectrum resources.

## VIP Room (聚贤厅), Track 2

**08:00-10:00**
**W1F • Optical transmission II**
*Presider: **Ming Tang**, Huazhong University of Science and Technology, China*

**W1F.1 • 08:00** Invited

**Clarification of Several Challenging Issues in LED Lighting Based Communication**, Jian Chen[1]; [1]*Nanjing Univ. of Posts and Tel., China*.

**W1F.2 • 08:20** Invited

**Gb/s physical-layer secure key generation and distribution in fiber communications**, Liuming Zhang[1], Xinran Huang[1], Erich Leitgeb[2] and Xuelin Yang[1]; [1]*Shanghai Jiao Tong Univ., China;* [2]*Graz Univ. of Tech., Austria.* We present the high-speed physical-layer secure key generation and distribution in fiber networks. A key generation rate of 2.7 Gb/s is achieved over 10 km single-mode fiber using a specifically-designed bidirectional polarization scrambler.

**W1F.3 • 08:40** Invited

**Improved SNR Performance of Imbalanced Digital Back-Propagation**, Xingwen Yi[1]; [1]*Sun Yat-sen Univ., China*. We discuss the improved SNR performance of imbalanced digital back propagation that simply tunes the signal power in the virtual link. We derive the closed-form expressions for one-span links and conduct simulation for multi-span transmissions.

## Yishan Hall (沂山厅), BSPA-Track 1

**W1A.5 • 09:00**
**A broadband single-polarization single-mode hollow core anti-resonant optical fiber**, Shidi Liu[1], Tianyu Yang[2], Ming Tian[1], Liang Zhang[2] and Yuming Dong[2]; [1]*Wuhan Research Inst. of Posts and Tel., China*; [2]*Shenzhen Inst. of Advanced Tech., CAS, China.* In this paper, an anti-resonant hollow core fiber with an ultra-wide bandwidth of single-polarization single-mode (SPSM) operation is realized and analyzed by strategically filling epsilon negative (ENG) material.

**W1A.6 • 09:15**
**Train-induced vibration analysis of subway tunnel under different train speeds based on optical fiber accelerometer**, Jianxiang Zhang[1], Wenzhu Huang[1], Wentao Zhang[1], Fang Li[1] and Yanliang Du[2]; [1]*Inst. of Semiconductors, CAS, China; [2]Shenzhen Univ., China*. A long-term and real-time monitoring for train-induced vibration response of subway tunnel based on optical fiber accelerometers is proposed. The vibration response characteristics of subway tunnel under different train speeds is analyzed.

**W1A.7 • 09:30**
**Switchable dual-wavelength random fiber laser based on random grating array**, Bing Lv[1], Wentao Zhang[1], Wenzhu Huang[1] and Fang Li[1]; [1]*Inst. of Semiconductors, CAS, China*. A switchable dual-wavelength random fiber laser using a Fabry-Perot filter to select different lasing wavelengths is proposed. By adjusting the pump power, wavelength selecting and switching can be realized.

**W1A.8 • 09:45**
**Encapsulated Sapphire Fiber Bragg Grating Sensor with Improved High-Temperature Performance**, Jia He[1], Jun He[1], Xizhen Xu[1], Ying Wang[1], Changrui Liao[1] and Yiping Wang[1]; [1]*Shenzhen Univ., China*. We report a novel method for packaging sapphire fiber Bragg grating (SFBG) sensors with inert gas. The high-temperature stability of SFBG was enhanced, showing a stable operation at 1600 ℃ up to 20 hours.

## Lushan Hall (鲁山厅), BSPA-Track 6

**W1B.5 • 09:00**
**Algorithm of the Cavity Length Demodulation for Optical Fiber F-P Sensors Based on Nuttall Window Four-spectrum-line Interpolation FFT**, Wei Liu[1], Tianyu Yang[1], Jianwei Wu[2], Liang Zhang[1] and Yuming Dong[1]; [1]*Shenzhen Inst. of Advanced Tech., CAS, China*; [2]*Chongqing Normal Univ., China.* We propose an algorithm of cavity length demodulation based on Nuttall window four-spectrum-line interpolation FFT. The simulation results show this algorithm's demodulation accuracy and speed are better than cubic spline interpolation and FFT algorithm.

**W1B.6 • 09:15**
**Experimental Research on Ethanol Gas Sensing Characteristics of Microbottle Resonator Based on Whispering Gallery Mode**, Mingyue Wang[1], Naisi Zhu[1], Xusheng Zhang[1] and Ya-Nan Zhang[1]; [1]*Northeastern Univ., China*. This paper studied the sensing characteristics of silica micro-bottle resonator coupled with non-adiabatic tapered fiber based on whispering gallery mode, including the refractive index and ethanol gas after being coated with graphene oxide and polydimeth.

**W1B.7 • 09:30**
**Temperature self-compensative uniform strength cantilever beams acceleration sensing structure based on double fiber Bragg grating**, Shaokang Yan[1], Jun Zhang[2], Weilong Lou[2] and Han Zhu[2]; [1]*Univ. of Shanghai for Sci. and Tech., China; [2]The 23rd research institute, China elec. Tech. group co.,* China. A acceleration sensor based on double fiber Bragg grating is proposed. The temperature cross-sensitivity is greatly reduced. The amplitude-frequency response, sensitivity characteristics, temperature self-compensation characteristics of the sensor were studied by the experiment.

**W1B.8 • 09:45**
**Magnetic field sensing based on photonic crystal fiber WGM microcrivity sensor infiltrated with the magnetic fluids**, Zhang Chen[1]; [1]*USTS, China*. A novel, compact and easy fabrication WGM magnetic field sensor is proposed. The sensor is sensitive to magnetic field intensity and has a maximum sensitivity of 53pm/mT.

## Mengshan Hall (蒙山厅), SS 3

**W1C.4 • 09:00** Invited

**Bio-Inspired Infrared Photodetectors**, Jinshui Miao[1]; [1]*Shanghai Inst. of Technical Physics, CAS, China*.

**W1C.5 • 09:20** Invited

**Graphene optical fiber and based electro-optical modulator**, Xu Zhou[1]; [1]*South China Normal Univ., China*. we demonstrate a new hybrid material, Gr–PCF, with length up to half a metre, produced using a chemical vapour deposition method.The Gr–PCF shows a strong light–matter interaction with ~8 dB cm−1 attenuation. In addition, the Gr–PCF-based electro-optic modulator demonstrates a broadband response (1,150–1,600 nm) and large modulation depth (~20 dB cm−1 at 1,550 nm) under a low gate voltage of ~2 V. Our results could enable industrial-level graphene applications based on this Gr–PCF and suggest an attractive platform for two-dimensional material-PCF.

**W1C.6 • 09:40** Invited

**Integrated silicon and chalcogenide photonic devices at 2-micron waveband**, Hongtao Lin[1]; [1]*Zhejiang Univ., China*. In this talk, we will present our recent works on the integrated silicon and chalcogenide photonic devices for the 2-micron wavelength range.

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**10:00-10:30 Poster Session 2 & Coffee Break, 2F**

## Laoshan Hall (崂山厅), SS 1

**W1D.4 • 09:00** Invited

**High efficient emission and high-CRI warm white light-emitting diodes based on inorganic perovskite nanocrystals**, Zhigang Zang[1]; [1]*Chongqing Univ., China*.

**W1D.5 • 09:20**

**High-performance white LED based on lead-free Cs3Cu2Cl5@silica perovskite for visible light communication**, Shuangyi Zhao[1] and Zhigang Zang[1]; [1]*Chongqing Univ., China*. The white LED based on Cs3Cu2Cl5@silica of visible light communication demonstrates a −3 dB bandwidth of 420 kHz, and the achieved data rate reaches 2.65 Mbps using orthogonal frequency division multiplexing modulation.

**W1D.6 •09:35**

**Stability Enhancement of CsPbBr3 QDs Synthesized at Room-Temperature**, Wensi Cai[1], Dongdong Yan[1] and Zhigang Zang[1]; [1]*Chongqing Univ., China*. Sn-doped CsPbBr3 QDs were synthesized at room temperature. 20% Sn-doped CsPbBr3 QDs show a significantly enhanced thermostability compared with the undoped case and WLEDs based on the doped QDs also show a better optical performance.

## Taishan Hall (泰山厅), Track 3

**W1E.4 • 09:00** Invited

**All Optical Service Networks Architecture and Protocols for Integration of Space and Ground**, Zhiqing Wang[1], Yikai Liu[1], Huowen Peng[2], Yajie Li[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*; [2]*The University of Edinburgh, UK.* The concept of all optical service networks for integration of space and ground is proposed in this paper. The architecture of the network was given, and five key technologies are listed with analyzing the service process.

**W1E.5 • 09:20** Invited

**Computing-aware Proactive IP-Optical Integrated Restructuring**, Linna Wang[1], Rentao Gu[1], Zhekang Li[1], Ruoxing Li[1] and Yuefeng Ji[1]; [1]*Beijing Univ. of Posts and Tel., China*. A proactively IP-optical integration architecture is proposed to adaptively configure IP topology for dynamic service demand, realizing cross-layer network on-demand provision; the experiment results indicate that its average network resource utilization is elevated.

**W1E.6 • 09:40** Invited

**End-to-end system design and optimization to approach the limit of fiber channel capacity**, Qunbi Zhuge[1]; [1]*Shanghai Jiao Tong Univ., China*.

## VIP Room (聚贤厅), Track 2

**W1F.4 • 09:00** Invited

**Advances in Photonics Assisted Terahertz Wireless Communication System**, Bingchang Hua[2], Min Zhu[1], Jiao Zhang[1], Yuancheng Cai[1], Mingzheng Lei[2], Yucong Zou[2], Aijie Li[2] and Jianjun Yu[2]; [1]*Southeast Univ., China;* [2]*Purple Mountain Laboratories, China*. In this paper, the latest research progress of photonics-assisted terahertz wireless communication is summarized, and THz signal generation technologies, multi-dimensional multiplexing techniques, THz signal detection technologies for photonics-assisted terahertz wireless communication are briefly introduced.

**W1F.5 • 09:20** Invited

**Look-Up-Table Based Adaptive Equalization for Optical Fiber Communication Systems**, Yi Cai[1]; [1]*Soochow Univ., China*.

**W1F.6 • 09:40** Invited

**Direct Detection System with Low-resoulation DAC and Electrical Dispersion Pre-compensation for 80-km SMF Transmission**, Fan Li[1]; [1]*Sun Yat-sen Univ., China*.

**10:00-10:30 Poster Session 2 & Coffee Break, 2F**

## Poster Session 2 (10:00-10:30)

**P2.1**

**Performance of Spatial Diversity for FSO Links with Pointing Errors over Malaga Turbulence**, Dan Chen[1], Mengmeng Lu[1] and Huiqin Wang[1]; [1]*Xi'an Univ. of Tech., China;* [2]*Lanzhou Univ. of Tech., China*. Based on the joint probability density function, the asymptotic expressions of the average BER for MIMO system with three combing methods including maximum ratio combining(MRC), equal gain combining(EGC) and select combining(SC) are derived.

**P2.2**

**A novel 4nm tunable erbium-doped fiber ring laser based on fiber Bragg grating-assisted add-drop filter**, Zhao Yao[1], Gao Yesheng[1] and Han Zhengying[1]; [1]*CETC, China*. By using the fiber Bragg grating-assisted add-drop filter as a wavelength selector and a wavelength changer at the same time, a stable laser output was obtained with a 4nm tuning range.

**P2.3**

**Link optimization for fiber communication network with sensing capability**, Shiying Yao[1], Quanming Zhang[1], Junhua Li[1], Donglian Gao[1], Yuhong Zhang[1] and Pan Wang[2]; [1]*State Grid Sichuan Economic Research Inst., China;* [2]*Univ. of Elec. Sci. and Tech. of China, China.* This paper proposes a link failure monitoring method to facilitate link optimization.In the fiber communication network model, the parameters of network topology and sensing capability are introduced into the fuzzy logic system, which numerically studied.

**P2.4**

**Tunable DFB Laser Array for Multi-gas Detection**, Meijia Chen[1], Yuechun Shi[2], Rulei Xiao[2], Zhenxing Sun[2], Siyuan Chen[2], Yang Xu[1], Bingxiong Yang[1] and Xiangfei Chen[2]; [1]*Nanjing Univ. of Aeronautics and Astronautics, China;* [2]*Nanjing Univ., China*. We designed a Distributed FeedBack laser array with a large tuning range of 1650.4nm-1657.6nm based on Reconstruction-Equivalent-Chirp technique for the first time. We experimentally demonstrated that the laser can be continuously adjusted for multi-gas detection.

**P2.5**

**High Performance Demonstration of a 16 x 16 Silica-based Cyclic Arrayed-Waveguide Grating Router**, Zhuping Fan[1] and Jianjun He[1]; [1]*@, China*. In this letter, we design and demonstrate a silica-based 16 x 16 cyclic-AWGR device with a channel spacing of 100 GHz, which shows excellent commercial value in terms of loss, crosstalk, polarization-independence and channel deviation.

**P2.6**

**OAM Signal Transmission Of IM/DD Over 1-km Ring-core Fiber With CNN Equalized**, Fei Wang[2], Huan Chang[2], Yi Cui[1], Zhipei Li[2] and Ran Gao[2]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. We propose a convolutional neural network as the nonlinear classifier in the orbital-angular-momentum transmission with intensity modulation and direct detection. Significant improvement is achieved for a 20-Gbauds PAM4 signal over 1-km ring-core fiber.

**P2.7**

**All-optical photodetector based on fiber integrated with MXene Nb2CTx**, Yang Yang[1], Yinping Miao[1], Wenjie Li[1] and Kailiang Zhang[1]; [1] *Tianjin Univ. of Tech., China*. A highly sensitive all-optical photodetector is proposed based on the strong evanescent field of the microfiber and the excellent photothermal effect of Nb2CTx. This photodetector has widespread applications in spectroscopy, communications, and night vision.

**P2.8**

**A Microwave Photonic Multiple Frequency System with Tunable Frequency Multiplication Factor of 3-10**, Chen Zhijia[1], Yin Feifei[1], Wan Xin[2], Dai Yitang[1] and Xu Kun[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*National Computer Network Emergency Response Technical Team/Coordination Center of China, China*. A microwave photonic multi-frequency scheme with a tunable frequency multiplication factor of 3-10 is proposed,which has good frequency tunability, and the frequency multiplication factor can reach up to 10.

**P2.9**

**Intelligent vibration detection using pattern recognition and unmanned aerial vehicle in distributed optical fiber perimeter security system**, Kang Xue[1], Kun Liu[1], Junfeng Jiang[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China*. In order to further improve the recognition accuracy and efficiency of distributed optical fiber perimeter security, this paper proposes a fusion classification scheme based on pattern recognition and UAV video judgment.

**P2.10**

**Magneto-refractive characteristics and mechanism of erbium-doped silica fiber**, Wenlin Zhang[1], Kun Liu[1], Junfeng Jiang[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China*. This study aims to contribute to this growing area of SPR research by exploring the impact of WS2 on tapered fiber SPR sensors. A method for enhancing the sensitivity of SPR sensors is proposed.

**P2.11**

**The Noise Analysis of Long-range Dual Mach-Zehnder Interferometer System Applying Raman Amplifier**, Yuelang Huang[1], Kun Liu[1], Hairuo Guo[1], Kang Xue[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China*. This study conducts noise analysis of dual Mach-Zehnder interferometer system applying Raman amplifier. The simulation indicates that the method can enhance the SNR of the system to extend the sensing range efficiently.

**P2.12**

**Intrusion pattern recognition method based on pulse Mach-Zehnder interferometer distributed optical fiber vibration system,** Zichun Zhou, Kun Liu, Junfeng Jiang and Tiegen Liu; *Tianjin Univ., China*. In the Mach-Zehnder interferometer-type distributed optical fiber vibration system, a magneto-optical switch is used to output pulsed laser, and the superimposed results of multiple frames of pulses are used for situation identification.

**Poster Session 2 (10:00-10:30)**

**P2.13**

**Method of multi-domain synchronization network planning via quantum annealing**, Bo Lv[1] and Zishan Liu[1]; [1]*China Academy of Info. and Communication, China*. A quantum-inspired method for multi-domain synchronization network planning is explored and proposed, formulated to multi-variable quadratic models via quantum annealing approach proving better experimental results of optimal performance and completing time comparing with simulated annealing.

**P2.14**

**Experimental observation of Conventional and Bound Optical Soliton Buildup via TS-DFT technique**, Weiqing Gao[1], Shaoqing Liu[1], Wenwen Dai[1], Liang Tong[1], Wu Chen[1], Xiaohui Ma[1], Wentan Fang[1], Xiaolin Chen[1], Wei Zhang[1] and Yong Zhou[1]; [1]*Hefei Univ. of Tech., China*. We experimentally observed the buildup process of conventional and bound optical solitons via time stretched dispersion Fourier transform technique in two Erbium doped fiber lasers.

**P2.15**

**Recent Advances in Power Domain Multiplexing /Access for Flexible Optical Access Network**, Bin Lian[1] and Nan Feng[2]; [1]*Hebei Univ. of Engineering, China;* [2]*Beijing Univ. of Posts and Tel., China*. This paper mainly focuses on the significant research interests of the PDM/PDA PON in terms of non-orthogonal multiple access, hierarchical modulation and non-uniform PAM. In addition, the brief reviews of some challenging areas are summarized.

**P2.16**

**The Effects of Power Ratios for the Joint NOMA and OFDMA Scheme in IM/DD PON System**, Bin Lian[1] and Nan Feng[1]; [1]*Hebei Univ. of Engineering, China;* [2]*Beijing Univ. of Posts and Tel., China*. This paper proposes the joint upstream non-orthogonal multiple access (NOMA) and orthogonal-frequency division multiplexing access (OFDMA) scheme in the IM/DD-PON system structure. The results show the effectiveness and flexibility of the power ratios.

**P2.17**

**Simulation analysis of gas concentration detection of tunable thulium-doped fiber laser at 2 μm**, Jifang Shan, Kun Liu, Junfeng Jiang, Yafan Li and Tiegen Liu; *Tianjin Univ., China*. This paper designs an intracavity gas sensing system structure based on a thulium-doped fiber laser based on the OptiSystem software, and a wavelength tuning of up to 200 nm is realized.

**P2.18**

**Wavefront regulation of terahertz frequency based on all-silicon medium coded metasurface**, Shi Siqi[1], Yang Kai[1], Jing Xufeng[1] and Liu Xiao[1]; [1]*China Jiliang Univ., China*. The ohmic loss caused by metal materials will seriously affect the coding efficiency of the metasurface. we propose an all-silicon medium metasurface. The coded metasurface is constructed by designing to control the terahertz frequency wavefront.

**P2.19**

**How to deal with undirected denial of service attacks faced by software-defined networks**, Tao Liu[1], He Wang[1] and Yuqing Zhang[1]; [1]*Xidian Univ., China*. A lightweight traffic anomaly detection scheme combining adaptive threshold detection algorithm based on time sliding window and repeated flow detection algorithm by analyzing the unique security threats faced by the software defined optical network.

**P2.20**

**Enhanced Bragg Resonances in Small Period Long Period Fiber Grating Fabricated with Femtosecond Laser Line by Line Technique**, Fangcheng Shen[1], Haiming Jiang[1], Hongyan Xia[1], Kang Xie[1], Xuewen Shu[2], Kaiming Zhou[3] and Lin Zhang[3]; [1] *Guangdong Univ. of Tech., China*; [2]Huazhong Univ. of Sci. and Tech., China; [3]Aston Univ., UK. Small period long period fiber grating is fabricated by femtosecond laser line by line technique. High order Bragg resonances, which are useful for dual-/multi- parameter sensing, are significantly enhanced (from ~0.6 dB to ~11 dB).

**P2.21**

**Generation of dual-wavelength square wave pulse in a passively mode-locked erbium-doped fiber laser**, Ying Jia[1], Dongfang Jia[1], Chunfeng Ge[1], Zhen Xu[1], Jiakang Li[1], Hui Wang[1], Yuanpeng Liu[1], Zhaoying Wang[1] and Tianxin Yang[1]; [1]*Tianjin Univ., China*. We report a passively mode-locked erbium-doped fiber laser operating in the region of dissipative soliton resonance with dual wavelength square pulse output at 1531 nm and 1557 nm based on nonlinear fiber loop mirror.

**P2.22**

**A demodulation algorithm for long distance distributed vibration sensing**, Zehua Bu[1], Bangning Mao[1], Zhaopeng Si[1] and Chunliu Zhao[1]; [1]*China Jiliang Univ., China*. This paper presents a new demodulation algorithm for long distance distributed vibration sensing.Both amplitude and phase signal are obtained by interpolation and segment processing.The frequency response of 200 Hz is demonstrated along 17 km fiber.

**P2.23**

**Practical Phase Noise Model for Continuous-Variable Quantum Key Distribution with a Real Local Oscillator**, Yun Shao[1], Heng Wang[1], Yaodi Pi[1], Wei Huang[1], Yang Li[1], Jinlu Liu[1], Jie Yang[1], Yichen Zhang[2] and Bingjie Xu[1]; [1]*Inst. of Southwestern Communication, China;* [2]*Beijing Univ. of Posts and Tel., China*. We propose a practical phase noise model for continuous-variable quantum key distribution (CV-QKD) with a real local oscillator. Our model can significantly improve the secret key rate and transmission distance of the system.

**P2.24**

**Dam Deformation of High Precision GNSS Satellite Research on Calibration Method of Monitor**, Yang Ning[1], Mao Bin[1], Li Qing[1], Qin Yu[1], Liu Ying[1], Zhou Wei[1] and Zhao Di[1]; [1]*Shaanxi Inst. of Metrology Sci., China*. In order to ensure the data validity of the GNSS dam deformation monitor with high precision, a method for calibrating the GNSS satellite dam deformation monitor with high precision is presented.

## Poster Session 2 (10:00-10:30)

**P2.25**

**High-Bandwidth Frequency Servo Loop for Resonant Micro Optic Gyroscope with a Reduced Sampling Rate Proportional-Derivative Controller**, Weiwen Qian[1], Lu Liu[1], Shuang Liu[1], Huilian Ma[1] and Zhonghe Jin[1]; [1]*Zhejiang Univ., China*. To suppress the high frequency noise in resonant micro optic gyroscope, this paper proposes a downsampling proportional-derivative control loop and simulation results show that the bandwidth is expanded 10 times after applying such a loop.

**P2.26**

**A shortening pattern selection method of shortened Polar codes**, Li Wanqi[1], Tian Qinghua[1], Jing Zexuan[1], Xin Xiangjun[1], Zhang Qi[1], Tian Feng[1], Yang Leijing[1] and Li Zhipei[2]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. We generate an auxiliary matrix by grouping the mother code sequences after bit-reversal permutation, then select the shortened code words. Simulation shows that the proposed shortened Polar codes outperform the conventional shortened Polar codes.

**P2.27**

**Analog PAM4 modulation technique enabled by a polarization multiplexing modulator**, Xiaolong Pan[1], Hongxin Zhang[1], Xishuo Wang[1] and Chuxuan Wang[1]; [1]*Beijing Univ. of Posts and Tel., China*. We propose a cost-effective method to generate radio-frequency pulse-amplitude-modulation with four amplitude levels signals by using a polarization multiplexing modulator, a polarization controller and a polarizer. The RF PAM4 signal at 9.07GHz has been generated.

**P2.28**

**Experimental Demonstration of a 2×20G Baud MDM Transmission over 20km**, Chuxuan Wang[1], Feng Tian[1], Tianze Wu[1], Yu Gu[1], Qi Zhang[1], Qinghua Tian[1] and Jue Wang[1]; [1]*Beijing Univ. of Posts and Tel., China*. We experimentally demonstrate a 2×20G Baud PAM4 Transmission over 20km. The result shows that while the mode is LP11a and LP11b, the BER of the transmission can be achieved under 1.0×10-4.

**P2.29**

**A Dynamic Resource Allocation based on Network Traffic Prediction for Sliced Passive Optical Network**, Xuanqiao Liang[1], Qinghua Tian[1] and Fu Wang[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. we propose a resource allocation scheme using LSTM neural network in an SDN-based TDM-PON, which can reduce the MFH slice latency by 23.3% compared with the typical method (load of 0.8).

