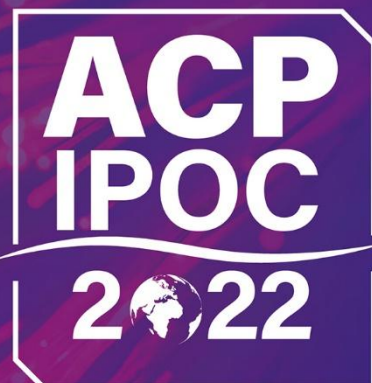




CONFERENCE PROGRAM



ASIA COMMUNICATIONS AND PHOTONICS CONFERENCE

INTERNATIONAL CONFERENCE ON INFORMATION PHOTONICS AND OPTICAL COMMUNICATIONS

November
5-8, 2022

Shenzhen
China



南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY



电子与电气工程系
DEPARTMENT OF ELECTRONIC AND ELECTRICAL ENGINEERING

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ACP/IPOC 2022

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Welcome

ACP/IPOC 2022

Asia Communications and Photonics Conference (ACP) is one of the largest conference in the Asia-Pacific region on optical communication, photonics and relevant technologies, which has been held annually tracing back to 2001 and jointly sponsored by OPTICA, SPIE, IEEE Photonics Society, The Chinese Optical Society and China Institute of Communications.

ACP2022 will be held concurrently with the International Conference on Information Photonics and Optical Communications (IPOC). IPOC was founded by the State Key Laboratory of Information Photonics and Optical Communications of Beijing University of Posts and Telecommunications in 2013.

ACP/IPOC 2022 will be hosted by Southern University of Science and Technology in **Shenzhen, on 5-8 November 2022**. We would like to invite you to participate in this international conference, to share your recent research outcome as well as taking this opportunity to meet academia, scientists and researchers from different parts of the world.

General Chairs

Perry Shum, Southern University of Science and Technology

Chennupati Jagadish, Australian National University

Connie Chang-Hasnain, Bernel Photonics

Daoxin Dai, Zhejiang University

David Payne, University of Southampton

Chao Lu, The Hong Kong Polytechnic University

Yuwen Qin, Guangdong University of Technology

Shuangchen Ruan, Shenzhen Technology University

Xinliang Zhang, Huazhong University of Science and Technology

Chunyang Yang, South-Central Minzu University

Committee

ACP/IPOC 2022

ACP Organizing Committee

General Chairs

Perry Shum, Southern University of Science and Technology
Chennupati Jagadish, Australian National University
Connie Chang-Hasnain, Bernel Photonics
Daoxin Dai, Zhejiang University
David Payne, University of Southampton
Chao Lu, The Hong Kong Polytechnic University
Yuwen Qin, Guangdong University of Technology
Shuangchen Ruan, Shenzhen Technology University
Xinliang Zhang, Huazhong University of Science and Technology
Chunyang Yang, South-Central Minzu University

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Jie Luo, State Key Laboratory of Optical Fiber and Cable Manufacture Technology, YOFC
Hongyan Fu, Tsinghua University
Zhaohui Li, Sun Yat-Sen University
Han Zhang, Shenzhen University
Hai Yuan, GIAT
Qizhen Sun, Huazhong University of Science and Technology

Special Session Chair

Xia Yu, Beihang University

Exhibition Chair

Nan Zhang, JPT

Sponsorship Chair

Zhen Gao, Southern University of Science and Technology

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Tianye Huang, China University of Geosciences (Wuhan)

Publicity Chair

Changyuan Yu, The Hong Kong Polytechnic University

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Niaomi Chavez, OPTICA
Arthur Chiou, National Yang Ming Chiao Tung University
Yun C. Chung, Korea Advanced Institute of Science and Technology
Sailing He, Zhejiang University
Chennupati Jagadish, Australian National University
Ming-Jun Li, Corning Inc.
Xingde Li, Johns Hopkins University
Xiang Liu, Huawei Technologies, Hongkong
Chao Lu, The Hong Kong Polytechnic University
Razzano Doug, IEEE Photonics Society
Yikai Su, Shanghai Jiao Tong University
Xunbin Wei, Peking University
Shaohua Yu, Wuhan Institute of Posts and Telecommunications
Xinliang Zhang, Huazhong University of Science and Technology

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Kun Xu, Beijing University of Posts and Telecommunications, China
Perry Shum, Southern University of Science and Technology, China
Huiyun Liu, University College London, UK
Yuefeng Ji, Beijing University of Posts and Telecommunications, China

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Chao Lu, The Hong Kong Polytechnic University, China
Lena Wosinska, Chalmers University of Technology, Sweden

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Workshop Technical Program Committee Co-Chairs

Gangxiang Shen, Soochow University, China
Xiang Liu, Huawei, China
Chongjin Xie, Alibaba, USA

Track Chairs

T1: Optical Fibers and Fiber-based Devices

Luming Zhao, Huazhong University of Science and Technology, China
Sze Yun Set, The University of Tokyo, Japan
Ju-Han Lee, University of Seoul, South Korea
Gangding Peng, The University of New South Wales, Australia

T2: Optical Transmission Systems, Sub-systems and Technologies

Ming Tang, Huazhong University of Science and Technology, China
Periklis Petropoulos, University of Southampton, UK
Junjie Li, China Telecom, China

T3: Networks Architectures, Management and Applications

Gangxiang Shen, Soochow University, China
Vittorio Curri, Politecnico di Torino, Italy
Suresh Subramaniam, The George Washington University, USA
Jiawei Zhang, Beijing University of Posts and Telecommunications, China
Xijia Zheng, Google LLC, Sunnyvale, CA, USA

T4: Materials, Devices and Optoelectronics Integration

Jianguo Liu, Institute of Semiconductors, CAS, China
Chao Peng, Peking University, China
Tian Jiang, National University of Defense Technology, China
Junming An, Institute of Semiconductors, CAS, China

T5: Microwave Photonics and Optical Signal Processing

Shilong Pan, Nanjing University of Aeronautics and Astronautics, China
Antonella Bogoni, NSant'Anna School of Advanced Studies, Italy
Jose Azana, Institut National de la Recherche Scientifique, Canada
Zhangyuan Chen, Peking University, China
Zhibiao Hao, Tsinghua University, China
Jungwon Kim, Korea Advanced Institute of Science and Technology, South Korea

T6: LEDs, Photovoltaics, and Optoelectronics in Energy

Aung Ko Ko Kyaw, Southern University of Science and Technology, China
Dewei Zhao, Sichuan University, China
Vincenzo Pecunia, Simon Fraser University, Canada
Xuyong Yang, Shanghai University, China
Abhishek Kumar Srivastava, The Hong Kong University of Science and Technology, China

T7: Biophotonics and Optical Sensors

Guanghai Wang, Nanjing University, China
Tianxun Gong, University of Electronic Science and Technology of China, China
Fei Xu, Nanjing University, China
Tuan Guo, Jinan University, China
Peng Fei, Huazhong University of Science and Technology, China

T8: Micro-, Nano-, and Quantum Science and Applications

Yun-Feng Xiao, Peking University, China

Ortwin Hess, Trinity College Dublin, Ireland

Kartik Srinivasan, National Institute of Standards and Technology, USA

Lin Wu, Singapore University of Technology and Design, Singapore

Special Session Chairs

SS1: Hollow Core Optical Fibers and Applications

Yingying Wang, Jinan University, China

Natalie Wheeler, University of Southampton, UK

SS2: Mid-IR lasers and Applications

Houkun Liang, Sichuan University, China

Jinwei Zhang, Huazhong University of Science and Technology, China

SS3: Terahertz Science and Technology

Chunmei Ouyang, Tianjin University, China

Yuanmu Yang, Tsinghua University, China

Sai Chen, Beihang University, China

Fei Fan, Nankai University, China

Jinhui Shi, Harbin Engineering University, China

Workshop Chairs

Workshop on Biomedical Imaging and Spectroscopy

Yu Xia, Beihang University, China

Qijie Wang, Nanyang Technological University, Singapore

Lingjie Kong, Tsinghua University, China

Liwei Liu, Shenzhen University, China

Yingmei Feng, Beijing You'an Hospital, China

Workshop on Space-Time Optics

Qiwen Zhan, University of Shanghai for Science & Technology, China

Ayman Abouraddy, University of Central Florida, USA

Workshop on Active Devices on Thin-film Lithium Niobate Platform

Kan Wu, Shanghai Jiao Tong University, China

Di Zhu, IMRE, A*STAR Singapore

Zhiwei Fang, East China Normal University, China

Workshop on What Is the Role of Optical Technologies in Building 6g Networks?

Qunbi Zhuge, Shanghai Jiao Tong University, China

Junwen Zhang, Fudan University, China

Paolo Monti, Chalmers University of Technologies, Sweden

Workshop on Fiber Optic Distributed Acoustic Sensors (DAS) and Applications

Qizhen Sun, Huazhong University of Science and Technologies, China

Gilberto Brambilla, University of Southampton, UK

Yunyue Elita Li, Purdue University, USA

Workshop on What Will Photonic Computing be Like in the Future?

Jianji Dong, Huazhong University of Science and Technology, China

Chaoran Huang, The Chinese University of Hong Kong, China

Xing Lin, Tsinghua University, China

Workshop on What Is the Role of Optical Sensors in Building Smart Environments?

George Y. Chen, Shenzhen University, China

Xiaohong Zhou, Tsinghua University, China

Ming Ding, Beihang University, China

Tongyu Liu, Qilu University of Technology (Shandong Academy of Sciences), China

Workshop on Advanced Optical Fiber Technologies for Underwater Applications

Liangming (Anson) Xiong, State Key Laboratory of Optical Fiber and Cable Manufacture Technology, YOFC, China

Junjie Li, China Telecom Research Institute, China

Liyang Shao, Southern University of Science and Technology, China

Industry Forum Chairs

Industry Forum on All Optical Transport Network in F5G and Beyond

Zhaohui Li, Sun Yat-Sen University, China

Ning Deng, Huawei Technologies Co., Ltd., China

Industry Forum on Enabling Technology and Application for Passive Optical Networks in F5G and Beyond

Gangxiang Shen, Soochow University, China

Jiawei Zhang, Beijing University of Posts and Telecommunications, China

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

Industry Forum on Where are the Boundaries between IMDD & Coherent Technology for 800G and beyond?

Chengliang Zhang, China Telecom Research Institute, China

Hua Zhang, LUSTER LightTech Co.,Ltd., China



Connie Chang-Hasnain

Time: 10:10-10:50 | Concert Hall, 1F

Berxel Photonics, China

Very High Power and High Speed VCSELs for LIDAR and Datacom Applications

Abstract: Recent advances of VCSELs using distributed Bragg reflectors (DBR) and high contrast grating (HCG) for multiple mode fiber optical communication and LIDAR applications will be reviewed. Results include 106 Gbps PAM4-encoded directly modulated VCSEL and high power density (>4000 W/mm²) VCSEL arrays for LIDAR applications.



Yi Luo

Time: 10:50-11:30 | Concert Hall, 1F

Tsinghua University, China

High Speed Photonic Devices for Lightwave Technology

Abstract: The optical devices are the backbone of fiber telecommunications, high speed 3D sensing such as Lidar systems, and VR/AR applications. In this talk, ultra-high speed DFB laser integrated with EA modulators, ultra-wide band lithium niobate thin film optical modulators, and ultra-high speed photodetectors will be introduced.



Lars Samuelson

Time: 11:20-12:00 | Concert Hall, 1F

SUSTech, China/Lund University, Sweden

Nanoscale Materials Science as basis for nanoLEDs for Displays and Communication

Abstract: While nitride LEDs with chip sizes of above several hundreds of microns have been widely applied for solid state lighting as well as in communications, there is an urgent need to reduce the chip size so that such LEDs can be used as individual pixels for next generation self-emissive displays. In this talk I will present our unique materials research that enables arrays of relaxed sub- μm sized InGaN platelets, virtually free from dislocations with a smooth top c-plane ideal for InGaN quantum well growth. The indium contents in such InGaN platelets can be tuned from 0 to 20%, so that the green and red-emitting InGaN quantum wells are grown on such templates with a low level of strain similar to highly efficient blue-emitting InGaN quantum wells on GaN films. Beside the obvious top application for advanced AR/VR/HUD applications, these ultra-small nanoLEDs may also find key applications in communication.



Ton Koonen

Time: 13:30-14:10 | Room 4-5, 4F

Eindhoven University of Technology, The Netherlands

Recent Progress in High-Capacity Optical Wireless Communication

Abstract: Optical wireless communication can surpass the capabilities of radio-based wireless communication in many respects. When using accurately steered infrared beams, it can offer fiber-equivalent high capacity at high user densities, while being highly secure, insensitive to EMI, and energy-efficient. This keynote talk presents recent advances in our indoor high-capacity beam-steering technologies for all-optical bi-directional wireless communication including accurate automatic self-calibrated user localization.



Sarun Sumriddetchkajorn

Time: 13:30-14:00 | Room 2-1, 2F

National Electronics and Computer Technology Center, Thailand

DIY Optical Spectrometers: From Lab to Market

Abstract: This talk overviews Do-It-Yourself (DIY) approaches for the implementation of optical spectrometers. It covers the basic theory and engineering principle behind each approach. In addition, field and commercial prototypes are highlighted including ones campaigned through crowdfunding platform.



John Dudley

Time: 14:00-14:30 | Room 2-1, 2F

Université de Franche-Comté, France

Machine Learning for New Insights into Ultrafast Nonlinear Fibre Optics

Abstract: The techniques of machine learning have tremendous potential to accelerate both basic science and important applications in ultrafast and nonlinear fibre optics. This paper will review a selection of our work in this area.

General Information

ACP/IPOC 2022

Conference Venue:



SUSTech Convention Center

Address: Gate 1, Southern University of Science and Technology (SUSTech), 1088 Xueyuan Avenue, Shenzhen, Guangdong Province, 518055

SUSTech Convention Center covers an area of about 17,900 square meters. It has a conference hall, a multi-functional theater, a circular conference hall and many small/medium size meeting rooms. The building is also the location of the UNESCO Higher Education Innovation Center (Shenzhen, China).

Transportation:

From Shenzhen Baoan International Airport (深圳宝安国际机场)

By public transportation:

Subway **LINE 11** (机场站) to (前海湾站) transfer **LINE 5** to (塘朗站), 5 minutes walking.

By Taxi: Around 31km, 50 minutes, 58 RMB

From Shenzhenbei Railway Station (深圳北站)

By public transportation:

Subway **LINE 5** (深圳北站) to (塘朗站), 5 minutes walking. Around 15 minutes.

By Taxi: Around 5.3km, 10 minutes, 12 RMB

From Futian Railway Station (福田站)

By public transportation:

Subway **LINE 4** (市民中心站) to (深圳北站), transfer **LINE 5** (深圳北站) to (塘朗站), 5 minutes walking. Around 50 minutes.

By Taxi: Around 15km, 25 minutes, 35 RMB

Conference Venue Entry Guideline

We have shuttle bus to transfer ACP 2022 attendees to the conference venue.

Shuttle Bus Boarding Location:

Subway **LINE 4** Tanglang Station (塘朗站) **C Exit**, HuahuiYunmen convenience store (华晖云门便利店) entrance.

Shuttle Bus Operation Time:

November 5th: 08:00-18:00

November 6th: 08:00-18:00

November 7th: 08:30-18:30

November 8th: 08:30-18:30

Shuttle Bus Taking Certificate:

November 5th: Registration QR Code

November 6th-8th: Name Badge of ACP/IPOC 2022

General Information

ACP/IPOC 2022

Onsite Speaker Preparation

All presenters should check in at the corresponding session room at least 30 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.

- The duration of a paper presentation slot is 15 minutes; Invited speech is 30 minutes.
- Your punctual arrival and active involvement in each session will be highly appreciated.
- Get your presentation PPT or PDF files prepared and backed up.
- Laptop (with MS-Office & Adobe Reader), projector & screen, laser sticks will be provided by the conference organizer.

Conference Room Guideline

Concert Hall: the conference room **Concert Hall** (音乐厅) on the 1st floor

Room 2-1: the conference room **201** on the 2nd floor

Room 2-2: the conference room **202** on the 2nd floor

Room 2-3: the conference room **203** on the 2nd floor

Room 4-C: the conference room **Lecture Hall** (报告厅) on the 4th floor

Room 4-5: the conference room **405** on the 4th floor

Room 4-7: the conference room **407** on the 4th floor

Room 4-8: the conference room **408** on the 4th floor

Room 4-9: the conference room **409** on the 4th floor

Duplication/ Recording

Unauthorized photography, audio taping, video recording, digital taping or any other form of duplication is prohibited in the conference.

Security

Please ensure that you take all items of value with you at all times when leaving a room. Do not leave bags or laptops unattended.

Name Badge

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

Safety & Well-being

- You are required to wear face masks in public areas.
- Good hand hygiene is one of the most important steps individuals can take to protect themselves.
- Attendees are suggested to have a body temperature check prior to arriving at the venue.
- Signs of COVID-19 and/or with a fever of 37.3° or greater should be reported immediately.
- You are requested to present your health code before entering the conference venue.
- Scan the QR code (on the right) to obtain your health code.



Registration Venue:

The registration desk on the 1st floor.

Lunches

Four-day lunches (Nov. 5-8) are included in the registration fee for all registered delegates. And lunch tickets are provided within the badge.

Social Activities

○ Conference Banquet and Awards Ceremony

There are several awards will be presented at the banquet. The Banquet is NOT INCLUDED in the registration fee for students, but is included for all other regular registration types. The ticket is provided within the badge. And extra banquet ticket could be purchased at the Registration Desk for 500RMB per person.

Location: Jincui Palace 金翠皇宫

Time: Monday, 7 November, 2022 | 19:00–21:00

Transportation: Shuttle Bus

COVID Test Guideline:

Location: SUSTech Concenter Center

November 5th: 15:00-17:00

November 6th: 08:00-11:00

November 7th: 10:00-12:00, 15:00-17:00

General Information

ACP/IPOC 2022

Online Presentation Guideline

Time Zone

Beijing Time (GMT+8)

You're suggested to set up the time on your computer in advance.

Platform: Zoom

Download link:

<https://zoom.us/download>

<https://zoom.com.cn/download>

Equipment Needed

A computer with internet connection and camera.

Headphone/earphone.

Environment Needed

A quiet place.

Stable internet connection.

Proper lighting and background.

Test Your Presentation

Date: November 4th, 2022

Prior to the formal meeting, presenters shall join the test room to ensure everything is on the right track.

Name

Name yourself with your **paper ID + Name**

Example: 9999+Laityn Xu (If you are a speaker/ listener, please use your real name when enter the conference)

Voice Control Rules

The host will mute all participants while entering the meeting.

Presenters will be unmuted when they are presenting.

Q&A part is scheduled after each presentation. Listeners will be unmuted if they would ask questions.

After Q&A part, the host will mute all participants.

Oral Presentation

Duration: a maximum of 15 minutes in total, including 3-5 minutes for Q&A. Please make sure your presentation is well timed.