**P2.30**

**Probabilistically Shaped PAM-8 for Few Mode IM/DD Links With a Training Sequence Aided CMA algorithm**, Tianze Wu[1], Feng Tian[1], Chuxuan Wang[1], Yu Gu[1], Jue Wang[1], Qi Zhang[1], Qinghua Tian[1] and Xiangjun Xin[1]; [1]*Beijing Univ. of Posts and Tel., China*. We apply the probabilistic shaping in the PAM-8 few mode IM/DD system. A training sequence aided CMA algorithm is used to equalize the dynamic characteristics of the few mode channel.

**P2.31**

**Impact of Ag nanospheres array for enhanced optical absorption in plasmonic-based InGaAs photodetector**, Shengtao Jiang[1], Yongqing Huang[1], Xuejie Wang[1], Dan Yang[1], Xiaofeng Duan[1], Kai Liu[1] and Xiaomin Ren[1]; [1]*Beijing Univ. of Posts and Tel., China*. A new structure of InGaAs photodetector with surface-modified Ag nanospheres array is proposed, which can obtain 50% optical absorptance at 1550nm and maintain good optical absorption performance when the light incident within 0-30 degree.

**P2.32**

**Microwave Photonic Filter based on broadband source sliced by SMF-FMF-SMF structure**, Ailing Zhang[1], Guang Hu[1], Yongfu Zhang[1] and Shuo Li[1]; [1]*Tianjin Univ. of Tech., China*. In this paper, a microwave photonic filter (MPF) based on broadband source sliced by SMF-FMF-SMF (SFS) structure is proposed. Its performances are investigated theoretically and experimentally. The MPF has the advantage of disturbance resistance.

**P2.33**

**Study on Frequency-dependent Saturation Characteristics of Modified Uni-traveling Carrier Photodetector**, Huayun Zhi[1], Yongqing Huang[1], Shengtao Jiang[1], Jiawei Du[1], Xiaofeng Duan[1], Kai Liu[1] and Xiaomin Ren[1]; [1]*Beijing Univ. of Posts and Tel., China*. The frequency-dependent RF output characteristics of the modified uni-traveling carrier photodetector are studied. The results show that RF saturation output power of the device decreases linearly with increasing of the incident signal frequency.

**P2.34**

**An InP-InGaAs-NiO p-i-n photodiode with partially depleted-absorber and depleted nonabsorbing region**, Xuejie Wang[1], Dan Yang[1], Yongqing Huang[1], Huayun Zhi[1], Kai Liu[1], Xiaofeng Duan[1] and Xiaomin Ren[1]; [1]*Beijing Univ. of Posts and Tel., China*. An InP-InGaAs-NiO p-i-n photodiode achieving p-side full coverage electrode and top illumination by using NiO films is proposed. This structure increases DC saturation current by about 27mA than conventional structure and has better bandwidth.

**P2.35**

**Nyquist Pulses Generation with Tunable Duty Cycle by Spectrum Broadening and Chirp Compensation**, Hui Wang[1], Jiakang Li[1], Dongfang Jia[1], Chunfeng Ge[1], Zhaoying Wang[1] and Tianxin Yang[1]; [1]*Tianjin Univ., China*. An effective optical Nyquist pulse generator is proposed based on a dual-parallel Mach-Zehnder modulator. By spectrum broadening and chirp compensation, optical Nyquist pulses with adjustable duty cycle of 21.6%, 8.1% and 5.4% are generated.

**P2.36**

**Ternary blend hostes for solution processed green phosphorescent organic light-emitting diodes**, Di Zhang[1], Zugang Liu[1], Qianmin Dong[1], Ranran Han[1] and Hongjun Wang[1]; [1]*China Jiliang Univ., China*. In this paper we have fabricated a series of solution processed green phosphorescent organic light-emitting diodes (PhOLEDs) based on blend hosts-guest configuration. we investigated the effect of various hole transport materials.

**Poster Session 2 (10:00-10:30)**

**P2.37**

**CS2-Filled Solid-Core Photonic Crystal Fiber for Temperature Sensing Based on Photonic Bandgap Effect**, Yueting Ni[1], Jinhui Yuan[1], Shi Qiu[1], Yuwei Qu[1], Guiyao Zhou[2], Changming Xia[2], Xian Zhou[3], Binbin Yan[1], Qiang Wu[4], Kuiru Wang[1], Xinzhu Sang[1], Keping Long[3] and Chongxiu Yu[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*South China Normal Univ., China;* [3]*Univ. of Sci. & Tech. Beijing, China;* [4]*Northumbria Univ., UK.* We propose a solid-core photonic crystal fiber filled with CS2 for temperature sensing. The average sensitivity can be up to 4.60 nm/℃ in the temperature range of -50 to 40 ℃.

**P2.38**

**Design of polarization-insensitive high responsivity Schottky photodetector utlizing mode hybridization effects**, Qian Li[1] and Yanli Zhao[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. A polarization-insensitive waveguide Schottky photodetector was proposed by engineering the asymmmetry of plasmonic waveguide. Absorptances of 95.92%/92.75% for wavelength of 1.55 μm under TE/TM incidences are theoretically achieved within 6nm-thick 5.2

**P2.39**

**Design of interference system for portable Fourier transform infrared gas analyzer**, Zhenwei Shan[1], Yanqing Qiu[1] and Bangning Mao[1]; [1]*China Jiliang Univ., China*. A interference system for portable FTIR gas analyzer was developed. 4 times optical path difference can be obtained at a small swing angle by swinging a structure with double cube corner mirrors of the system.

**P2.40**

**Research on FFT Demodulation System of Double Fiber Laser Beat Signal Based on FPGA**, Hong-en Zou[1], Bo-ning Zhou[1], Li-Tao Mo[1], Hong-wei Li[1], Yan Huang[1] and Guo-Hui Lv[1]; [1]*Heilongjiang Univ., China*. In this paper, based on FPGA, a wide-band, high-resolution, low-cost dual-channel fiber laser beat signal demodulation system is studied, which combines mixing technology and Fast Fourier Transform (FFT).

**P2.41**

**A novel training symbol structure design for transmitter IQ mismatch estimation and compensation in CO-OFDM system**, Xiurong Ma[1], Jingjing Li[1] and Yu Chen[1]; [1]*Tianjin Univ. of Tech., China*. In this paper, we proposed a novel training symbol structure to estimate transmitter IQ mismatch and channel distortion for CO-OFDM system at 100Gb/s. Simulation results show that the performance has been improved.

**P2.42**

**Research on polarization characteristics of comb filter based on microfiber Sagnac ring**, Min Li[1], Jiajia Sun[1], Yumeng Lv[1], Changsheng Shao[1], Lijun Li[1], Tianzong Xu[1], Jianhong Sun[1] and Qian Ma[1]; [1]*Shandong Univ. of Sci. and Tech., China*. The output characteristics of the microfiber Sagnac ring comb filter are theoretically analyzed. The experiment proves the influence of the polarization controller on the output spectrum of the filter.

**P2.43**

**Monolithically integrated narrow linewidth semiconductor laser with a narrow band reflector**, Hongji Wang[1], Yuechun Shi[1], Yitao Wu[1], Yuxin Ma[1], Ziming Hong[1], Haoyuan Wu[1] and Xiangfei Chen[1]; [1]*Nangjing Univ., China*. We proposed a monolithically integrated narrow linewidth semiconductor laser composing of an active section and a passive narrow band reflector. Linewidth about 16 kHz is obtained when the laser's length is 800 μm.

**P2.44**

**FPI filled with PDMS for high sensitivity gas pressure sensor**, Guo Xiaoshan[1], Wang Yuan[1] and Jiang Chao[1]; [1]*Hubei normal Univ., China*. A gas pressure sensor is designed and demonstrated experimentally, which is composed of a Fabry–Perot interferometer by the capillary filled with polydimethylsiloxane (PDMS). Experiment results show that the proposed sensor has a high sensitivity.

**P2.45**

**Carbon dioxide detection system based on TDLAS technology**, Shoulin Wang[1], Zhaowei Wang[1], Yanfang Li[1], Tingting Zhang[1], Weihua Gong[1], Yubin Wei[1] and Ruizhan Zhai[1]; [1]*Qilu Univ. of Tech., China*. This article mainly introduces the basic theory of TDLAS technology in CO_2 gas detection. It also introduces the the research of CO_2 absorption spectra in different regions of the infrared atmospheric window by many scholars.

**P2.46**

**An All-silica Fiber-optic Fabry-Perot Etalon Air Pressure Sensor**, Yueying Liu[1], Zhenguo Jing[1], Ang Li[1], Qiang Liu[1], Yang Cheung[1], Ang Lee[1] and Wei Peng[1]; [1]*Dalian Univ. of Tech., China*. Using hydroxide-catalysis bonding technology, an all-silica akinetic fiber-optic air pressure sensor, consisting of a rigid, fiber-coupled Fabry-Perot etalon (FPE) with a transparent central opening is fabricated and demonstrated, which may be desirable for altitude measurements.

## Yishan Hall (沂山厅), Track 1

**10:30-12:00**
**W2A • Novel fibers & devices III**
*Presider: **Huanhuan Liu**, Southern University of Science and Technology, China*

**W2A.1 • 10:30** Invited

**Research on Fabrication And Optical Modulation Characteristics of GRAPHENE-PHOTONIC Crystal Fiber**, Weihong Bi[1]; [1]*Yanshan Univ., China*. In order to integrate the advantages of graphene and photonic crystal fiber, the author and reseach group propose an idea of directly growing graphene into the inner holes of PCF by atmospheric chemical vapor deposition (APCVD).

**W2A.2 • 10:50** Invited

**Additive Manufacturing on Silica Optical Fibers**, Jianzhong Zhang[1]; [1]*Harbin Engineering Univ., China*. Additive manufacturing or 3D printing Tech. is introduced into silica optical fiber fabrication. Our group successfully fabricated single mode fiber, bismuth and erbium co-doped multicore optical fiber using this Tech.. It breaks through the limitations of traditional chemical vapor deposition preform fabrication Tech., with precisely centering the fiber core for step index optical fibers and avoiding complex manufacturing process of stack and draw for microstructure optical fibers.

**W2A.3 • 11:10** Invited

**Harnessing polarization characteristics in antiresonant hollow-core fibres**, Wei Ding[1]; [1]*Jinan Univ., China*. After briefly reviewing our progress in low-loss anti-resonant hollow-core fibers, I will focus on how to realize low-loss highly-birefringent ARF and how to utilize polarization to transmit quantum-states with high fidelity in an 830nm ARF.

## Lushan Hall (鲁山厅), BSPA-T5&S2

**10:30-12:00**
**W2B • T5 & S2 BSPA session**
*Presider: **Hongwei Chen**, Tsinghua University, China*

**☼W2B.1 • 10:30**

**Fourier Domain Mode Locking Optoelectronic Oscillator for VCO-output Signal Optimization**, Lingjie Zhang[1], Xiangrui Tian[1], Huan Tian[1], Zhiyao Zhang[1], Heping Li[1] and Yong Liu[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China*. A stimulated Brillouin scattering-based Fourier domain mode locking optoelectronic oscillator is demonstrated as a frequency-to-time-mapping signal optimizer. The output signal has better phase noise performance and coherence than those of the input signa

**☼W2B.2 • 10:45**

**Optical Transfer Delay Measurement Based on Multi-frequency Phase-Derived Ranging**, Xi Liu[1], Lihan Wang[1], Xiaohu Tang[1], Shupeng Li[1], Cong Ma[1], Yue Yang[1], Xin Jiang[1], Chaosheng Huang[1], Xiangchuan Wang[1] and Shilong Pan[1]; [1]*Nanjing Univ. of Aeronautics and Astronautics, China*. A fast and high accuracy optical delay measurement system is proposed using multi-frequency phase derived ranging. An accuracy of 0.2 ps is achieved while the measurement speed is improved for dozens of times to 1kHz.

**☼W2B.3 • 11:00**

**High-Performance Microwave Frequency Comb Generation Using Optically Injected Semiconductor Laser with Dual-loop Optoelectronic Feedback**, Renheng Zhang[1], Pei Zhou[1], Kunxi Li[1], Hualong Bao[1] and Nianqiang Li[1]; [1]*Soochow Univ., China*. An approach to generating microwave frequency combs is experimentally demonstrated based on optically injected semiconductor laser. An 8-GHz MFC with a comb contrast over 45 dB and a linewidth below 500 Hz is successfully generated.

## Mengshan Hall (蒙山厅), Track 7

**10:30-12:00**
**W2C • Ultrafast & nolinear optics II**
*Presider: **Peiguang Yan**, Shenzhen University, China*

**W2C.1 • 10:30** Invited

**Controlled nonlinearity in high power fiber femtosecond laser**, Minglie Hu[1]; [1]*Tianjin Univ., China*.

**W2C.2 • 10:50** Invited

**Ultrafast Raman fiber amplifier**, Yan Feng[1]; [1]*Shanghai Inst. of Optics and Fine Mechanics, CAS, China*. We propose and demonstrate a new method to transform a CW single frequency laser into femtosecond-scale pulses by nonlinear optical gain modulation in a fiber Raman amplifier. The proof-of-principle setup generates stable and highly-coherent laser at 1120 nm with a pulse energy of 25.7 nJ, a pulse width of 436 fs, and an optical efficiency of 69.4% by 14 ps gain modulation. Numerical simulation shows pulse energy scaling to μJ-level is feasible by increasing pump energy. By cascading the conversion process, high-energy, femtosecond-scale pulses can be produced over wide spectral range.

**W2C.3 • 11:10** Invited

**Low loss microstructure hollow core fiber and ultrafast laser applications**, Shoufei Gao[1]; [1]*Jinan Univ., China*. We will present several novel high-performance HC-ARFs with ultralow loss and broad transmission band, as well as applications including intense ultrashort pulse laser delivery, Raman gas laser and supercontinuum generation based on gas filled HC-ARF.

## Laoshan Hall (崂山厅), BSPA-SS 1

**10:30-11:30**
**W2D • Organic & nano optoelectronics-IV(BSPA)**
*Presider: **Dongge Ma**, South China University of Technology, China*

☼**W2D.1 • 10:30**
**A Gas Recognition Method Based on PCA and PSO-LSSVM**, Tingting Song[1], Wanyu Xia[1], Zhanwei Yan[1], Kai Song[1], Yinsheng Chen[1] and Deyun Chen[1]; [1]*Harbin Univ. of Sci. and Tech., China*. This paper proposes a mixed gas identification method based on PCA and PSO-LSSVM.The PCA is used to extract features, and PSO-LSSVM is used to identify the gas types.

☼**W2D.2 • 10:45**
**Performance of organic light emitting diodes with MoO3 and PEDOT PSS as double hole injection layers**, Wang Hongjun[1]; [1]*@, China*. MoO3 with diffrent thicknesses is introduced between ITO and PEDOT:PSS by thermal evaporation to explore it's performance as HIL. Study shows that MoO3/PEDOT:PSS enhances the hole injection capability and prevent the electrode from corrosion.

☼**W2D.3 • 11:00**
**Manipulating Charge-Transfer Excitons by Exciplex Matrix: Toward Thermally Activated Delayed Fluorescence Diodes with Power Efficiency beyond 110 lm W−1**, Duan Chunbo[1] and Xu Hui[1]; [1]*Heilongjiang Univ., China*. Herein, we use CDBP:mDBSOSPO exciplex host and 4CzTPNBu as dopant to fabricate yellow TADF diodes with the record power and quantum efficiencies of 114.9 lm W-1 and 30.3% to data.

## Taishan Hall (泰山厅), Track 3

**10:30-12:00**
**W2E • Optical networks II (BSPA)**
*Presider: **Gangxiang Shen**, Soochow University, China*

☼**W2E.1 • 10:30**
**A dynamic optical network units slicing algorithm for centralized flexible time- and wavelength-division multiplexing passive optical network**, Shixuan Li[1], Qinghua Tian[1], Fu Wang[1], Xiangjun Xin[1], Qi Zhang[1], Yongjun Wang[1], Feng Tian[1] and Leijing Yang[1]; [1]*Beijing Univ. of Posts and Tel., China*. A dynamic optical network units (ONU) slicing algorithm is proposed and simulated for centralized flexible Time- and Wavelength-division Multiplexing Passive Optical Network (TWDM-PON), which can reduce the pressure of core network and decrease implement

☼**W2E.2 • 10:45**
**NoPeak：An Intelligent Multi-hop Scheduling Scheme for Optical Data Center**, Li Shuo[1], Yu Xiaoshan[1], Gu Huaxi[1] and Lu Yunfeng[1]; [1]*Xidian Univ., China*. We propose an intelligent multi-hop scheduling algorithm capable of supporting any one hop scheduling algorithm to reduce the impact of traffic imbalance on the overall performance of the network.

☼**W2E.3 • 11:00**
**Hybrid-Trusted/Untrusted-Relay based Protection Strategy in Quantum Key Distribution Enabled Optical Networks (QKD-ON)**, Qin Zhang[1], Xiaosong Yu[1], Xinyang Li[1], Yajie Li[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. This paper addresses the survivability issue by proposing a hybrid-trusted/untrusted-relay based protection strategy in QKD-ON. Simulation results show it performs well on service blocking rate and protection path construction rate.

## VIP Room (聚贤厅), Track 2

**10:30-12:15**
**W2F • Optical transmission III (BSPA)**
*Presider: **Xiaoguang Zhang**, Beijing University of Posts and Telecommunications, China*

☼**W2F.1 • 10:30**
**Demonstration of Flexible Access in Rate-Adaptive Visible Light Communication System with Constellation Probabilistic Shaping**, Sizhe Xing[1], Fangchen Hu[1], Guoqiang Li[1], Junhui Hu[1], Wangwei Shen[1], Junwen Zhang[1] and Nan Chi[1]; [1]*Fudan Univ., China*. Distance-based rate-adaptive visible-light-communication system with probabilistic shaping is proposed and experimentally demonstrated. We achieved flexible access with the net data-rate from 1.84 to 3.27-Gbps for 20 and 1-meter distance, with maximum 28%.

☼**W2F.2 • 10:45**
**Modeling analysis of vortex beams propagation through a merged atmospheric turbulence and aerosol medium**, Ziwen Wu[1], Chunyong Yang[1], Wenjun Ni[1] and Perry Ping Shum[2]; [1]*South-Central Univ. for Nationalities, China;* [2]*Southern Univ. of Sci. and Tech., China*. We theoretically proposed a model of vortex beams transmitting in a merged atmospheric turbulence and aerosol medium, which based on the extended Huygens-Fresnel diffraction principle.

☼**W2F.3 • 11:00**
**An Efficient and Robust Pairwise Optimization Search Algorithm of Modulation Constellations for Probabilistic Amplitude Shaping Architecture**, Xiang Liu[1], Jiao Zhang[1], Min Zhu[1], Bingchang Hua[2], Yuancheng Cai[1], Mingzheng Lei[2], Yucong Zou[2] and Aijie Li[2]; [1]*Southeast Univ., China;* [2]*Purple Mountain Laboratories, China*. We propose a general modified pairwise optimization (MPO) search algorithm. The simulation results show the performance of PS-MPO-16QAM has a gain of 0.2 bit/symbol over 16QAM and 0.05 bit/symbol over PS-16QAM, respectively.

## Yishan Hall (沂山厅), Track 1

**W2A.4 • 11:30**
**All-fiber second-order Mode Converter Based on Twisted Long-period Fiber Grating**, Mao Feng[1], Wenzhe Chang[1], Baiwei Mao[1], Pan Wang[1], Zhi Wang[1] and Yan-Ge Liu[1]; [1]*Nankai Univ., China*. We demonstrated a twisted long-period fiber grating mode converter to generate LP21 mode. The introduction of twisting could significantly improve the fabrication efficiency and reduce the damage to fiber structure.3

**W2A.5 • 11:45**
**Narrowband Filter Based on Triangular Tri-Core Fiber Long-Period Gratings**, Huiqin Peng[1], Yunhe Zhao[1], Wei Wang[1], Yunqi Liu[2] and Yongsheng Yang[1]; [1]*Shanghai Maritime Univ., China;* [2]*Shanghai Univ., China.* We proposed a novel narrowband filter based on long-period gratings in triangular tri-core fiber. Mode coupling and spectral properties were investigated. The 3 dB bandwidth of the proposed filter could achieve to be 9.11 nm.3

## Lushan Hall (鲁山厅), BSPA-T5&S2

☼**W2B.4 • 11:15**
**Prediction Utilizing Photonic Reservoir Computing Based on Complex Chaotic Mask**, Jiaoyang Jin[1], Ning Jiang[1], Weizhou Feng[1], Anke Zhao[1], Fan Luo[1] and Kun Qiu[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China*. We investigate the photonic reservoir based on semiconductor-lasers with optical injection and feedback. Enhanced performance of the time-series prediction task can

☼**W2B.5 • 11:30**
**Piecewise Feedforward Neural Network Based Nonlinear Equalizer for Short-Reach DML-DD System**, Qi Wu[1], Yixiao Zhu[1] and Weisheng Hu[1]; [1]*Shanghai Jiao Tong Univ., China*. We propose a targeted PW-FNN to mitigate both the linear and nonlinear distortions in DML-based IM-DD system. By this equalizer, a 56Gbit/s PAM-4 transmission over 30km SSMF is experimentally demonstrated with BER below 7% HD-FEC.

## Mengshan Hall (蒙山厅), Track 7

**W2C.4 • 11:30** Invited

**Merging of dissipative soliton resonance pulses in a fiber laser**, Luming Zhao[1]; [1]*Huazhong Univ. of Science and Tech., China*. Dissipative soliton resonance (DSR) is a reliable way for achieving pulses with larger pulse energy. However, due to the gain-increasing breaking in practice, anti-DSR effect such as pulse breaking, narrowing or even period doubling can appear. We report merging of DSR pulses by manipulating initial pulse separation, which paves a new way for achieving pulse energy boost further. Criteria for achieving merging of double and tripple DSR pulses are summarized.

**12:00-13:30 Lunch Break, *Zhanxiang Hall(展香园 ), 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F***

## Laoshan Hall (崂山厅), BSPA-SS 1

☼**W2D.3 • 11:15**
**Study of CIGS Absorber Thickness and Gradient Bandgap effect on Device Performance**, Ranran Han[1], Zugang Liu[1] and Qianmin Dong[1]; [1]*China Jiliang Univ., China*. This paper proposes a copper indium gallium selenide (CIGS) thin film solar cell structure model and and use wxAMPS software to carry out simulation calculation about the influence of parameter changes on device performance

## Taishan Hall (泰山厅), Track 3

☼**W2E.4 • 11:15**
**Spectrum Overlap based Routing and Resource Allocation (SO-RRA) in Elastic Optical Networks (EON)**, Peiyi Li[1], Xiaosong Yu[1], Qingcheng Zhu[1], Feng Wang[2], Yongli Zhao[1], Xinghua Li[2] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*State Grid Electric Power Technical Research Inst., Yinchuan; China*. This paper proposes a spectrum overlap based routing and resource allocation algorithm in elastic optical networks. Simulation results show that it achieves good performance in terms of service blocking ratio.

☼**W2E.5 • 11:30**
**Service Priority Based Cross-Layer Routing and Resource Allocation in Quantum Key Distribution Enabled Optical Networks (QKD-ON)**, Kaili Zhang[1], Xiaosong Yu[1], Yazi Wang[1], Yajie Li[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. This paper proposes a service priority based cross-layer routing and resource allocation algorithm in QKD-ON. Results show it achieves good performance in terms of service success ratio and resource utilization.

☼**W2E.6 • 11:45**
**FSS:A Fast Switch System Based on AWGR for Optical Datacenter Network**, Zuoqing Zhao[1], Bingli Guo[1], Shanguo Huang[1], Yisong Zhao[1], Yuanzhi Guo[1] and Xuwei Xue[1]; [1]*BUPT, China*. A flexible and fast switch system based on AWGR to enable optical datacenter networks is proposed and numerically investigated. Results validate that the packet loss is less than 18.84%, latency is less than 11.7 μs.

## VIP Room (聚贤厅), Track 2

☼**W2F.4 • 11:15**
**BER Performance Analysis of Ground-to-UAV FSO SIMO Links with Optimized Channel Model**, Wenjing Guo[1]; [1]*Tech. and Engineering Center for Space Utilization, CAS, China*. The BER of Ground-to-UAV-FSO-SIMO links with our optimized channel model is analyzed. Simulation results show that the BER can be significantly decreased by increasing the number of receiving apertures when receiving area is the same.

☼**W2F.5 • 11:30**
**Orthant-Symmetric Multi-dimensional Geometrically-Shaped Modulation Optimization**, Wei Ling[1], Bin Chen[1] and Yi Lei[1]; [1]*Hefei Univ. of Tech., China*. Generalized mutual information is used to design geometrically-shaped modulations based on orthant-symmetric(OS) constraint. Numerical results show that the proposed 4D-OS modulation provides gains upto 0.8dB over SP-128QAM and the time-saving factor is u

☼**W2F.6 • 11:45**
**Cost-efficient Fiber-wireless-fiber Integration System at 28-GHz Ka-band for 5G Millimeter-wave Coverage Scenario**, Meining Wu[1], Jiao Zhang[1], Min Zhu[1], Shuang Gao[1], Zilu Wang[1], Xiang Liu[1], Bingchang Hua[2], Yuancheng Cai[1], Mingzheng Lei[2], Yucong Zou[2], Qinru Li[1], Yingxin Wei[1], Weidong Tong[1] and Aijie Li[2]; [1]*Southeast Univ., China*; [2]Purple Mountain Laboratories, China. We have proposed a cost-efficient fiber-wireless-fiber integration system at 28GHz Ka-band using one ECL and one EML, and experimentally demonstrated 14.375Gbit/s DMT-32QAM signals transmission over a 2-m wireless link between 2-km and 3-km fiber links.

☼**W2F.7 • 12:00**
**Ultra long single span distributed sensing distance over 200km based on the phase-sensitive OTDR with bidirectional high-order Raman amplification**, Mingchao Nie[1] and Jian Xu[1]; [1]*Accelink, China*. An ultra-long phase-sensitive optical time domain reflectometry (Φ-OTDR) that can achieve sensing distance 205.46km single fiber with spatial resolution of 15m is presented to solve the problem of long-distance fiber optic cable monitoring

**12:00-13:30 Lunch Break, *Zhanxiang Hall(展香园 ), 1F & QILU Grand Ballroom (齐鲁大宴会厅), 2F***

## Yishan Hall (沂山厅), Track 1

**13:30-15:30**
**W3A • Novel fibers & devices IV**
*Presider: **Liang Wang**, Huazhong University of Science and Technology, China*

**W3A.1 • 13:30** Invited

**An inner air-cavity with long cavity length for fiber in-line Mach-Zehnder interferometer construction**, Dongning Wang[1]; [1]*China Jiliang Univ., China*. We present an optical fiber in-line Mach-Zehnder interferometer based on an inner air-cavity with a relatively long cavity length. The device is fabricated by using femtosecond laser to inscribe a waveguide in the fiber core, and then discharging the waveguide area with a fusion splicer. Such an inner air-cavity structure is highly robust, and the Mach-Zehnder interferometer formed has a small free spectral range for implementing accurate measurement. The device can be used for high temperature sensing and external refractive index sensing.

**W3A.2 • 13:50** Invited

**Femtosecond laser inscribed optical fiber microstructure devices and their applications**, Xuewen Shu[1]; [1]*Huazhong Univ. of Sci. and Tech., China*.

**W3A.3 • 14:10** Invited

**A kind of bamboo-like microfiber grating fabricated by fusion tapering a sawtooth fiber preform**, Yanyan Zhi[1], Zhixuan Liu[1], Lanlan Wang[1], Peiyuan Liu[1], Yuanpeng Li[1], Jie Li[1], Hao Liang[1] and Bai-Ou Guan[1]; [1]*Jinan Univ., China*. We report a bamboo-like microfiber structure by milling sawtooth-shaped interfaces on a standard fiber and subsequently tapering them to periodic silica bumps. The spectrum show an extinction ratio of ~18.2dB around 1553.3nm.

## Lushan Hall (鲁山厅), Track 6

**13:30-15:30**
**W3B • Optical measurement IV**
*Presider: **Qizhen Sun**, Huazhong University of Science and Technology, China*

**W3B.1 • 13:30** Invited

**Fiber Magnetic Current Sensors Based on the Long-Period Fiber Gratings**, Yunqi Liu[1]; [1]*Shanghai Univ., China*. The mode coupling and characteristics of the HLPGs written in the specialty fibers were investigated experimentally. The generation and conversion of the orbital angular momentum (OAM) modes were achieved by the special designed gratings. The high sensitivity vector magnetic current sensors are proposed based on the fabricated gratings. The LPFGs could have promising application as high sensitivity optical sensors.

**W3B.2 • 13:50** Invited

**A real-time and anti-interference lidar based on field programmable gate array**, Zhi-Jie Han[1], Xi Tang[1], Zheng-Mao Wu[1] and Guang-Qiong Xia[1]; [1]*Southwest Univ., China*. Taking the chaotic output from a DFB-SL under optical feedback and pulsed current modulation as the source for a lidar, we experimentally demonstrate real-time and anti-interference ranging based on a field programmable gate array (FPGA).

**W3B.3 • 14:10** Invited

**The sensitivity improvement of SPR sensor via film optimization**, Kun Liu[1]; [1]*Tianjin Univ., China*.

## Mengshan Hall (蒙山厅), Track 7

**13:30-15:45**
**W3C • Ultrafast & nolinear optics III**
*Presider: **Luming Zhao**, Huazhong University of Science and Technology, China*

**W3C.1 • 13:30** Invited

**Long-distance Fast Light Propagation Based on Brillouin Random Lasing Oscillation in Optical Fibers**, Haoran Xie[1], Zhelan Xiao[1], Zenghuan Qiu[1], Jilin Zhang[1], Yikun Jiang[1], Fufei Pang[1] and Liang Zhang[1]; [1]*Shanghai Univ., China*. We experimentally demonstrated Brillouin-induced fast light based on random lasing oscillation with random feedback of distributed Rayleigh scattering in optical fibers

**W3C.2 • 13:50** Invited

**Unveiling Noise-like Pulse Dynamics and Ultrashort Pulse Generation in Mode-locked Fiber Lasers**, Qian Li[1]; [1]*Peking Univ. Shenzhen Graduate School, China*. We present our recent advances on noise-like pulses generation in mode-locked fiber lasers based on nonlinear amplifying loop mirror and unveil their intra-cavity dynamics. Impressively, dark rectangular noise-like pulses have been firstly demonstrated in our figure-nine fiber laser.

**W3C.3 • 14:10** Invited

**Spatiotemporal mode-locking: concept, realization, nonlinear dynamics, and recent progress**, Xiaosheng Xiao[1]; [1]*Beijing Univ. of Posts and Tel., China*. Comparing with traditional mode-locked lasers, there are much more nonlinear phenomena in spatiotemporal mode-locked (STML) lasers, and the energies of the output pulses of STML lasers are higher, due to the involved multiple transverse modes. In this talk, the concept, realization, nonlinear dynamics, and recent progress of STML lasers will be presented.

## Laoshan Hall (崂山厅), SS 1

**13:30-15:30**
**W3D • Organic & nano optoelectronics-V**
*Presider: **Zugang Liu**, China Jiliang University, China*

**W3D.1 • 13:30** Invited

**Continuous tunable polymer laser system**, Cheah Kok Wai[1]; [1]*Hong Kong Baptist Univ., China*. Here we demonstrate the feasibility to dynamically tune amplification/lasing wavelengths in the entire emission spectrum from polymeric guest-host gain system by adjusting the blending ratio. The unprecedented tunability in amplification and lasing is governed by energy migration process, which enables us to achieve wavelength-controlled semiconductor lasers spanning the full visible region of the electromagnetic spectrum. Our distributed feedback lasers cover almost all CIE colour gamut (94%), which is 170% more perceptible colours than standard Red Green Blue space.

**W3D.2 • 14:00** Invited

**Stable Pure-blue Hyperfluorescence Organic Light-emitting Diodes with High-efficiency and Narrow Emission**, Chihaya Adachi[1]; [1]*Kyushu Univ., Japan*. Here we report pure-blue (CIE x, y color coordinates of [0.13, 0.16]) OLEDs with high-efficiency (external quantum efficiency of 32 % at 1000 cd m–2), narrow-emission (full-width half maximum of 19 nm), and good stability (LT95 of 18 hours at an initial luminance of 1000 cd m–2). The design is based on a two-unit stacked tandem hyperfluorescence OLED with an improved singlet-excited energy transfer process from a sky-blue TADF assistant dopant (HDT-1) to a pure-blue emitter (ν-DABNA). We will discuss the detailed working mechanism including fast upconversion and efficient FRET processes. With stricter control of device fabrication and procedures it is expected that device lifetimes will further improve to rival commercial fluorescent blue OLEDs.

## Taishan Hall (泰山厅), Track 4

**13:30-15:30**
**W3E • Optoelectronics III**
*Presider: **Jianji Dong**, Huazhong University of Science and Technology, China*

**W3E.1 • 13:30** Invited

**Silicon photonics integration for coherent Lidar application**, Linjie Zhou[1]; [1]*Shanghai Jiao Tong Univ., China*. We demonstrate external cavity laser (ECL) and optical phased array (OPA) for LiDAR application. The ECL can be modulated to generate a frequency-modulated continuous-wave signal. The 256-channel OPA allows high-resolution optical beam scanning.

**W3E.2 • 13:50** Invited

**Recent advances in mid-infrared silicon photonics**, Zhenzhou Cheng[1]; [1]*Tianjin Univ., China*.

**W3E.3 • 14:10** Invited

**High speed elecro-optic modulator based on Silicon Nitride and Lithium Niobate hybrid integration platform**, Yonghui Tian[1]; [1]*Lanzhou Univ., China*.

## VIP Room (聚贤厅), Track 8

**13:30-15:30**
**W3F • Space communications II**
*Presider: **Nan Chi**, Fudan University, China*

**W3F.1 • 13:30** Invited

**Technique Considerations on Long-reach Underwater Wireless Optical Communications**, Jing Xu[1]; [1]*Zhejiang Univ., China*.

**W3F.2 • 13:50** Invited

**Atmospheric trasmission at 2μm band**, Tianshu Wang[1]; [1]*Changchun Univ. of Sci. and Tech., China*.

**W3F.3 • 14:10** Invited

**Application and Development of Microwave Photonics Technology in Space Telemetry, Tracking, Command and Communication System**, Haifeng Yang[1], Li Lei[1] and Lin Chai[1]; [1]*China Electronics Tech. Group Corporation No.10 Research Inst., China*. This paper summarizes the innovative work of the CETC10 in the application of laser measurement and communication integration, microwave photonic RF front-end technology in space telemetry, tracking, command and communication system.

## Yishan Hall (沂山厅), Track 1

**W3A.4 • 14:30** Invited

**Analysis of optical parametric amplification in chalcogenide photonic crystal fiber by injecting orbital angular momentum beams**, Weiqing Gao[1]; [1]*Hefei Univ. of Tech., China*. Orbital angular momentum (OAM) beams have attracted wide concerns due to their enhanced intermodal nonlinear interactions. Here, we simulate optical parametric amplification in As2Se3 photonic crystal fiber by injecting orbital angular momentum beams.

**W3A.5 • 14:50** Invited

**All-fiber Vortex Beam for Optical Sensing Application**, Huanhuan Liu[1]; [1]*Southern Univ. of Sci. and Tech., China*. We have proposed the vortex fibers for the generation of vortex beams including orbital angular momentum modes and cylindrical vector modes, and experimentally demonstrated all-fiber vortex beams for magnetic-field, temperature, strain, and refractive-index sensing.

**W3A.6 • 15:10** Invited

**Fiber grating-integrated devices for optical modulation and sensing applications**, Biqiang Jiang[1]; [1]*Northwestern Polytechnical Univ., China*. Optical fiber gratings have been well developed into numerous functional devices for optical communications and sensors. In this talk, we demonstrate several fiber grating/microfiber integrated devices and their applications in optical modulation and sensing fields.

## Lushan Hall (鲁山厅), Track 6

**W3B.4 • 14:30** Invited

**Femtosecond Laser-Inscribed Fiber Bragg Grating Array for Sensing in Harsh Environments**, Jun He[1]; [1]*Shenzhen Univ., China*. We present the fabrication of fiber Bragg gratings (FBGs) array using femtosecond laser direct writing technology. Wavelength-division-multiplexed (WDM) FBGs array and identical ultra-weak FBGs array have been realized and used for distributed high-temperature sensing.

**W3B.5 • 14:50** Invited

**Thermal sensitivities of hollow-core fibers**, Fei Yu[1], Yazhou Wang[1] and Lili Hu[1]; [1]*Shanghai Inst. of Optics and Fine Mechanics, CAS, China*. By confining the light field in the air/vacuum, hollow-core fibers minimize the impact of fiber material to the modal properties including the thermal phase noise. Thermal sensitivities and tuning methods of hollow-core fibers are discussed.

**W3B.6 • 15:10** Invited

**Distributed Optical Fiber Shape Sensing**, Guolu Yin[1]; [1]*Chongqing Univ., China*. The real-time monitoring ability of shape sensor is limited by the scanning speed of light source and the parallel algorithm of post-processing; the high reflection of optical fiber end makes the sensor have the blind area of shape measurement; the on-line monitoring of residual stress distribution in the packaging process of shape sensor is the key to improve the performance of shape sensor; the torsion of optical fiber is also an important problem affecting the accuracy of shape reconstruction.

## Mengshan Hall (蒙山厅), Track 7

**W3C.4 • 14:30** Invited

**Ultrafast spectroscopy in two dimensional materials: Carrier coupling dynamics and valley regulation**, Tian Jiang[1] and Ke Wei[1]; [1]*National Univ. of Defense Tech., China*. Here, based on the advanced technique of ultrafast laser spectroscopy, we explore some novel physical phenomena from the perspective of light-matter interaction, including (1) Acoustic phonon recycling process in graphene-WS2 heterostructure.

**W3C.5 • 14:50** Invited

**Towards in fiber nonlinear silicon photonics**, Li Shen[1], Chaotan Sima[1] and Anna Peacock[2]; [1]*Huazhong Univ. of Sci. and Tech., China;* [2]*University of Southampton, UK.* This paper will review progress in nonlinear devices from the silicon core fiber platform. There will be benchmarked through demonstrations of high-speed all-optical wavelength conversion, modulation, and continuum generation across a broad wavelength range.

**W3C.6 • 15:10** Invited

**High-power sub-50 fs Yb-hybrid regenerative amplifier and mid-infrared generation**, Houkun Liang[1]; [1]*Sichuan Univ., China*.

**15:30-16:00 Poster Session 3 & Coffee Break, 2F**

## Laoshan Hall (崂山厅), SS 1

**W3D.4 • 14:40** Invited

**Chemically modified graphenes: from synthesis to applications**, Rabchinskii Maxim[1]; [1]*Ioffe Inst., Russia*. Hereby we present our results on the synthesis and following application of a set of CMGs in the sensing applications [1-4]. The photochemical and wet-chemistry methods for the conversion of graphene oxide (GO) into CMGs modified predominantly by carboxyls (C-xy graphene [1,2]), carbonyls (C-ny graphene [3]), or amines (Am graphene [4]) are described. The structural modifications of the graphene layer, inevitably accompanying the performed functionalization of the graphene layer with different organic groups, are discussed in detail. The influence of the introduced oxygenic and nitrogen functionalities on the electronic structure and electrophysical properties, allowing to tailor the valence band structure, work function, optical absorbance, and fluorescence spectra of the graphene layer, is demonstrated. Finally, the gas analytical multisensory chips and biosensing systems developed based on the synthesized CMGs are presented, starting from the performance of such devices and ending with the mechanisms underlying the sensing properties of CMGs.

**W3D.6 • 15:05** Invited

**Organic optoelectronic components in highly integrated systems for plasmonics sensing in food security/quality**, Stefano Toffanin[1]; [1]*CNR-ISMN, Italy*. In this contribution, we report on the latest results obtained in the project with particular attention to (i) the scheme of monolithic integration of the different nanostructured device-components resulting in a sensor size as low as 0.1 cm3, (ii) the proof of concept of the innovative detection scheme in lab environment reporting dose-response curves for analytes of interest and (iii) two specific application scenarios for screening milk at the different levels of the value chain (i.e. cow, farm and plant levels).

## Taishan Hall (泰山厅), Track 4

**W3E.4 • 14:30** Invited

**Broadband optical devices using on-chip silicon-based lens**, Yong Zhang[1]; [1]*Shanghai Jiao Tong Univ., China*.

**W3E.5 • 14:50**

**Ultra-compact Silicon 90° Optical Hybrid by Adjoint-based Inverse Design Method**, Shanglin Yang[1] and Hao Jia[2]; [1]*Inst. of Semiconductors, CAS, China;* [2]*Lanzhou Univ., China*. We demonstrate an ultra-compact 2×4 90° optical hybrid with adjoint-based inverse design method. The device footprint is 6.4 μm × 4.4 μm. For S and R-light input, the insertion losses are less than 0.78 dB.3

**W3E.6 • 15:05**

**Multi-channel High Power Laser Array Chip for Silicon Photonic Integration**, Ziming Hong[1], Yong Zhao[1], Yuxin Ma[1], Yuechun Shi[1], Xin Wang[2] and Xiangfei Chen[1]; [1]*NJU, China;* [2]*Inusitute of semiconductors, CAS, China*. We proposed and fabricated a new DFB laser array chip with sampled gratings, AR-HR coating and noncentral phase shift. It has 21 channels with power over 100 mW, SMSR over 45 dB, and precise wavelengths.3

**W3E.7 • 15:20**

**Ultra-sharp Fano resonances based on two-hole-assisted side-coupled multi-mode racetrack microring structure**, Yuan Yuan[1], Ruihuan Zhang[1], Yu He[1], Yong Zhang[1] and Yikai Su[1]; [1]*Shanghai Jiao Tong Univ., China*. We propose a multi-mode racetrack micro-ring resonator, side-coupled with a bus waveguide to generate an ultra-sharp Fano resonance lineshapes. The slope rate can reach ~968 dB/nm and the extinction ratio is ~7 dB.3

## VIP Room (聚贤厅), Track 8

**W3F.4 • 14:30**

**Analysis and Simulation of Pointing Error and Angle-of-Arrival Fluctuations on Fiber Coupling Efficiency of Ground to HAP FSO system**, Jianhua He[1] and Yueying Zhan[1]; [1]*Tech. and Engineering Center for Space Utilization, CAS, China*. Considering pointing error, angle of arrival fluctuation, and atmospheric turbulence, the coupling efficiency of space light to fiber in the receiver of free space optical communication system from Ground to HAP is analyzed and simulated.3

**W3F.5 • 14:50**

**Constellation Design Method for Large Scale Satellite Optical Networks**, Mingzhu Yang[1], Xinyi He[1], Wei Wang[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. Based on the single satellite coverage model and multiple coverage theory of circular orbit constellation, this paper proposes a large-scale satellite constellation design method to meet the requirements of multi-coverage.3

**W3F.6 • 15:05**

**Vector vortex beams encoding/decoding for visible-light communications**, Xiangyu Zhang[1], Xinying Zhao[1] and Liyong Ren[1]; [1]*Shaanxi Normal Univ., China*. By using a spatial light modulator, we firstly generate 16 states of vector vortex beams, then by encoding and decoding them, a gray image with a resolution of 60 x 60 pixels was transmitted successfully.3

**15:30-16:00 Poster Session 3 & Coffee Break, 2F**

## Poster Session 3 (15:30-16:00)

**P3.1**

**A polarization-multiplexed coherent RoF link with simple digital laser-phase-noise cancellation**, Changlin Liu[1], Huixing Zhang[1], Yuan Men[1], Aijun Wen[1], Shuaikang Wang[1], Wei Zeng[1] and Wenjie Li[1]; [1]*Xidian Univ., China*. We present a polarization-multiplexed coherent RoF link with simple digital laser-phase-noise cancellation. In the experiments, 25-km fiber transmission of four 64-QAM microwave vector signals with error vector magnitudes (EVMs) of less than 10% is demonstrated.

**P3.2**

**Role of the FBG's bandwidth in long distance point sensing system based on random fiber laser**, Jianhua Cao[1], Yiming Chen[2], Jingtang Luo[2], Yuxuan Yang[2], Jiang Ni[2], Weiting Xu[2] and Ke Zhu[2]; [1]*Univ. of Elec. Sci. and Tech. of China, China;* [2]*State Grid Sichuan Economic Research Inst., China.* We study the influence of the fiber-Bragg-grating's bandwidth on the performance of the long-distance point-sensing based on random-fiber-laser by simulation and experiment, which shows that the optical-signal-to-noise-ratio decreases with the increase of FBG bandwidth.

**P3.3**

**Refractive index and temperature sensor based on no-core fiber and few-mode fiber coupling**, Yeming Zhao[1], Zhengrong Tong[1], Weihua Zhang[1] and Jietong Zhang[1]; [1] *Tianjin Univ. of Tech., China*. An interferometric optical fiber sensor based on no-core fiber(NCF) is proposed, and small sections of few-mode fiber (FMF) are fused to each end of the NCF to enhance the sensitivities of the sensor.

**P3.4**

**MOF-Derived Co3O4-Ni polyhedra for 109th harmonic generation**, Zhuoying Ge[1], Yani Zhang[1] and Xiaohui Li[2]; [1]*Shaanxi Univ. of Sci. & Tech., China;* [2]*Shaanxi Normal Univ. China*. Porous Co3O4-Ni metal organic frameworks (MOFs) were prepared by annealing method, and saturable absorber (SA) based on the MOFs was prepared. Using this SA, the 109th harmonic pulses were obtained in erbium-doped fiber laser.

**P3.5**

**Research on Multi-band Fiber Transmission System with Multi-carrier and Adaptive Modulation**, Xiaofeng Gao[1], Feng Tian[1], Qi Zhang[1], Qinghua Tian[1], Yongjun Wang[1], Leijing Yang[1] and Xiangjun Xin[1]; [1]*Beijing Univ. of Posts and Tel., China*. In this paper, a novel multi-band fiber transmission system based on multi-carrier and adaptive modulation is proposed. The simulation results show that the scheme can effectively improve the throughput of system.

**P3.6**

**Surface Engineering of PTAA for Inverted Perovskite Solar Cell by adding Al2O3 interfacial layer**, Ming Qi Zhang[1]; [1]*China Jiliang Univ., China*. Perovskite solar cells (PSCs) have shown an enormous potential due to their excellent performance and simple architecture with low temperature and compatibility processing methods.

**P3.7**

**Design of Low-chromatic-dispersion Weakly-coupled Few Mode Fiber**, Qichen He[1], Yao Li[2], Fei Gao[2], Mingqing Zuo[1], Haotian Cao[1], Yuyang Gao[1], Yongqi He[1], Zhangyuan Chen[1] and Juhao Li[1]; [1]*Peking Univ., China;* [2]*China Shipbuilding System Engineering Research Inst., China.* We propose a low-chromatic-dispersion (CD) weakly-coupled FMF design method based on perturbation theory. 4-mode and 7-mode weakly-coupled FMFs with CD coefficients ranging from -8 to +8 ps/km/nm are designed.

**P3.8**

**Joint Optimization of 260km Unrepeatered Transmission System using Third Order DRA and ROPA**, Chenhao Lu[1], Qi Zhang[1], Ran Gao[2], Xishuo Wang[1], Xiangjun Xin[1], Qinghua Tian[1], Feng Tian[1], Yongjun Wang[1], Zhipei Li[2], Fu Wang[2] and Kaiqiang Gao[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. A Joint Optimization method for 260km unrepeatered transmission system using third-order DRA and ROPA is proposed. Through simulation, we can get 54.98dB loss budget and 0.7398dB gain flatness.