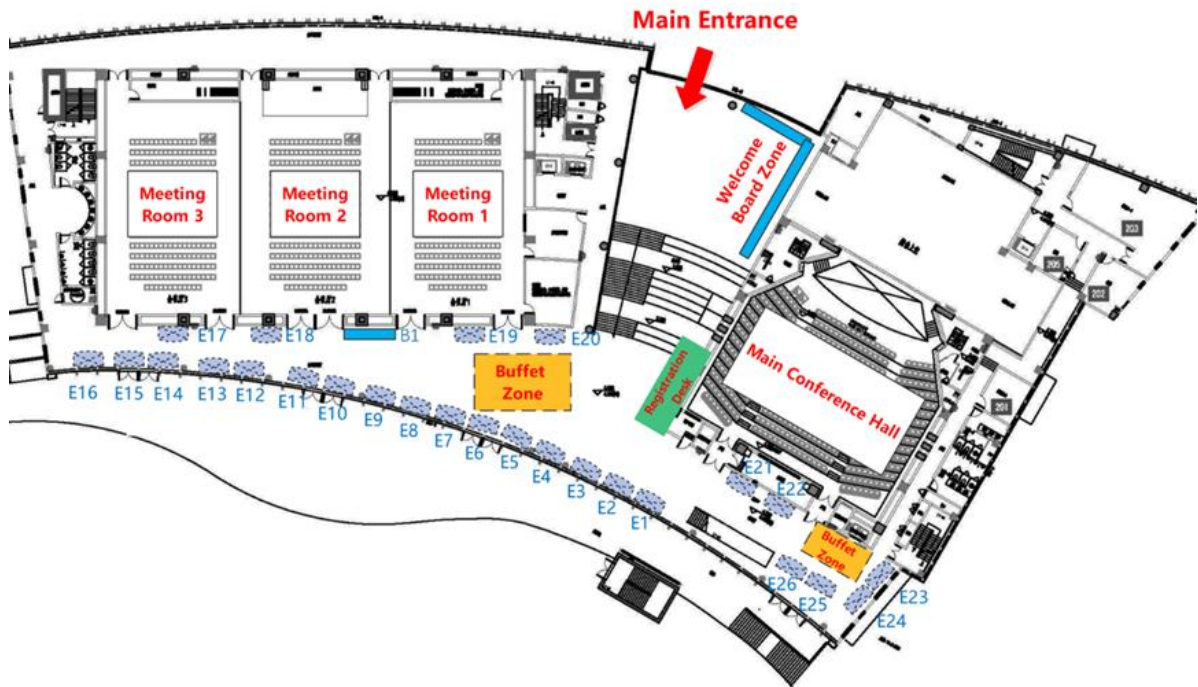
Conference Recording

Your presentation will be recorded and uploaded to the ACP website for attendees to view with a password before November 30th.

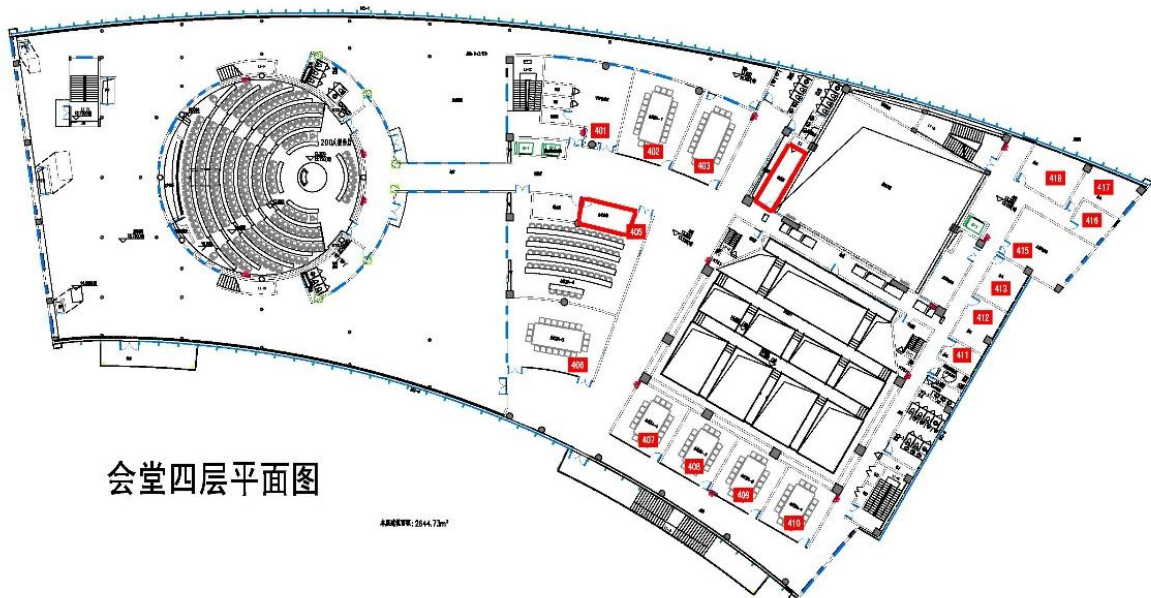
Conference Venue & Exhibition

ACP/IPOC 2022

○ 2F



○ 4F



会堂四层平面图


AREA: 2044.73m²

○ Sponsors & Exhibitors

Platinum Sponsors

| | | |
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| E3-E4 | B1 | E5-E6 |

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Silver Sponsors

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| E2 | E8 | E20 |

Exhibitors

| | | |
|---|---|---|
|  |  |  |
| E9 | E21 | E10-E11 |
|  |  |  |
| E19 | E12 | E15 |
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| E1 | E18 | E13 |
|  |  |  |
| E23 | E22 | E14 |
|  |  |  |
| E25 | E26 | E24 |

Agenda Overview

Friday ~ Saturday, November 4th~5th

ACP/IPOC 2022

| FRIDAY 4 November, 2022 (ONLINE TEST) | | | | | | | |
|---|--|--|---|--|-------------------------------|---|---|
| Meeting Room | Room 1, ID: 845 4370 7772 | Room 2, ID: 838 0639 6686 | Room 3, ID: 858 1993 0487 | Room 4, ID: 873 1845 7907 | Room 5, ID: 846 6291 4130 | Room 7, ID: 893 4541 0357 | Room 8, ID: 831 1366 0011 |
| 09:00-12:00 | Plenary/Keynote/ Workshop/ Industry Forum/VCSEL Rump Session Speakers | Session 1 - Session 10 | Session 21 - Session 30 | Session 41 - Session 50 | Session 61 - Session 70 | Session 81 - Session 90 | Session 101 - Session 110 |
| 12:00-13:30 | Lunch Break | | | | | | |
| 13:30-16:30 | Plenary/Keynote/ Workshop/ Industry Forum/VCSEL Rump Session Speakers | Session 11 - Session 20 | Session 31 - Session 40 | Session 51 - Session 60 | Session 71 - Session 80 | Session 91 - Session 100 | Session 111 - Session 122 |
| SATURDAY 5 November, 2022 ONSITE & ONLINE | | | | | | | |
| 09:00-18:00 | Sign-up & Workshops & Industry Forums | | | | | | |
| 08:30-17:00 | Workshop on Active Devices on Thin-film Lithium Niobate Platform | | | | | Zoom ID: 863 2270 8565 | |
| 09:00-17:35 | Workshop on What will Photonic Computing be Like in the Future? | | | | | Room 4-5 , Zoom ID: 854 1284 3584 | |
| 09:00-18:00 | Workshop on Advanced Optical Fiber Technologies for Underwater Applications | | | | | Room 2-3 , Zoom ID: 873 1845 7907 | |
| 09:00-18:00 | Workshop on Fiber Optic Distributed Acoustic Sensors (DAS) and Applications | | | | | Room 4-7 , Zoom ID: 838 0639 6686 | |
| 09:00-12:00 | Room 2-1 Zoom ID: 846 6291 4130 | | Room 2-2 Zoom ID: 842 7075 7440 | | | Room 4-9 Zoom ID: 836 5238 9479 | |
| | Industry Forum: Where are the Boundaries between IMDD & Coherent Technology for 800G and beyond? | | Industry Forum: All Optical Transport Network in F5G and Beyond | | | Workshop on What is the Role of Optical Sensors in Building Smart Environments? | |
| 12:00-13:30 | Lunch Break | | | | | | |
| 13:30-18:00 | Room 2-1 Zoom ID: 846 1762 4368 | | | Room 2-2 Zoom ID: 842 7075 7440 | | Room 4-9 Zoom ID: 893 4541 0357 | Room 4-3 Zoom ID: 831 1366 0011 |
| | Keynote Speech: Sarun Sumriddetchkajorn, National Electronics and Computer Technology Center | Keynote Speech: John Dudley, Université de Franche-Comté, France | Photonics Global Student Conference | Industry Forum: Enabling Technology and Application for Passive Optical Networks in F5G and Beyond | | Workshop on What Is the Role of Optical Technologies in Building 6g Networks? | Workshop on Biomedical-Imaging-Spectroscopy |
| 15-17:15 | ACP 2022 Rump Session: Promises and Opportunities of VCSELs | | | | | Room 4-C , Zoom ID 845 4370 7772 | |

Agenda Overview

Sunday, November 6th

ACP/IPOC 2022

| SUNDAY 6 November, 2022 ONSITE | | | | | | | | | | |
|------------------------------------|---|--|--|--|--|--|--|--|--|--|
| 08:30-09:30 | Networking Breakfast | | | | | | | | Concert Hall Zoom ID: 845 4370 7772 | |
| Opening Ceremony | | | | | | | | | | |
| 9:30-10:10 | Opening Remark: Prof. Perry Shum | | | | | | Presider: Nan Zhang, Yu Zheng | | | |
| | Welcome Address: President Qikun Xue | | | | | | | | | |
| | Opening of Light Science & Applications (LSA) Editorial Office in Shenzhen By President Xue Qikun & LSA Chief Editor Bai Yuhong | | | | | | | | | |
| | OPTICA Fellow Presentation By Connie Chang (former OPTICA President) | | | | | | | | | |
| Award Presentations | | | | | | | | | | |
| Plenary/Keynote Speeches | | | | | | | | | | |
| 10:10-10:50 | Plenary Speech: Connie Chang-Hasnain, Berxel Photonics, China | | | | | | Presider: Dan Luo | | | |
| 10:50-11:30 | Plenary Speech: Yi Luo, Tsinghua University, China | | | | | | Presider: Longqing Cong | | | |
| 11:30-12:10 | Plenary Speech: Lars Samuelson, SUSTech, China/Lund University, Sweden | | | | | | Presider: Zhaojun Liu | | | |
| 12:10-13:30 | Lunch Break | | | | | | | | | |
| 13:30-17:50 | Shenzhen Visible Light Communication and Optical Computing Industry Alliance Establishment Preparatory Meeting & Visible Light Symposium | | | | | | | | Room 2-1 Zoom ID: 838 0639 6686 | |
| 13:30-14:10 | Keynote Speech: Ton Koonen, Eindhoven University of Technology, The Netherlands | | | | | | Presider: Baicheng Yao | | Room 4-5 Zoom ID: 854 1284 3584 | |
| 14:10-14:40 | Session 01 | | | | | | | | | |
| 13:30-15:00 | Room 4-C Zoom ID: 845 4370 7772 | Room 2-2 Zoom ID: 858 1993 0487 | Room 2-3 Zoom ID: 873 1845 7907 | Room 4-9 Zoom ID: 846 6291 4130 | Room 4-7 Zoom ID: 893 4541 0357 | Room 4-8 Zoom ID: 831 1366 0011 | | | | |
| | Session 02 | Session 03 | Session 04 | Session 05 | Session 06 | Session 07 | | | | |
| 15:00-15:15 | Coffee Break | | | | | | | | | |
| 15:15-16:45 | Room 4-C Zoom ID: 845 4370 7772 | Room 4-6 Zoom ID: 836 5238 9479 | Room 2-2 Zoom ID: 858 1993 0487 | Room 2-3 Zoom ID: 873 1845 7907 | Room 4-9 Zoom ID: 846 6291 4130 | Room 4-5 Zoom ID: 854 1284 3584 | Room 4-7 Zoom ID: 893 4541 0357 | Room 4-3 Zoom ID: 831 1366 0011 | | |
| | Session 08 | Session 09 | Session 10 | Session 11 | Session 12 | Session 13 | Session 14 | Session 15 | | |
| 16:45-17:00 | Break | | | | | | | | | |
| 17:00-18:30 | Session 16 | Session 17 | Session 18 | Session 19 | Session 20 | Session 21 | Session 22 | Session 23 | | |
| 14:00-15:30 | Poster Session 1 | | | | | | | | | |

Agenda Overview

Monday, November 7th

ACP/IPOC 2022

| MONDAY 7 November, 2022 ONSITE | | | | | | | | |
|------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Venue | Room 4-C Zoom ID: 845 4370 7772 | Room 2-1 Zoom ID: 838 0639 6686 | Room 2-2 Zoom ID: 858 1993 0487 | Room 2-3 Zoom ID: 873 1845 7907 | Room 4-9 Zoom ID: 846 6291 4130 | Room 4-5 Zoom ID: 854 1284 3584 | Room 4-7 Zoom ID: 893 4541 0357 | Room 4-3 Zoom ID: 831 1366 0011 |
| 9:00-10:30 | Session 24 | Session 25 | Session 26 | Session 27 | Session 28 | Session 29 | Session 30 | Session 31 |
| 10:30-10:45 | Coffee Break | | | | | | | |
| 10:45-12:15 | Session 32 | Session 33 | Session 34 | Session 35 | Session 36 | Session 37 | Session 38 | Session 39 |
| 10:00-11:30 | Poster Session 2 | | | | | | | |
| 11:45-13:30 | Lunch Break | | | | | | | |
| 13:30-15:00 | Session 40 | Session 41 | Session 42 | Session 43 | Session 44 | Session 45 | Session 46 | |
| 15:00-15:15 | Coffee Break | | | | | | | |
| 15:15-16:45 | Session 48 | Session 49 | Session 50 | Session 51 | Session 52 | Session 53 | Session 54 | Session 55 |
| 15:15-17:30 | Online Room 4, ID: 846 1762 4368 | | | | | | | |
| | Session 47 | | | | | | | |
| 14:00-15:30 | Poster Session 3 | | | | | | | |
| 19:00-21:00 | Banquet and Awards Ceremony | | | | | | | |

| MONDAY 7 November, 2022 ONLINE | | | |
|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Meeting Room | Online Room 1 ID: 863 2270 8565 | Online Room 2 ID: 836 5238 9479 | Online Room 3 ID: 842 7075 7440 |
| 9:00-10:30 | Session 70 | Session 71 | Session 72 |
| 10:30-10:45 | Break | | |
| 10:45-12:15 | Session 73 | Session 74 | Session 75 |
| 12:15-13:30 | Lunch Break | | |
| 13:30-15:00 | Session 76 | Session 77 | Session 78 |
| 15:00-15:15 | Break | | |
| 15:15-16:45 | Session 79 | Session 80 | Session 81 |
| 16:45-17:00 | Break | | |
| :00-18:30 | Session 82 | Session 83 | Session 84 |

Agenda Overview

Tuesday, November 8th
ACP/IPOC 2022

| TUESDAY. 8 November, 2022 ONSITE | | | | | | | |
|--------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Venue | Room 4-C Zoom ID: 845 4370 7772 | Room 2-1 Zoom ID: 838 0639 6686 | Room 2-2 Zoom ID: 858 1993 0487 | Room 2-3 Zoom ID: 873 1845 7907 | Room 4-9 Zoom ID: 846 6291 4130 | Room 4-5 Zoom ID: 854 1284 3584 | Room 4-7 Zoom ID: 893 4541 0357 |
| 9:00-10:30 | Session 56 | Session 57 | Session 58 | Session 59 | Session 60 | Session 61 | Session 62 |
| 10:30-10:45 | Coffee Break | | | | | | |
| 10:45-12:15 | Session 63 | Session 64 | Session 65 | Session 66 | Session 67 | Session 68 | Session 69 |
| 10:00-11:30 | Poster Session 4 | | | | | | |

| TUESDAY. 8 November, 2022 (ONLINE) | | | | | | | | |
|--------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Meeting Room | Online Room 1 | Online Room 2 | Online Room 3 | Online Room 4 | Online Room 5 | Online Room 6 | Online Room 7 | Online Room 8 |
| | ID: 863 2270 8565 | ID: 836 5238 9479 | ID: 842 7075 7440 | ID: 846 1762 4368 | ID: 836 8564 2371 | ID: 827 1560 8818 | ID: 881 1220 7791 | ID: 831 1366 0011 |
| 9:00-10:30 | Session 85 | Session 86 | Session 87 | Session 88 | Session 89 | Session 90 | Session 91 | Session 92 |
| 10:30-10:45 | Break | | | | | | | |
| 10:45-12:15 | Session 93 | Session 94 | Session 95 | Session 96 | Session 97 | Session 98 | Session 99 | Session 100 |
| 12:15-13:30 | Lunch Break | | | | | | | |
| 13:30-15:00 | Session 101 | Session 102 | Session 103 | Session 104 | Session 105 | Session 106 | Session 107 | |
| 15:00-15:15 | Break | | | | | | | |
| 15:15-16:45 | Session 108 | Session 109 | Session 110 | Session 111 | Session 112 | Session 113 | Session 114 | Session 115 |
| 16:45-17:00 | Break | | | | | | | |
| 17:00-18:30 | Session 116 | Session 117 | Session 118 | Session 119 | Session 120 | Session 121 | Session 122 | |

All Optical Transport Network in F5G and Beyond

Organizers: Zhaohui Li, Sun Yat-Sen University; Ning Deng, Huawei Technologies Co., Ltd., China

Time: 09:00-12:00 | Room 2-2, 2F (Zoom ID: 842 7075 7440)

Intro.: For F5G and next-generation (F5.5G, F6G) all-optical transport network, the capacity of backbone optical networks requires continuous increase (e.g. the transmission rate of the single-channel grows from 400G to 800G, even to 1.6T, and the capacity of fiber grows from 32T to 64T, even to >100T) as well as flexible all-optical wavelength grooming. Highly-integrated optical amplification with ultra-low noise, and high-dimensional wavelength switching technologies are required. In metro network, simplified optical network architecture and one-hop optical connection are expected, based on a simplified point-to-multipoint (P2MP) architecture, abundant wavelengths, and simplified wavelength grooming. The key technologies mentioned above will be focused in this workshop.