**P3.9**

**A comprehensive nonlinear filter scheme for 50Gb/s PAM4-PON Systems**, Hao Ma[1], Qi Zhang[1] and Ran Gao[2]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. A comprehensive nonlinear filter scheme is proposed in this paper. Results show that a link power gain of 1.3 dB can be obtained at the HD-FEC threshold compared to the Volterra filter.

**P3.10**

**An Improved End-to-end Optical Transmission System Based On Deep Learning**, Qianwu Zhang[1], Zicong Wang[1] and Shuaihang Duan[1]; [1]*Shanghai Univ., China*. An improved end-to-end optical transmission system based on deep learning is proposed and experimentally demonstrated. Experimental results show the computational complexity of the receiver is reduced by replacing multiplication with addition without system performance degradation.

**P3.11**

**Satellite local node state awareness and adaptive forwarding routing algorithm**, Xintong Zhang[1], Ying Tao[2], Qi Zhang[1], Dong Chen[2], Jinxi Qian[2], Feng Tian[1], Qinghua Tian[1] and Hui Li[1]; [1]*Beijing Univ. of Post and Tel., China;* [2]*China Academy of Space Tech., China*. The proposed algorithm improves the network load balancing capability through the perception of local network state. The simulation results show that the algorithm achieves shorter end-to-end delay and lower packet loss rate.

**P3.12**

**Nonlinear Damage Compensation using Support Vector Regression**, Lu Han[1], Yongjun Wang[1], Chao Li[1], Zhenhong Gao[1] and Xiangjun Xin[1]; [1]*Beijing Univ. of Posts and Tel., China*. In this paper, a nonlinear equalizer based on perturbation theory and support vector regression is proposed and experimentally demonstrated for 64-QAM coherent optical communication system. Compared with ridge regression, better BER performance is obtaine.

**Poster Session 3 (15:30-16:00)**

**P3.13**
**Generation of Collinear Superimposed Orbital Angular Momentum Modes Using a Phase-only Grating**, Tianhao Zhang[1], Huan Chang[2], Qi Zhang[1], Ran Gao[2], Xiangjun Xin[2], Qinghua Tian[1], Feng Tian[1], Fu Wang[1] and Dong Guo[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. An Orbital Angular Momentum (OAM) generation method based on Adapted Mutation Particle Swarm Optimization (AM-PSO) algorithm is proposed. Based on the traditional iteration algorithm, AM-PSO simultaneously generates multiple OAM modes with higher iterative efficiency.

**P3.14**
**Image Edge Enhancement Technique Using a Novel Optical Vortex Filtering**, Zhenhong Gao[1], Yongjun Wang[1], Lu Han[1], Chao Li[1] and Xiangjun Xin[1]; [1]*Beijing Univ. of Posts and Tel., China*. This paper proposes a new approach to producing optical vortex filter by using a Sinc function, called the Sinc spatial filter (SSF). We prove that the SSF can realize a high contrast edge enhancement.

**P3.15**
**A FTN rate transmission scheme for multi-band optical transmission systems**, Tong Wu[1], Feng Tian[1], Qi Zhang[1], Xiaofeng Gao[1], Tianze Wu[1], Yu Gu[1], Ruichun Wang[1] and Xiangjun Xin[1]; [1]*Beijing Univ. of Posts and Tel., China*. This paper introduces a transmission using FTN rate in multi-band optical transmission system.It compacts symbol spacing by introducing inter-symbol interference artificially, and transmits more symbols with the same bandwidth through sampling technology

**P3.16**
**Optical Fiber Nonlinearity Equalizer Based Perturbation Theory on Deep Neural Network Classifier**, Chao Li[1], Yongjun Wang[1], Lu Han[1] and Xiangjun Xin[1]; [1]*Beijing Univ. of Posts and Tel., China*. In this paper, based on DNN, we reconstructed input features through I/Q data at receiving side with perturbation theory and proposed a new classifier FEP-DNN.

**P3.17**
**All-fiber linear sampling device for absolute distance measurement**, Chunze Wang[1], Jiaqi Wang[1], Youjian Song[1], Guanyu Liu[1], Ziling Wu[1] and Minglie Hu[1]; [1]*Tianjin Univ., China;* [2]*Shanghai Radio Equipment Research Inst., China.* An all-fiber linear sampling device for dual-comb time-of-flight distance measurement is demonstrated. We studied the impact of optical filter and adjustable attenuator on the system, and the precision can be improved to 7 um.

**P3.18**
**The optimization of error floor in M-QAM multilevel coded modulation scheme based on LDPC code**, Mao Ge[1], Liqian Wang[1], Zhihui Wang[1] and Runqiu Gao[1]; [1]*Beijing Univ. of Posts and Tel., China*. In M-QAM multilevel coded modulation scheme with LDPC, the system error floor can be effectively reduced and the coding gain can be improved by adjusting the component code rate based on the capacity rule.

**P3.19**
**A Broadband Polarization Beam Splitter Based on Compressed Hexagonal Structure and Liquid Crystal-Filled Dual-Core Photonic Crystal Fiber**, Yanan Xu[1], Jinhui Yuan[1], Yuwei Qu[1], Shi Qiu[1], Xian Zhou[1], Binbin Yan[1], Qiang Wu[1], Kuiru Wang[1], Xinzhu Sang[1] and Chongxiu Yu[1]; [1]*Beijing Univ. of Posts and Tel., China*. A broadband polarization beam splitter (PBS) based on compressed hexagonal structure and liquid crystal-filled dual-core photonic crystal fiber is proposed. it has a short length of 109.5 μm, and the bandwidth is 280 nm.

**P3.20**
**Light sources in L-band based on a Bi/Er/La co-doped silica optical fiber**, Lei Yang[1], Jianxiang Wen[1], Longzhao Zeng[1], Yan Wu[1], Sujuan Huang[1], Fufei Pang[1], Xiaobei Zhang[1] and Tingyun Wang[1]; [1]*Shanghai Univ., China*. We fabricated a Bi/Er/La co-doped silica optical fiber and thus designed an amplified spontaneous emission light source with -14.58 dBm in the range of 1557-1607 nm and a different-wavelength lasers in L-band.

**P3.21**
**Fabry-perot cavity array based on-chip waveguide spectrometer**, Jinpeng Pang[1], Xiao Ma[1] and Jianjun He[1]; [1]*Zhejiang Univ., China*. A Fourier-transform Raman integrated spectrometer based on 650 Fabry-Perot-cavity array with a total size of 0.4 cm2 is proposed. It can work from 820 nm to 930 nm with a resolution of 5 cm-1.

**P3.22**
**Explore Broadband Near-Infrared Phosphor—Perovskite LaLuO3:Cr3+**, Zhicong Sun[1], Ronghui Liu[1], Tianliang Zhou[2], Xueyuan Tang[2] and Rongjun Xie[2]; [1]*National Engineering Research Center for Rare Earth Materials, GRINM Group Co., Ltd., China;* [2]*Xiamen Univ., China.* A novel NIR phosphor, LaLuO3:Cr3+ ,was synthesized by solid state sintered technology in reducing atmosphere. Under 460 nm excitation, LLO:0.01Cr3+ shows broadband NIR emissions between 700 nm and 1200 nm with peaking at ~880 nm.

**P3.23**
**FlexNet: A Optical Switching Architecture for Optical Data Center Networks**, Peng Li[1], Xiaoshan Yu[1], Huaxi Gu[1] and Yunfeng Lu[1]; [1]*Xidian Univ., China*. FlexNet is proposed to improve the utilization of optical link resources.In FlexNet, a centralized controller is added to estimate traffic demands, and a flexible configuration algorithm is designed to change the network topology efficiently.

**P3.24**
**Spectrum Allocation Algorithm for Satellite Elastic Optical Network Based on Spectrum Resource Assessment Set**, Rong Zhou[1], Qi Zhang[1], Ying Tao[2], Dong Chen[2], Qinghua Tian[1], Feng Tian[1] and Jinxi Qian[2]; [1]*Beijing Univ. of Post and Tel., China;* [2]*China Academy of Space Tech., China*. For reducing the waste of spectrum resource, a spectrum allocation algorithm for satellite optical network (LSRA-RSA) is proposed. The simulation proved that the proposed algorithm can effectively reduce the blocking rate and improve spectrum utilization.

**Poster Session 3 (15:30-16:00)**

**P3.25**

**Multidimensional Modulation Method based on Grouped Subcarrier Index Modulated OFDM**, Xin Wang[1], Qi Zhang[1], Ran Gao[2], Xishuo Wang[1], Xiangjun Xin[2], Feng Tian[1], Qinghua Tian[1], Yongjun Wang[1], Dong Guo[2] and Huan Chang[2]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. The proposed method makes the number of silent subcarriers as an extra modulation dimension, so as to increase the number of bits carried on SIM-OFDM symbol and improve the spectrum efficiency of the system.

**P3.26**

**Design of 28-polarization-maintaining-mode Bow-tie Elliptical-core Fiber for MIMO-less Mode-division-multiplexing**, Xiaofeng Li[1], Fang Ren[2], Yongqi He[1], Zhangyuan Chen[1] and Juhao Li[1]; [1]*Peking Univ., China;* [2]*Univ. of Sci. and Tech. Beijing,China*. We propose a polarization-maintaining few-mode fiber design with elliptical core and symmetrical bow-tie stress-applying areas, which supports 28 fully degeneracy-lifted eigenmodes with minimum effective index difference larger than 2.16 × 10−4 at 1550 nm

**P3.27**

**Fiber chromatic dispersion measurements based on programmable spectrum shaping and wavelength-to-time mapping**, Yingshu Yang[1] and Juanjuan Yan[1]; [1]*Beihang Univ., China*. A fiber dispersion measurement method based on programmable spectrum shaping and wavelength-to-time mapping is experimentally demonstrated. The dispersion in a 4-km fiber is measured, and the results agree with the values provided by manufacturer.

**P3.28**

**Self-sustained optical frequency comb generation using a phase-modulator-based dual-loop optoelectronic oscillator**, Juanjuan Yan[1] and Ruifeng He[1]; [1]*Beihang Univ., China*. Optical frequency comb (OFC) generation using a phase-modulator-based dual-loop optoelectronic oscillator is demonstrated. A 17-line OFC with a spacing of 10 GHz and a flatness of 7.7 dB is experimentally generated.

**P3.29**

**Mode-Dependent Characterization of Rayleigh Backscattering in Ring-Core Fibers**, Cong Huang[1], Junyi Liu[1], Zhenrui Lin[1], Jie Liu[1], Jiangbo Zhu[2] and Siyuan Yu[3]; [1]*Sun Yat-sen Univ., China;* [2]*Northumbria Univ., UK;* [3]*Univ. of Bristol, UK*. The mode-dependent characteristic of Rayleigh backscattering in a ring-core fiber is theoretically and experimentally demonstrated. Compared to few-mode fiber,the Rayleigh backscattering of high-order orbital momentum mode supported by ring-core fiber bears much resemblance.

**P3.30**

**Improved Proportional Fairness Algorithm in Visible Light Communication / WiFi Hybrid Networks**, Liwei Yang[1], Ziyi Huang[1], Xiangcheng Yi[1], Haoxu Wang[1] and Lin Li[1]; [1]*China Agricultural Univ., China*. In the visible light communication (VLC) / WiFi hybrid network, an improved proportional fairness (PF) algorithm is proposed, which improves fairness when allocating resources in different areas.

**P3.31**

**A robustness optimization scheme for location-assisted on-demand routing protocol**, Hui Li[1], Dong Chen[2], Jinxi Qian[2], Ying Tao[2], Qi Zhang[1], Qinghua Tian[1] and Feng Tian[1]; [1]*Beijing Univ. of Post and Tel., China;* [2]*China Academy of Space Tech., China*. An optimization scheme for Location-Assisted On-demand Routing protocol is proposed in order to improve its robustness. The simulation shows that proposed scheme can improve the robustness and reduce the routing cost of LEO routing system.

**P3.32**

**Satellite Resource Reservation Algorithm Based on ARIMA Model with Balanced Performance**, Ju Cheng[1], Zhang Qi[1], Tao Ying[2], Zu Yunxiao[1], Chen Dong[2], Tian Qinghua[1], Tian Feng[1] and Qian Jinxi[2]; [1]*Beijing Univ. of Post and Tel., China;* [2]*China Academy of Space Tech., China*. The algorithm is proposed to solve uneven resource allocation in different priority services of multi-layer satellite. The algorithm divides the spectrum resources based on ARIMA traffic prediction results, and evaluates its impact.

**P3.33**

**Graphene oxide-coated microfiber interferometric biosensor for detecting AFP**, Qi Yang[1], Kaijun Liu[1], Hong Gu[1], Xiangwen Yang[1], Binbin Luo[1], Shenghui Shi[1], Decao Wu[1] and Shanghai Jiang[1]; [1]*Chongqing Univ. of Tech., China*. a graphene oxide (GO) functionalized microfiber is proposed and used for immunodetection of alpha-fetoprotei. The results demonstrated that the detection sensitivity of microfiber is ~1.471 nm/log(mg/ml) within the range of 1 to 10000 pg/mL.

**P3.34**

**A Compact and Low-loss TE Mode-order Converter Based on LNOI Platform**, Jiwang Peng[1], Jianguo Liu[1], Jinye Li[1] and Liangchen Sun[1]; [1]*Univ. of CAS, China*. This paper proposes a compact and high-efficient mode converter based on Lithium-Niobate-on-isolator platform. The size of the mode converter is 8 ×3.6 μm2 and the TE0-to-TE1 conversion efficiency is 93.46% at 1550 nm.

**P3.35**

**Low-complexity Coherent Transceivers for Intra-Datacenter Optical Interconnects**, Yu Gu[1], Xiao Xu[1] and Jia Zhao[1]; [1]*Shandong Univ., China*. We propose a self-homodyne coherent detection (SHCD) system using 25 GHz modulator and 30 GHz photodiode. 480Gb/s PDM-16QAM transmission is realized in 10 km and 2 km with simplified digital signal processing.

**P3.36**

**A High Gain Sepic-Cuk Converter with Coupled Inductor**, Desheng Rong[1], Xuanjin Sun[1] and Ning Wang[1]; [1] *Liaoning Technical Univ., China*. In order to improve the voltage gain of the Sepic converter and the Cuk converter, a Sepic-Cuk converter with coupled inductor is proposed.

**Poster Session 3 (15:30-16:00)**

**P3.37**
**Optical fiber sensor based on remote pump optical amplification technology Study on phase noise characteristics**, Ningtao Hu[1], Chunyan Cao[1], Feng Lei[1], Fuyin Wang[1] and Qingkai Hou[1]; [1]*National Univ. of Defense Tech., China*. This paper studies the relationship between the nonlinear effect of remote pump optical amplification and the sensor phase noise in a 100km transmission system.

**P3.38**
**Photonic generation of phase-coded microwave signal with programmability**, Wensheng Zhai[1]; [1]*North China Univ. of Water Resources and Electric Power, China*. We propose a photonic scheme to generate a tunable frequency phase-coded microwave signal based on double parallel modulator and balanced detection. The experimental results implement 20 GHz signal with a coding rate of 3 Gb/s.

**P3.39**
**A Multi-Channel Tunable Periodic Narrowband Filter Chip Composed of Cascaded Silicon Nitride Microring Resonators**, Zhu Runliang[1], Yin Feifei[1], Wan Xin[1], Dai Yitang[1] and Xu Kun[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*National Computer Network Emergency Response Technical Team/Coordination Center of China, China*. A multi-channel tunable periodic narrowband filter chip composed of cascaded silicon nitride microring resonators is proposed and implemented in this paper, which can be used in microwave photonic system instead of traditional optical filters.

**P3.40**
**Deep Learning based Optical Network Layer Recovery Mechanism for Critical Services of Power Communication Network**, Geng Zhang[1], Yanan Wang[1], Huixia Ding[1], Gang Ma[2], Wei Gao[1] and Kaiqiang Gao[1]; [1]*China Electric Power Research Inst. Co., Ltd., China;* [2]*State Grid Tianjin Electric Power Co., China*. This paper proposes a critical service optical network layer recovery mechanism based on fault prediction and fault model assistance and deep learning technology, improving the success rate of critical service recovery.

**P3.41**
**A tilted fiber Bragg grating pH sensor coated with polyaniline**, Bowen Wang[1], Haining Xu[1], Yunting Du[2], Fang Wang[1], Yuting Sun[1], Yang Zhang[1], Zhenguo Jing[1] and Wei Peng[1]; [1] *Dalian Univ. of Tech., China;* [2]*Liaoning Cancer Hospital and Inst., China*. A functionalized tilted fiber grating (TFBG) sensor based on polyaniline (PANI) was proposed for the detection of environmental pH. The maximum sensitivity of the sensor is up to 2.55 dB/pH.

**P3.42**
**Three-Dimensional Tomographic Imaging of N2 Orbitals**, Zhongxue Ren[1], Yan Yang[1] and Zengxiu Zhao[1]; [1]*National Univ. of Defense Tech., China*. We implemented the reconstruction from the two-dimensional projection to the three-dimensional molecular orbital according to the idea of molecular orbital tomography, and obtained the three-dimensional HOMO (High Occupied Molecular Orbital) of N2.

**P3.43**
**Virtual Optical Network Mapping Approches with Inter-Core Crosstalk in Space Division Multiplexing Elastic Optical Data Center Networks**, Wenwen Zheng[1], Jingwen Hu[1], Qi Chen[1], Weidong Shao[1], Hong Chen[1], Mingyi Gao[1], Bowen Chen[1] and Jinbing Wu[2]; [1]*Soochow Univ., China;* [2]*Suzhou LZY Tech. Co., Ltd., China*. This paper proposes the spectrum-efficiency VON mapping approaches with the inter-core crosstalk in SDM-EODCNs. Simulation results show that the proposed VON approaches reduce spectrum occupancy rate and average inter-core crosstalk.

**P3.44**
**A novel vector magnetic field sensor probe based on surface plasmon resonance and magnetic fluid**, Yongxi Li[1], Zijian Hao[1] and Shengli Pu[1]; [1]*Univ. of Shanghai for Sci. and Tech., China*. A novel vector magnetic field fiber sensor has been proposed and investigated. The proposed sensor has two gold plated surfaces on the tip of a multi-mode fiber.

**P3.45**
**Four-channel high-speed strain measurement based on VT-DBR laser**, Ang Lee[1], Zhenguo Jing[1], Yueying Liu[1], Qiang Liu[1], Ang Li[1], Yang Cheung[1] and Wei Peng[1]; [1]*Dalian Univ. of Tech., China*. The simultaneous demodulation of four-channel strain Fabry-Perot sensor is realized based on self-calibrating wavelength-shift interferometry (WSI) technique and vernier tuned distributed Bragg reflector (VT-DBR) laser.

**P3.46**
**Quasi-distributed acoustic sensing system based on the VT-DBR laser**, Ang Li[1], Zhenguo Jing[1], Yueying Liu[1], Qiang Liu[1], Yang Cheung[1], Ang Lee[1] and Wei Peng[1]; [1]*Dalian Univ. of Tech., China*. We realized a Fabry-Perot Interferometer acoustic sensing technique based on quasi-distributed acoustic sensing system. This quasi-distributed acoustic sensing system based on the VT-DBR laser provides a novel solution for quasi-distributed acoustic sensing measurement.

## Yishan Hall (沂山厅), Track 1

**16:00-18:00**
**W4A • Novel fibers & devices V**
*Presider: **Xuewen Shu**, Huazhong University of Science and Technology, China*

**W4A.1 • 16:00** Invited

**Two-Octave Supercontinuum Generation of OAM Modes in Ring Fiber**, Yang Yue[1], Jian Yang[1], Yingning Wang[1], Zhi Wang[1] and Changjing Bao[2]; [1]*Nankai Univ., China;* [2]*University of Southern California, USA*. Recent progress on supercontinuum generation of OAM modes in optical fiber is reviewed. Two-octave SC generation of up to OAM17,1 mode spanning from 1560 to 6250 nm in the high-index ring fiber will be discussed.

**W4A.2 • 16:20** Invited

**Fabrication and high-order orbital angular momentum optical amplification of the active fibers**, Jianxiang Wen[1]; [1]*Shanghai Univ., China*.

**W4A.3 • 16:40** Invited

**Brillouin-Raman frequency comb based on random laser**, Zuxing Zhang[1]; [1]*Nanjing Univ. of Posts and Tel., China*.

## Lushan Hall (鲁山厅), Track 6

**16:00-18:00**
**W4B • Optical measurement V**
*Presider: **Bo Dong**, Shenzhen Technology University, China*

**W4B.1 • 16:00** Invited

**Optical Sensors Based on Quantum Dots Nanocomposite Film**, Xiaobo Xing[1], Pengfei Xia[1], Zongbao Li[2], Haiyan Wang[3] and Jianlin Huang[4]; [1]*South China Normal Univ., China;* [2]*Tongren Univ., China;* [3]*Guangdong Industry Technical College, China;* [4]*Guangzhou Institute of Measurement and Testing Technology, China*. Three optical sensors based on quantum dots nanocomposite films were developed for real-time humidity and formaldehyde gas detection. Our optical sensors have the advantages of simple preparation, low cost, good stability and high sensitivity.

**W4B.2 • 16:20** Invited

**Single fiber imaging under deformation by neural network**, Yunxu Sun[1]; [1]*Harbin Inst. of Tech., China*. We develop an imaging technology of single multimode optical fiber by a neural network of complex number. We explore the imaging regularity and effectiveness under the condition of slight deformation and severe deformation.

**W4B.3 • 16:40** Invited

**OFDR based curvature sensing with few-mode fibers**, Jianfei Liu[1]; [1]*Hebei Univ. of Tech., China*. We combine few mode fiber with optical frequency domain reflection (OFDR), and make full use of spatial characteristics of different modes in few mode fiber, to obtain a bending sensing method with higher accuracy and spatial resolution.

## Mengshan Hall (蒙山厅), Track 7

**16:00-17:40**
**W4C • Ultrafast & nolinear optics IV**
*Presider: **Zhi-Chao Luo**, South China Normal University, China*

**W4C.1 • 16:00** Invited

**Femtosecond laser fabrication for micro/nanostructures**, Hong-Zhong Cao[1]; [1]*Qufu Normal Univ., China*. Here, we report our work on multi-photon lithography with several kinds of photoresists, and multi-photon photoreduction and femtosecond laser trapping for fabrication of metallic micro/nanostructures. Structures with spatial resolution of about 40 nm were obtained in multi-photon lithography, and silver lines with width of 30 nm were directly written in multi-photon photoreduction fabrication. Both silver and gold nanostructures were fabricated in femtosecond laser trapping fabrication. A lot of 2D and 3D structures which have extensive application prospects were also fabricated by using these technologies.

**W4C.2 • 16:20** Invited

**High power 976nm single mode fiber laser**, Huanian Zhang[1]; [1]*Shandong Univ. of Tech., China*.

**W4C.3 • 16:40** Invited

**FD-FWM based Micro-combs**, Hualong Bao[1]; [1]*Soochow Univ., China*. Microcavity-based frequency combs has developed into a hot research area recently. Here, we will present our recent advances towards effective control of micro-combs in a system comprising an micro-cavity nested in an auxiliary fibre-gain cavity.

## Laoshan Hall (崂山厅), SS 1

**16:00-18:00**
**W4D • Organic & nano optoelectronics-VI**
*Presider: **Hong Meng**, Peking University Shenzhen Graduate School, China*

**W4D.1 • 16:00** Invited

**Engineering dielectrics and interfaces in organic light emitting devices,** Caterina Soldano[1]; [1]*Aalto Univ., Finland*. Organic light emitting transistors (OLETs) are devices with a two-fold functionality since they behave as thin-film transistors and at the same time are able to generate light under appropriate bias conditions. One key building block of such device is the dielectric layer. Engineering the dielectric layer and the interface with the organic materials enable achieving high-performing low-bias devices.

**W4D.2 • 16:25** Invited

**Optimising v-DABNA based hyperfluorescent OLEDs for saturated deep blue emission,** Andrew Monkman[1]; [1] *Durhsam Univ., UK*. The photophysics of the multiple resonance TADF molecule v-DABNA will be described.

**W4D.3 • 16:50** Invited

**OLED: A few untold stories**, Fred Chen[1]; [1]*Shine Materials Technolgy Co., China*. Throughout the early development of materials and device Tech. at Kodak, there were many memorable serendipitous discoveries and amusing anecdotes that were mostly unknown to the OLED community and probably worth recollecting for posterity. This talk represents a personal account of several exciting events that led eventually to some of the most important milestones in the development of OLED.

## Taishan Hall (泰山厅), Track 4

**16:00-18:00**
**W4E • Optoelectronics IV**
*Presider: **Linjie Zhou**, Shanghai Jiao Tong University, China*

**W4E.1 • 16:00** Invited

**Sub-wavelength waveguide grating components for integrated optics applications**, Yaocheng Shi[1]; [1]*Zhejiang Univ., China*. The sub-wavelength grating (SWG), which is a one-dimensional array of deeply sub-wavelength nano-strips, can provide precise control over modal confinement, effective index, dispersion and birefringence, showing great potentials in high-performance nano-photonic devices. The SWG based on silicon waveguides thereby opening up new approaches to manipulate the optical responses and control the flow of light. In this talk, we will introduce some of our recent work on the silicon metamaterial based silicon integrated devices, including the bent multi-mode waveguides, multi-mode crossings, and also the polarization manipulation devices.

**W4E.2 • 16:20** Invited

**High speed 2μm photodetectors and beyond**, Baile Chen[1]; [1]*ShanghaiTech Univ., China*. High-speed photodetectors beyond 2μm have many important applications such as frequency comb spectroscopy, next generation optical fiber communication. In this work, I will report high-speed type-II superlattice photodetectors for eSWIR and MWIR detection.

**W4E.3 • 16:40** Invited

**Non-reciprocal transmission and discrete optics based on integrated optomechanical devices**, Lei Shi[1]; [1]*Huazhong Univ. of Sci. and Tech., China*.

## VIP Room (聚贤厅), Track 2

**16:00-18:00**
**W4F • Optical transmission IV**
*Presider: **Juhao Li**, Peking University, China*

**W4F.1 • 16:00** Invited

**Video Monitoring System based on Power-Over-Fiber Technique**, Jin Wang[1], Yi Ruan[1], Tian Wang[1], Yunqing Lu[1] and Chenggang Guan[2]; [1]*Nanjing Univ. of Posts and Tel., China;* [2]*Huazhong Univ. of Sci. and Tech. China*. We review some proposed video monitoring systems based on power-over-fiber (POF) technique. Finally, our demonstrative system shows a real-time video stream at a transmission rate of ~221 Mbps with an image resolution of 640x480.

**W4F.2 • 16:20** Invited

**Probabilistically Shaped Multicarrier Communication**, Mengli Liu[1] and Mingyi Gao[1]; [1]*Soochow Univ., China*. IM/DD probabilistically-shaped multicarrier communication is attractive for optical interconnects due to low cost and power consumption, enhanced resilience to noise and flexibility of entropy allocation. In this work, we present its principles and key features.

**W4F.3 • 16:40** Invited

**Next Generation High-Speed Optical Access Network: Opportunities, Challenges and Outlook**, Junwen Zhang[1]; [1]*Fudan Univ., China*. Recent progresses of next generation high-speed optical access network are reported. This invited talk reviews challenges, solutions and outlooks for next-gen optical access network for 100G and even beyond to support new emerging services.

## Yishan Hall (沂山厅), Track 1

**W4A.4 • 17:00** Invited

**Random lasing in fiber type waveguide and imaging applications**, Weili Zhang[1]; [1]*Univ. of Electronic Sci. and Tech. of China, China*. As weakly scattering mediums，fiber type optical waveguides provide a good platform for light emission and control. Here, realization and control of fiber type random lasers as well as their applications, e.g., imaging will be introduced.

**W4A.5 • 17:20** Invited

**Fiber lasers and applications in water treatment process**, Meng Zhang[1]; [1]*Beijing Univ. of Aeronautics and Astronautics, China*.

**W4A.6 • 17:40** Invited

**Random fiber laser applications in temporal ghost imaging and random bit generation**, Han Wu[1]; [1]*Sichuan Univ., China*. We explore the feasibility to use a Rayleigh feedback assisted ytterbium-doped random fiber laser (YRFL) which has relatively broad bandwidth as the light source to perform ghost imaging in the time domain and the ultrafast random bit generation.The temporal correlations of the intensity fluctuations of YRFL are experimentally investigated and the results show YRFL exhibits random temporal intensity fluctuations when the pump power is well above the threshold. For temporal ghost imaging application, we show that the near-perfect retrieval of ultrafast temporal objects can be realized by using YRFL source, in contrast with conventional

## Lushan Hall (鲁山厅), Track 6

**W4B.4 • 17:00** Invited

**Ultra high sensitivity multi parameter optical fiber sensor based on high order harmonic vernier effect**, Jiajun Tian[1]; [1]*Harbin Inst. of Tech., Shenzhen, China*.

**W4B.5 • 17:20** Invited

**Optical fiber sensing Technology for marine information monitoring**, Zhengyong Liu[1]; [1]*Jinan Univ., China*. In this talk, I will give an overview of the optical fiber technology and introduce some applications of marine information monitoring based on the developed fiber sensing system, including the intelligent data analysis.

**W4B.6 • 17:40** Invited

**Advanced photoacoustic spectroscopy trace gas sensing instrument**, Chaotan Sima and Ping Lu[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. The abstract introduces research progress on the engineering prototype of photoacoustic spectroscopy instrument and implementations in multiple gas detection at the local transformer substation

## Mengshan Hall (蒙山厅), Track 7

**W4C.4 • 17:00** Invited

**Intelligent mode locked fiber laser**, Guoqing Pu[1] and Lilin Yi[1]; [1]*Shanghai Jiao Tong Univ., China*. We implement an intelligent mode locked fiber laser which can automatically search various pulsation regimes with excellent time-consuming performance. Further, by dispersive Fourier transform, the output spectrum of the laser can be programmed.

**W4C.5 • 17:20** Invited

**High-dimensional quantum network**, Bi-Heng Liu[1]; [1]*Univ. of Sci. and Tech. of China, China*. Compare with two-dimensional systems, high-dimensional systems have many advantages in quantum networks. Here we build up a high-dimensional quantum network using the spatial mode of photons, including the preparation, manipulation, and measurement of high-dimensional systems.

**18:00-21:00 Banquet and Awards Ceremony, QILU Grand Ballroom (齐鲁大宴会厅), 2F**

## Laoshan Hall (崂山厅), SS 1

**W4D.4 • 17:20** Invited

**Highly efficient luminescence of AIEgens and OLEDs**, Dongge Ma[1]; [1]*South China Univ. of Tech., China*. In this report, we fabricated high efficiency of over 7% blue OLEDs based on non-doped AIEs as emitter, and further improved it to 10.2% by the design of device structure. The detailed mechanism was studied by photophysics and magnetic electroluminescence (MEL). Furthermore, we found that AIEs are also excellent host of red, green and yellow phosphors, thus high efficiency phosphorescence OLEDs can be fabricated. Finally, we have successfully developed white OLEDs based on highly efficient blue AIE molecules. The power efficiency reaches about the maximum value of 100 lm/W and 72.1 lm/W at the luminance of 1000 cd/m2.

**W4D.5 • 17:40** Invited

**Non-Fused Ring Electron Acceptors for Highly Efficient Organic Solar Cells**, Dou Lou and Aung Ko Ko Kyaw[1]; [1]*Southern Univ. of Sci. and Tech., China*. We employed alkyl chain engineering and electron-deficient diketone unit engineering for non-fused ring electron acceptors to achieve highly efficient OSCs (13.35%) with low energy loss (0.51eV) and high open-circuit voltage (0.85 V).

## Taishan Hall (泰山厅), Track 4

**W4E.4 • 17:00** Invited

**High-sensitivity ultrasound detection combining with monolithic integrated microresonators and digital optical frequency comb**, Lei Wan[1]; [1]*Jinan Univ., China*.

**W4E.5 • 17:20** Invited

**III-V/Si Heterogeneous Integration for Nonlinear Integrated Photonics**, Weiqiang Xie[1]; [1]*Shanghai Jiao Tong Univ., China*. In this talk, we present our recent work on heterogeneously integrated low-loss AlGaAs nanowaveguides on Si and show ultra-high quality AlGaAs nonlinear microresonators, together with the demonstration of various on-chip nonlinear applications with ultra-high efficiency.

**W4E.6 • 17:40** Invited

**Integrated programmable optical waveshaper**, Ang Li[1], Qixiang Cheng[2] and Shilong Pan[1]; [1]*Nanjing Univ. of Aeronautics and Astronautics, China;* [2]*Cambridge Univ., UK.* programmable waveshapers have been serving as key equipment in microwave and optical systems. Conventional programmable waveshapers are based on liquid crystals. In this paper, we report how to realize an all-silicon integrated programmable waveshaper.

## VIP Room (聚贤厅), Track 2

**W4F.4 • 17:00** Invited

**Shaped Modulation and Hybrid Forward Error Correction for Optical Fiber Communication Systems**, Bin Chen[1]; [1]*Hefei Univ. of Tech., China*.

**W4F.5 • 17:20** Invited

**Constellation shaping Tech. in high-speed optical communication**, Qi Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. For starters, the information theory and algorithms related to constellation shaping, such as distribution matcher (DM) and pair-wise optimization (PO) are reviewed. Secondly, the matching techniques between constellation shaped optical signal and channel coding are presented, namely the probabilistic amplitude shaping (PAS) architecture enabled by low density parity-check (LDPC) coding, and the cascading scheme based on trellis-coded modulation (TCM). Thirdly, tailored transmitter and receiver digital signal processing (DSP) algorithms that are suitable for constellation shaped signals are also introduc
ed.

**W4F.6 • 17:40**

**Optical filtering tolerant and spectrally efficient 200Gbps real-time transmission using flex-shaping algorithms**, Hu Shi[1], Wendong Shang[1], Huan Chen[1] and Zhenhua Feng[1]; [1]*ZTE Corp., China*. Real-time transmission of 46200Gb/s channels within 37.5GHz grid over 16 WSSs is realized with less than 1.1dB penalty, thanks to SDO enabled by configurable TDHM and ODE algorithms, suitable for field deployment in ROADM networks.3

**18:00-21:00 Banquet and Awards Ceremony, QILU Grand Ballroom (齐鲁大宴会厅), 2F**

## Yishan Hall (沂山厅), Track 1

**08:00-10:00**
**Th1A • Novel fibers & devices VI**
*Presider: **Yunqi Liu**, Shanghai University, China*

**Th1A.1 • 08:00** Invited

**Optical Free-Form Couplers for High-density Integrated Photonics (OFFCHIP): A Universal Optical Interface**, Juejun Hu[1]; [1]*Massachusetts Inst. of Tech., USA*.

**Th1A.2 • 08:20** Invited

**Intelligent Photonics: Applications of artificial intelligence and swarm intelligence in fiber Optics**, Sheng Liang[1]; [1]*Beijing Jiaotong Univ., China*.

**Th1A.3 • 08:40** Invited

**Research progress of optical fiber hydrogen sensor in recent years**, Chunliu Zhao[1] and Jiali Li[1]; [1]*China Jiliang Univ., China*. In this paper, the research progress of optical fiber Fabry-Perot interferometer hydrogen sensor in our team is introduced, including the multiplexing technology and enhanced sensitivity technology based on vernier effect.

## Lushan Hall (鲁山厅), Track 5

**08:00-10:00**
**Th1B • Microwave photonics**
*Presider: **Jifang Qiu**, Beijing University of Posts and Telecommunications, China*

**Th1B.1 • 08:00** Invited

**Recent Progress on Microwave Photonics enabled Distributed Coherent Aperture Radar**, Shangyuan Li[1]; [1]*Tsinghua Univ., China*.

**Th1B.2 • 08:20** Invited

**STFT based on bandwidth-scaled microwave photonics**, Yitang Dai[1]; [1]*Beijing Univ. of Posts and Tel., China*. In this paper, STFT based on bandwidth-scaled microwave photonics is proposed, where the requirement for dispersion is relaxed and the attendant transmission delay in dispersive media is greatly reduced. Moreover, the frequency resolution towards MHz level could be expected in the proposed STFT. We prove that "bandwidth scaling" combined with periodic wavelength-to-time mapping (WTM) mathematically agrees with the definition of STFT. The method of customizing system parameters according to the requirements of ultrafast spectrum measurement is carefully clarified.

**Th1B.3 • 08:40** Invited

**High-Numerical-Aperture(NA) Microwave Metalens and Its Applications in High-Gain Antenna**, Yong-Qiang Liu[1]; [1]*Sci. and Tech. on Electromagnetic Scattering Laboratory, China*. In this talk, a four-layer plasmonic microwave metalens and its applications in the high-gain antenna are studied and demonstrated.

## Mengshan Hall (蒙山厅), Track 9

**08:00-10:00**
**Th1C • Quantum photonics I**
*Presider: **Zhong-Xiao Man**, Qufu Normal University, China*

**Th1C.1 • 08:00** Invited

**Quantum frequency conversion and its applications based on periodically poled lithium niobate waveguide**, Qiang Zhang[1]; [1]*Univ. of Sci. and Tech. of China, China*. Through the self-developed miniaturized optical fiber filter, we have realized the first integrated four-channel all-fiber up-conversion single photon detector (C-band) in the world. Its performance could satisfy QKD over 100km. In addition, in order to achieve wavelength division multiplexing of quantum network and classical network, 1310-nm (O-band) single photon source as quantum channel is an optimal choice.

**Th1C.2 • 08:20** Invited

**Quantum-ehanced sensing: from target detection to imaging**, Lijian Zhang[1]; [1]*Nanjing Univ., China*. We report an experimental demonstration of quantum-enhanced target detection with the accuracy approaching the fundamental Helstrom limit, and a theoretical analysis of the quantum-limited precision of two fundamental imaging tasks.

**Th1C.3 • 08:40** Invited

**Quantum network based on non-classical light**, Xiaolong Su[1]; [1]*Shanxi Univ., China*.

## Laoshan Hall (崂山厅), SS 1

**08:00-09:50**
**Th1D • Organic & nano optoelectronics-VII**
*Presider: **Yiwang Chen** Nanchang University, China*

**Th1D.1 • 08:00** Invited

**Integration Design and Printing Process of Flexible Perovskite Solar Cells**, Yiwang Chen[1]; [1]*Nanchang Univ., China*. A self-adhesive polymer encapsulated perovskite interface layer is proposed to prevent the erosion of the perovskite layer by water and oxygen. The introduction of EVA glue interface layer can effectively improve the long-term stability, water resistance and bending durability of perovskite solar cells. systematically adopts integrated Tech., spine-like structure and Steel bracket to release stress and solves the self-repairing problem of perovskite active layer fracture to fully realizes the flexible manufacturing of perovskite solar cells.

**Th1D.2 • 08:20** Invited

**In-Situ Cross-linking and Chemical Anti-corrosion Strategy for Efficient and Operationally Stable Perovskite Solar Cells**, Junfeng Fang[1]; [1]*East China Normal Univ., China*. Motivated by the idea of metal anti-corrosion, here we propose a chemical anti-corrosion strategy to fabricate stable inverted PSCs through introducing a typical organic corrosion inhibitor of BTA (benzotriazole) before Cu electrode deposition.

**Th1D.3 • 08:40** Invited

**Bioinspired molecules design for bilateral synergistic passivation of planar perovskite solar cells**, Yiqiang Zhang[1]; [1]*Zhengzhou Unviersity, China*. Inspired by the adhesion mechanism of mussels, three catechol derivatives with functional Lewis base groups were strategically designed to be incorporated into the buried interface between perovskite and SnO2 surface, achieving bilateral synergetic passivation effect.

## Taishan Hall (泰山厅), Track 3

**08:00-10:00**
**Th1E • Optical networks III**
*Presider: **Rentao Gu**, Beijing University of Posts and Telecommunications, China*

**Th1E.1 • 08:00** Invited

**Cost-efficient Parallel Service Function Chain with Elaborate Layout for Elastic Optical Network**, Hui Yang[1]; [1]*Beijing Univ. of Posts and Tel., China*. This paper propose a kind of cost-efficient parallel service function chain with elaborate layout, which can effectively reduce the resource overhead of packet copying and significantly reduce the latency of SFC at the meanwhile.

**Th1E.2 • 08:20** Invited

**Selective Offloading Network Resource Optimization Approaches in Collaborative Cloud-Edge Computing Networks**, Ling Liu[1], Ruixin Liang[1], Shoucui Wang[1], Hong Chen[1], Mingyi Gao[1], Bowen Chen[1] and Jinbing Wu[2]; [1]*Soochow Univ., China;* [2]*Suzhou LZY Technology Co., Ltd., China*. This paper proposes selective offloading network resource optimization approaches to address the offloading network resource problems in collaborative cloud-edge computing networks.The proposed approaches can optimize network resource allocation and can reduce end-to-end latency.

**Th1E.3 • 08:40** Invited

**optical switch control: bridging the last mile for optical data centers**, Xuwei Xue[1]; [1]*Beijing Univ. of Posts and Tel., China*.

## VIP Room (聚贤厅), Track 2

**08:00-10:00**
**Th1F • Optical transmission V**
*Presider: **Jin Wang**, Nanjing University of Posts and Telecommunications, China*

**Th1F.1 • 08:00** Invited

**Beyond 200 Gb/s per lane transmission with direct-detection**, Jing Zhang[1], Qun Liu[1], Mingyue Zhu[1] and Kun Qiu[1]; [1]*Univ. of Electronic Sci. and Tech. of China, China*. We have experimentally demonstrate a 200-Gb/s Discrete multi-tone (DMT) signal transmission over 2-km SSMF with entropy loading. The BER is below 20% SD-FEC threshold.

**Th1F.2 • 08:20** Invited

**Matched Filter-based Optimum Synchronization in CO-OFDM Systems**, Xinwei Du[1]; [1]*BNU-HKBU United International College, China*. We develop a joint ML estimator of the timing offset (TO) and carrier phase offset (CPO) for each hypothesized value of the CFO. The TO and CPO are estimated efficiently as the frequency and phase of a complex sinusoid observed in noise, via either a time-domain or a frequency-domain approach. A sequential algorithm with lower complexity is then presented. We derive the Cramer-Rao lower bounds (CRLB) on the performance of our estimators, and show via simulations that our estimators for high SNR attain these performance lower bounds.

**Th1F.3 • 08:40**
**Design and Field Trial of a Novel Dispersion Optimized Optical Fiber for 5G Front-haul Network**, Yunbo Li[1], Dong Wang[1], Lei Shen[2], Lei Zhang[2], Jiang Sun[1], Dechao Zhang[1], Jie Luo[2], Xiaobo Lan[2], Han Li[2] and Dawei Ge[1]; [1]*China Mobile Research Inst., China;* [2]*YOFC, China*. For 5G front-haul network, a novel fiber is proposed and demonstrated in both laboratory and field-deployed network. At least 2.5-dB link budget improvement is achieved. The fiber is also suitable for Ethernet applications.

## Yishan Hall (沂山厅), Track 1

**Th1A.4 • 09:00** Invited

**Temperature Compensation of Optical Current Sensor based on an Artificial Intelligence Algorithm**, Qing Jia[1], Qun Han[1], Zhizhuang Liang[1] and Zhenzhou Cheng[1]; [1]*Tianjin Univ., China*. An algorithm based on BP neural network was proposed to solve temperature-dependent Verdet-constant induced accuracy problem of optical current sensors. The maximum error is 0.157% in the range of -20 to 60℃.

**Th1A.5 • 09:20**

**LOW-LOSS FAN-IN/FAN-OUT DEVICE FOR 8-CORE FIBER**, Jun Chu[1], Lei Zhang[1], Lei Shen[1], Ying Li[1], Xiaobo Lan[1], Jie Luo[1] and Enpei He[2]; [1]*YOFC, China;* [2]*Hubei Univ. Tech.,* China. We demonstrate a fused-taper type fan in/fan-out device for 8-core fiber . The maximum insertion loss of Fi/Fo device is 0.98dB and the crosstalk is under -40 dB at 1310nm.

**Th1A.6 • 09:35**

**Silt-Beam Shaping Method for Femtosecond Laser Point-by-Point Inscription of Highly Localized Fiber Bragg Gratings with Enhanced Cladding Modes**, Runxiao Chen[1], Jun He[1], Xizhen Xu[1], Changrui Liao[1] and Yiping Wang[1]; [1]*Shenzhen Univ., China*. We demonstrate a silt-beam shaping method for fabricating highly localized fiber Bragg gratings with enhanced cladding modes, low insertion loss and wide spectral band by fs laser inscription.

**Th1A.7 • 09:50**

**Highly-sensitive SPR urea biosensor based on urease immobilized in metal-organic zeolite framework**, Liangliang Cheng[1], Wanlu Zheng[1], Like Li[1] and Ya-Nan Zhang[1]; [1]*Northeastern Univ., China*. A highly-sensitive multi-mode thin-core multi-mode SPR structure is applied in urea sensing with ZIF-8/Urease coating. Experimental measurement sensitivity can reach to 4 nm/mM.

## Lushan Hall (鲁山厅), Track 5

**Th1B.4 • 09:00** Invited

**MWP-compatible SOI devices based on inverse-desgin**, Jifang Qiu[1]; [1]*Beijing Univ. of Posts and Tel., China*.

**Th1B.5 • 09:20** Invited

**Optical all-pass filter and its applications**, Yuan Yu[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. So far, the amplitude-frequency responses of optical filters have been intensively studied and widely used in applications, including low-pass, band-pass, high-pass, and band-stop responses. However, the phase-frequency response also has important applications, especially the all-pass filter, which has constant amplitude-frequency response and pure phase-frequency response. As a fundamental optical component, the optical all-pass filter can be applied to optical signal processing and microwave photonics. In this talk, the principle of optical all-pass filters will be introduced. Two optical all-pass filter devices fabricated on silicon-on-insulator wafer and their applications in optical signal processing and microwave photonics will also be introduced.

**Th1B.6 • 09:40**

**Generation of reconfigurable linearly chirped microwave waveforms based on Fourier-domain mode-locked optoelectronic oscillator**, Lin Wang[1], Weilei Gou[1], Yuan Yu[1] and Xinliang Zhang[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. we propose and demonstrate a Fourier-domain mode-locked optoelectronic oscillator based on a reconfigurable microwave photonic filter, which can generate dual-chirp linearly chirped microwave waveforms and linearly chirped microwave waveforms with a singl

## Mengshan Hall (蒙山厅), Track 9

**Th1C.4 • 09:00** Invited

**Optimal precision of multi-parameter precision measurement**, Guoyong Xiang[1]; [1]*Univ. of Sci. and Tech. of China, China*.

**Th1C.5 • 09:20** Invited

**Generalized entropic uncertainty relations and their applications**, Dong Wang[1]; [1]*Anhui Univ., China*. We propose a stronger bound for entropic uncertainty relation within tripartite systems and a generalized entropic uncertainty relation for measurements of multiple observables in many-body systems, and demonstrate their applications in practical quantum information processing.

**Th1C.6 • 09:40** Invited

**Secure underwater optical communications based on quantum technologies**, Lei Gai[1], Wendong Li[1], Yu Wei[1], Yonghe Yu[1], Yang Yang[1], Xinjian Zhang[1], Qiming Zhu[1], Guoyu Wang[1] and Yongjian Gu[1]; [1]*Ocean Univ. of China, China*. Underwater wireless optical communication are studied through single photon detection, photon states modulation and quantum key encryption. These studies will promote the development of optical communication applications in underwater vehicles and underwater sensor networks.

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**10:00-10:30 Poster Session 4 & Coffee Break, 2F**

## Laoshan Hall (崂山厅), SS 1

**Th1D.4 • 09:00** Invited

**High Efficiency Perovskite Solar Cells**, Shengzhong Liu[1]; [1]*Dalian Inst. of Chemical Physics, CAS, China*. For the high efficiency perovskite solar cells, the power conversion efficiencies for the planar device is as high as 24.9%. More importantly, we have developed a superior low temperature modified SnO2 material for ETL and transferred the cell fabrication process onto lightweight flexible polymeric substrate. The highest cell efficiency achieved is 24.8% on rigid substrate and over 21% on the flexible one, it is also the highest efficiency among the flexible perovskite cells reported. Furthermore, upon bandgap engineering, we developed a method to fabricate perovskite solar cell for low light applications.