SPEAKERS

| Time | Speakers | Title |
|-------------|------------------|--|
| 09:00-09:20 | Chun Sun | Optical Network Evolution and Key Technologies |
| 09:20-09:40 | Yongli Zhao | Optical Cloud Networks (OCN): Next-Generation Optical Networks for Cloud Service |
| 09:40-10:00 | Yi Cai | Technologies to Further Increase Single-mode Fiber Transmission Capacity |
| 10:00-10:20 | Xinlun Cai | High Speed Thin-film Lithium Niobate Modulators |
| 10:20-10:40 | Coffee Break | |
| 10:40-11:00 | Junwen Zhang | Point-to-multipoint (P2MP) Coherent Technology and Metro Applications |
| 11:00-11:20 | Jian-Jun He | Simplified and Scalable Optical Switching Architecture and Technologies |
| 11:20-11:40 | Xingjun Wang | Technology of Low-cost Optical Amplifier and Light Source |
| 11:40-12:00 | Liang Mu | Low Cost Multimode Pump Laser Technology and Reliability |
| 12:00-12:20 | Panel Discussion | |

09:00-09:20 Optical Network Evolution and Key Technologies

Chun Sun, Huawei Technologies

Abstract: The development of the digital society brings the explosion of customer data volume and high-quality service requirements, driving the rapid growth of backbone and metro all-optical network infrastructure. This report summarizes the research progress in the optical communications industry and describes the networking and application trends of all-optical networks for future data growth, and how to use all-optical networks to carry services with lower bit costs and higher quality. Some key technical challenges in the development of all-optical networks are summarized and summarized.

09:20-09:40 Endogenous Security in Optical Networks

Yongli Zhao, Beijing University of Posts and Telecommunications

Abstract: Long distance and high speed are the advantages of optical fiber communications. So optical networks have become the most important information infrastructure. Security is also very important for optical networks, which carry so much valuable information. This talk introduces the concept of endogenous security in optical networks. Some key technologies and experimental results will be shown

09:40-10:00 Technologies to Further Increase Single-mode Fiber Transmission Capacity

Yi Cai, Soochow University

Abstract: In this talk, we review the key technologies to further increase single-mode fiber transmission capacity. We discuss and compare technology options from the aspects of capacity-to-cost ratio and capacity-distance product.

10:00-10:20 High Speed Thin-film Lithium Niobate Modulators

Xinlun Cai, Sun Yat-sen University

Abstract: Thin-film Lithium Niobate (TFLN) platform has emerged as a promising candidate for future optical modulators. In this talk, we discuss the technologies for realizing TFLN platform. Various functional devices derived from the Mach-Zehnder interferometer configuration are also reviewed.

10:40-11:00 Point-to-multipoint (P2MP) Coherent Technology and Metro Applications

Junwen Zhang, Fudan University

Abstract: Coherent optics has been a game changer for enabling ultra-high-speed data transmission in point-to-point long-haul networks. Interest in coherent optics is at an all-time high for application to metro and short-reach point-to-multipoint networks. This presentation will focus on the enabling technologies of coherent Point-to-multipoint (P2MP) communication system its applications in metro and short-reach networks.

11:00-11:20 Simplified and Scalable Optical Switching Architecture and Technologies

Jian-Jun He, Zhejiang University

Abstract: Optical switching is the key technology for optical networks, datacenter interconnects and high-performance computer (HPC) systems. The current optical switching systems are mainly based on electronic switching ICs with power-hungry optical-electrical-optical conversions or expensive and bulky wavelength selective switches (WSS). This talk will present a simplified optical switching architecture based on distributed wavelength routing. The recent advances in associated technologies will be reviewed, including widely tunable lasers monolithically integrated with high-speed modulators, intelligent tunable transceivers with inter-module message channels, sub-nanosecond fast-switching multi-wavelength multi-port transmitter-router, and high-performance cyclic arrayed waveguide grating routers (AWGR). The distributed optical switching system enables the wavelength routing functionality at transmitting/receiving nodes, eliminating the centralized optical switching node requiring high-capacity electronic switching ICs. It also avoids optical-electrical-optical conversions, thus reducing the number of transceiver modules, power consumption, and latency in the transmission links. The distributed wavelength routing architecture is compared with other network architectures such as the spine-leaf architecture commonly used in datacenters. It can combine the advantages of both high-capacity optical circuit switching (OCS) or optical burst switching (OBS) and low-granularity electronic packet switching (EPS).

11:20-11:40 Technology of Low-cost Optical Amplifier and Light Source

Xingjun Wang, Peking University

Abstract: I will introduce the technology of low-cost optical amplifier and light source in last five years, including Er

doped waveguide amplifier and integrated comb.

11:40-12:00 Low Cost Multimode Pump Laser Technology and Reliability

Liang Mu, O-Net Communications(Shenzhen) Limited

Abstract: 9xxnm Multimode Pump Laser was widely used in industrial high power fiber laser and CATV field. As the technology innovation, the cost and reliability has significant improvement. Multimode pump will be used in space optical communications, LiDAR and other applications in the near future.

Enabling Technology and Application for Passive Optical Networks in F5G and Beyond

Organizers: Gangxiang Shen, Soochow University; Jiawei Zhang, Beijing University of Posts and Telecommunications; Liangchuan Li, Huawei Technologies Co., Ltd., China

Time: 14:00-18:00 | Room 2-2, 2F, (Zoom ID: 842 7075 7440)

Intro.: The ambition of F5G for passive optical networks is to open new opportunities by comprehensively applying fiber technology to various scenarios, in a sense making the paradigm of Fiber to the Home for traditional residential users become a Fiber to Everything for diverse vertical industries. With the trend above, enabling technologies and potential applications for future PON will be discussed in this workshop.

SPEAKERS

| Time | Speakers | Speech Title |
|-------------|------------------|---|
| 14:00-14:20 | Chao Lu | Transmission and Monitoring Schemes for Future PON systems |
| 14:20-14:40 | Dezhi Zhang | All-optical Intelligent Access Network, Promoting the Development of Industry Network |
| 14:40-15:00 | Shikui Shen | Discussion of DWDM Technique Application in Metro Comprehensive Access Network |
| 15:00-15:20 | Zhicheng Ye | Embrace the Opportunities of Optical Communication in the F5.5G Era |
| 15:20-15:40 | Yingzhuang Liu | Fiber To the Radio: Challenges and Key Technologies |
| 15:40-16:00 | Tea Break | |
| 16:00-16:20 | Ji Zhou | Burst-Mode Digital Signal Processing for Coherent P2MP Passive Optical Networks |
| 16:20-16:40 | Gengchen Liu | Flexible Transceivers for Access Network: Perspectives and Challenges |
| 16:40-17:00 | René Bonk | Innovations Taking Optical Access Networks towards the Next Decade |
| 17:00-17:20 | Paolo Monti | Techno-economics of RAN Transport Networks: The Fiber Vs. Microwave Case |
| 17:20-17:40 | Gangxiang Shen | Enabling Technologies of Access Networks for F5G and Beyond |
| 17:40-18:00 | Panel Discussion | |

14:00-14:20 Transmission and Monitoring Schemes for Future PON Systems

Chao Lu, Sun Yat-sen University

Abstract: With the increase of data transmission rate of future PON system, it is essentially that low cost high speed transmission scheme with high link budget can be realized. At the same time, to ensure reliable operation of the PON

system, enhancement of the current PON monitoring scheme is also necessary. In this talk, some of the possible approaches to achieve these objectives will be discussed.

14:20-14:40 All-optical Intelligent Access Network, Promoting the Development of Industry Network

Dezhi Zhang, China Telecom Research Institute

Abstract: Introduce the scenario application, standard and industrial situation of All-optical intelligent access network in high-speed, ubiquitous, intelligent and other fields, mainly involving key technologies such as 50G PON and PON Determinism, as well as future technology and industry prospects.

14:40-15:00 Discussion of DWDM Technique Application in Metro Comprehensive Access Network

Shikui Shen, China Unicom

Abstract: End-users' demand on bandwidth increased explosively for all kinds of users, and metro networks bear most of the traffic. How to upgrade the access capability is one of the main challenges for full services operators. Deployment of DWDM technique with high capacity from backbone to metro network is the trend. The application of DWDM in metro access network is discussed in the report.

15:00-15:20 Embrace the Opportunities of Optical Communication in the F5.5G Era

Zhicheng Ye, Huawei Technologies

Abstract: Since the release of F5G, the industry has rapidly formed a concerted effort to push the optical industry into a fast track, enabling the expansion of optical fibers from homes to rooms, campuses to desktops, and factories to machines. F5.5G uses key technologies such as 50G PON, Wi-Fi 7, 800G, ADN L4, deterministic low latency, optical fiber sensing, and green and low carbon to improve the network connection capability of F5G by more than 10 times, enabling 10G experience rates to be ubiquitous. This solution can meet future digital transformation requirements for people's entertainment and industries, and improve network capabilities such as microsecond-level ultra-low latency. The optical access P2MP architecture features a simplified architecture, easy evolution, high reliability, energy saving, and environmental protection. It will be the foundation of the F5.5G all-optical network intelligent society and build various intelligent scenario-based solutions that integrate ultra-broadband connections, intelligent awareness, and edge computing capabilities. The optical access network is based on home broadband and is moving toward the industry. All-scenario application requirements will drive technology development in more directions and faster. The industry has great potential. This topic describes the vision of the optical access industry in the F5.5G era, continuously expands the optical access industry space, and identifies the in-depth technical direction.

15:20-15:40 Fiber To The Radio: Challenges and Key Technologies

Yingzhuang Liu, Huazhong University of Science and Technology

Abstract: With the popularity of FTTH and the continuous improvement of people's requirements for the quality of wireless services, the integration of FTTH and wireless communication has become inevitable. In indoor environments, the integration of FTTH and short-range wireless communication systems will be the core of future indoor communication systems. The concept of Fiber To The Radio (abbreviation: FTTR) emerged as the times require, and it will be an important development direction of F5G in the future. The report introduces the challenges of FTTR and its key technologies, including: interference management technology in FTTR ultra-dense networks, low time extended, high-reliability wireless resource management technology, and prospects for FTTR

16:00-16:20 Burst-Mode Digital Signal Processing for Coherent P2MP Passive Optical Networks

Ji Zhou, Jinan University

Abstract: Optical access networks have been evolving to meet the explosive growth of data traffic. It is foreseeable

that the 100Gb/s/λ and beyond passive optical network (PON) will be required in future optical access networks. Coherent optical communication is a promising solution for the future beyond 100G PON. However, the traditional digital signal processing (DSP) for coherent optical communication is difficult to realize fast convergence due to blind and complex algorithms. In this talk, I will present a specific preamble structure and propose a burst-mode DSP to achieve fast convergence for the coherent P2MP PON. The proposed specific preamble structure and burst-mode DSP jointly implement the fast convergence using a short preamble with only 416 symbols. The experimental results show that the 8-Gbaud/SC×8-SCs 400Gb/s-net-rate coherent PON in burst-mode detection achieves the receiver sensitivity of approximately -27dBm at the 20% soft-decision forward error correction limit and approximately 35.5dB optical power budget with an optical pre-amplifier.

16:20-16:40 Flexible Transceivers for Access Network: Perspectives and Challenges

Gengchen Liu, Huawei Technologies

Abstract: Achieving higher-speed PON while maintains high sensitivity and low costs has posed challenges on massive rollout of next generation PON systems. We discuss how flexible transceiver mitigates the performance-cost dilemma by extracting more capacity from current PON networks.

16:40-17:00 Innovations Taking Optical Access Networks towards the Next Decade

René Bonk, Nokia, Bell Labs

Abstract: Innovations in optical technologies and digital signal processing are essential to enable higher-speed PON systems with line rates of 50G-PON and beyond. We will provide an overview of the important fiber evolution and options towards very high-speed PON. This will also include addressing flexibility in access allowing the delivery of the best bitrate for a given optical distribution network. Further, new PON use cases are outlined for which innovative solutions are required with respect to several parameters, e.g., jitter and latency, to extend the PON application space from FTTH-centric towards deterministic networking.

17:00-17:20 Techno-economics of RAN Transport Networks: The Fiber Vs. Microwave Case

Paolo Monti, Chalmers University of Technology

Abstract: The talk compares the techno-economic performance of fiber and microwave-based 5G transport deployments using vendor's inventories and real-life field deployment scenarios. Results highlight how microwave gains vary based on the geo-types, the fiber trenching, and microwave equipment costs.

17:20-17:40 Enabling Technologies of Access Networks for F5G and Beyond

Gangxiang Shen, Soochow University

Abstract: The future access network is envisioned to provide not only gigabit access, but also the guaranteed quality of service (QoS) to support various broadband services in the F5G era. In this talk, we will discuss research on optical and Wi-Fi access networks from the cross-layer and cross-domain perspectives.

Where are the Boundaries between IMDD & Coherent Technology for 800G and beyond?

Presider: Chengliang Zhang, China Telecom Research Institute; Hua Zhang, LUSTER LightTech Co., Ltd.

Time: 09:00-12:00 | Room 2-1, 2F (Zoom ID: 846 6291 4130)

Intro.: As the data rate continue to increase to 400G, 800G and beyond, Coherent and IMDD technology has been given rise to more and more demand. Coherent has gradually encroached the market share of IMDD, and the industry are also actively developing next-generation coherent solutions targeting even shorter distances such as <10km. So where are the eventual boundaries between IMDD and Coherent technology? The boundary can be characterized by various metrics like data rate, distance, power consumption and transceiver cost, and may be closely related to the application drivers.

This forum will discuss the below topics:

- 800G and Beyond Application in telecom
- 140GBd coherent system for DCI applications
- coherent optical module development
- 800G and beyond Coherent for short distance applications
- Technology and application of Thin-Film Lithium Niobate modulator in coherent and IMDD

| SCHEDULE | |
|-------------|--|
| 08:30-09:00 | Sign-up |
| 09:00-09:10 | Opening Address Chengliang Zhang |
| 09:10-09:30 | Discussion on the Technology Evolution and Application of 800G and beyond Anxu Zhang, China Telecom Research Institute |
| 09:30-09:50 | Discussion of Metro Coherent Technology Application Shikui Shen, China Unicom Research Institute |
| 09:50-10:10 | Discussion on the Development and Application Trend of 800G Coherent optical modules Quan Cao, Wuhan Fisilink |
| 10:10-10:30 | Application Prospect of Thin-Film Lithium Niobate Modulator in Coherent and Non-coherent optical transmission Dennis Zhou, AFR |
| 10:30-10:40 | Coffee Break |
| 10:40-11:00 | Coherent for Short Distance Applications at 800G and beyond Chongjin Xie, Alibaba |
| 11:00-11:20 | 140GBd Coherent System for DCI Applications Fangchao Li, Tencent |
| 11:20-11:40 | Opportunities and Challenges in Coherent Optical Communication System for DCI Applications Fenghe Yang, ZhangJiang Laboratory |
| 11:40-12:10 | Panel Discussion |

Biomedical-Imaging-Spectroscopy

Chairs: Yu Xia, Beihang University, China; Qijie Wang, Nanyang Technological University, Singapore; Lingjie Kong, Tsinghua University, China; Liwei Liu, Shenzhen University, China; Yingmei Feng, Beijing You'an Hospital, China

President: Yinmei Feng, Capital Medical University; Lingjie Kong, Tsinghua University

Time: 14:00-17:40 | Room 4-8, (Zoom ID: 831 1366 0011)

Intro.: Imaging and spectroscopy are important tools for biomedical diagnosis. With the common goals to see clearly, reach deeper, with higher speed and more sensitive specificity, researchers with photonics background work closely with scientist/medical doctors with clinical background. This workshop aims to bring together researchers to create synergy in this important multi-disciplinary research area. Latest technology development in the area of optical imaging, optical spectroscopy and spectro-imaging for biomedical applications will be covered in this workshop. The potential and challenges of these diagnosis tools in clinical settings will be discussed as well.

SPEAKERS

| Time | Speakers | Presentation Title |
|-------------|---------------|---|
| 14:00-14:20 | Derrick Yong | Traversing the Translational Biospectroscopy Spectrum: from Lab to Clinic, Asia and Beyond |
| 14:20-14:40 | Oliver Heckl | Single-cavity Dual-comb for Spectroscopy and Ranging Applications |
| 14:40-15:00 | Tian Zhen | THz Photoacoustics and Optical Photoacoustic Remote Sensing for Potential Biomedical Applications |
| 15:00-15:20 | Guanghui Wang | Optical Spectrum Detection Techniques in Microfluidic System for Biological Applications |
| 15:20-15:40 | Fucaï Zhang | Recent Progress of Wavefront Modulation Based Coherent Diffraction Imaging Methods |
| 15:40-16:00 | Coffee Break | |
| 16:00-16:20 | Hui Li | Optical Clearing and Aberration Correction Empower Two-photon Microscopy for Instant Deep-Tissue Histological Mapping |
| 16:20-16:40 | Lei Xi | Photoacoustic Microscopy of Brain Functions |
| 16:40-17:00 | Liwei Liu | Nonlinear Optical Microscopy and Its Applications |
| 17:00-17:20 | Qiuqiang Zhan | Break the Unbroken Limits Toward Super-resolution Microscopy Using Photon Upconversion |
| 17:20-17:40 | Xiaojun Yu | Speckle Reductions in Optical Coherence Tomography |

14:00-14:20 Traversing the Translational Biospectroscopy Spectrum: from Lab to Clinic, Asia and Beyond

Derrick Yong, Endofotonics, Singapore

Abstract: Endofotonics leverages the synergistic overlap between established fundamentals of Raman spectroscopy, engineering prowess, and AI, to bring spectroscopy into the clinics. This talk shares with you our journey and

challenges thus far and plans ahead.

14:20-14:40 Single-cavity Dual-comb for Spectroscopy and Ranging Applications

Oliver Heckl, University of Vienna, Austria

Abstract: We present a simple approach for ambiguity-free dual-comb ranging. We exploit the intrinsic Intensity modulation of a single-cavity dual-color dual-comb for simultaneous time-of-flight and dual-comb distance measurements enabling us to overcome ambiguity limitations.

14:40-15:00 THz Photoacoustics and Optical Photoacoustic Remote Sensing for Potential Biomedical Applications

Tian Zhen, Tianjin University

Abstract: Two photoacoustic techniques are presented including terahertz photoacoustics and optical photoacoustic remote sensing. They may be a potential powerful tool for spectroscopy and biomedical imaging.

15:00-15:20 Optical Spectrum Detection Techniques in Microfluidic System for Biological Applications

Guanghui Wang, Nanjing University

Abstract: Based on hollow-core optical fiber and microfluidic chip, we demonstrate the all-fiber microfluidics including droplet generation, mixing, and focus on all-fiber online optical spectral detection. By using metal-lined hollow-core fibers (MLHCF) with large bandwidth, good field confinement, extremely large numerical aperture and arbitrary length, we proposed a portable optical detection cell, for fast online spectral detection, which also possesses high-sensitivity and high-accuracy.

15:20-15:40 Recent Progress of Wavefront Modulation Based Coherent Diffraction Imaging Methods

Fucai Zhang, Southern University of Science and Technology

Abstract: With the construction and planning of the fourth-generation X-ray synchrotron facility and free electron laser in China, the need for developing new high-performance imaging technology is in urgent demand. Plane-wave coherent diffraction imaging shows good performance for imaging isolated samples and ptychography has been developed into a mainstream technique. For them, the intensity data are mostly obtained in the far field of the sample, and the sample exit wave and the light field at the detector are related by Fourier transform; Our recent studies show that changing the mathematical dependence between the data and the sample exit wave is an important factor in improving the performance of phasing algorithm. Some recent advances in coherent modulation imaging work and its combination with ptychography will be presented.