**Th1D.5 • 09:20**

**Design and Fabrication of All-Inorganic Perovskite Solar Cells**, Jia Liang[1]; [1]*Fudan Univ., China*. Organic-inorganic perovskite solar cells (PSCs) exhibited poor stability and high cost. In order to overcome these disadvantages, we develop all-inorganic PSCs based on CsPbX3 (X = I, Br, Cl) and low-cost carbon films.

**Th1D.6 •09:35**

**Cd-free CIGS solar cells and modules**, Jianmin Li[1] and Xudong Xiao[1]; [1]*Wuhan Univ., China*. The study of Zn(O,S) based Cu(In,Ga)Se2 (CIGS) solar cells is developing gradually from basic research to industrialization. Recently, we have achieved over 20% efficiency for cells and over 16% for modules.

## Taishan Hall (泰山厅), Track 3

**Th1E.4 • 09:00** Invited

**Secret-Key Provisioning in Quantum Key Distribution Enabled Optical Networks**, Xiaosong Yu[1]; [1]*Beijing Univ. of Posts and Tel., China*.

**Th1E.5 • 09:20** Invited

**Provisioning of Distributed Model Training in Edge Computing-enabled Optical Networks**, Yajie Li[1]; [1]*Beijing Univ. of Posts and Tel., China*. The emergence of edge computing provides an effective solution to execute distributed model training (DMT). However, the deployment of training data among edge nodes affects the training efficiency and network resource usage. This talk focuses on the efficient provisioning of DMT services by optimizing the partition and distribution of training data in edge computing-enabled optical networks.

**Th1E.6 • 09:40**

**Collaborative Allocation of Computing, Storage, and Transport Resources for Data Center Allopatric Services in Elastic Optical Networks**, Rui Wang[1], Yikai Liu[1], Huowen Peng[1], Yajie Li[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*The Univ. of Edinburgh, UK*. We propose a resource allocation algorithm that considers computing, storage and transport resources collaboratively for data center allopatric services in elastic optical network.Results show the algorithm can reduce blocking rate and improve resource ut

## VIP Room (聚贤厅), Track 2

**Th1F.4 • 09:00**

**Combined Equalization-Enhanced Phase Noise from Chromatic Dispersion and Differential Mode Delay in Mode Division Multiplexing Systems**, Xingwen Yi[1] and Huaiyin Wang[1]; [1]*Sun Yat-sen Univ., China*. In mode-division multiplexed systems, chromatic dispersion (CD) and differential mode delay (DMD) both lead to equalization-enhanced phase noise (EEPN) from the local laser. We show that the two types of EEPNs are highly correlated.

**Th1F.5 • 09:15**

**Experimental Demonstration of an Optical Domain Decryption Method for PSK Quantum Noise Randomized Cipher**, Li Yunkun[1], Pu Tao[1], Zheng Jilin[1], Xiang Peng[1], Li Jin[1] and Zhang Xin[1]; [1]*Army Engineering Univ. of PLA, China*. An optical domain decryption method for PSK quantum noise randomized cipher was proposed and demonstrated. The experimental 1024PSK QNRC transmission system was achieved with a length of 50 km and a bit rate of 5Gbps

**W1F.6 • 09:30**

**Ciphertext Mapping Method based on Gray Code in Quantum Noise Stream Cipher**, Junjia Li[1], Yajie Li[1], Bo Wang[1], Kai Wang[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. A ciphertext mapping method based on Gray code is proposed to improve the security of QNSC. The performance is verified in 300km optical transmission. Furthermore, the case of less bit number of basis is simulated

**W1F.7 • 09:45**

**Large coverage MIMO UWOC system against turbulence and transmission delay**, Xiao Chen[1], Zejun Zhang[1] and Jing Xu[1]; [1]*Zhejiang Univ., China*. A 2×2 MIMO IM/DD UWOC system with large coverage is proposed to release the alignment problem and combat the turbulence induced fading. RC and STBC are employed as space-time coding scheme.



**10:00-10:30 Poster Session 4 & Coffee Break, 2F**

## Poster Session 4 (10:00-10:30)

**P4.1**

**External manipulations of soliton molecules in a passively mode-locked fiber laser**, Yusong Liu[1], Yiyang Luo[1], Ran Xia[2], Wenjun Ni[3], Siyun Huang[2], Qizhen Sun[2], Xiahui Tang[2] and Perry Ping Shum[4]; [1]*Chongqing Univ., China;* [2]*Huazhong Univ. of Sci. and Tech., China;* [3]*South-Central Univ. for Nationalities China;* [4]*Southern Univ. of Sci. and Tech., China*. We report on the external manipulations of temporal pulse separation and subtle molecular structures of soliton molecules in a nonlinear polarization rotation based passively mode-locked fiber laser with near-zero dispersion.

**P4.2**

**Ultraviolet OLEDs: fabrication, interface engineering and efficiency promotion**, Dengli Yao[1], Dongliang Li[1], Yongfang Yuan[1] and Xiaowen Zhang[1]; [1]*Guilin Univ. of Elec. Tech., China*. Some key issues of UV OLEDs are introduced.The fabrication, interface engineering and efficiency promotion are discussed in details.

**P4.3**

**Differential Fresnel Reflection Based Fiber-optic Relative Humidity Sensor**, Yifei Feng[1], Wei Xu[2], Cheungchuen Yu[3], Jing Li[4], Ying He[1] and Wenye Sun[5]; [1]*Naval Specialty Medical Center, China;* [2]*Xi'an Inst. of Optics and Precision Mechanics, CAS, China;* [3]*Yangtze Delta Region Inst. of Tsinghua Univ., China;* [4]*Anlight OptoElec. Tech. Inc., China;* [5]*The Second Affiliated Hospital of Soochow Univ., China*. Simple fiber-optic differential Fresnel reflection based relative humidity sensor with large dynamic range on is proposed and investigated. The response rate and the stability of the sensor are also addressed.

**P4.4**

**Optimization of Dynamic Bandwidth Allocation Algorithm for Passive Optical Network**, Liwei Yang[1], Yanling Cai[1], Lin Li[1] and Wenjie Zhang[2]; [1]*China Agricultural Univ., China;* [2]*Minnan Normal Univ., China*. The article adopts the method of analyzing the Dynamic Bandwidth Allocation of the Next-Generation Passive Optical Network, and proposes a Dynamic Bandwidth Allocation algorithm that supports the quality of service and the level of service.

**P4.5**

**Energy Transfer and Tuning of Photoluminescence in the BaMgAl10O17: Cr3+/Eu2+ Phosphor**, Li You[1], Tianliang Zhou[1], Minqian Mao[1], Jinyi Wang[1], Chenjie Zhang[1] and Rongjun Xie[1]; [1]*Xiamen Univ., China*. In this work, the BaMgAl10O17: Cr3+, Eu2+ phosphor was successfully obtained via solid state reaction, which showing efficient energy transfer between Cr3+ and Eu2+ with the energy transfer efficiency (ηT) maximal value of 30.3%.

**P4.6**

**Research on Channel Estimation Algorithm of Visible Light ACO-OFDM System**, Xiaoli Hu[1], Yongwei Li[1], Ling Qin[1], Fengying Wang[1] and Tao Guo[1]; [1]*Inner Mongolia Sci. and Tech. Univ., China*. Aiming at the problem that communication BER of VLC system is high under NLOS link, this paper improves an algorithm(Modified-Sparsity Adaptive Multipath Matching Pursuit ) based on compressed sensing to reduce the communication BER.

**P4.7**

**Proactive Dynamic Calendar Allocation Scheme for 5G/B5G Transport Network Slicing Based Flexible Ethernet**, Zhekang Li[1], Rentao Gu[1], Huixia Ding[2], Duanyun Chen[3], Delong Yang[2], Yue Hu[2], Zhijian Xu[3] and Rongkang Xiu[3]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*China Electric Power Research Inst. Co., Ltd., China;* [3]*State Grid Fujian Electric Power Co., China*. This paper proposed a proactive calendar allocation scheme that enhances utilization for optical network resource and provides differentiated service for network slicing. The simulation shows utilization improvement from 72.8% to 81.2% under the evaluated.

**P4.8**

**Realizing Single TE01 Mode Transmission in Hollow Core Fiber by Directional Lattices**, Huiyi Guo[1], Yong You[1], Baiwei Mao[1], Zhi Wang[1] and Yan-Ge Liu[1]; [1]*Nankai Univ., China*. In this work, the modes in a 19-cell hollow core photonic bandgap fiber are selectively modulated, and only the transmission of the first-order angular polarization mode is allowed.

**P4.9**

**Propagation Characteristics of Laguerre-Gaussian Beams with OAM in Atmospheric Turbulence**, Shutian Luo[1] and Xiaofeng Li[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China*. Based on Kolmogorov turbulence phase aberrations, the OAM measurement probabilities of Laguerre-Gaussian beams in atmospheric turbulence are researched. We derive the functions of OAM measurement probabilities varied with propagation distance of Laguerre-Gaussian beams.

**P4.10**

**An Integrated Fiber-optic White-light interferometry System based on VT-DBR Laser**, Yang Cheung[1], Zhenguo Jing[1], Ang Li[1], Qiang Liu[1], Yueying Liu[1], Zhiyuan Huang[1], Zhi Li[1], Da-Peng Zhou[1] and Wei Peng[1]; [1]*DaLian Univ. of Tech., China*. A cost-effective and high-precision optical Fiber Sensing System based on VT-DBR LASER for white light interferometry is proposed. A low power, high modulation-bandwidth design integrated current and temperature driver with excellent long-term stability is described

**P4.11**

**Ultra-broadband Long Period Fiber Grating Mode Converter with Tunable Wavelength based on Dual-resonance Coupling Mechanism**, Yu Zheng[1], Huiyi Guo[1], Mao Feng[1], Zhi Wang[1] and Yan-Ge Liu[1]; [1]*Nankai Univ., China*. In this work, we show how to adjust the dispersion turning point through the fusing and pulling technology, and realize the mode conversion of a large bandwidth by long period fiber gratings with adjustable wavelength.

**P4.12**

**Ultrafast optical properties and applications of two-dimensional materials**, Lili Tao[1], Haiming Lu[1], Xiangxiang Hu[1], Pengfei He[1] and Zhiwan Hu[1]; [1]*Guangdong Univ. of Tech., China*. In our group, self-made tapered fibers deposited with 2D materials, large-area 2D material films and 2D/PVA films are prepared and applied as saturable absorbers in fiber and solid-state lasers to obtain Q-switched and mode-locked lasers.

**Poster Session 4 (10:00-10:30)**

**P4.13**

**Ultra-sensitive magnetic field sensing based on microfiber coupler**, Min Yuan[1] and Shengli Pu[1]; [1]*Univ. of Shanghai for Sci. and Tech., China*. A highly sensitive magnetic field sensing structure is proposed. The Vernier effect and the characteristics of the dispersion turning point are studied numerically. As a result, the magnetic sensitivity of -97.856 nm/mT is achieved.

**P4.14**

**A novel photonic crystal fiber refractive index sensor based on surface plasmon resonance effect with wide detection range**, Jingao Zhang[1], Jinhui Yuan[1], Yuwei Qu[1], Shi Qiu[1], Xian Zhou[2], Binbin Yan[1], Qiang Wu[3], Kuiru Wang[1], Xinzhu Sang[1] and Chongxiu Yu[1]; [1]*Beijing Univ. of Posts and Tel., China*; [2]*Univ. of Sci. and Tech. Beijing, China;* [3]*Northumbria Univ., UK.* A novel PCF RI sensor based on SPR effect is proposed. The proposed PCF RI sensor has excellent sensing performances and wide detection range, it have potential application prospects in biology, chemistry, and environment monitoring.

**P4.15**

**Study on Single-Terminal Transmission Visibility Meter based on reflector**, Haiyang Qi[1], Sunqiang Pan[1], Pengbing Hu[1], Sumei Liu[1], Wenzhao Zhao[1] and Dong Liu[2]; [1]*Zhejiang Inst. of Metrology, China;* [2]*Zhejiang Univ., China*. A single-terminal transmission visibility meter is set up. The optical length can reach at 1 km. The accuracy of the system is ensured by the neutral density filters. Good consistency is shown in the calibration.

**P4.16**

**OFDM-based Underwater Visible Light Communication: system construction and performance analysis**, Liwei Yang[1], Wenlong Xu[1], Jiacheng Lai [1], Chen Jin[2] and Furong Zhu[1]; [1]*China Agricultural Univ., China;* [2]*Chinese Academy of Agricultural Mechanization Sci., China*. Underwater visible light communication system (UVLC) based on OFDM modulation was proposed and the constellation diagram as well as transceiver signal waveforms was obtained by simulation to evaluate the system performance.

**P4.17**

**Optical Nyquist Pulses Generation by Recirculating Frequency Shifting**, Jiakang Li[1], Hui Wang[1], Dongfang Jia[1], Chunfeng Ge[1], Zhaoying Wang[1] and Tianxin Yang[1]; [1]*Tianjin Univ., China*. By recirculating frequency shifting, optical Nyquist pulses with tunable duty cycle are generated.

**P4.18**

**Research on Intelligent Liquid Detector Based on Fuzzy Inference**, Xinlei Zhang[1], Hongquan Zhang[1], Tingting Zhao[1] and Yongyi Sun[1]; [1]*Harbin Engineering Univ., China*; [2]*Heilongjiang Univ., China*. An intelligent leaking liquid detector is proposed, which is integrated with multiple sensors to realize the detection of leaking liquid and seawater infiltration rate, and the intelligent judgment of the type of leaking liquid.

**P4.19**

**C+L band light sources based on Bi / Er / La co-doped silica fibers**, Longzhao Zeng[1], Jianxiang Wen[1], Lei Yang[1], Yan Wu[1], Xiaobei Zhang[1], Sujuan Huang[1], Fufei Pang[1] and Yanhua Dong[1]; [1]*Shanghai Univ., China*. We designed C+L band light sources with Bi/Er/La co-doped silica fibers. The broadband one had fluorescence intensity of -21.00 dBm in 1529-1607 nm, and the different-wavelength lasers were generated.

**P4.20**

**Design and Implementation of the Hardware Platform of Satellite Optical Switching Node**, Huan Zhai[1], Zhihui Zhang[1], Huibin Zhang[1], Bo Wang[1], Yongli Zhao[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China; 2 China Elec. Import & Export Co., Ltd.*, China. We design and implement a satellite optical switching hardware platform based on optical burst switching (OBS) technology. The hardware platform runs stably and realizes 20*20 channels of Microseconds level optical switching.

**P4.21**

**New Efficient Four-Dimensional Trellis Coded Modulation Format**, Yuanzhou Zhang[1], Dong Guo[1], Huan Chang[1], Fu Wang[1] and Zhipei Li[1]; [1]*Beijing Univ. of Posts and Tel., China*. Two new four-dimensional modulation schemes, 4DTCM-SP-128QAM and 4DTCM-SP-128TQAM, are proposed with lower BER. The simulation show that they can obtain 2.53dB and 1.33dB gain respectively with great potential used in long-haul optical transmission system

**P4.22**

**Curvature sensor based on cascaded dual-core photonic crystal fiber**, Chang Liu[1], Yanyan Chu[1], Xinghu Fu[1], Wa Jin[1], Guangwei Fu[1] and Weihong Bi[1]; [1]*Yanshan Univ., China*. We proposed a cascade single-mode fiber,few-mode fiber and dual-core photonic crystal fiber curvature sensor.The results show that within 0 to 1.06m-1 curvature range,the highest curvature sensitivity is -1.74nm/m-1,and the lowest is -1.31nm/m-1.

**P4.23**

**Grouping Asynchronous Link Switching Method in Satellite Optical Network**, Fangfang Zheng[1] and Guiming Lu[1]; [1]*North China Univ. of Water Resources and Electric Power, China*. To solve the system performance deterioration caused by synchronous switching in satellite optical network, this paper proposed a grouping asynchronous switching method. The simulation results show that the proposed scheme can effectively improve delay performance.

**P4.24**

**Microwave Photonic Frequency Conversion System Based on a Dual-loop Optoelectronic Oscillator for B5G/6G Communication**, Jiu Min[1], Zhen Zeng[1], Yuchong Su[1], Zhiyao Zhang[1], Lingjie Zhang[1] and Yong Liu[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China*. A microwave photonic frequency conversion system based on a dual-loop optoelectronic oscillator for B5G/6G communication is proposed.The switching between the up- and down-conversion state can be realized by changing the working status of the modulater.

**Poster Session 4 (10:00-10:30)**

**P4.25**

**A Novel Architecture based on Highly Nonlinear Fiber for All-Optical Binary Pattern Matching System**, Ying Tang[1], Xin Li[1], Haijing Hou[1], Zicheng Shi[1], Lu Zhang[1] and Shanguo Huang[1]; [1]*BUPT, China;* [2]*China Network Communications Corporation Shandong Branch. China*. We propose a novel architecture for all-optical binary pattern matching system which mainly consists of a highly nonlinear fiber and a regenerator. The system is simple and can recognize the target in high data rates.

**P4.26**

**Wavelength-switchable spatiotemporal mode-locked multimode fiber laser**, Mingwei Qiu[1], Mengmeng Chen[1] and Zuxing Zhang[1]; [1]*Nanjing Univ. of Posts and Tel., China;* [2]*Nanjing Xiaozhuang Univ., China.* We propose and demonstrate a wavelength-switchable spatiotemporal mode-locked multimode fiber laser, which relies on spatial beam self-cleaning via the nonlinear Kerr effect to attain high pulse energy with near Gaussian output beam shape.

**P4.27**

**Au triangles array as saturable absorber for a 1.5 μm passively mode-locked erbium-doped fiber laser**, Xiaofeng Cai[1], Ping Gu[1] and Zuxing Zhang[1]; [1]*Nanjing Univ. of Posts and Tel., China*. we report an all-fiber passive mode-locking EDFL with a repetition rate of 2.08 MHz and a pulse period of 480 ns for a pump power of 704 mW that using Au triangles array as SA.

**P4.28**

**Mode-locked laser with high-order mode generation based on grating combiner**, Yaqiong Lu[1], Shaokang Bai[1] and Zuxing Zhang[1]; [1]*Nanjing Univ. of Posts and Tel., China*. We propose and demonstrate an all-fiber passively mode-locked laser that generates high-order mode. A grating combiner of a few-mode long-period fiber grating and a few-mode fiber Bragg grating are introduced into the laser cavity.

**P4.29**

**Simulation of temperature induced colorimetric shift of Metal halide Perovskite**, Ting Ji[1] and Xisosong Zhang[2]; [1]*Tianjin Xin Hua Staff and Workers Univ., China*; [2]*Tianjin Univ. of Tech., China.* Metal halide perovskite has aroused wide attention in various fields due to its simple fabrication process, adjustable band gap. The temperature dependence of chromaticity coordinate and correlated color temperature of metal halide perovskite are investig.

**P4.30**

**DSP-Free Coherent Receiver based on 3×3 Coupler for OOK Signals**, Linchangchun Bai[1], Taowei Jin[1], Zhaohui Wang[1], Jing Zhang[1] and Kun Qiu[1]; [1]*Univ. of Elec. Sci. and Tech. of China, China*. We have demonstrated a DSP-free coherent receiver based on 3×3 coupler for 10-Gb/s OOK signals by simulation. We analyze the laser phase noise, chromatic dispersion and the phase rotation angle deviation tolerance, respectively.

**P4.31**

**Self-powered all-fiber polarimeters with twisted black phosphorus heterostructure**, Yifeng Xiong[1] and Fei Xu[1]; [1] *Nanjing Univ., China*. An all-fiber polarimeter was demonstrated by stacking twisted van der Waals units onto fiber endface. The device performed high photoresponse, fast response time, high polarization contrast, linear and circular polarization analysis ability at zero bias.

**P4.32**

**A high stability microfiber Sagnac loop refractive index sensor**, Jiajia Sun[1], Min Li[1], Yumeng Lv[1], Changsheng Shao[1], Lijun Li[1], Tianzong Xu[1], Jianhong Sun[1] and Qian Ma[1]; [1]*Shandong Univ. of Sci. and Tech., China*. A hybrid micro - nano fiber grating Sagnac ring refractive index sensor is designed and implemented.By the linear fitting of the experimental results, the sensor structure has higher sensitivity and stability.

**P4.33**

**Observing the Build-up of Second Harmonic Mode-locking in Ultrafast Fiber Lasers**, Xueming Liu[1] and Shaobo Zhang[1]; [1]*Zhejiang Univ., China*. We have experimentally observed the build-up dynamics of the second harmonic mode-locking in ultrafast fiber lasers, where a bigger pulse is split into two smaller pulses with different evolutionary trajectories.

**P4.34**

**C + L-band erbium-doped fiber amplified-spontaneous-emission sources**, Jinlian Mo[1], Xinyong Dong[1] and Pengbai Xu[1]; [1] *Guangdong Univ. of Tech., China*. A erbium-doped fiber amplified spontaneous emission（ASE）source with C+L band is reported. The structure is amplified by erbium-doped fiber to obtain a wide band flat ASE source.

**P4.35**

**Low noise wide-band flat erbium-doped fiber amplifier**, Wenlong Zheng[1], Xinyong Dong[1] and Pengbai Xu[1]; [1]*Guangdong Univ. of Tech., China. This paper describes the low noise gain of C+L band by using a high doped* fiber.

**P4.36**

**Multi-wavelength thulium-doped fiber lasers based on four-wave mixing and sagnac rings**, Lewen Zhou[1], Xinyong Dong[1] and Pengbai Xu[1]; [1]*Guangdong Univ. of Tech., China*. A multi-wavelength thulium-doped fiber laser based on four-wave mixing and Sagnac ring is proposed.

**P4.37**

**Raman random laser based on Germanium Doped Fiber**, Yaozong Hu[1], Xinyong Dong[1] and Pengbai Xu[1]; [1] *Guangdong Univ. of Tech., China*. Germanium Doped Fiber can provide more efficient stimulated Raman gain and lower loss in 2-3μm band.We can overcome the technical limitations of fiber laser development in the 2-3μm band by using Germanium Doped Fiber.

**Poster Session 4 (10:00-10:30)**

**P4.38**

**Optimized Decision Method Based on K-means-TKNN for Coherent Optical Communication Systems**, Zixuan Liu[1], Qi Zhang[1], Ran Gao[2], Xishuo Wang[1], Dong Guo[2], Xiangjun Xin[2], Qinghua Tian[1], Feng Tian[1], Huan Chang[2], Yongjun Wang[1] and Xia Sheng[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. We proposed a nonlinear equalization method based on K-means-Tailored K-Nearest Neighbors (K-means-TKNN) algorithm. The simulation results show the computational complexity of K-means-TKNN can be reduced to 20.3% of that of traditional KNN for 64-QAM systems.

**P4.39**

**The research of probabilistic shaping signal transmission scheme based on neural network LLR calculation**, Pandi Pang[1], Huan Chang[2], Qi Zhang[1], Xiangjun Xin[2], Ran Gao[2], Feng Tian[1], Qinghua Tian[1] and Yongjun Wang[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Beijing Inst. of Tech., China*. A scheme of probabilistic shaping signal transmission utilizing neural network based log-likelihood ratio (LLR) calculation is proposed and the mean square error ratio is reduced by about 100 times compared with approximate LLR calculation method.

**P4.40**

**Thulium-doped fiber laser with high side mode suppression ratio with wavelength at 2166nm**, Decai Zhu[1], Xinyong Dong[1], Yaozong Hu[1], Yuncai Wang[1] and Yuwen Qin[1]; [1]*Guangdong Univ. of Tech., China*. We demonstrated a thulium-doped fiber laser based on grating feedback. When the pump power at 793nm is changed from 2.79W to 4.2W, a laser with a side-mode suppression ratio of 70dB is obtained at 2160nm.

**P4.41**

**Study on Reconstruction Algorithm of X-ray Fluorescence Computed Tomography based on L1/2-norm and Expectation-Maximum**,Shanghai Jiang, Shuang Yang, Hong Gu, Shenghui Shi, Binbin Luo, Xinyu Hu, Mingfu Zhao and Xue Zou; *Chongqing Univ. of Tech., China*. X-ray fluorescence computed tomography has the problems of long scanning time and high radiation dose. In this study, a computed tomography reconstruction algorithm based on L1/2-norm was presented to solve these problems.

**P4.42**

**Low-temperature processed CsPbIBr2 perovskite solar cells with improved carrier dynamic,** Huaxin Wang and Zhigang Zang; *Chongqing Univ., China*. This work introduces a series investigations including band alignment, heterojunction interface engineering, and defect passivation, to improve the carrier dynamic of CsPbIBr2 solar cells.

**P4.43**

**A Humidity Sensor Based on CFBG Fabry-Perot Interferometer,** Qian Yu, Kai Ni, Yuwei Zhang and Jiakai Xu; *China Jiliang Univ., China*. A fiber-optic humidity sensor by cascading two identical CFBG to form a FPI is proposed and experimentally demonstrated, which is coated with CMC-Na solution as the humidity sensitive film to achieve the emeasuring humidity effect.

**P4.44**

**Research on the measurement of Road Icing Thickness by Infrared laser detection technology**, Ying Zhang[1], Junyu Long[1], Yufeng Guo[1], Decao Wu[1], Binbin Luo[1], Shanghai Jiang[1] and Mingfu Zhao[1]; [1]*Chongqing Univ. of Tech., China*. An ice thickness measurement algorithm based on differential method is derived.The experimental results show that the method of dual wavelength cooperative detection of ice thickness can effectively measure the ice thickness.

**P4.44**

**Research on the measurement of Road Icing Thickness by Infrared laser detection technology**, Ying Zhang[1], Junyu Long[1], Yufeng Guo[1], Decao Wu[1], Binbin Luo[1], Shanghai Jiang[1] and Mingfu Zhao[1]; [1]*Chongqing Univ. of Tech., China*. An ice thickness measurement algorithm based on differential method is derived.The experimental results show that the method of dual wavelength cooperative detection of ice thickness can effectively measure the ice thickness.

**P4.45**

**Intensity Interrogation Properties of Polymer-cladded Optical Fiber Localized Surface Plasmon Resonance Sensors**, Ming Lin, Wei Peng and Mengdi Lu; *Dalian Univ. of Tech., China*. Optical fiber based Localized Surface Plasmon Resonance sensors are widely used in biomolecular interaction analysis owing to their advantages of highly sensitive, easily surface modification, real-time monitoring and others.

**P4.46**

**Novel bio-sensing platform based on TFBG and multifunctional 3D nanoflower**, Yuting Sun, Yujie Wang, Yunting Du, Ming Chen, Haining Xu, Fang Wang, Bowen Wang, Yang Zhang and Wei Peng; [1]*Dalian Univ. of Tech., China*. The refractive index sensitivities of ZnO coated TFBG sensors are respectively 19.4dB/RIU and 22.96dB/RIU, which are significantly improved 5 times compared to conventional bare TFBG.

**P4.47**

**Research on Ethyl Cellulose Flexible Inductive Humidity Sensor Based on Biomass Hair Modification**, Linlin Guo, Hongquan Zhang, Junchang Yu, Yongyi Sun, Ligang Dou and Tingting Zhao; *Harbin Engineering Univ., China*. A flexible inductive humidity sensor based on ethyl cellulose hair modification is proposed. It is more suitable for wearable scenarios and has a wide range of potential for humidity detection applications.

## Yishan Hall (沂山厅), SS 2

**10:30-11:50**
**Th2A • Machine learning II**
*Presider: **Yongli Zhao**, Beijing University of Posts and Telecommunications, China*

**Th2A.1 • 10:30** Invited

**Machine learning assisted optical fiber speckle wavemeter**, Yi Li[1]; [1]*China Jiliang Univ., China*.

**Th2A.2 • 10:50**

**Opto-electronic neural networks based on few-mode fiber**, Jinsheng Xu[1], Jian Zhao[1], Tianhua Xu[1] and Kenneth Wong[2]; [1]*Tianjin Univ., China*; [2]The Univ. of Hong Kong, HK. In this work, for the first time to our knowledge, the spatial degrees of freedom are introduced to opto-electronic neural networks, and the few-mode fiber based multiplexing is numerically simulated to realize parallel synapses.

**Th2A.3 • 11:05**

**Simultaneously monitoring of CD and OSNR based on delay-tap sampling and image processing**, Jinsheng Xu[1], Jian Zhao[1], Tianhua Xu[1] and Kenneth Wong[2]; [1]*Tianjin Univ., China*; [2]The Univ. of Hong Kong, HK. We demonstrated a simultaneously CD and OSNR monitoring method for NRZ-OOK signals by employing the delay-tap sampling and image processing techniques. The monitoring ranges of OSNR and CD are 14-30 dB and 0-1275 ps/nm, respectively.

## Lushan Hall (鲁山厅), Track 6

**10:30-12:00**
**Th2B • Optical measurement VI**
*Presider: **Yi Li**, China Jiliang University, China*

**Th2B.1 • 10:30** Invited

**Ultrasensitive optical fiber sensor based on Vernier effect**, Xiaohui Fang[1]; [1]*Guangzhou Univ., China*.

**Th2B.2 • 10:50** Invited

**Tilted fiber Bragg grating based liquid flow rate sensor**, Changyu Shen[1]; [1]*China Jiliang Univ., China*. Here we propose a simple liquid flow rate sensor by using a tilted fiber Bragg grating (TFBG) as the sensing element. As the water flows in the vicinity of the TFBG along the fiber axis direction, the TFBG's spectrum changes due to its contact with water. By comparing the time-swept spectra of the TFBG in water to that of the TFBG with water flowing over it, a spectral sweep comb was formed, and the flow rate can be detected by selecting a suitable sweeping frequency.

**Th2B.3 • 11:10** Invited

**Few-mode fiber gratings and their sensing applications,** Yunhe Zhao[1]; [1]*Shanghai Maritime Univ., China*. Mode coupling performance in few-mode fiber with transmissive and reflective fiber gratings are demonstrated, including the core-to-core mode coupling and core-to-cladding mode coupling, as are their sensing applications.

## Mengshan Hall (蒙山厅), Track 9

**10:30-12:25**
**Th2C • Quantum photonics II**
*Presider: **Qiang Zhang**, University of Science and Technology of China, China*

**Th2C.1 • 10:30** Invited

**Practical security of RSA against NTC-architecture quantum computing attacks**, Qingyu Cai[1]; [1]*Hainan Univ., China*.

**Th2C.2 • 10:50** Invited

**Multiphoton nonlinear interference on a silicon chip**, Xifeng Ren[1]; [1]*Univ. of Sci. and Tech. of China, China*. Here, rather than interference of different intrinsic properties of particles, we experimentally demonstrated coherent superposition of two different birthplaces of a four-photon state. The quantum state is created in four probabilistic photon-pair sources, two combinations of which can create photon quadruplets. Coherent elimination and revival of distributed 4-photons can be fully controlled by tuning a phase. The stringent coherence requirements are met by using a silicon-based.

**Th2C.3 • 11:10** Invited

**High-dimensional quantum network**, Bi-Heng Liu[1]; [1]*Univ. of Sci. and Tech. of China, China*. Compare with two-dimensional systems, high-dimensional systems have many advantages in quantum networks. Here we build up a high-dimensional quantum network using the spatial mode of photons, including the preparation, manipulation, and measurement of high-dimensional systems.

## Laoshan Hall (崂山厅), SS 1

**10:30-12:05**
**Th2D • Organic & nano optoelectronics-VIII**
*Presider: **Lixin Xiao**, Peking University, China*

**Th2D.1 • 10:30** Invited

**High Mobility Conjugated Polymers: Design, Synthesis and Their Organic Thin Film Transistors**, Yanhou Geng[1]; [1]*Tianjin Univ., China*. Various diketopyrrolopyrrole (DPP)-based conjugated polymers were designed and synthesized via either direct arylation polycondensation or Stille polycondensation. High mobility organic thin film transistors were fabricated via bar coating.

**Th2D.2 • 10:50** Invited

**Highly stable organic field-effect semiconductor materials and transistors**, Liqiang Li[1]; [1]*Tianjin Univ., China*. We revealed the intrinsic mechanism for the aging of organic field-effect semiconductor materials and devices, and developed efficient strategy to construct highly stable organic transistor devices.

**Th2D.3 • 11:10** Invited

**Metal-oxide field-effect transistors for display and beyond**, Jun Li[1]; [1]*Shanghai Univ., China*. We will report the advance of our OLED, metal oxide (MO) field-effect transistor (FETs), and application in CMOS circuit, artificial synapse and gas sensor.

## Taishan Hall (泰山厅), Track 3

**10:30-11:20**
**Th2E • Optical networks IV**
*Presider: **Hui Yang**, Beijing University of Posts and Telecommunications, China*

**Th2E.1 • 10:30** Invited

**Polymer waveguides for high-speed on-board optical interconnects application**, Lin Ma[1]; [1]*Shanghai Jiao Tong Univ., China*. We report on the design and fabrication of low-loss polymer waveguides for on-board high-speed optical interconnects application. Both the roughness-induced loss and bandwidth of the waveguides have been theoretically and experimentally investigated. High-speed transmission performances were evaluated using both NRZ transmission and PAM4 transmission. There is no obvious degradation on the eye diagram due to the insertion of the waveguide. Our results imply that low-loss polymer waveguides have good potential in high-density and high-speed optical interconnects application.

**Th2E.2 • 10:50**
**Energy-efficient Scaling of Active Electrical/Optical Switches in Hybrid Packet/Circuit Switched Data Center Networks**, Yan Shen[1], Wei Wang[1], Tianhe Liu[1] and Jie Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China*. The data center traffic is time-varying, this paper studies the energy-efficient scaling approaches to manage the ON/OFF state of optical circuit switches and electrical packet switches to save energy while ensuring service quality.

## VIP Room (聚贤厅), Track 2

**10:30-12:10**
**Th2F • Optical transmission VI**
*Presider: **Tianshu Wang**, Changchun University of Science and Technology, China*

**Th2F.1 • 10:30** Invited

**Non-mechanical Beam Steering and Adaptive Beam Control for Free-Space Optical Communications**, Vuong Mai and Hoon Kim[1]; [1]*KAIST, South Korea*. We present our recent research activities on the beam steering and adaptive beam control implemented by using variable focus lenses for free-space optical communication systems.

**Th2F.2 • 10:50** Invited

**Phase Retrieval Receiver for Full Field Recovery**, Haoshuo Chen[1]; [1]*Nokia Bell Labs, USA, USA*.

**Th2F.3 • 11:10** Invited

**High capacity nonlinear frequency division multiplexing transmission**, Fan Zhang; *Peking Univ., China*. We discuss the recent progress of high capacity nonlinear frequency division multiplexing (NFDM) transmission. Terabit NFDM wavelength division multiplexing systems over hundreds of kilometers standard single mode fiber are experimentally demonstrated. The digital signal processing enabling high capacity NFDM operation are presented in detail. The neural network-based algorithms are discussed for system design and performance promotion.

## Yishan Hall (沂山厅), SS 2

**Th2A.4 • 11:20**
**Intelligent performance monitoring for high-speed short-reach optical networks**, Yuqing Yang[1], Jian Zhao[1], Tianhua Xu[1] and Kenneth Wong[2]; [1]*Tianjin Univ., China*; [2]The Univ. of Hong Kong, HK. We have developed performance monitoring approaches in 100/400/800 Gbit/s short-reach transmissions with advanced modulation formats. The MSE of the monitored OSNR are less than 0.1 dB and accuracies of 100% have been achieved in MFI.

**Th2A.5 • 11:35**
**ANN-Assisted Resource Allocation Scheme for Edge-Computing-Enabled Elastic Optical Networks**, Xiao Lin[1], Zhihui Lin[1], Yaping Li[1], Huimin Cheng[1] and Shaohao Wang[1]; [1]*Fuzhou Univ., China*. We use ANN models to estimate the performance of latency-critical and delay-tolerant tasks when applying edge cooperation in EC-enabled EONs. Using the performance estimation, a resource allocation scheme is proposed to jointly optimize multiple performance.

## Lushan Hall (鲁山厅), Track 6

**Th2B.4 • 11:30**
**Doppler coherent wind lidar based on golvanometer scanner**, Xinxin Chen[1] and Shuling Hu[1]; [1]*Beihang Univ., China*. In order to improve the detection probability of wind lidar and realize three-dimensional velocity measurement, we propose a single-beam wind lidar based on golvanometer scanner, which realize three-dimensional velocity measurement in the range of ±20°

**Th2B.5 • 11:45**
**Unsensitive-bending Mach-Zehnder interferometer for the detection of the Clostridium alpha toxin**, Shuaibo Zhang[1], Xiaoqi Liu[1], Yange Liu[1] and Zhi Wang[1]; [1]*Nankai Univ., China*. A kind of unsensitive-bending Mach-Zehnder interferometer(MZI) is designed for the detection of the Clostridium alpha toxin. The MZI is fabricated by mismatching fused method. Moreover, it has ability to resist the effection of bending.

## Mengshan Hall (蒙山厅), Track 9

**Th2C.4 • 11:30** Invited

**Efficient detection of multipartite quantum states**, He Lu[1]; [1]*Shandong Univ., China*.

**Th2C.5 • 11:50** Invited

**Entanglement of photons in their dual wave-particle nature**, Zhong-Xiao Man[1]; [1]*Qufu Normal Univ., China*. Here we introduce and experimentally realize a scheme that deterministically generates entanglement between the wave and particle states of two photons. The elementary tool allowing this achievement is a scalable single-photon setup which can be in principle extended to generate multiphoton wave-particle entanglement. Our study reveals that photons can be entangled in their dual wave-particle behavior and opens the way to potential applications in quantum information protocols exploiting the wave-particle degrees of freedom to encode qubits.

**Th2C.6 • 12:10**
**25 MHz repetition rate pilot-tone-assisted Gaussian-modulated continuous-variable quantum key distribution with a local local oscillator**, Heng Wang[1], Yaodi Pi[1], Yun Shao[1], Yan Pan[1], Wei Huang[1], Yang Li[1] and Bingjie Xu[1]; [1]*Inst. of Southwestern Communication, China*. A 25 MHz repetition rate pilot-tone-assisted Gaussian modulated continuous-variable quantum key distribution with a local local oscillator is experimentally demonstrated for supporting high secure key rate of 1.61 Mbps in the asymptotic regime.

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**12:00-13:30 Lunch Break, *Zhanxiang Hall (展香园 )* 1F**

## Laoshan Hall (崂山厅), SS 1

**Th2D.4 • 11:30** Invited

**Large-area Precise Patterning of Organic Single Crystals for High-Performance Transistors**, Jiansheng Jie[1]; [1]*Soochow Univ., China*. In this talk, we will introduce our recent advances in the large-area alignment and patterning of ordered SMOSNs for high-performance organic field-effect transistors (OFETs). A highly efficient yet simple method that combines micro/nano templates and conventional organic coating techniques, such as spin-coating, dip-coating, and blade-coating, was developed to produce organic mico/nanowire arrays at designated locations with high-precision and high-efficiency.

**Th2D.5 • 11:50**

**Efficient and low-voltage vertical organic light-emitting transistors**, Zhongbin Wu[1]; [1]*Northwestern Polytechnical Univ., China*. Efficient and low-voltage vertical organic light-emitting transistors.

## Taishan Hall (泰山厅), Track 3

## VIP Room (聚贤厅), Track 2

**Th2F.4 • 11:25**

**Two-layer Optical label for Operation, Administration and Maintenance of Optical Network**, Liang Junpeng[1], Wang Zhuo[1] and Wang Weiming[1]; [1]*ZTE Corparation, China*. We propose a two-layer optical label scheme for operation, administration and maintenance (OAM) of optical network. The proposed optical label can transmit abundant OAM information and provide a series of monitor functions.

**Th2F.5 • 11:40**

**BER Performance Analysis of Ground-to-UAV FSO SIMO Links with Optimized Channel Model**, Wenjing Guo[1]; [1]*Tech. and Engineering Center for Space Utilization, CAS, China*. The BER of Ground-to-UAV-FSO-SIMO links with our optimized channel model is analyzed. Simulation results show that the BER can be significantly decreased by increasing the number of receiving apertures when receiving area is the same.

**Th2F.6 • 11:55**

**SC-Loc: Milli-meter Accuracy Localization based on Visible Light Screen Communication**, Kao Wen[1], Yubin Zhao[2], Kejiang Ye[1] and Junjian Huang[1]; [1]*Shenzhen Inst.s of Advanced Tech., CAS, China;* [2]*Zhuhai Campus of Sun Yat-sen Univ., China*. This article proposes a low-cost and long-distance indoor positioning system based on screen optical communication and deep learning technology.

**12:00-13:30 Lunch Break, *Zhanxiang Hall*（*展香园*）1F**

## Yishan Hall (沂山厅), Track 1

**13:30-14:50**
**Th3A • Novel fibers & devices VII**
*Presider: **Xiaobo Xing**, South China Normal University, China*

**Th3A.1 • 13:30** Invited

**Distributed multi-parameter Brillouin fiber-optic sensor based on 98%mol Ge-doped few-mode fiber**, Pengbai Xu[1], Yongkang Dong[2], Xinyong Dong[1], Jun Yang[1] and Yuwen Qin[1]; [1]*Guangdong Univ. of Tech., China;* [2]*Harbin Institute of Tech., China*. We develop a multi-parameter Brillouin sensor based on 98%mol Ge-doped few-mode fiber that have three individual Brillouin gain spectrum, whose strain and temperature coefficients are 0.0239MHz/με, 0.025MHz/με, 0.03MHz/με, and 0.218MHz/℃, 0.318MHz/℃, 0.417MHz/℃, respectively.

**Th3A.2 • 13:50**
**Noise Characteristics of Cascading Brillouin random fiber lasers**, Yikun Jiang[1], Zhelan Xiao[1], Zenghuan Qiu[1], Haoran Xie[1], Jilin Zhang[1], Fufei Pang[1] and Liang Zhang[1]; [1]*Shanghai Univ., China*. The noise properties of a cascading Brillouin random fiber laser are characterized, exhibiting a phase and frequency noise suppression as well as a low-frequency relative intensity noise additive transfer with respect to the 1st Stokes.

**Th3A.3 • 14:05**
**Broad Spectrum Characteristics of Bi/Er co-doped Silica Optical Fiber in C-band**, Zexin Zheng[1], Xiangping Pan[1] and Weizhu Ji[1]; [1]*Shanghai Univ., China*. The fiber exhibits ultra-broadband luminescence spectrum region between 1100 and 1700 nm. And the maximum gain of the fiber can reach 34 dB at 1534 nm when the pump power is 131.3 mW.

**Th3A.4 • 14:20**
**Miniature Fiber-optic Modal Interferometer Based on Ultrasonic-Cutting Technique for Low-range Refractive Index Sensing**, Qian Wang[1], Jixuan Wu[1], Binbin Song[2], Hua Bai[1], Bo Liu[3] and Shaoxiang Duan[3]; [1] *Tiangong Univ., China;* [2]*Tianjin Univ. of Tech., China;* [3]*Nankai Univ., China.* A fiber-optic modal interferometer is proposed and experimentally investigated for low-range refractive index sensing. This interferometer is fabricated by ultrasonic-cutting technique with a sensitivity of 12085.1 nm/RIU, which makes it an application in biological fields.

## Lushan Hall (鲁山厅), Track 6

**13:30-15:25**
**Th3B • Optical measurement VII**
*Presider: **Changyu Shen**, China Jiliang University, China*

**Th3B.1 • 13:30** Invited

**Protein detection based on time dependent refractive index modulation in bidirectional magnetophoresis**, Rende Ma[1]; [1]*Qufu Normal Univ., China*. Here, based on the time dependent refractive index modulation of biofunctionalized ferrofluid, we demonstrate a methodology for designing label-free optical biosensors. The functionalization of optical device is avoided. As a result, this methodology greatly simplifies the experimental operation, possesses good reproducibility, and can improve detection speed.

**Th3B.2 • 13:50**
**Measurement of Young's Modulus of Metallic Materials Based on Fiber Bragg Grating**, Xinxin Chen[1], Boning Zhou[1], Siyang Wang[1], Xu Jiang[1] and Shuli Sun[1]; [1]*Heilongjiang Univ., China*. This article uses 42CrMo alloy steel as the measurement material. A design method for measuring the Young's modulus of metallic materials using fiber Bragg gratings and pressure sensors is proposed.

**Th3B.3 • 14:05**
**Dual-mode interference microfiber vibration sensor based on rectangular beam with through hole**, Kaijun Liu[1], Xianglong Zou[1], Qi Yang[1], Junhao Fan[1], Yufeng Guo[1], Binbin Luo[1], Xue Zou[1], Decao Wu[1] and Shenghui Shi[1]; [1]*Chongqing Univ. of Tech., China*. A reflected microfiber vibration sensor is proposed. The axial strain sensitivity of proposed sensor is -3.65pm/με, the acceleration sensitivity is 0.15214V/g at 35Hz, and the frequency detection range is 30-3500Hz.

## Mengshan Hall (蒙山厅), SS 4

**13:30-15:25**
**Th3C • Electronic Technonolgy I**
*Presider: **Lu Zhang**, China Agricultural University, China*

**Th3C.1 • 13:30** Invited

**Research on quantification characterization technology of electromagnetic compatibility (EMC) based on test results**, Xin Chen[1], Yang Qiu[2] and Jin Tian[2]; [1]*Inst. of Electronic Engineering, China Academy of Engineering Physics, China*; [2]*Xidian Univ,. China*. Based on the quantitative requirements of equipment electromagnetic compatibility (EMC), the quantitative representation methods of EMI and EMS test results are put forward and the mathematical model is established.

**Th3C.2 • 13:50** Invited

**Study on the working temperature characteristics of methane sensor by directional ordered Al2O3 nanotubes confined catalysis**, Bin Shen[1], Leiming Jiang[1], Xinlei Liu[1], Fang Zhang[1], Xiaoyang Song[1], Haiyang Yang[1] and Chunbo Jin[1]; [1]*Heilongjiang Univ. of Sci. and Tech., China*. In order to solve the high working temperature of catalytic gas sensor, a catalytic gas sensor based on ceramic micro-hotplate is fabricated by MEMS technology, which will help to improve the stability of the sensor.

**Th3C.3 • 14:10** Invited

**A novel circular convolution imaging algorithm based on compressed sensing for FMCW csar**, Shujie Mu[1]; [1]*Yingkou Inst. of Tech., China*. To solve the problem of low efficiency in wavenumber domain imaging of frequency modulated continuous wave circular synthetic aperture radar, a fast circular convolution algorithm is proposed.

## Laoshan Hall (崂山厅), SS 1

**13:30-15:25**
**Th3D • Organic & nano optoelectronics-VIIII**
*Presider: **Guoli Tu**, Huazhong University of Science and Technology, China*

**Th3D.1 • 13:30** Invited

**AC Driven Electroluminescent Devices with Planar Structure**, Hong Meng[1]; [1]*Peking Univ. Shenzhen Graduate School, China*. We propose a novel structure for ACEL displays with coplanar electrodes. Basing on this device geometry, attractive applications were demonstrated. This structure can be further applied in various device structures as sensors and AC-OLEDs etc.

**Th3D.2 • 13:50** Invited

**Recent Advances in Manufacturing Large Area Precision Thin Films with Slot-Die Coating：From Flat Panel Display to Perovskites PV and IC Fan-Out Panel Level Packaging**, Jin-Shan Wang[1]; [1]*Shanghai Precision Systems, Inc, China*. advances in manufacturing large area precision thin films with Slot-Die Coating with the focus on in very new applications in two areas: Perovskites solar cell and IC advanced packaging such as FO-WLP and FO-PLP.

**Th3D.3 • 14:10** Invited

**Persistent luminescence based on molecular hybrid materials**, Dongpeng Yan[1]; [1]*Beijing Nornal Univ., China*. In this work, we systematically describe recent advances in establishing persistent luminescent materials—specifically focusing on materials composed of molecular hybrids. We describe the main strategies for synthesizing these hybrid materials, namely: (i) inorganics/organics, (ii) organics/organics, and (iii) organics/polymer systems and demonstrate how molecular hybrids provide synergistic effects, while improving luminescence lifetimes and efficiencies.