16:00-16:20 Optical Clearing and Aberration Correction Empower Two-photon Microscopy for Instant Deep-Tissue Histological Mapping

Hui Li, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences

Abstract: We developed a fast tissue optical clearing protocol, F-CUBIC, and an adaptive optics method to correct spherical aberration in cleared tissues. Combined with two-photon microscopy, these methods would substantially benefit instant histopathological examinations.

16:20-16:40 Photoacoustic Microscopy of Brain Functions

Lei Xi, Southern University of Science and Technology

Abstract: Photoacoustic microscopy (PAM) is an important approach for imaging the structural and functional information of brain activities, due to the advantages of high spatial resolution, deep penetration depth and label-free property. We developed a series of PAMs to achieve the improvement in the flexibility and imaging speed of the

device, reduction in the laser power density, and increase in the imaging contrast of brain functions.

16:40-17:00 Nonlinear Optical Microscopy and Its Applications

Liwei Liu, Shenzhen University

Abstract: This report mainly introduces our recent research work based on nonlinear optical microscopic imaging technology in biomedical applications.

17:00-17:20 Break the Unbroken Limits Toward Super-resolution Microscopy Using Photon Upconversion

Qiuqiang Zhan, South China Normal University

Abstract: Photon upconversion nanoparticles, which do not suffer from the photophysical artifacts limiting fluorescent molecules, offer an exciting opportunity for biological super-resolution imaging. By optically controlling the photon upconversion process, we discovered efficient optical depletion mechanism in lanthanide upconversion nanoparticles, enabling subcellular super-resolution microscopic imaging.

17:20-17:40 Speckle Reductions in Optical Coherence Tomography

Xiaojun Yu, Northwestern Polytechnical University

Abstract: OCT inevitably suffers from the influences of speckles originated from multiple-scattered photons. Speckles hide tissue microstructures and degrade the accuracy of disease diagnoses, which thus hinders OCT clinical applications. Various methods have been proposed for OCT image despeckling. This talk discuss about OCT speckles with an emphasis on the various methods been proposed for speckle reductions.

Active Devices on Thin-film Lithium Niobate Platform

Chairs: Kan Wu, Shanghai Jiao Tong University; Di Zhu, IMRE, A*STAR Singapore; Zhiwei Fang, East China Normal University

Time: 08:30-17:00 | Online Room 1, ID: 863 2270 8565

Intro.: Active devices in thin-film lithium niobate enable on-chip light generation, amplification and nonlinear processing, which are essential for a fully integrated photonic circuit. In this workshop, we report and discuss the latest research progress on active devices on rare earth ion doped, hybrid and/or nonlinear thin-film lithium niobate platforms.

SPEAKERS

| Presider: Kan Wu, Shanghai Jiao Tong University | | |
|--|------------------|--|
| Time | Presenter | Title |
| 08:30-08:55 | Qiang Lin | Development of Active Photonics Functionalities on The Thin-Film Lithium Niobate Platform |
| 08:55-09:20 | Linbo Shao | Integrated Acousto-optics Using Lithium Niobate Platform |
| 09:20-09:45 | Mengjie Yu | Ultrafast Pulse Sources on LN |
| 09:45-10:10 | Aaron Danner | Thermo-optics in Thin Film Lithium Niobate |
| 10:10-10:20 | Break | |
| Presider: Di Zhu, IMRE, A*STAR Singapore | | |
| 10:20-12:00 | Panel Discussion | |
| Presider: Zhiwei Fang, East China Normal University | | |
| 13:30-13:55 | Xiankai Sun | Etchless Lithium Niobate Integrated Photonic Circuits and Devices |
| 13:55-14:20 | Jinsong Xia | Photonic Devices on Thin-Film Lithium Niobate for Nonlinear Optics |
| 14:20-14:45 | Zhenda Xie | A Scheme for Deterministic N-photon State Generation Using Lithium Niobate on Insulator Device |
| 14:45-15:10 | Yuanlin Zheng | Second-order Nonlinearities on The Lithium Niobate-On-Insulator Platform |
| 15:10-15:20 | Break | |
| Presider: Di Zhu, IMRE, A*STAR Singapore | | |
| 15:20-15:45 | Rachel Grange | Thermo- and Electro-optic Modulators from Visible to Near Infrared |
| 15:45-16:10 | Hui Hu | Single-crystal Lithium Niobate Thin Film Materials and Technologies |

| | | |
|-------------|-----------|--|
| 16:10-16:35 | Feng Chen | Self-powered Lithium Niobate Thin-Film Photodetectors |
| 16:35-17:00 | Huihui Lu | Microstructured Lithium Niobate for Beam Steering and Electric Filed Sensing |

08:30-08:55 Development of Active Photonics Functionalities on The Thin-Film Lithium Niobate Platform

Qiang Lin, University of Rochester, USA

Abstract: In this talk, I will present our recent progress in developing active integrated photonic components and functions on the thin-film lithium niobate integrated photonic circuits, including lasers, tunable soliton microcombs, and electrically controlled quantum functionalities.

08:55-09:20 Integrated Acousto-optics Using Lithium Niobate Platform

Linbo Shao, Virginia Tech, USA

Abstract: We will discuss our recent progress in integrated acousto-optic devices using lithium niobate including microwave-to-optical conversions, frequency shifting, and optical frequency comb generation.

09:20-09:45 Ultrafast Pulse Sources on LN

Mengjie Yu, University of Southern California, USA

Abstract: TBA

09:45-10:10 Thermo-optics in Thin Film Lithium Niobate

Aaron Danner, National University of Singapore, Singapore

Abstract: The thermo-optic effect in lithium niobate is stronger, but much slower, than the electro-optic effect. Nonetheless it can be used for purposes where fast switching is unnecessary, and has certain advantages. We have fabricated various devices exploiting this property.

13:30-13:55 Etchless Lithium Niobate Integrated Photonic Circuits and Devices

Xiankai Sun, The Chinese University of Hong Kong, China

Abstract: We will cover our recent progress in etchless lithium niobate integrated photonics, which includes the operating principles and applications in second-harmonic generation, acousto-optic modulation, wavelength-division multiplexing, high-dimensional optical communication, and hybrid 2D-material photonic integration.

13:55-14:20 Photonic Devices on Thin-Film Lithium Niobate for Nonlinear Optics

Jinsong Xia, Huazhong University of Science and Technology, China

Abstract: As 5G mobile network has been commercialized and widely deployed, the research community has shifted the focus to the development of the 6G network. The key performance indicators of 6G are expected to improve by a factor of 10-100 relative to 5G, including capacity, speed and coverage. In addition, new abilities such as sensing and positioning will be embedded in 6G. To fulfill these requirements, disruptive innovations will be needed, and optical technologies are expected to play a key role. This workshop will discuss the role of optical technologies in building 6G networks. Enabling technologies and potential applications will be discussed in this workshop, including optical transmission and networking for 6G fronthaul/midhaul/backhaul, RoF, Photonic-assisted MMW and THz, FSO, VLC, MWP as well as optical switching, computing and sensing.

14:20-14:45 A Scheme for Deterministic N-photon State Generation Using Lithium Niobate on Insulator Device

Zhenda Xie, Nanjing University, China

Abstract: Large-photon-number quantum state is a fundamental but non-resolved request for practical quantum information applications. Here we propose an N-photon state generation scheme that is feasible and scalable, using lithium niobate on insulator circuits. Such scheme is based on the integration of a common building block called photon-number doubling unit (PDU), for deterministic single-photon parametric down-conversion and up-conversion. The PDU relies on 10^7 -optical-quality-factor resonator and mW-level on-chip power, which is within the current fabrication and experiment limits. N-photon state generation schemes, with cluster and GHZ state as examples, are shown for different quantum tasks.

14:45-15:10 Second-Order Nonlinearities on the Lithium Niobate-on-Insulator Platform

Yuanlin Zheng, Shanghai Jiao Tong University, China

Abstract:

15:20-15:45 Thermo- and Electro-Optic Modulators from Visible to near Infrared

Rachel Grange, ETH Zurich, Swiss

Abstract:

15:45-16:10 Single-crystal Lithium Niobate Thin Film Materials and Technologies

Hui Hu, Shandong University, China

Abstract: Single crystal lithium niobate thin film remains the excellent physical properties of LN bulk and has high refractive index contrast, which is becoming an important material platform for integrated photonics.

16:10-16:35 Self-Powered Lithium Niobate Thin-Film Photodetectors

Feng Chen, Shandong University, China

Abstract: We realize a self-powered LNOI photodetector by encapsulating both Ag nanoparticles and ions. The Ag implantation enables encapsulated Ag nanoparticles, enhancing photoelectric response, and introduces Ag ions and defects to increase conductivity and photoexcited carrier concentration.

16:35-17:00 Microstructured Lithium Niobate for Beam Steering and Electric Field Sensing

Huihui Lu, Jinan University, China

Abstract: We report the microstructured lithium niobate (LN) as a versatile platform for enhancing electro-optic (EO) effect, combining its sub-wavelength structures to boost and enhance the light-matter interaction, this progresses the low-voltage driven, versatile, miniaturized photonic devices for beam steering and E field sensing.

Nov. 06 13:30-17:00

Presider: Kan Wu, Shanghai Jiao Tong University

| | | |
|-------------|--------------|--|
| 13:30-13:55 | Xinlun Cai | III-V and Thin-film Lithium Niobate Hybrid Integrated Devices |
| 13:55-14:20 | Bing Xiong | Wide Bandwidth Capacitively-loaded thin film LN Modulators |
| 14:20-14:45 | Liu Liu | Thin Film Lithium Niobate based Modulators and Its Hybrid Integration with Silicon Photonics |
| 14:45-15:10 | Yonghui Tian | Integrated Photonics Based on Silicon Nitride and Lithium Niobate Hybrid Platform |
| 15:10-15:20 | Break | |

| Presider: Zhiwei Fang, East China Normal University | | |
|--|-------------|--|
| 15:20-15:45 | Fang Bo | Broadband and Cascaded Second-order Nonlinear Optical Effects in Periodically-Poled Lithium Niobate Waveguides |
| 15:45-16:10 | Yuping Chen | Monolithic Integration of Laser and Amplifier on Er-doped LNOI Platform |
| 16:10-16:35 | Jintian Lin | Single-frequency Narrow-linewidth Tunable Microlaser and Microwave Source Generated on Single Active Lithium Niobate Microcavities |
| 16:35-17:00 | Minglu Cai | Erbium Doped Lithium Niobate Devices |

| | | |
|--|---|--|
| 13:30-13:55 | III-V and Thin-film Lithium Niobate Hybrid Integrated Devices | |
| Xinlun Cai, Sun Yat-sen University, China | | |
| Abstract: | | |
| 13:55-14:20 | Wide Bandwidth Capacitively-loaded thin film LN Modulators | |
| Bing Xiong, Tsinghua University, China | | |
| Abstract: In this talk, we will review recent works on capacitively-loaded Thin Film LN Modulators, including first theoretical proposal and experimental demonstrations, compact meandered TFLN modulators, and undercut structure design for 300 GHz bandwidth devices. | | |
| 14:20-14:45 | Thin Film Lithium Niobate based Modulators and Its Hybrid Integration with Silicon Photonics | |
| Liu Liu, Zhejiang University, China | | |
| Abstract: | | |
| 14:45-15:10 | Integrated Photonics Based on Silicon Nitride and Lithium Niobate Hybrid Platform | |
| Yonghui Tian, Lanzhou University, China | | |
| Abstract: | | |
| 15:20-15:45 | Broadband and Cascaded Second-order Nonlinear Optical Effects in Periodically-Poled Lithium Niobate Waveguides | |
| Fang Bo, Nankai University, China | | |
| Abstract: Broadband second harmonic generation of 100-nm bandwidth and efficient cascaded third harmonic generation was realized in periodically poled lithium niobate ridge waveguides with step-chirped, quasi-period domain structures, respectively, utilizing their rich and designable reciprocal wavevectors. | | |
| 15:45-16:10 | Monolithic Integration of Laser and Amplifier on Er-doped LNOI Platform | |
| Yuping Chen, Shanghai Jiao Tong University, China | | |
| Abstract: We monolithically integrated a micro-laser and an optical amplifier on Er-doped LNOI platform, showing an enhancement of integration level. By low-temperature (300 °C) thermal in-diffusion, we achieved a novel Er-doped LNOI platform with a variable concentration. | | |
| 16:10-16:35 | Single-frequency Narrow-linewidth Tunable Microlaser and Microwave Source Generated on Single Active Lithium Niobate Microcavities | |
| Jintian Lin, Shanghai Institute of Optics and Fine Mechanics, CAS, China | | |
| Abstract: We reported the generation of electro-optically tunable single-frequency narrow-linewidth microlasers on | | |

single weakly perturbed active lithium niobate circular microdisks coupled with tapered fibers. Polygon modes coherently formed in such weakly perturbed microdisk with high Q factors and sparse free spectral ranges within optical gain, were used to generate single-mode microlasers around 1550 nm wavelength. Benefited from the large spatial mode overlap between the high-Q pump and lasing polygon modes, microlaser was demonstrated with low threshold of 25 uW and narrow linewidth of ~500 Hz. Besides single-frequency lasing, dual-wavelength microlaser have also been observed from nearly degenerate polygon modes on single active microdisks. And photonic generation of microwave signals were synthesized from the dual-wavelength microlasers with phase-noises as low as 6870 Hz.

16:35-17:00 **Erbium Doped Lithium Niobate Devices**

Minglu Cai, Shanghai Jiao Tong University, China

Abstract: Erbium-doped lithium niobate on insulator (Er:LNOI) with gain property has potential to build a fully integrated photonic system. We demonstrate the integrated amplifier and laser based on Er:LNOI, and describe the mechanism of signal amplification and generation.

What is the Role of Optical Technologies in Building 6G Networks?

Chairs: Qunbi Zhuge, Shanghai Jiao Tong University, China; Junwen Zhang, Fudan University, China; Paolo Monti, Chalmers University of Technologies, Sweden
 Presider: Qunbi Zhuge, Junwen Zhang, Paolo Monti

Time: 13:30-18:00 | Room 4-9, 4F | Room 7, ID: 893 4541 0357

Intro.: As 5G mobile network has been commercialized and widely deployed, the research community has shifted the focus to the development of the 6G network. The key performance indicators of 6G are expected to improve by a factor of 10-100 relative to 5G, including capacity, speed and coverage. In addition, new abilities such as sensing and positioning will be embedded in 6G. To fulfill these requirements, disruptive innovations will be needed, and optical technologies are expected to play a key role. This workshop will discuss the role of optical technologies in building 6G networks. Enabling technologies and potential applications will be discussed in this workshop, including optical transmission and networking for 6G fronthaul/midhaul/backhaul, RoF, Photonic-assisted MMW and THz, FSO, VLC, MWP as well as optical switching, computing and sensing.

SPEAKERS

| Time | Presenter | Title |
|-------------|-------------------------|---|
| 14:00-14:15 | Weisheng Hu | 6G(f, m): a big communication entangled with fiber and mobile. |
| 14:15-14:30 | Jianyang Shi | Visible Light Communication Toward 6G |
| 14:30-14:45 | Xiang Liu | F5G-Advanced, evolving towards F6G |
| 14:45-15:00 | Jiao Zhang | THz-wireless and Fiber Seamless Integration Networks for 6G |
| 15:00-15:15 | Xueyang Li | Advanced direct detection schemes for 6G X-haul |
| 15:15-15:40 | Part 1 Panel discussion | |
| 15:40-16:00 | Coffee Break | |
| 16:00-16:15 | Dan Kilper | Smart Optical Networks for A Low Latency Edge |
| 16:15-16:30 | Anna Tzanakaki | Combining Edge and Central Cloud Processing: An Enabler for 6G Services |
| 16:30-16:45 | Reza Neiabati | 6G and Quantum Internet Synergies |
| 16:45-17:00 | Liam P. Barry | Analogue Radio-over-fibre Technology for 6G Networking |
| 17:00-17:15 | Zou Jim | Converged optical edge connecting future mobile networks |
| 17:15-17:40 | Part 2 Panel discussion | |

Fiber Optic Distributed Acoustic Sensors (DAS) and Applications

Chairs&Presiders: Qizhen Sun, Huazhong University of Science and Technology

Gilberto Brambilla, University of Southampton

Yunyue Elita Li, Purdue University

Time: 09:00-18:00 | Room 4-7, 4F, (Zoom ID: 838 0639 6686)

Intro.: Distributed acoustic sensing (DAS) is a technology that records sound and vibration signals along an optical fiber. Its advantages of high sensitivity, long distance, high resolution, continuous, and real-time measurements promote the wide applications. The workshop will present the latest research progress on principles, methods, and applications of fiber optics DAS.

SPEAKERS

| Time | Speaker | Title |
|-------------|-------------------------|---|
| 09:00-09:35 | Gang Yu | DAS-VSP Technique and Its Applications for Oil and Gas Exploration and Production |
| 09:35-10:10 | Zuyuan He | Advanced Optical Fiber Distributed Acoustic Sensors |
| 10:10-10:25 | Coffee Break | |
| 10:25-11:00 | Yunyue Li & Yanlong Niu | Lab-scale Small-strain Stiffness Measurement Based on Distributed Acoustic Sensing |
| 11:00-11:35 | Zinan Wang | QDAS Bandwidth Enlargement Utilizing Orthogonal Codes on the Same Carrier |
| 11:35-12:10 | Gang Fang | Monitoring Tunneling Construction Using Distributed Acoustic Sensing |
| 12:10-14:00 | Lunch Break | |
| 14:00-14:35 | Hao Li | Backscattering enhanced optical fiber (BEOF) DAS and Its Applications |
| 14:35-15:10 | Avinoam Zadok | Sensing of Media Outside the Cladding of Standard Fibers |
| 15:10-15:45 | Dimin Yu | Production Profiling with DAS and DTS in Karamay |
| 15:45-16:00 | Coffee Break | |
| 16:00-16:35 | Ali Masoudi | Signal Fading in Distributed Acoustic Sensors: Analysis and Mitigation Strategies |
| 16:35-17:10 | Sheng Liang | AI for Intelligent Sensing: AI Based Event Classification for Fiber-Optic Distributed Vibration Sensor. |
| 17:10-17:45 | Xin Gong | Industrial Review: Fiber Bragg Grating Manufacturing? Yes, the old dog has new tricks. |

09:00-09:35 DAS-VSP Technique and Its Applications for Oil and Gas Exploration and Production

Gang Yu, BGP Inc., CNPC, China.

Abstract: Borehole and surface joint seismic exploration is a 3-D seismic exploration method formed by the combination of surface seismic & borehole seismic data acquisition simultaneously. DAS-VSP can provide high efficient & high density data, and reduce operation cost and time significantly. Deploy armored optical cable behind casing is the best way to conduct time lapse DAS-VSP surveys, which can monitor reservoir fluid changes within the whole oilfields.

09:35-10:10 Advanced Optical Fiber Distributed Acoustic Sensors

Zuyuan He, Shanghai Jiaotong University, China

Abstract: The principle and technologies of advanced DAS, especially newly developed DAS based on TGD-OFDR, are reviewed. DAS technology is still developing rapidly. Attentions can be paid to the research fields, such as continuous improving the performance, vibration pattern recognition based on machine learning, etc. The standardization and the integration play the most important parts in the promotion of DAS applications.

10:25-11:00 Lab-scale Small-strain Stiffness Measurement Based on Distributed Acoustic Sensing

Yunyue Li & Yanlong Niu, Purdue University, USA; National University of Singapore

Abstract: This talk involves a new approach to performing quality checks for cement-stabilized soil utilizing distributed acoustic sensing (DAS) on the lab scale. The measurement is based on the free-free resonant column test under both active and passive sources to extract the longitudinal and transversal resonance and derive the small-strain stiffness correspondingly. Then, the proposed workflow of extracting resonance from various passive sources induced by laboratory daily activities are further investigated.

11:00-11:35 QDAS Bandwidth Enlargement Utilizing Orthogonal Codes on the Same Carrier

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

Abstract: In recent years, quasi-distributed acoustic sensing (QDAS) based on single mode fiber with enhanced point array has emerged. To break the trade-off between sensing bandwidth and distance, additional frequency domain resources are always needed to multiplex the sensing channel. This talk will elaborate that, multiple-input multiple-output coding technology is a good approach to realize QDAS channel-multiplexing, with the orthogonal probe sequences in the same frequency band.

11:35-12:10 Monitoring Tunneling Construction Using Distributed Acoustic Sensing

Gang Fang, National University of Singapore

Abstract: Underground tunneling with tunnel boring machine (TBM) in Singapore faces challenges related to the rheological behavior of the rock mass and possible changes in the hydrogeological conditions within the tunnel environment. We implement distributed acoustic sensing (DAS) for tunnel construction monitoring at one stretch of the Circle Line of the Singapore subway network. The estimated velocities along the tunnel are consistent with the borelog data and mud samples.

14:00-14:35 Backscattering enhanced optical fiber (BEOF) DAS and Its Applications

Hao Li, Huazhong University of Science and Technology, China

Abstract: Optic fiber distributed acoustic sensing has been widely studied and applied due to its unique advantages. In this talk, the high-performance DAS system based on the backscattering enhanced optical fiber is proposed, in which the key technologies and wide applications will be discussed.

14:35-15:10 Sensing of Media Outside the Cladding of Standard Fibers

Avinoam Zadok, Bar-Ilan University, Israel

Abstract: The analysis of media outside the boundaries of the cladding and coating layers represents a fundamental challenge for optical fiber sensors. In this presentation, I describe two possible solution paths. The first is based on the optical excitation and monitoring of guided acoustic modes. The second involves the random access coupling of light to the optical cladding modes, using Brillouin scattering dynamic gratings. Both methods support point-sensing and spatially distributed analysis.

15:10-15:45 Production Profiling with DAS and DTS in Karamay

Dimin Yu, Nanjing Jianqiao Energy Tech, China

Abstract: DAS systems are being deployed in the oil and gas industry for production monitoring for sometime. Optical fiber are commonly attached to coiled tubing (CT) for testing purposes. In this talk, we present a recent study done in Karamay region and discuss how fiber deployment methods and data processing techniques would impact DAS applications.

16:00-16:35 Signal Fading in Distributed Acoustic Sensors: Analysis and Mitigation Strategies

Ali Masoudi, University of Southampton, UK

Abstract: Signal fading is one of the hallmarks of most distributed acoustic sensor (DAS) systems, including phase, polarization, and intensity fading. In this presentation, the sensing principle based on differential phase analysis will be reviewed first. Next, the three fading processes and their effect on each one of these sensing arrangements will be analyzed. Finally, different strategies to eliminate signal fading in each sensing arrangement and their effectiveness will be presented.

16:35-17:10 AI for Intelligent Sensing: AI Based Event Classification for Fiber-Optic Distributed Vibration Sensor

Sheng Liang, Beijing Jiaotong University, China

Abstract: Artificial intelligence (AI) has brought great development to event classification of Fiber-optic distributed vibration sensor (DVS). We transformed the temporal vibration signals to the 2D images and classified them through neural networks. Then, to reduce the huge work of labeling in supervised learning, we have proposed the unsupervised-learning based vibration events classification. Future work is also discussed by 4 keywords to make AI "see more, know more".

17:10-17:45 Industrial Review: Fiber Bragg Grating Manufacturing? Yes, the old dog has new tricks

Xin Gong, Engionic-Femto Grating GmbH, Germany (formerly FemtoFiberTec GmbH)

Abstract: Fiber grating manufacturing methods have gone through phase mask, interference, point by point and other methods. This industry review mainly presents the characteristics of various writing methods, and points out the grating scenarios suitable for specific writing methods, especially new applications during the past five years, such as broadband weak gratings (scattering enhanced optical cables), narrowband weak gratings, FP pair arrays, random laser distributed reflective arrays, grating manufacturing in thin cladding fibers, tilted gratings, eccentric gratings, etc.

What Will Photonic Computing be Like in the Future?

Chairs: Jianji Dong, Huazhong University of Science and Technology, China; Chaoran Huang, The Chinese University of Hong Kong, China; Xing Lin, Tsinghua University, China
 President: Huang Chaoran, Lin Xing

Time: 09:00-17:35 | Room 4-5, 4F; Room 6, ID: 854 1284 3584

Intro.: The topic of photonic computing is both old and new. There is a recent surge in the study of photonic computing from both academic and industrial community. What will photonic computing be like in the future? It is a hot topic of debate. This workshop aims to bring together researchers from diverse backgrounds to create synergy in this emerging research area.

SPEAKERS

| Time | Speaker | Title |
|------------------|--|--|
| President | Chaoran Huang, Chinese University of Hong Kong, China | |
| 09:00-09:25 | Aydogan Ozcan | Diffractive Optical Networks & Computational Imaging without A Computer |
| 09:25-09:50 | Volker J. Sorger | Photonic Chips for Machine Intelligence |
| 9:50-10:15 | Thomas Ferreira De Lima | Neuromorphic Photonics for Real-time Processing |
| 10:15-10:40 | Xian Xiao | Large-scale and Energy-Efficient Tensorized Optical Neural Networks |
| 10:40-11:05 | Hongwei Chen | Optical Pre-Sensor Computing for High-Level Machine Vision |
| 11:05-15:30 | Break | |
| President | Xing Lin, Tsinghua University, China | |
| 15:30-15:55 | Daniel Brunner | Towards Scalable Photonic Neural Networks with (3+1) D Integrated Optics |
| 15:55-16:20 | Zihan Geng | Photonic Computing for High-Speed Optical Communication |
| 16:20-16:45 | Changhe Zhou | Dammann Optical Computer |
| 16:45-17:10 | Zengguang Cheng | Phase Change Photonics for Memory and Computing Applications |
| 17:10-17:35 | Xingyuan (Mike) Xu | Optical Neuromorphic Convolutional Neural Networks |

09:00-09:25 Diffractive Optical Networks & Computational Imaging without A Computer

Aydogan Ozcan, University of California, Los Angeles (UCLA), USA

Abstract: I will discuss diffractive optical networks designed by deep learning to all-optically implement various complex functions as the input light diffracts through spatially-engineered surfaces.

09:25-09:50 Photonic Chips for Machine Intelligence

Volker J. Sorger, George Washington University

Abstract: Here I will introduce prospects and opportunities of photonics for machine learning and intelligent systems.

09:50-10:15 Neuromorphic Photonics for Real-time Processing**Thomas Ferreira De Lima, NEC labs**

Abstract: Neural networks have recently showcased state-of-the-art performance in signal processing applications. However, real-time demonstrations for high bandwidth signals requires integrating analog computing hardware, such as photonics, to digital processors. In this talk, we will show examples of analog time series processing with photonic processors.

10:15-10:40 Large-scale and Energy-Efficient Tensorized Optical Neural Networks**Xian Xiao, HP labs**

Abstract: This talk will introduce an energy-efficient, high-throughput, scalable, and compact tensorized optical neural network (TONN) on Hewlett Packard's advanced, densely integrated heterogeneous III–V-on-silicon device platform. The TT decomposition enables the proposed architecture to be scalable to 1024×1024 and beyond, which is extremely difficult for conventional integrated ONNs.

10:40-11:05 Optical Pre-Sensor Computing for High-Level Machine Vision**Hongwei Chen, Tsinghua University, China**

Abstract: In machine vision applications, optical computing can naturally exist as a kind of pre-sensor computing. I will introduce some approaches to realize optical pre-sensor computing for high-level machine vision tasks.

15:30-15:55 Towards Scalable Photonic Neural Networks with (3+1) D Integrated Optics**Daniel Brunner, FEMTO-ST Institute, France**

Abstract: We demonstrate complex 3D multimode waveguide networks based on polymer waveguides surrounded by air and developed a (3+1)D direct laser writing technique to realize single mode step or graded index waveguides.

15:55-16:20 Photonic Computing for High-Speed Optical Communication**Zihan Geng, Tsinghua-Berkley Shenzhen Institute, China**

Abstract: The development of high-speed fiber optics communication systems is facing the challenge of computational cost and power consumption of signal processing. Optical computing is a promising way to tackle the problem.

16:20-16:45 Dammann Optical Computer**Changhe Zhou, Jinan University, China**

Abstract: Dammann optical computer can perform optical convolution of two matrices in full parallelism for both scientific calculation and optical neural network, which might exceed the supercomputer for large-scale convolution in the future.

16:45-17:10 Phase Change Photonics for Memory and Computing Applications**Zengguang Cheng, Fudan University, China**

Abstract: We combine non-volatile phase-change materials (PCMs) and optical waveguides to implement photonic in-memory computing and associative learning networks to construct two neuromorphic paradigms

17:10-17:35 Optical Neuromorphic Convolutional Neural Networks**Xingyuan (Mike) Xu, Beijing University of Posts and Telecommunications, China**

Abstract: This talk introduces a universal optical vector convolutional accelerator operating at more than ten TOPS. The results are based on simultaneously interleaving temporal, wavelength and spatial dimensions enabled by an integrated microcomb source.

What Is the Role of Optical Sensors in Building Smart Environments?

Chairs: George Y. Chen, Shenzhen University, China; Xiaohong Zhou, Tsinghua University, China; Ming Ding, Beihang University, China; Tongyu Liu; Qilu University of Technology (Shandong Academy of Sciences), China

Presider: George Y. Chen, Shenzhen University, China

Time: 09:00-12:00 | Online Room 2, ID: 836 5238 9479

Intro.: The development of optical sensors has been a major driving force behind smarter cities and industries, as well as better protection of our natural environment. This workshop invites researchers to contribute novel ideas and discussions that can stimulate the field and bridge the gap between fundamental research and real-world solutions.

SPEAKERS

| Time | Speaker | Title |
|-------------|---------------|--|
| 09:00-09:30 | Jun He | Femtosecond laser direct-written fiber Bragg gratings for smart structures in extreme environments |
| 09:30-10:00 | Liang Wang | Achieving integrated denoising and information extraction using a single CNN for simultaneous temperature and strain measurement in BOTDA sensing system |
| 10:00-10:15 | | Break |
| 10:15-10:45 | Mengmeng Chen | Distributed Optical fiber sensors based on Rayleigh Backscattering |
| 10:45-11:15 | Zhangqi Song | Optical fiber shape sensing for submarine landslide monitoring |

09:00-09:30 Femtosecond Laser Direct-Written Fiber Bragg Gratings for Smart Structures in Extreme Environments

Jun He, Shenzhen University

Abstract: Femtosecond laser direct-written FBGs are attractive for creating smart structures in extreme environments due to its excellent flexibility and thermal stability. We overview the advances in fabrication technologies and sensing applications of various FBGs array.

09:30-10:00 Achieving Integrated Denoising And Information Extraction Using A Single CNN for Simultaneous Temperature And Strain Measurement in BOTDA Sensing System

Liang Wang, Huazhong University of Science and Technology

Abstract: A denoising and extraction convolutional neural network composed of denoising convolutional autoencoder and residual attention network modules has been proposed and demonstrated to extract temperature and strain simultaneously in Brillouin optical time-domain analysis system.

10:15-10:45 Distributed Optical fiber sensors based on Rayleigh Backscattering

Mengmeng Chen, Nanjing University/

Abstract: Femtosecond laser direct-written FBGs are attractive for creating smart structures in extreme environments due to its excellent flexibility and thermal stability. We overviews the advances in fabrication technologies and sensing

applications of various FBGs array.

10:45-11:15 Optical Fiber Shape Sensing For Submarine Landslide Monitoring

Zhangqi Song, Southern University of Science and Technology

Abstract: A 3D optical fiber shape sensor with FBG clusters for submarine landslide monitoring is proposed. The spatial shape recovery algorithms for temperature and underwater pressure eliminating are introduced. It works well in a harbor experimental.

Advanced Optical Fiber Technologies for Underwater Applications

Chairs: Liangming (Anson) Xiong, State Key Laboratory of Optical Fiber and Cable Manufacture Technology, YOFC, China; Junjie Li, China Telecom Research Institute, China; Liyang Shao, Southern University of Science and Technology, China

Time: 09:00-18:00 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

Intro.: Submarine fiber-optic cables now carry >95% of all transoceanic telecommunications traffic in an economic, fast and secure way. Fiber-optic cables also play a very important role in underwater sensing or monitoring. To develop advanced optical fiber technologies for underwater applications has been attracted extensive and intensive research interest. This workshop will give some representative optical fiber technology and application cases, involving in novel optical fibers and cables, high-speed high-capacity submarine fiber-optic communication in C+L and visible bands, and fiber-optic sensing or monitoring.

SPEAKERS

| Time | Presenter | Title |
|-------------|--------------------|---|
| 10:30-10:55 | Xiaoming Chen | Test Method for GSNR of Submarine Open Cable System |
| 10:55-11:20 | Lipeng Feng | The Technologies and Challenges of Large-capacity Long-distance Submarine Fiber-optic Communication |
| 11:20-11:45 | Xin Zhao | Technical Standards and Development Trend of Submarine Cable Communication |
| 11:45-12:10 | Jianping Li | Open Submarine Cable Communication Technology and Application |
| 12:10-14:00 | Break | |
| 14:00-14:25 | Xuping Zhang | On-line Distributed Monitoring for the Offshore Wind Turbine and Submarine Power Transmission Cable |
| 14:25-14:50 | Zhengyong Liu | Multi-parameter Optical Fiber Sensing System and Its Application in Marine Information Monitoring |
| 14:50-15:15 | Yang Lu | Orientation Evaluation of Acoustic Signals Using Distributed Acoustic Sensing on An Optical Fiber Telecom Cable |
| 15:15-15:40 | Lin Ma, Jiehui Liu | Transmission Distance Adaptable Underwater Visible Light Communication |
| 15:40-16:05 | Jun Luo | New Optical Fibers for Submarine Cable Application |
| 16:05-16:30 | JiEn Song | Integrated Development of Marine Communication and Sensing |
| 16:30-17:00 | Panel Discussion | |

Photonics Global Student Conference

Presiders: Wei Zhang, Wang Zihao, Xingwei Chen,

Time: 13:30-18:00 | Room 2-1, 2F, (Zoom ID: 846 1762 4368)

SPEAKERS

| Time | Presenter | Title |
|-------------|--|---|
| 13:30-14:00 | Keynote Speech: Sarun Sumriddetchkajorn | DIY Optical Spectrometers: From Lab to Market |
| 14:00-14:30 | Keynote Speech: John Dudley | Machine Learning for New Insights into Ultrafast Nonlinear Fibre Optics |
| 14:30-14:50 | Like Li | Highly Sensitive Optical Fiber Seawater Salinity Sensor |
| 14:50-15:10 | Ruifeng Li | Research on all-fiber laser-self-mixing Doppler Velocity Measurement System |
| 15:10-15:30 | Jie Yang | Singular Electromagnetics: A symmetry Point of View |
| 15:30-15:50 | Sheng-ke Zhu | Towards Integrated Mode-division Demultiplexing Spectrometer by Deep Learning |
| 15:50-16:10 | Guanqing Zhou | Spontaneous Carrier Generation and Low Recombination in High-Efficiency Non-fullerene Solar Cells |
| 16:10-16:30 | Shuaihao Ji | Research on Ho^{3+} -doped ZBLAN visible Fiber Lasers |
| 16:30-16:50 | Qing Wang | Noninvasive Vital Signs Assessment for Perioperative Infants with the Optical Fiber Sensor Based on Deep Learning |
| 16:50-17:10 | Yefen Wei | Multi-function Sensors Based on Three-Core Fiber |
| 17:10-17:30 | Pei Zhang | Pigmented Structural Color Actuators Fueled by Near-Infrared Light |
| 17:30-17:50 | Weihao Lin | Research on Temperature Sensing Characteristics of Micro-Nano Fiber Interferometer based on Different Configurations in Fiber Laser |
| 17:50-18:10 | Redha Ibrahim | Orbital Angular Momentum Spectrum Decomposition for Image Rotation |

ACP 2022 Rump Session: Promises and Opportunities of VCSELs

Presider: Connie Chang-Hasnain, Bixel Photonics, China

Time: 15:15-17:15 | Room 4-C, 4F (Zoom ID: 845 4370 7772)

Intro.: VCSELs are the light source of choice for a wide range of applications because of cost-effective manufacturing and testing, and user-friendly optical beams for system designs. They are widely deployed in short-reach data center interconnects, 3D sensing and LIDAR applications. Recent exciting progress include very high speed VCSELs at 106 Gbps per lane (via 53 Gbaud PAM4) arrays are under pilot runs. Novel design approaches allow decreased device heating and increased saturation currents. They are excellent choices for green photonics with <100 fJ/bit. The 3D sensing market stimulated 6"-wafer fabrication and testing, enabling mass production of high power-conversion efficiency (PCE), large emitter-count arrays. The emerging automotive LiDAR further leverages this development for high power density arrays, reaching now several Kw/mm². In this rump session, we invite system application engineers, device researchers and manufacturing engineers to get together and discuss state-of-the-art VCSEL technologies, remaining device and systems challenges, synergies across different market segments. In particular, we seek thought-provoking presentations and discussions on promises and challenges, future directions and emerging applications of VCSELs.