## Taishan Hall (泰山厅), Track 4

**13:30-15:30**
**Th3E • Optoelectronics V**
*Presider: **Zhenzhou Cheng**, Tianjin University, China*

**Th3E.1 • 13:30** Invited

**Recent progress on membrane photonics devices**, Shinji Matsuo [1]; [1]*NTT Device Tech. Laboratories, Japan*.

**Th3E.2 • 13:50** Invited

**High-performance heterogeneous quantum-dot single- and multi-wavelength lasers on silicon**, Di Liang[1]; [1]*Hewlett Packard Labs, China*.

**Th3E.3 • 14:10** Invited

**Optoelectronic Characteristics of Organic Semiconductors at 2D Limit,** Jian-Bin Xu[1]; [1]*The Chinese Univ. of Hong Kong, China*. In this presentation, we will report on the recent advances in interrogation on optoelectronic characteristics of organic semiconductors at two-dimensional limit. A number of organic semiconductor molecules were selected for preparation of highly-crystalline molecularly-thin films on several substrates by physical vapor transport (PVT) technique. It is found that high-quality ultra-thin films of N,N'-dimethyltriphenylene 3,4,9,10-tetracarboxylic diimide (PTCDI-C13) and its derivative can be produced on hexagonal boron nitride (h-BN) and SiO2 substrates. Various optoelectronic attributes will be presented.

## VIP Room (聚贤厅), Track 2

**13:30-15:05**
**Th3F • Optical transmission VII**
*Presider: **Jing Zhang**, University of Electronic Science and Technology of China, China*

**Th3F.1 • 13:30** Invited

**Bandwidth-constrained Short-reach IM/DD Transmissions for Next-generation Data-center Interconnections**, Meng Xiang[1]; [1]*Guangdong Univ. of Tech., China*. In this paper, we review some key techniques enabling next-generation data-center interconnections with bandwidth constraint. Using either transmitter-side Tomlinson Harashima precoding (THP) or receiver-side feed forward equalization (FFE) aided with 2-tap post filter and maximum likelihood sequence estimation (MLSE).

**Th3F.2 • 13:50**
**Analysis on adaptability and training methods of Photonic Reservoir Computing in compensating nonlinear effects**, Hailong Zhu[1], Xianfeng Tang[1], Li Deng[2], Le Liu[1], Peng Zhan[3], Hao Chen[4] and Xiaoguang Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China; [2]State Grid Information and Telecommunication Branch, China; [3]Info. and Communication Branch of Hubei Ele. Power Company, China; [4]Anhui Jiyuan Software Co., Ltd., China*. In this paper, the adaptability and effectiveness of photonic reservoir computing to recover non-linearly distorted signal are investigated; in addition, performance of the system is analyze using three different linear regression training methods

**Th3F.3 • 14:05**
**Physical layer encryption for polarization division multiplexir coherent optical communication system based on the rotation the state of polarization**, Chuanwei Gao[1], Xianfeng Tang[1], Na Cui[1], Hengying Xu[2], Changqing Yang[1], Longyong Chen[3], Yuche Luan[3], Qi Meng[4], Wenjie Kong[4] and Xiaoguang Zhang[1]; [1]*Beijin Univ. of Posts and Tel., China; [2]Liaocheng Univ., China; [3]CA China; [4]State Grid Zhejiang Electric Power Company Info. & Tel Branch, China*. In this paper, we propose an optical physical laye encryption method to encrypt the signal of polarization division multiplexing (PDM) coherent optical communication system by introducing an artificially controlled fast rotation of SOP.

## Yishan Hall (沂山厅), Track 1

**Th3A.5 • 14:35**
**Distributed fiber optic vibration sensing with high frequency response assisted by a distributed interferometer**, Zhenshi Sun[1], Kun Liu[1], Junfeng Jiang[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China academy of space Tech., China*. A vibration scheme by merging phase-sensitive optical time domain reflectometry and Michelson interferometer has been proposed. The vibration frequency of 45 kHz and spatial resolution of 15 m are achieved in 2 km fiber link.

**Th3A.6 • 14:50**
**Theoretical Investigation of Optical Fiber Waveguide Coupled Surface Plasmon Resonance Sensor with Narrow Full Width at Half-Maximum**, Jianying Jing[1], Kun Liu[1], Junfeng Jiang[1], Tianhua Xu[1], Shuang Wang[1], Jinying Ma[1], Zhao Zhang[1], Wenlin Zhang[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China*. Long range-surface plasma resonance (LR-SPR) biosensor with low limit of detection (LOD) based on plasma coupling and sandwich immunoassay was demonstrated for human-immunoglobulin G detection.

**Th3A.7 • 15:05**
**Intracavity Gas Sensing System Based on Tunable Thulium-doped Fiber Laser**, Yafan Li[1], Kun Liu[1], Jifang Shan[1] and Tiegen Liu[1]; [1]*Tianjin Univ., China*. An all-fiber tunable thulium-doped fiber laser has been designed to generate the 2 μm band laser. And the spectral scanning of water vapor in the range of 1928~1938 nm is realized.

**Th3A.8 • 14:20**
**The sensitivity enhancement based on the Au/black phosphorus composite film for the surface plasma resonance fiber sensor,** Zhao Zhang, Kun Liu, Junfeng Jiang, Tianhua Xu, Shuang Wang, Jinying Ma, Jianying Jing, Wenlin Zhang and Tiegen Liu; *Tianjin Univ., China*. The newly sensitivity enhancement mechanism about Au/black phosphorus composite film based on surface plasma resonance (SPR) fiber sensor. The sensitivity enhancement level can reach as high as 140%.

## Lushan Hall (鲁山厅), Track 6

**Th3B.4 • 14:20**
**Sweep-free BOTDA using non-orthogonal frequency division multiplexing**, Yaxi Yan[1], Hua Zheng[1], Chao Lu[1] and Changjian Guo[2]; [1]*The Hong Kong Polytechnic Univeristy, China;* [2]*South China Normal Univ., China*. A novel sweep-free BOTDA using the non-orthogonal frequency division multiplexing is proposed. Dynamic measurement with 3.1 m spatial resolution and 1.294 MHz measurement accuracy over 10 km sensing range is demonstrated.

**Th3B.5 • 14:35**
**114 nm broadband all fiber nonlinear-polarization-rotation mode locked laser and time-stretch optical coherence tomography**, Dongmei Huang[1], Hongjie Chen[1] and Ziihao Cheng[1]; [1]*The Hong Kong Polytechnic Univ., China*. An all fiber Er-doped mode-locked laser with a 3 dB spectrum of 114 nm based on the NPR technique is demonstrated. It is also applied time stretch optical coherence tomography with 12.1 um high resolution.

**Th3B.6 • 14:50**
**Fast BOTDA based on high-order harmonics enhanced by injection-locking**, Dexin Ba[1], Xuejie Mu[1], Tianfu Li[1] and Yongkang Dong[1]; [1]*Harbin Inst. of Tech., China*. Broadband arbitrary waveform generator (~11GHz) is essential for fast Brillouin optical time-domain analysis (BOTDA). A fast BOTDA based on injection-locking of high-order harmonics is proposed, which saves the bandwidth by approximately an order of magnitude.

## Mengshan Hall (蒙山厅), SS 4

**Th3C.4 • 14:30** Invited

**Self-validating Soft Sensor Model for Machine Olfactory System**, Yinsheng Chen[1]; [1]*Harbin Univ. of Sci. and Tech., China*. Machine olfaction is a new bionic technology, but it has not been able to break through the bottleneck of practical application.This paper introduces a robust self-validating soft sensor model.

**Th3C.5 • 14:50** Invited

**Antenna Design Based on Minkowski Like Fractal Structure**, Xuemei Zheng[1] and Songqi Li[1]; [1]*Northeast Electric Power Univ., China*. A dual band fractal microstrip antenna is designed, which works in WLAN and WiMAX band. The center frequency is 2.4GHz and 2.7GHz, and the isolation near the center frequency is more than 15dB.

**Th3C.6 • 15:10**
**Design of a remote multi-channel high-precision strain acquisition system**, Gangfeng Huang[1], Zhenrong Zhang[1] and Xiangcheng Li[1]; [1]*Guangxi Univ., China*. In this paper, a remote multi-channel high-precision strain acquisition system based on stm32 is designed, and the system can be verified to meet the expected requirements after testing.

**15:30-16:00 Coffee Break, 2F**

## Laoshan Hall (崂山厅), SS 1

**Th3D.4 • 14:30** Invited

**The realization of transparent and flexible organic electronics via ALD**, Yu Duan[1]; [1]*Jilin Univ., China*. The degradation of OLEDs has been reported in literature by various researchers. ALD, a technique widely used nowadays. The purpose of this work is to introduce ALD into flexible transparent OLEDs.

**Th3D.6 • 15:50** Invited

**PbX Quantum Dot Solar Cells**, Zeke Liu[1]; [1]*Soochow Univ., China*. I will report our progress on simplifying the fabrication process of (PbX, X=S,Se) QD solar cells and demonstrate the effect of water on QD solar cells.

**Th3D.6 • 15:10**
**Flexible fabric-type solar-powered integrated electronic circuit**, Xing Fan[1], Siwei Xiang[1] and Xiaofei Wei[1]; [1]*Chongqing Univ., China*. We developed a series of fiber-structured energy devices, sensors and transistors. Following a proper circuit design, the above fiber devices were integrated in an all-woven way, to realize an uninterrupted fabric-type integrated electronic circuit system

## Taishan Hall (泰山厅), Track 4

**Th3E.4 • 14:30**
**Bandwidth broadening for CS-MMI-based Optical Quantizer**, Chang Liu[1], Jifang Qiu[1], Bowen Zhang[1], Yan Li[1] and Jian Wu[1]; [1]*Beijing Univ. of Posts and Tel., China*. We broaden the narrow operation bandwidth of our previously proposed CS-MMI-based optical quantizer by using the material of Si3N4. Simulation results show that the operation range is broadened from 12nm to 43nm for ENOB>3bit.

**Th3E.5 • 14:45**
**High Q Nanobeam cavity based on etchless lithium niobate integrated platform**, Jiaxin Zhang[1], Weixi Liu[1], Bingcheng Pan[1], Daoxin Dai[1] and Yaocheng Shi[1]; [1]*Zhejiang Univ., China*. Photonic BICs applied in the LNOI has been exploited. Here we firstly propose a nanobeam structure with BICs exhibiting a high Q factor of over 7000 with the length of only ~100 μm.

**Th3E.6 • 15:00**
**Ultra-Compact Multi-Mode Converter for Optical Delay Line Application**, Ningning Wang[1], Xing Yang[1], Di Wu[1], Liangjun Lu[1], Linjie Zhou[1] and Jianping Chen[1]; [1] *Shanghai Jiao Tong Univ., China*. We propose a novel optical delay line structure based on multi-mode conversion. The multi-mode converter can simultaneously convert TEi to TEi+1 modes (i = 1, 2, 3) with an area of 4μm × 3μm.

**Th3E.7 • 15:15**
**A Methodology of Building a Platform to Evaluate the Loss and the Crosstalk in Silicon Photonic Interconnects on Chip,** Hui Li, Jiahe Zhao and Mengying Ru; *Xidian Univ., China*. This work proposes a methodology of building a platform to evaluate the loss and crosstalk in silicon photonic interconnects on chip. Compared to professional tools, it can offer faster results, although the accuracy needs improvement.

## VIP Room (聚贤厅), Track 2

**Th3F.4 • 14:20**
**Improving Performance of Direct-Detection Terahertz Communication System based on k-Means Adaptive Vector Quantization**, Linghao Yue[1], Yuancheng Cai[2], Min Zhu[1], Pengyuan Wang[1], Liyao Zhang[1], Mengfan Sun[1], Sheng Liang[1], Mingzheng Lei[2], Jiao Zhang[2], Bingchang Hua[2], Liang Tian[2], Yucong Zou[2] and Aijie Li[2]; [1]*Southeast Univ., China;* [2]*Purple Mountain Laboratories, China*. The performance of the adaptive vector quantization based on k-means clustering for direct-detection terahertz communication in 0.3 THz band is studied by simulation. This technology can significantly improve quantization performance.

**Th3F.5 • 14:35**
**Identifying modulation formats using integrated clustering algorithm**, Jinmei Ye[1], Wenbo Zhang[1], Zixian Yue[1], Hengying Xu[2], Yuxiang Wang[1] and Xulun Zhang[1]; [1]*Beijing Univ. of Posts and Tel., China;* [2]*Liaocheng Univ., China*. We propose an integrated-clustering-algorithm-base modulation format identification

**Th3F.6 • 14:50**
**Performance analysis for multi-hop FSO communication system over M distribution with pointing errors**, Weina Pang[1], Wenwen Chen[1], Yatong Song[1], Ganggang Li[1], Ping Wang[1], Mengyi Duan[1] and Shuang Li[1]; [1] *Xidian Univ., China*. The performance of multi-hop free-space optical (FSO) communication system is investigated over M distribution. Considering the BPSK SIM/DD techniques, the average bit error rate and ergodic capacity expressions are obtained over i.n.i.d. fading channels.

**Th3F.7 • 15:05**
**Bit-Wise Achievable Information Rates for Probabilistically Shaped 64-QAM in the Presence of Bandwidth Narrowing due to Cascaded Wavelength Selective Switches**, Linan Li[1], Junjie Zeng[1], Minglong Pu[1], Junqiang Ren[1], Lei Zhang[1] and Ning Xin[1]; [1]*Inst. of telecommunication and navigation satellites, China academy of space Tech., China*. An efficient procedure is presented for evaluating the performance implications of cascaded WSSs on probabilistically shaped 64-QAM. The constellation distribution that yields the optimum shaping gain in BW-AIR depends on the extent of the narrowing.

**15:30-16:00 Coffee Break, 2F**

## Yishan Hall (沂山厅)

## Lushan Hall (鲁山厅), Track 6

**16:00-17:35**
**Th4B • Optical measurement VIII**
*Presider: **Pengbai Xu**, Guangdong University of Technology, China*

**Th4B.1 • 16:00** Invited

**Recent progress in high-speed correlation-domain Brillouin sensing**, Heeyoung Lee[1]; [1]*Shibaura Inst. of Tech., Japan*. We present the current status and future challenges of a fiber-optic distributed strain and temperature sensing method termed as Brillouin optical correlation-domain reflectometry (BOCDR). BOCDR operates on the basis of synthesized optical coherence functions and is a unique technique that can simultaneously achieve single-end operation, high spatial resolution, random accessibility, and cost efficiency. One of its drawbacks was the relatively low-speed operation, but this issue has been resolved by special schemes including slope-assisted BOCDR.

**Th4B.2 • 16:20**
**Optical Integrated Sensor Based on 2x4 Multimode Interference Coupler and Intensity Mechanism with a High Sensitivity**, Van Hach Nguyen[1], Anh Tuan Nguyen[2], Duy Tien Le[2] and Trung Thanh Le[2]; [1]*Univ. of Natural Resources and Environment, Vietnam;* [2]*Vietnam National Univ., Vietnam*. We propose a new optical sensor with high sensitivity based on intensity mechanism using only one 2x4 multimode interference (MMI) coupler. The sensor structure can provide a very high sensitivity compared with conventional structures.

**Th4B.3 • 16:35**
**Phase bias in dual-axis optical gyroscope based on a double-ring structure**, Hong Gu[1]; [1]*Tiangong Univ., China*. A dual-axis angular velocity sensor is presented. The sensitivity can be improved by adding a bias phase. The best sensitivity can be obtained by adding a phase bias of ±3π/2.

## Mengshan Hall (蒙山厅), SS 4

**16:00-17:30**
**Th4C • Electronic Technonolgy II**
*Presider: **Xin Chen**, Institute of Electronic Engineering, China Academy of Engineering Physics, China*

**Th4C.1 • 16:00** Invited

**Research on fault recovery method of AC / DC hybrid distribution network with electric vehicle charging station**, Minfa Huang[1], Hong Shen[1], Juanjuan Peng[1] and Lu Zhang[2]; [1]*State Grid Hubei Electric Power Co. Ltd. Technical Training Center, China;* [2]*China Agricultural Univ., China*. This paper proposed a fault recovery method of AC / DC hybrid distribution network with electric vehicle charging station.

**Th4C.2 • 16:20** Invited

**The Design and Implementation of Hydrogen Sensor Fault Detection Device**, Jin Li[1] and Yongyi Sun[1]; [1]*Liaoning police academy, China*. It is of great significance to design and implement a hydrogen sensor fault detection device. In this paper, a hydrogen detection device based on STM32 is designed.

**Th4C.3 • 16:40** Invited

**Research on Self-calibration Strategy of Workpiece Processing Based on Machine Vision**, Zhenqi Wang[1], Dong Guo[1], Yongjin Wang[1], Chunyong Wang[1], Wending Wei[1] and Runan Ding[1]; [1]*Liaoning Univ. of Tech., China*. Self-calibration processing equipment is studied through measuring the precise size of the workpiece produced in the factory assembly line based on the machine vision measurement technology. Hough circles detection and subpixel edge algorithm are adopted.

## Laoshan Hall (崂山厅), SS 1

**16:00-17:50**
**Th4D • Organic & nano optoelectronics-X**
*Presider: **Lingling Ren**, National institute of metrology, China, China*

**Th4D.1 • 16:00** Invited

**The Micro-/Nano-structured Engineering on Colorless Polyimide Films**, Guoli Tu[1], Xiangfu Liu[1], Jiulin Shen[1] and Jinming Ma[1]; [1]*Huazhong Univ. of Sci. and Tech., China*. The nanostructured inorganic multilayer and metal grid were fabricated on colorless polyimide (PI) to meet the requirements in flexible optoelectronics, and the in-situ growth of metal nanostructures on PI were also utilized in flexible sensing.

**Th4D.2 • 16:20** Invited

**Calibration and uncertainty evaluation of fluorescence quantum efficiency absolute measurement method**, Lingling Ren[1], Zhili Jia[1] and Yaxuan Yao[1]; [1]*National institute of metrology, China*. we will show the absolute method for the fluorescence quantum efficiency by a complete optical path with an integrating sphere. Moreover, the whole path is calibrated and the uncertainty of the absolute method is evaluated.

**Th4D.3 • 17:40** Invited

**Infrared photodetector based on colloidal quantum dots,** Wenjia Zhou; *ShanghaiTech Univ., China*. Infrared photodetectors have important applications in both military civil and fields. Colloidal quantum dots are considered to one of the candidates for next-generation materials for infrared photodetectors. We will introduce our recent works on this field.

## Taishan Hall (泰山厅)

## VIP Room (聚贤厅), Post-deadline

**16:00-17:45**
**Th4F • Post-deadline**
*Presider: **Yunhe Zhao**, Shanghai Maritime University, China*

**Th4F.1 • 16:00**
**Wearable and Alignment-free Optical Microfiber Device for Human Health Monitoring**, Liangye Li, Changying Song, Yunfei Liu, Shunfeng Sheng, Zhijun Yan and Qizhen Sun; Huazhong *Univ. of Sci. and Tech., China*. The wearable and alignment-free photonic chip which consists of optical microfiber and flexible liquid chip for human health monitoring was developed. High-fidelity physiological signals and vital signs were detected and extracted for cardiovascular health assessment.

**Th4F.2 • 16:15**
**OFDR based curvature sensing with quasi-single mode operated few-mode fibers**, Chao Li, Jianfei Liu, Mingming Luo, Xiangye Zeng and Wenrong Yang; Hebei Univ. of Tech*., China*. We demonstrate a distributed curvature sensor based on quasi-single mode Rayleigh backscattering in few mode fiber(FMF). we combine FMF with Optical Frequency Domain Reflectometry (OFDR) mechanism to obtain high precision and spatial resolution curvature sensing.

**Th4F.3 • 16:30**
**All-Silicon On-Chip Polarizer with > 415 nm working bandwidth**, Weixi Liu, Daoxin Dai and Yaocheng Shi; Zhejiang *Univ., China*. We proposed and demonstrated an all-silicon TM polarizer by introducing double-slot Euler bending on 340-nm SOI with experimental excess loss < 1 dB and polarization extinction ratio > 25 dB over > 415-nm working bandwidth.

## Yishan Hall (沂山厅)

## Lushan Hall (鲁山厅), Track 6

**Th4B.4 • 16:50**
**Generative Adversarial Network based Image Blind Denoising for Brillouin Distributed Sensing**, Ya'Nan Yang[1], Yong Dong[1] and Kuanglu Yu[1]; [1]*Beijing Jiaotong Univ., China*. We employ a GAN-CNN based framework to address the problem of image blind denoising problem for Brillouin optical time domain analyzer(BOTDA), which achieves impressive results at promoting signal-to-noise ratio(SNR), measure accuracy and spatial resoluti

**Th4B.5 • 17:05**
**Metal-organic Framwork Humidity Sensing Based on Optical Fiber Fabry-Perot Interference**, Shuaicheng Liu[1], Yixiao Ma[1], Guanjun Wang[1], Weiting Yang[1] and Mengxing Huang[1]; [1]*Hainan Univ., China*. This paper studies a humidity sensor which is based on a combination of metal-organic framework (MOF) and single-mode optical fiber. Humidity can be quantitatively detected in real time, and the sensitivity reaches 135pm per %RH.

## Mengshan Hall (蒙山厅), SS4

**Th4C.4 • 17:00**
**The Construction of Public Security Emergency Communication Architecture Based on Satellite Communication**, Yangyang Liu[1], Fang Ji[1] and Yongyi Sun[1]; [1] *Liaoning police academy, China*. Based on the conventional application of public security emergency communication, this paper discusses how to build a new Architecture support based on space network communication by adding portable satellite communication station and police UAV.

**Th4C.5 • 17:15**
**Multi-fault identification of iron oxide gas sensor based on CNN-wavelelet-based network,** Tingting Zhao, Hongquan Zhang, Xinlei Zhang, Yongyi Sun, Ligang Dou and Shengjie Wu; *Harbin Engineering Univ., China*. An improved method based on traditional CNN network is proposed for fault detection of hydrogen iron oxide sensors. The excitation function of CNN network is optimized and combined with the wavelet analysis method.

Laoshan Hall (崂山厅), SS 1

Taishan Hall (泰山厅)

VIP Room (聚贤厅), Post-deadline

**Th4D.4 • 17:00** Invited

**Metasurface-based subtractive color filter fabricated on a 12-inch glass wafer using CMOS platform**, Zhengji Xu[1]; [1]*Sun Yat-sen Univ., China*. In this study, SCFs on 12-inch glass wafer substrate fabricated using the CMOS-compatible process is demonstrated. The functional SCFs with different colors have been demonstrated, and the displayed colors are verified by matching the complementary color of filtered color within red-yellow-blue (RYB) color wheel. The transmittance spectra obtained from simulation and experiment have been compared and discussed. The works paves the way towards the large-scale mass production of the structural color filters.

**Th4D.5 • 17:20**

**The mechano-responsive luminescence (MRL) of organic materials with persistent room-temperature phosphorescence (pRTP)**, Zhiyong Yang[1], Faxu Lin[1], Danman Guo[1], Yifeng Cao[1], Huahua Huang[1], Yi Zhang[1] and Zhenguo Chi[1]; [1]*Sun Yat-sen Univ., China*. The mechano-responsvie luminescence (MRL) of orgainc persistent RTP (pRTP) materials have been systematic studied: proposed “n-π stacking” mechanism for pRTP, reported the highest quantum yield of pRTP, and discovered several novel kinds of dual-emissive

**Th4D.6 • 17:35**

**Tamm-FP coupling narrowband infrared perfect absorber based on TiN**, Simeng Liu[1], Jinghao Wu[1] and Yanlong Meng[1]; [1]*China Jiliang Univ., China*. A hybrid structure of optical cavity and Tamm plasma (TP) mode coupling is proposed, which achieves a narrow-band perfect absorption with adjustable wavelength in the mid-infrared spectrum range of 3.5 μm-8 μm

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Mingqing Zuo - P3.7
Zhen Zuo - P1.18