SPEAKERS

| Time | Presenter | Title |
|--------------|---------------|--|
| 15:15-15:40 | Li (Andy) Zhu | Artificial Intelligence of Things: The Next Phase of 3D Sensing |
| 15:40-16:05 | Si-Cong Tian | Single-Mode, High-Speed Multi-Aperture VCSELs |
| 16:05-16:30: | Hongyan Fu | VCSELs for Optical Wireless Communications |
| 16:30-16:55 | Fumio Koyama | VCSEL Photonics for CPO Transceivers and LIDAR Applications |
| 16:55-17:20 | Anjin Liu | Vertical-Cavity Surface-Emitting Laser with Post-Supported High-Contrast Grating |

Session 01-T5: Microwave Photonics and Optical Signal Processing**Presider: Baicheng Yao, University of Electronic Science and Technology of China****Time: 14:10-14:40 | Room 4-5, 4F (Zoom ID: 854 1284 3584)****13:30-14:10****Keynote speaker** Ton Koonen**Recent Progress in High-Capacity Optical Wireless Communication**

Abstract: Optical wireless communication can surpass the capabilities of radio-based wireless communication in many respects. When using accurately steered infrared beams, it can offer fiber-equivalent high capacity at high user densities, while being highly secure, insensitive to EMI, and energy-efficient. This keynote talk presents recent advances in our indoor high-capacity beam-steering technologies for all-optical bi-directional wireless communication including accurate automatic self-calibrated user localization.

14:10-14:40**Invited speaker** Baicheng Yao**Graphene Functionalized Microcombs for Microwave Sensing and Signal Processing and Processing**

Abstract: Microcomb devices bridge the optical and microwave band, have attracted intense interests. By incorporating graphene optoelectronics into microcavity geometries, we enable tunable functions for some advanced applications such as sensing and signal processing

Session 02-T1: Optical Fibers and Fiber-based Devices**Presider: Xiaoming Wei,****Time: 13:30-15:00 | Room 4-C, 4F (Zoom ID: 845 4370 7772)****13:30-14:00****Invited speaker** Xiaoming Wei**14:00-14:15 # ID 2754****Narrow Linewidth Fiber Laser Based on Nanoparticles Doped Self-Injection Module****Authors:** Jiahao Luo, Xujia Zhang, Shichao Yang, Wilfried Blanc, Zhijun Yan and Xia Yu

Abstract: A sub-kilohertz narrow linewidth fiber laser based on nanoparticles doped self-injection module is proposed. Experimental study and analysis of laser performance key parameters including optical spectrum, linewidth and noise performance have been carried out.

14:15-14:30 # ID 2160**An All Optical Airflow Sensor Based on Radiated Tilted Fiber Grating and Multiwalled Carbon Nanotube****Authors:** Qiang Lu, Qingguo Song, Pengyu Zhang, Song Li, Zhixuan Ye, Qizhen Sun and Zhijun Yan

Abstract: We proposed and demonstrated an all-optical airflow sensor based on carbon nanotube functionalized radiated tilted fiber grating. Its measurement capability has been proved.

14:30-14:45 # ID 1636**All-fiber 770 nm Laser Based on Second Harmonic Generation****Authors:** Xu Chen, Jiahao Luo, Jingmin Liu, Shichao Yang and Xia Yu

Abstract: A 770 nm all-fiber laser based on second harmonic generation is presented. The basic properties of the laser have been experimentally demonstrated and analyzed. The laser with low noise is suitable for precise quantum measurement.

14:45-15:00 # ID 6677**Linewidth Compressor Based on Single-Frequency Brillouin Lasing Resonance for 64 Quadrature Amplitude Modulation Communications****Authors:** Haozhe Shou, Yunlong Hao, Yining Ding, Yifan Qiao, Ruolan Shi, Yikun Jiang, Fufei Pang and Liang Zhang

Abstract: An efficient laser linewidth compressor via single-frequency Brillouin lasing resonance for dual-polarization 64 quadrature amplitude modulation coherent optical communications was proposed and evaluated, yielding over one-order of magnitude improvement in the bit error rate.

Session 03-T2: Optical Transmission Systems, Sub-systems and Technologies**Presider: Gengchen Liu, Huawei Technologies****Time: 13:30-15:00 | Room 2-2, 2F (Zoom ID: 858 1993 0487)****13:30-14:00****Invited speaker Gengchen Liu, Huawei Technologies****Flexible Transceivers for Access Network: Perspectives and Challenges**

Abstract: Achieving higher-speed PON while maintains high sensitivity and low costs has posed challenges on massive rollout of next generation PON systems. We discuss how flexible transceiver mitigates the performance-cost dilemma by extracting more capacity from current PON networks.

14:00-14:15 # ID 7909**Demonstration of Real-time 6.4-Tb/s (128-Gb/s × 50) DP-QPSK Over 1.5-m Free-space Transmission without Optical Filter****Authors:** Chao Yang, Ming Luo and Quan You

Abstract: A real-time 6.4-Tb/s (128-Gb/s×50) DP-QPSK signal transmission is experimentally demonstrated over 1.5-m free-space without optical filter. The experimental results indicate that optical wireless communication can realize ultra-high-capacity transmission at low transmitted power with coherent reception.

14:15-14:30 # ID 3121**The Investigation of Using Active Analog Filter to Compensate Dispersion in Coherent Optic Communication****Authors:** Wei Li, Shan Hu, Tao Zeng, Xi Xiao and Ming Luo

Abstract: This paper proposes an analog filter architecture composed by operational amplifier, resistor, capacitor and Hilbert transformer for dispersion compensation, which simplify the coherent receiver. We verify its practicability in the 25/50 Gb/s QPSK transmissions simulation.

14:30-14:45 # ID 9439**Modes Selection for Multimode Transmission with Mode-Division Multiplexing****Authors:** Meng Liang, Yuna Liu, Jiaying Guo and Bei Zhao

Abstract: We apply the Gaussian noise (GN) model to evaluate the multimode OSNR for Mode-division multiplex (MDM) and the genetic algorithms (GA) to search for the modes that makes the system performance more effective.

14:45-15:00 # ID 581**On the Performance of Probabilistic Shaped 16-QAM with different Entropies using Probability-aided Maximum Likelihood Sequence Detector****Authors:** Xiaoshuo Jia, Yan Li, Ming Luo, Chao Yang, Jifang Qiu, Xiaobin Hong, Hongxiang Guo and Jian Wu

Abstract: In this paper, the performance of PS-16QAM with different entropies is investigated using the probability-aided MLSD, which could effectively alleviate some adverse impacts of probabilistic shaping technology on the decision module.

Session 04-T2: Optical Transmission Systems, Sub-systems and Technologies**President: Shaoliang Yu****Time: 13:30-15:00 | Room 2-3, 2F (Zoom ID: 873 1845 7907)****13:30-13:45 # ID 8627****155 Tbit/s Wideband Transmission over 50 km Standard Single Mode Fiber with Semiconductor Optical Amplifier Assistance in S-band Receiver****Authors:** Xu Zhang, Ming Luo, Chao Yang, Zhixue He, Xi Xiao and Shaohua Yu

Abstract: We demonstrate a 155 Tbit/s transmission in 15.5 THz of S, C and L bands over 50 km SSMF. With SOA assistance, S band can achieve the capacity similar to that of common C/L band

13:45-14:00 # ID 832**A Frequency Domain DSP Scheme with Pre-equalization for DSCM Transmitters****Authors:** Zhiyuan Ji, Yuchen Zhang, Xue Chen, Guiqing Sun, Tao Yang, Liangjun Zhang and Weiming Wang

Abstract: A frequency domain DSP scheme with pre-equalization function for DSCM transmitters is proposed. This scheme can complete filter shaping, subcarrier multiplexing, and pre-equalizing with lower computational complexity.

14:00-14:15 # ID 7713**An Innovative Optical Antenna Design for Indoor Narrow Beam Fibre-to-The-Ray (NB-FTTRay) Communication System****Authors:** Hui Liu, Yan Zeng, Xuming Wu, Qiang Cheng and Xiang Wang

Abstract: This paper demonstrates a NB-FTTRay system, an innovative optical antenna is implemented in the system. Camera-based image recognition and beam quality feedback mechanism are done to achieve alignment. The system supports 2.5 Gbps data rate.

14:15-14:30 # ID 7463**A Multiplane Light Conversion Device Supporting Bi-Directional Few-Mode PONs over Single Fiber with Net Gain in Upstream Loss Budget****Authors:** He We, Ning Wang, Jinglong Zhu, Junwei Li, Dechao Zhang and Jie Zhang

Abstract: A multiplane-light-conversion device is designed to enable single-fiber bi-directional PONs with net gain in upstream loss budget. This is achieved by incorporating mode multiplexing for upstream and power splitting for downstream signals in the device.

14:30-14:45 # ID 3188**Signal Processing Using Wavelet Transform and Short-time Fourier Transform Based on Spectral-scanning FMCW LiDAR****Authors:** Lican Wu, Zhi Li, Yaqi Han, Songping Mai, Xinpeng Xing and H. Y. Fu

Abstract: Time-frequency analysis is critical for spectral-scanning FMCW LiDAR. We use the Short-time Fourier transform (STFT) and wavelet transform (WT) to analyze the beat signal. Compared with STFT method, the resolution performance of WT is improved.

14:45-15:00 # ID 650**32×800Gb/s/carrier DWDM Coherent Transmission over 1050km EDFA amplified G.652 Fiber using OE-MCM Prototype with up to 140GBd Symbol Rate****Authors:** Anxu Zhang, Lipeng Feng, Yuyang Liu, Xiaoli Huo, Junjie Li, Chengliang Zhang, Baoluo Yan, Hu Shi, Nan Lu, Philippe Jennevé, Shaoliang Zhang, Miquel A. Mestre and Dayou Qian

Abstract: In this paper, 800Gb/s prototype based on 140GBd OE-MCM is first demonstrated. 32×800Gb/s DWDM transmission over a 1050km G.652 fiber link using only EDFAs is achieved

Session 05-T3: Networks Architectures, Management and Applications**Presider: Ning Deng, Huawei Technologies Co., Ltd.****Time: 13:30-15:00 | Room 4-9, 4F (Zoom ID: 846 6291 4130)****13:30-14:00****Invited speaker Bitao Pan, Beijing University of Posts and Telecommunications****Title: Novel metro-access optical node for converged fixed and mobile 5G networks**

Abstract: We present and investigate a novel optical metro-access ring network and control with dynamic optical express channels allocation. Numerical results show a deterministic latency lower than 50 μ s for time sensitive 5G mobile traffic.

14:00-14:15 # ID 2774**Partially Disaggregated Data Centers: Service Provisioning and Resource Allocation****Authors: Zhihao Liu, Sanjay K. Bose and Gangxiang Shen**

Abstract: We propose a scheme that partially disaggregates resources in data centers, and we develop an integer linear programming model and an efficient heuristic algorithm to handle service provisioning and resource allocation.

14:15-14:30 # ID 4085**Delay-aware Resource Scheduling in Integrated 50G-PON and Wi-Fi 7 Network****Authors: Jinhan Cai, Jun Li, Gangxiang Shen, Xiang Lu, Liangchuan Li, Tianhai Chang and Guanyu Wang**

Abstract: This paper proposes a delay-aware resource scheduling scheme for an integrated system consisting of 50G passive optical network (PON) and Wi-Fi 7, in which PON allocates bandwidth for frames jointly considering their wireless delays. Simulation results show that the proposed scheme can reduce the variance of end-to-end delays (i.e., jitter) for time-sensitive services by up to 45% compare with a benchmark scheme.

14:30-14:45 # ID 1345**Automatically Reconfigurable Optical Network for HPC system based on Deep Reinforcement Learning****Authors: Yu Shang, Xingwen Guo, Bingli Guo, Haixi Wang, Jie Xiao and Shanguo Huang**

Abstract: We propose a reconfigurable optical network for HPC system based on Deep Reinforcement Learning using Actor-Critic and Deep Deterministic Policy Gradient algorithm. Results show that our prototype achieves up to 1.7x performance improvement.

14:45-15:00 # ID 5465**Latency Aware Deployment of Networked Flying Platforms for FSO-based relay Networks****Authors: Zhiqun Gu, Yuhang Zhou, Jiawei Zhang and Yuefeng Ji**

Abstract: This paper studies the deployment of NFPs by considering the characteristic of FSO links and the limited power consumption. Simulation results demonstrate the performance of the proposed algorithm outperforms the two compared methods.

Session 06-T4: Materials, Devices and Optoelectronics Integration**Presider: Xiaolong Chen, Southern University of Science and Technology****Time: 13:30-15:00 | Room 4-7, 4F (Zoom ID: 893 4541 0357)****13:30-14:00****Invited speaker Yang Li, Tsinghua University****Optical Ranging using Integrated Lithium Niobate Electro-Optic Frequency Combs**

Abstract: Simple, accurate, and fast distance measurement has broad applications including autonomous vehicles, remote sensing, and integrated-chip manufacture. Based on the integrated lithium niobate electro-optic frequency comb, we connect the output of the comb to an unbalanced Mach-Zehnder interferometer with one arm including the

distance under test. While the repetition rate is swept within a certain range, we can obtain the distance under test by measuring the separation between two neighboring peaks of the interferogram of the unbalanced Mach-Zehnder interferometer. Through fast sweeping repetition rate, this method can increase the acquisition rate significantly.

14:00-14:30

Invited speaker Jinyu Mo, POET Technologies

Hybrid-integration Platform for Next Generation Optical Interconnects

Abstract: We present a unique hybrid integration platform for wafer scale passive assembly of electronics and photonics devices using a CMOS based optical interposer. This unique integration platform is the first such platform in the industry which enable paths for size and cost significant reduction in next generation optical interconnects.

14:30-14:45 # ID 3644

Physics-Aware Predictive Models for Tunable Photonics Devices

Authors: Zhenyu Zhao, Yujia Zhang, Xuhan Guo and Yikai Su

Abstract: We propose a novel method for modeling tunable photonic devices, providing an effective approach to tune photonic devices. The proposed models can learn from a small number of measured spectra and provide accurate predictions.

14:45-15:00 # ID 8839

150 GHz Bandwidth Modified Uni-traveling-carrier Photodiodes with 2.45 dBm Saturation Output Power

Authors: Yuxin Tian, Bing Xiong, Changzheng Sun, Zhibiao Hao, Jian Wang, Lai Wang, Yanjun Han, Hongtao Li and Yi Luo

Abstract: Back-illuminated modified uni-traveling-carrier photodiodes are optimized to achieve high power and wide bandwidth. The fabricated 6- μm -diameter PD demonstrates a 3-dB bandwidth of 150 GHz with a record-high saturation power of 2.45 dBm @ 150 GHz.

Session 07-T7: Biophotonics and Optical Sensors

President: Fei Xu, Nanjing University

Time: 13:30-15:00 | Room 4-8, 4F (Zoom ID: 831 1366 0011)

13:30-14:00

Invited speaker Fei Peng, Huazhong University of Science and Technology

Deep-learning 4D Live Microscopy

Abstract: We present the use of deep learning technique to break the spatiotemporal resolution limits of current 3D fluorescence microscopy for capturing instantaneous biological processes in three dimensions and 4D superresolution imaging of organelle interactions.

14:00-14:30

Invited speaker Dan Luo, Southern University of Science and Technology

Liquid Crystals Optical Sensors

Abstract: We demonstrate several biological and chemical optical sensor based on liquid crystals for detection of cholic acid, ammonia, and Pb^{2+} . The optical sensor based on liquid crystal demonstrates a kind of highly selective and sensitive novel naked-eye sensor,

14:30-14:45 # ID 3619

Polarization Rapid Rotation Location in Real-Time Coherent Optical Communication Systems

Authors: Xu Zhang, Xiang Li, Ming Luo, Desheng Li, Xuwei Wang, Zhixue He, Xi Xiao and Xi Wang

Abstract: We experimentally demonstrate an optical polarization sensor method in real-time coherent optical communication system. Based on the adaptive equalization in receiver DSP, the polarization rapid rotation event can be located in the bidirectional communication links.

14:45-15:00 # ID 6161**An Intelligent Recognition Algorithm for Urban Utility Tunnel Surface Intrusion Via Spatio-Temporal-Spectral Joint Information Extraction with FPN Network****Authors:** Tao He, Qizhen Sun, Shixiong Zhang, Hao Li, Zhijun Yan and Deming Liu

Abstract: An intelligent recognition algorithm for utility tunnel surface intrusion based on spatio-temporal-spectral joint information extraction with FPN network is proposed. Finally, the average recognition accuracy of 93.8% for five types of events were realized

Session 08-T1: Optical Fibers and Fiber-based Devices**Presider:** Guodong Shao, Wuhan Huaray Precision Laser Co., Ltd**Time:** 15:15-16:45 | Room 4-C, 4F (Zoom ID: 845 4370 7772)**15:15-15:45****Invited speaker** Wei Yan, Nanyang Technological University**15:45-16:00 # ID 7954****Dynamic Pulsating Behaviors of Mode-Locked Pulses in An Ultrafast Erbium-Doped Fiber Laser****Authors:** Yuan Zou, Qiong Zeng, Yufeng Song and Zhenhong Wang

Abstract: The experimental observation of pulsating pulse in erbium-doped fiber laser with nonlinear polarization rotation structure is reported. The research shows that these pulses have high pulse energy.

16:00-16:15 # ID 6497**Generation of Chaotic Pulses in A Passively Mode-Locked Fiber Laser for High-Resolution Fiber Fault Monitoring****Authors:** Yixiang Sun, Haoguang Liu, Yusong Liu, Siyun Huang, Yiyang Luo, Hao Li, Perry Ping Shum and Qizhen Sun

Abstract: We reported a high-resolution fiber fault monitoring technique by using the chaotic pulses delivered from a passively mode-locked fiber laser. Multiple reflection points are readily distinguished with an invariant high spatial resolution of 4 mm.

16:15-16:30 # ID 9282**High Performance Raman Distributed High-temperature Sensing System Based on Single Crystal YAG Fiber****Authors:** Xu Liu, Ruimin Jie, Suhbabrata Bera, Yunjiang Rao, Ciming Zhou and Bo Liu

Abstract: A high-performance Raman distributed high temperature sensing system with a single-crystal-YAG fiber up to 1400 °C was presented with an unprecedented record of 7 cm spatial resolution and a new record of 0.89 °C temperature resolution.

16:30-16:45 # ID 5477**Reflective and Transmissive Characteristics in an All-polarization-maintaining Linear-cavity Fiber Laser Mode-locked by Nonlinear Polarization Evolution****Authors:** Siwei Peng, Xuanyi Liu, H. Y. Fu and Qian Li

Abstract: An erbium-doped all-polarization-maintaining fiber laser with a linear cavity mode-locked by nonlinear polarization evolution is demonstrated, delivering a 447.8-fs, 105.8-MHz soliton pulse. Performance comparisons between reflective and transmissive characteristics are presented by dual-output ports.

Session 09-T2: Optical Transmission Systems, Sub-systems and Technologies**President: Shaoliang Yu****Time: 15:15-16:45 | Room 4-6, 4F (Zoom ID: 836 5238 9479)****15:15-15:30 # ID 5960****Real-time 200Gbps Coherent PON Based on Silicon Photonic Integrated Transceiver****Authors:** Jie Li, Ming Luo, Leilei Hu, Linfei Gan, Xu Zhang, Zhixue He, Xi Xiao and Shaohua Yu

Abstract: We demonstrate real-time 100/200-Gbps DP-QPSK coherent PON based on silicon photonic integrated transceiver. Several schemes are investigated. Over 40/38.5 dB power budgets are achieved for 100/200G system after 40-km SSMF transmission under SD-FEC threshold.

15:30-15:45 # ID 1940**Pre-tilting Gain for Multi-stage C+L-band EDFA by Gain Flattening Filter****Authors:** Tianyang Peng, Ningning Guo, Tao He, Kai Zhang, Ning Deng, Tianhai Chang and Gangxiang Shen

Abstract: To compensate for the stimulated Raman scattering (SRS) effect in long-haul transmission, we design a gain pre-tilted multi-stage C+L-band EDFA by properly configuring the loss spectrum of a gain flattening filter (GFF) in the EDFA. Simulation results show that the designed EDFA can achieve pre-tilted gain, and has a small gain ripple, and a low noise figure.

15:45-16:00 # ID 3439**A Low-complexity Nonlinear Compensation Scheme Assisted by Space-time Adjacent Symbols for Wavelength-division-multiplexed Systems****Authors:** Xinyu Chi, Chenglin Bai, Hengying Xu, Fan Yang, Hongbing Gao, Xueyuan Luo, Xiuhua Lv and Yaxuan Fan

Abstract: We propose a scheme based on SpTiAS-SFNN-NLC for WDM systems, which realizes the joint nonlinear compensation of SPM and XPM. And its computational complexity is significantly reduced under the same performance compared with classic DBP.

16:00-16:15 # ID 3667**A Performance Improvement Scheme of Optical Label Enabled Monitoring System Using m-sequence Spread Spectrum****Authors:** Kaixuan Li, Tao Yang, Xue Wang, Sheping Shi and Liqian Wang

Abstract: A low-cost and high-efficiency scheme of optical labels enabled optical performance monitoring using m-sequence spread spectrum is proposed. The information of optical labels can be demodulated without errors at low OSNR penalty in WDM systems.

16:15-16:30 # ID 6873**High-precision Indoor Visible Light Positioning with Tilt Receiver Based on Image Sensors****Authors:** Mengjin Wang, Wenjun Ni, Chunyong Yang and Ping Shum

Abstract: In recent years, visible light positioning (VLP) based on image sensors has been widely studied as the demand for indoor precise positioning services are increasing. We use commercial light emitting diodes (LEDs) as the transmitter and a commercial mobile phone or stereo camera as the receiver to acquire a fringe picture carrying information through the rolling shutter effect of the complementary metal oxide semiconductor (CMOS) image sensor. Based on this, the algorithm is proposed in this paper, either 2D positioning with the phone rotated at any angle in the horizontal plane, or further extension, 3D positioning with the stereo camera tilted at any rotation angle, can achieve good positioning effectiveness. Meanwhile, it also avoids the use of angle sensors that cannot provide reliable and accurate angle measurements continuously. The experimental results show that the system established in this paper is capable of achieving centimeter-level positioning accuracy.

16:30-16:45 # ID 5228**Clock Recovery and Rx/Tx IQ skew Compensation based on Polarization Transforming and Interpolation for Long-haul Coherent Receivers****Authors:** Liye Fang, Jia Chai, Xue Chen, Ziqin Yan, Tao Yang, Junpeng Liang and Weiming Wang

Abstract: A clock recovery and Rx/Tx IQ skew compensation scheme based on polarization transforming and interpolation is proposed, which can eliminate the impact of singularity, and has lower complexity compared with TD 4×2 MIMO equalizer scheme.

Session 10-T5: Microwave Photonics and Optical Signal Processing**President: Junqing Zhao****Time: 15:15-16:45 | Room 2-2, 2F (Zoom ID: 858 1993 0487)****15:15-15:30 # ID 7107****Photonic-assisted Modulation Format Identification Using Convolutional Neural Networks****Authors:** Zongxin Gan, Jia Ye, Lianshan Yan, Xihua Zou and Pan Wei

Abstract: A photonic-assisted architecture is used to implement self-interference on radio-frequency (RF) signals to create modulation-biased amplitude patterns. The experiments show that the identification accuracy reaches 97.06% using convolutional neural networks.

15:30-15:45 # ID 9204**Hybrid SiN Polymer Waveguide Ring Resonator Modulator****Authors:** Hongyan Yu and Feng Qiu

Abstract: A hybrid SiN polymer waveguide ring resonator modulator exhibited a high tunability of 6 pm/V, which enabled a 3dB bandwidth of up to 25 GHz, and a data rate of 40 Gbps for OOK signals.

15:45-16:00 # ID 2006**Defective Soliton Crystal Microcomb in Silicon Nitride Microresonator****Authors:** Junyi Yuan, Zhonghan Wu, Hui Liu, Tian Zhang, Jian Dai and Kun Xu

Abstract: In our work, an extended background waves are incorporated into the soliton waveform circulating in the resonator, the spectrum produced solitons has a flat top in the C-band, and the conversion efficiency can reach ~10%.

16:00-16:15 # ID 7912**Physical Aware Clustering Training Method for Integrated Photonic Convolution Neural Network with Nonlinear Distributed Weights****Authors:** Yue Jiang, Wenjia Zhang, Xuying Liu, Wenyu Zhu and Zuyuan He

Abstract: In this paper we proposed a Physical Aware Clustering training method where the Physical Aware Cluster Quantizer is embed with the straight-through estimator (STE) algorithm for integrated Photonic CNN with quantized and nonlinear distributed weights. Experiment shows that, by employing the upgraded STE methods (namely, STE plus), the Photonic CNN using micro ring weighting bank and PAM4 controlling modules achieves the nearly 99.3 % accuracy ratio for Fashion MNIST recognition task, whereas only 41.5% of that by using baseline STE training algorithms with the same physical devices.

16:15-16:30 # ID 4335**W-Band Communication Transmitter Enabled by Silicon Photonic Microring Modulators****Authors:** Xuying Liu, Wenjia Zhang, Yue Jiang and Zuyuan He

Abstract: We propose silicon micro-ring modulator (MRM) based W-band transmitter for next generation wireless communication. 14 Gb/s non-return-to-zero (NRZ) communication at 80 GHz carrier frequency have been experimentally demonstrated by utilizing off-chip elect

16:30-16:45 # ID 195**Photonics-based Microwave Frequency Measurement with Broadband Signal Generation and Processing****Authors:** Zhigang Tang, Pei Zhou, Jian Zhu, Nianqiang Li

Abstract: A photonics-based microwave frequency measurement system with broadband signal generation and processing is demonstrated. A microwave frequency measurement range from 1 to 39 GHz is experimentally achieved with a measurement error below ± 50 MHz.

Session 11-T3: Networks Architectures, Management and Applications**President:** Jiawei Zhang, Beijing University of Posts and Telecommunications**Time:** 15:15-16:45 | Room 2-3, 2F (Zoom ID: 873 1845 7907)**15:15-15:45****Invited speaker Jun Li, Soochow University****Boosting Federated Learning in Optical Networks for Edge Computing**

Abstract: We will introduce two strategies to address the scalability issue in passive optical network for edge computing where federated learning tasks can be executed. Furthermore, several future research directions are identified.

15:45-16:00 # ID 6870**A Multilink Wavelength Assignment Scheme for QKD Optical Network Based on BB84 and SNS Protocols over Multicore Fiber****Authors:** Ziqi Gao, Yongmei Sun, Weiwen Kong and Yaoxian Gao

Abstract: In QKD optical network based on BB84 and SNS protocols, we propose a resource assignment scheme for reducing the impact between links in which we define the impact rate to evaluate the impact of wavelength.

16:00-16:15 # ID 748**Noise-Aware Resource Allocation for CV-QKD Over Multicore Fiber-Based WDM Networks****Authors:** Shifeng Ding and Chun-Kit Chan

Abstract: We propose a noise-aware resource allocation (NARA) scheme to balance the generation and consumption of secret keys for CV-QKD over MCF-based WDM networks. Simulation results show its efficiency compared with a noise margin-based benchmark.

16:15-16:30 # ID 2412**Free-space Optical Communication-enabled Federated Learning for UAV Swarm****Authors:** Jiaqi Xu, Ru Zhang, Haipeng Yao, Tianle Mai and Fu Wang

Abstract: A federated learning (FL) system is designed for the UAV swarm to realize intelligent training. Moreover, free-space optical (FSO) is proposed for the FL-based UAV swarm system to ensure reliable and high-performance communication.

16:30-16:45 # ID 9766**Digital Twin-Assisted Margin-aware RWMA Scheme in Optical Networks****Authors:** Yuhang Zhou, Peng Xu, Weiwei Li, Xiaochen Liang, Jinsuo Jia, Zhiqun Gu and Jiawei Zhang

Abstract: We propose a digital twin-assisted margin-aware RWMA (M-RWMA) scheme, where a mirror model predicts the deployed lightpaths' margin. Results show that the M-RWMA scheme reduces the number of unreliable lightpaths compared with classic RWMA scheme.

Session 12-T4: Materials, Devices and Optoelectronics Integration**Presider: Qiancheng Zhao, Southern University of Science and Technology****Time: 15:15-16:45 | Room 4-9, 4F (Zoom ID: 846 6291 4130)****15:15-15:45****Invited speaker Qiancheng Zhao, Southern University of Science and Technology****Photonic Integrated Microresonators as Optical Reference Cavities**

Abstract: Optical reference cavities are essential to laser frequency stabilization. Miniaturization is the next step towards on-chip integration and field-deployed applications. This talk will briefly introduce the recent achievements of on-chip optical reference cavities.

15:45-15:15**Invited Speaker Si-cong Tian****Green Data Communication: Intelligent Physics And Engineering Will Contribute to A Sustainable Society**

Abstract: Novel design for VCSELs, leading to onset of roll-over at larger currents than possible until now and work on high speed novel drivers based on advanced CMOS design is reported, leading to reduced energy consumption.

16:15-16:30 # ID 526**Ultra-high Resolution On-Chip Spectrometer with A Large Working Window****Authors:** Zhihuan Ding, Long Zhang, Shihan Hong and Daoxin Dai

Abstract: We propose and demonstrate on-chip spectrometer with an ultra-high-resolution of ~30 pm and a large working window of ~30 nm, which is realized by combining an array of 2nd-order adiabatic elliptical-micro-racetracks (AEMs) and a Euler micro-racetrack-resonator (EMRR).

16:30-16:45 # ID 7430**Ultra-broadband and high-resolution On-chip Silicon Spectrometer****Authors:** Shihan Hong, Long Zhang, Zhihuan Ding, Gangmin Li and Daoxin Dai

Abstract: We demonstrate an ultra-broadband operation window of 75 nm and high-resolution of 0.1 nm on-chip spectrometer working at the O band by combining an array of Bragg grating filters and a high-Q micro-resonator.

Session 13-T5: Microwave Photonics and Optical Signal Processing**Presider: Bo Lv, Harbin Engineering University****Time: 15:15-16:45 | Room 4-5, 4F (Zoom ID: 854 1284 3584)****15:15-15:45****Invited speaker Bo Lv, Harbin Engineering University****Nontrivial Topological States Realized in Classical Circuits**

Abstract: TBA

15:45-16:00 # ID 5107**Modulation Format Recognition and OSNR Estimation Using Few-shot Learning in Coherent Optical Communication Systems****Authors:** Feng Xia, Di Zhang and Yan Ling Xue

Abstract: An effective model based on the few-shot learning method is demonstrated in implementing modulation format recognition and optical signal-to-noise ratio (OSNR) estimation. It's shown the method can achieve an almost 100% accuracy rate.

16:00-16:15 # ID 7288**Single-shot Characterization of Femtosecond Pulses by a Residual Network****Authors:** Chenxu Fan, Guoqing Pu, Weisheng Hu and Lilin Yi

Abstract: Through the combination of the transport-of-intensity equation and a residual network, single-shot characterization of femtosecond pulses is numerically achieved under a sampling rate of merely 10 GSa/s.

16:15-16:30 # ID 1038**Aliasing-Free Velocity Measurement of FMCW Lidar System Enabled by Frequency Shifted Optical Beam****Authors:** Quanxin Na, Qijie Xie, Yingzhi Li, Baisong Chen, Lanxuan Zhang, Guomeng Zuo and Junfeng Song

Abstract: A approach is proposed to avoid signal aliasing in a FMCW Lidar by using a frequency-shifted light enabled by an acousto-optic modulator. It can distinguish a target spinning up to 34 m/s at 2.6 m.

16:30-16:45 # ID 2977**The Effect of Illumination Uniformity on The Saturation Characteristics of Photodiodes****Authors:** Xiuqi Zhang, Yanjun Han, Bing Xiong, Hongtao Li, Yi Luo, Changzheng Sun, Jian Wang, Zhibiao Hao and Lai Wang

Abstract: The saturation photocurrent of modified uni-traveling-carrier photodiode is increased 300% by improving the illumination uniformity. The experimental results are in fair agreement with simulations of electric field variation inside the PD under different

Session 14-T8: Micro-, Nano-, and Quantum Science and Applications**President:** Jin Liu**Time:** 15:15-16:45 | **Room** 4-7, 4F (**Zoom ID:** 893 4541 0357)**15:15-15:45****Invited speaker** Bi-Heng Liu, University of Science and Technology of China**High-Dimensional Quantum Network****15:45-16:15****Invited speaker** Chun-Hua Dong, University of Science and Technology of China**16:15-16:30 # ID 6674****Flat-band and Band Transition in The Synthetic Space with Two Types of Ring Resonators****Authors:** Luoja Wang, Guangzhen Li, Luqi Yuan and Xianfeng Chen

Abstract: We implement one-dimensional photonic stub lattice along the synthetic frequency dimension in two coupled ring resonators of different lengths, where flat band, mode localization, and flat-to-nonflat band transition are demonstrated both in experiments and simulations.

16:30-16:45 # ID 4759**Entanglement Generation with Schrödinger Kitten States****Authors:** Hongbin Song, Guofeng Zhang and Hidehiro Yonezawa

Abstract: We present a protocol to generate entanglement with Schrödinger Kitten States. Stronger quantum entanglement than photon-subtracted two-mode squeezed vacuum states (PSTMSV) and TMSV are obtained for low initial squeezing.

Session 15-T7: Biophotonics and Optical Sensors**Presider: Tuan Guo, Jinan University****Time: 15:15-16:45 | Room 4-8, 4F (Zoom ID: 831 1366 0011)****15:15-15:45****Invited speaker Wenjun Ni, South-Central Minzu University****Fiber-membrane Composite Devices for Acoustic Wave Sensing**

Abstract: Fiber optic broadband acoustic sensors feature the advantages of high sensitivity, resistant to strong electromagnetic interference, light weight and small size. Currently, it is shining the light on the application of oil/gas leakage monitoring.

15:45-16:15**Invited speaker Jiuchuan Guo****Ultra-long Organic Phosphorescence Nanoprobes Enabled Lateral Flow Immunoassay**

Abstract: UOP nanoprobes based lateral flow immunoassay was developed with a palm-size reader. The system can achieve quantitative detection of different immune indicators in a short time and has great potential in household healthcare application.

16:15-16:30 # ID 4513**A Lightweight Convolutional Neural Network for Bacterial Identification Based on Raman Spectra****Authors: Bo Zhou, Yu-Kai Tong, Ru Zhang and Anpei Ye**

Abstract: We propose a lightweight model with very few model parameters for bacterial Raman spectral classification, achieving similar results to ResNet on both public bacterial Raman datasets.

16:30-16:45 # ID 3008**Surface Enhanced Infrared Absorption Spectroscopy with Broadband Nanoantenna****Authors: Yupei Bian, Jing Ni, Donglai An and Xia Yu**

Abstract: A nanoantenna with two specific resonance peaks excited by different polarized light is designed and the array arrangement period is selected. The designed nanoantenna has the potential to customize a broad enhancing band for SEIRA .

Session 16-T1: Optical Fibers and Fiber-based Devices**Presider: Wei Ding****Time: 17:00-18:30 | Room 4-C, 4F (Zoom ID: 845 4370 7772)****17:00-17:30****Invited speaker Guodong Shao, Wuhan Huaray Precision Laser Co., Ltd****Development and Applications of Industrial High Power Ultrafast Lasers**

Abstract: In this presentation, a review of industrial high power high power ultrafast fiber laser technologies will be showed. Some technology of pulse energy boost based on commercial photonics crystal fiber will be discussed.

17:30-17:45 # ID 7659**Rayleigh-scattering-enhanced SMF based on UV Exposure for High Spatial Resolution Strain Measurement****Authors: Cailing Fu, Chao Du and Yiping Wang**

Abstract: A high-spatial-resolution strain sensor based on Rayleigh-scattering-enhanced SMF was demonstrated. Rayleigh scattering intensity could be adjusted by exposure parameters. The strain profiles of the fiber could be clearly demodulated when the applied strain was 200 ~ 2600 $\mu\epsilon$.

17:45-18:00 # ID 3730**Demodulation Method of Tilted Fiber Bragg Grating Refractometer Based on Gramian Angle Field Algorithm and 2D Residual Convolutional Neural Network****Authors:** Zihan Cao, Titi Xia, Shengqi Zhang, Yongchang Mei, Zhaohui Li and Zhengyong LiuAbstract: A novel demodulation method based on GAF algorithm and 2D residual CNN model is proposed and verified experimentally. The coefficient of determination reaches 99.75% and the MSE is $4.049 \times 10^{(-7)}$.**17:45-18:00 # ID 6279****Dissipative Soliton Resonance in a Concise-Structure Large-Normal-Dispersion Erbium-Doped Fiber Laser****Authors:** Shugeng Yao, Xuanyi Liu, Feng Ye, H. Y. Fu and Qian Li

Abstract: We have experimentally demonstrated a long-cavity large-normal-dispersion erbium-doped fiber laser utilizing an optical integrated module (OIM) and nonlinear polarization rotation technique to realize dissipative soliton resonance (DSR) in a concise way.

Session 17-T2: Optical Transmission Systems, Sub-systems and Technologies**President:** Xinhai Zhang, Southern University of Science and Technology**Time:** 17:00-18:30 | Room 4-6, 4F (Zoom ID: 836 5238 9479)**17:00-17:15 # ID 3747****Real-time Unrepeated Extended C-Band Transmission of 16-Tb/s over 420-km (73.2-dB) and 24-Tb/s over 390-km (67.7-dB) with Field-deployed Submarine Cable****Authors:** Junjie Li, Anxu Zhang, Lipeng Feng, Yuyang Liu, Xiaoli Huo, Fei Yan, Yusen Yang, Haiqiang Wang, Lingquan Wang, Lv Hu, Tianrui Dai, Yuxin Liu, Hao Chen, Wendou Zhang, Jie Chen, Yi Yu, Liangchuan Li, Jun Wu and Liangming Xiong

Abstract: Real-time 80×200Gb/s PM-QPSK and 60×400Gb/s PM-16QAM DWDM signals are respectively transmitted over 420km (73.2dB span loss) and 390km (67.7dB span loss), exhibiting a span loss and capacity product record in unrepeated transmission systems.

17:15-17:30 # ID 9585**Timing Recovery Algorithms for Transceiver IQ Skew Compensation and Monitoring****Authors:** Liang Junpeng, Qinwei Hu, Xue Chen and Jia Chai

Abstract: We propose a modified Godard algorithm to monitor receiver skew and an adaptive timing algorithm operate at 1sample/symbol to monitor transmitter skew. Compared to high-order MIMO schemes, the complexity can be reduced at least 50%.

17:30-17:45 # ID 2562**Performance Analysis of The Interpolation Functions in The Kramers-Kronig Receiver****Authors:** Yuyang Liu, Anxu Zhang, Lipeng Feng, Xiaoli Huo, Junjie Li, Chengliang Zhang, Yan Li and Jian Wu

Abstract: We experimentally investigate the performance of different interpolation functions in the KK receiver. The results show that the anti-aliasing filter-based scheme with 9-tap Hilbert FIR filter (4-SPS) can transmit the signal up to 1440-km (SD-FEC@2e-2).

17:45-18:00 # ID 3683**Theoretical Attenuation Model for Indoor Fiber-Wireless-Fiber Systems Based on Fast Steering Mirrors****Authors:** Cheng Zong, Xiaodi You, Yan Zeng, Hui Liu, Xiang Wang and Gangxiang Shen

Abstract: A theoretical attenuation model is established for the indoor fiber-wireless-fiber system using fast steering mirrors. The link attenuation is < 1.4 dB with link alignment, and very sensitive to the angular misalignment of steering mirrors.

18:00-18:15 # ID 466**DNN-Based Demodulator/Post-equalizer and APSK Constellation Gain in Underwater Visible Light Communication System****Authors:** Zengyi Xu, Junhui Hu, Guojin Qin, Ruizhe Jin and Nan Chi

Abstract: This research combines APSK and DNN to perform enhance the performance of UVLC system, increasing its usable Vpp range by at most 75%, and reduces minimum BER by more than 30% compared with traditional methods.

18:15-18:30 # ID 3984**Co-propagation of Distributed Acoustic Sensing in the L-band and 100-Gb/s WDM Coherent Communication Systems****Authors:** Li Shen, Wenhai Yu, Ruiwan Xu, Yaqin Wang and Bo Du

Abstract: We report the co-propagation of a L-band chirped pulse Distributed Acoustic Sensing (DAS) system with 100-Gb/s WDM channels over 50 km fiber. The coexistence penalty and sensing performance of DAS system are investigated.

18:30-18:45 # ID 1433**Dual-Polarization Direct Detection with Jones Space Field Recovery****Authors:** Qi Wu, Yixiao Zhu, Qunbi Zhuge and Weisheng Hu

Abstract: We propose the first optical full-field recovery receiver in Jones space to achieve polarization and phase diversity for the direct detection system. 448 Gb/s dual-polarization 16-QAM signal is successfully recovered after 80-km SMF transmission.

Session 18-T3: Networks Architectures, Management and Applications**Presider:** Gangxiang Shen, Soochow University**Time:** 17:00-18:30 | Room 2-2, 2F (Zoom ID: 858 1993 0487)**17:00-17:30****Invited speaker** Liangjia Zong, Huawei technologies**Upgrade Challenges and Potential Solutions for C+L Band Optical Transmission System**

Abstract: In this talk, we present the main architectures and the related optical components in C+L band transmission systems. The challenges and potential solutions are also discussed.

17:30-17:45 # ID 6128**Gravity Model-based Planning Algorithm of Ground Station for Satellite Networks****Authors:** Yuanjian Zhang, Yongli Zhao, Yinji Jing, Hua Wang, Wei Wang and Jie Zhang

Abstract: In this paper, a satellite ground station planning based on the gravity model algorithm is proposed. Simulation results show that it can increase the number of ground-satellite links and reduce the blocking rate.

17:45-18:00 # ID 6049**CNN Based End to End Model for C+L Band Channel Power Estimation****Authors:** Hong Li, Wu Liu, Runzhe Fan and Ming Luo

Abstract: Estimate power outputs of 113 channels with random inputs using a CNN model, which is verified with 240km C+L fiber link. Achieve MAE <0.14dB at different launch power, with 41.2% less parameters than conventional ANN.

18:00-18:15 # ID 6256**Performance Evaluation of WSS-based All-Optical Spine-Leaf Data Center Network****Authors:** Jiemin Lin, Zhenwei Zhai, Yongcheng Li, Zeshan Chang, Liangjia Zong, Ning Deng, Tianhai Chang and Gangxiang Shen

Abstract: We consider a WSS-based all-optical DCN with spine-leaf topology. Two service provisioning algorithms are

proposed for all-stop (AS) and not-all-stop (NAS) scenarios. Results show that NAS significantly reduces the total completion time compared with AS.

18:15-18:30 # ID 1287

Modulation Format Recognition Based on Coordinate Transformation and Combination in VLC System

Authors: Wendi Gao, Chi Xu, Zengyi Xu, Ruizhe Jin and Nan Chi

Abstract: We proposed a coordinate merging algorithm (CMA) that processed data for Convolutional Neural Networks. It gets higher accuracy of modulation format recognition in visible light communication (VLC) system against traditional IQ data trained method.

Session 19-T4: Materials, Devices and Optoelectronics Integration

President: Dong Bo, Shenzhen Technology University

Time: 17:00-18:30 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

17:00-17:30

Invited Speaker Zi-Lan Deng, Jinan University

Metasurfaces for Versatile Polarization Manipulations

Abstract: Recently, metasurfaces emerges as a flat optics platform with powerful capability for versatile polarization manipulations. Here, we introduce several metasurfaces for polarization manipulations, including planar high-Q chiral metasurfaces, skyrmion metasurface with polarization topology, etc.

17:30-17:45 # ID 5380

High-speed Integrated Graphene–Silicon Slot Waveguide Electro-Absorption Modulator at 1.5- μm and 2- μm Wavebands

Authors: Chao Luan, Deming Kong, Yunhong Ding and Hao Hu

Abstract: We demonstrated a hybrid integrated graphene silicon slot-waveguide electro-optic (E/O) modulator with large modulation bandwidth and high modulation efficiency at both 1.5- μm and 2- μm wavebands.

17:45-18:00 # ID 4106

GaAs-based Modified Uni-traveling Carrier Photodetector for Simultaneous High-Speed Data Transmission and DC Electrical Power Generation

Authors: Luyu Wang, Zhiyang Xie, Zhiqi Zhou and Baile Chen

Abstract: We demonstrate a novel GaAs/AlGaAs based high-speed photodetector for simultaneous high-speed data acquisition and electrical power generation from the optical signal, with 3dB bandwidth of 12.2 GHz and conversion efficiency of 31% under +0.6 V.

18:00-18:15 #7447

Lateral PIN Ge/Si Avalanche Photodiode for High-speed, Low-budget Silicon Photonics Interconnects

Authors: Feng Gao, Changpeng Li and Jia Zhao

Abstract: A lateral Ge/Si PIN avalanche photodiode is fabricated using the standard CMOS process. The primary responsivity is 0.95A/W with -3dB bandwidth over 67GHz at bias voltage of -4V. The gain bandwidth product value of 130GHz (the -3dB bandwidth of 37GHz at the avalanche gain of 3.5) is realized at dark current of 1.6 μA .

Session 20-T4: Materials, Devices and Optoelectronics Integration

President: Zhen Gao, Southern university of Science and Technology

Time: 17:00-18:30 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

17:00-17:30**Invited Speaker** Zhen Gao, Southern university of Science and Technology**Three-dimensional Photonic Topological Phases**

Abstract: In this report, we will focus on the 3D photonic topological phases that include 3D photonic topological insulators, 3D unconventional photonic Weyl semimetals and 3D photonic topological Chern insulators.

17:30-18:00**Invited Speaker** Li Shen, Huazhong University of Science and Technology**Group IV Integrated Devices for Near and Mid-Infrared Wavelengths****18:00-18:15 # ID 8829****Effects of Sidewall Angle in Silicon Waveguide for High Degree Cascaded Pulse Compression at 2.0 μm** **Authors:** Ruifeng Chen, Jiayao Huang, Feng Ye and Qian Li

Abstract: We analyze the cascaded pulse compression performance in the silicon waveguide with the sidewall angles from 90° to 70° at 2 μm , where the compression factor declines from 32.17 to 14.47.

18:15-18:30 # ID 1568**Analyzing Bent Waveguide Using Variational Effective Index Method and Cylindrical Perfectly Matched Layers****Authors:** Hongbo Qiao and Zhibiao Hao

Abstract: An efficient mode solver is proposed and applied to analyze bent waveguide. The mode solver provides an efficient and reliable estimation of the modal field profile and curvature loss of three-dimensional bent waveguide.

Session 21-T5: Microwave Photonics and Optical Signal Processing**President:** Bo Lv, Harbin Engineering University**Time:** 17:00-18:30 | Room 4-5, 4F (Zoom ID: 854 1284 3584)**17:00-17:30****Invited Speaker** Chaoran Huang, The Chinese University of Hong Kong**Prospects and Applications of Photonic Neural Networks**

Abstract:

17:30-17:45 # ID 9863**W-band Photonic-based Integration of Sensing and Communication with Frequency-division Multiplexed Waveforms in Fiber-wireless Integrated Network****Authors:** Boyu Dong, Junlian Jia, Guoqiang Li, Jianyang Shi, Haipeng Wang, Junwen Zhang and Nan Chi

Abstract: We proposed and experimentally demonstrated a novel W-band photonic-based integration of sensing and communication system with frequency-division multiplexed waveforms in the fiber-wireless network, achieving high-resolution sensing and high-speed communication.

17:45-18:00 # ID 3028**Net 4.5 Gb/s single-pixel-LED and 4-bit-DAC based UOWC system using NWF and MLSE****Authors:** Chen Cheng, Xueyang Li, Yongchao Jin and Yanfu Yang

Abstract: We demonstrate a net data rate of 4.5 Gb/s UOWC system using a single-pixel mini-LED and a 4-bit DAC over a 2-m underwater channel. A 36% BER performance gain is achieved by using NWF and MLSE decoder.

18:00-18:15 # ID 6680**A Novel Silicon Integrated Optical Rotman Lens for RF Beamforming**

Authors: Yanlong Yin, Teyan Chen, Yixin Wu, Yuhao Guo, Zenghui Gu, Fei Duan and Wenwei Xu

Abstract: We propose a novel integrated optical Rotman lens based on mature 220nm-thick SOI platform, which supports 33 beamforming angles ranging from -75° to 75° , and the sweeping speed is as fast as nanoseconds in prospect.

18:15-18:30 # ID 8174

Blue-green Comb Generation in a Si₃N₄ Microresonator with Near-Infrared Pump

Authors: Yifan Wu, Jijun He and Shilong Pan

Abstract: We demonstrated the visible blue-green comb generation in the Si₃N₄ ring microresonator by third-harmonic generation and third-order sum frequency generation followed cascaded four-wave mixing processes, which might facilitate the demonstration of microco

Session 22-T8: Micro-, Nano-, and Quantum Science and Applications
President: Chun-Hua Dong, University of Science and Technology of China
Time: 17:00-18:30 | Room 4-7, 4F (Zoom ID: 893 4541 0357)

17:00-17:30

Invited Speaker Hui Jing, Hunan Normal University

Quantum Nonreciprocity: New Effects and Applications

17:30-18:00

Invited Speaker Mengxin Ren, Nankai University

New Functionalities by Non-Phase-Matched Nonlinearity

Abstract: In this talk, we will discuss the nonlinear response from nanometer thin lithium niobate films where the phase matching condition is deliberately broken, and new phenomena and functionalities including comprehensive measurement of the second order nonlinear susceptibility and the polarization imaging will be presented

18:00-18:15 # ID 4690

A Core and Wavelength Allocation Scheme for Synergistic Transmission of Classical and Quantum Signals

Authors: Xueqin Ren, Yongmei Sun, Weiwen Kong and Yaoxian Gao

Abstract: In this paper, a synergistic transmission system is realized. Experiments verify that the proposed scheme can suppress noise photons on classical and quantum channels up to 152.71% and 167.28% compared to the benchmark scheme, respectively.

Session 23-T7: Biophotonics and Optical Sensors
President: Wenjun Ni, Wenjun Ni, South-Central Minzu University
Time: 17:00-18:30 | Room 4-8, 4F (Zoom ID: 831 1366 0011)

17:00-17:30

Invited Speaker Qiuqiang Zhan

Break the Unbroken Limits Toward Super-Resolution Microscopy Using Photon Upconversion

Abstract: Photon upconversion offers an exciting opportunity for biological super-resolution imaging. By harnessing excitation and emission processes of upconversion, we discovered powerful nonlinear depletion and emission, enabling subcellular super-resolution microscopy by breaking the unbroken traditional limitations.

17:00-17:30

Invited Speaker Shuhua Yue, Beihang University

Stimulated Raman scattering microscopy reveals altered lipid metabolism as therapeutic target for diseases

Parallel Sessions

Abstract: Enabled by stimulated Raman scattering microscopy, we unraveled altered distribution and composition of essential lipid molecules in pathological tissues. Our finds improve understanding of dysregulated lipid homeostasis in diseases and open opportunities for treatment.

17:30-17:45 # ID 6157

Ultra-sensitive Detection of Alzheimer's Biomarkers Using Plasmonic Optical Fiber Sensors

Authors: Lijiao Zu, Jiwei Xie, Peng Liu, Wei Bi, Francesco Chiavaioli, Lei Shi, Tuan Guo, Weiru Liu, Zhencheng Li, Shiqing Zhang, Lihong Zhu, Xuejun Zhang and Kaiwei Li

Abstract: We demonstrated a TFBG-SPR biosensors placed in a microfluidic system to achieve ultra-high sensitivity in the detection of A β 42, which holds great clinical application potentials for early Alzheimer's disease diagnosis.

17:45-18:00 # ID 6664

Breast Cancer Marker Detection based on Fiber Ring Laser with Lasso Structure

Authors: Jie Hu, Liyang Shao, Yang Ran, Weihao Lin, Fang Zhao, Yuhui Liu, Junhui Sun, Huanhuan Liu, Jinna Chen and Perry Ping Shum

Abstract: A fiber ring laser with lasso structure was proposed for the specific detection of CEACAM5. The limit of detection could reach 28 ng/mL. This biosensor has great potential as in situ biomedical monitoring devices that can be mass-produced.

Shenzhen Visible Light Communication and Optical Computing Industry Alliance Establishment Preparatory Meeting & Visible Light Symposium

President: Hongwei Chen, Tsinghua University

Time: 15:10-17:50 | Room 2-1, 2F (Zoom ID: 838 0639 6686)

| Time | Speakers | Title |
|-------------|--|--|
| 15:10-15:30 | Bing Xiong Tsinghua University | Research and Prospect of Ultra-wide Bandwidth Optoelectronic Devices |
| 15:30-15:50 | Jintao Wang Tsinghua University | Research on the internet of light |
| 15:50-16:10 | Hongyan Fu Tsinghua SIGS | Evolution of Optical Wireless Communications for B5G/6G |
| 16:10-16:30 | Xue Feng Tsinghua University | On-demand Photonic Ising Machine——PEIDIA |
| 16:30-16:50 | Xing Sheng Tsinghua University | Microscale LEDs for advanced displays and biomedicine |
| 16:50-17:10 | Yuhan Dong Tsinghua SIGS | High-Speed Large-Coverage Indoor Visible Light Communications |
| 17:10-17:30 | Junwen Zhang Fudan University | AI+ Intelligent Optical Communication: Machine Learning Enables High-speed Optical Communication |
| 17:30-17:50 | Kai Wang SUSTech | Modulated Bandwidth of Quantum Dot Light-emitting Devices for Visible Light Communication |

Session 24-T1: Optical Fibers and Fiber-based Devices

President: Xinyong Dong, Guangdong University of Technology

Time: 9:00-10:30| Room 4-C, 4F (Zoom ID: 845 4370 7772)

09:00-09:30

Invited Speaker Xiaosheng Xiao, Beijing University of Posts and Telecommunications

Recent Progress and Perspectives in Spatiotemporal Mode-Locked Fiber Lasers

Abstract: Spatiotemporal mode-locking (STML), i.e., simultaneously locking of multiple transverse and longitudinal modes, is a general form of mode-locking. In this Presentation, recent progress of STML will be reviewed, and the future outlook will be given.

09:30-09:45 # ID 6824

Coexistence Vector Dynamics of Noise-Like Pulses and Multiple Pulses In a Fiber Laser

Authors: Qiong Zeng, Ya-Tao Yang, Yufeng Song and Zhenhong Wang

Abstract: The coexistence of noise-like pulses (NLPs) and multiple pulses in an ultrafast erbium-doped fiber laser on the nonlinear amplifier loop mirror (NALM) configuration is reported.

09:45-10:00 # ID 3194

High-Sensitivity Hot-Wire Anemometer based on Cladding-Etched Fiber Bragg Grating

Authors: Yuhan Tang, Xuke Chen, Jiarui Zhang, Dajuan Lv, Liangming Xiong and Xinyong Dong

Abstract: A hot-wire anemometer based on a cladding-etched optical fiber Bragg grating (FBG) coated with a layer of silver film and optically heated by a laser diode is demonstrated, which shows a high sensitivity.

10:00-10:15 # ID 3624

Enhanced Spatial Light Coupling Efficiency of Polymer Optical Fiber Via Micro-Lens Self-Heating Melting Technique

Authors: Fanyu Liu, Zhigang Cao, Chenwei Xu, Li Zhang, Hao Zhong, Chao Li and Zhixue He

Abstract: A method for fabricating optical fiber end-face lens based on burning ball of a fusion splicer, which can be used to improve the performance of POFs in spatial light coupling.

10:15-10:30 # ID 7468

Theoretical Analysis of Weakly-Coupled Multicore Fibers' Potentials in Subsea Communications

Authors: Lin Sun, Gordon Ning Liu, Yi Cai, Gangxiang Shen, Junwei Zhang, Zhaohui Li and Chao Lu

Abstract: Optical subsea cables have special limitations of feed power and cable size. We theoretically analyze the advantages of weakly-coupled multi-core fibers in subsea scenarios over the SMFs ribbon solution.

Session 25-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Huanhuan Liu, Southern University of Science and Technology

Time: 9:00-10:30| Room 2-1, 2F (Zoom ID: 838 0639 6686)

09:00-09:15 # ID 9347

A Specklegrams based Optical Fiber Splice Offset Detection System using Deep Learning

Authors: Yuying Guo, Gang Tang, Cong Huang, Jie Liu and Siyuan Yu

Abstract: A specklegrams based optical fiber splice offset detection system is implemented in this paper. 97.22% classification accuracy and 0.3814 μm regression RMSE can be achieved using convolutional neural network.

09:15-09:30 # ID 5010

Demonstration of Real-Time MDM-WDM Transmission using Commercial 400G OTN Transceivers

Authors: Lei Shen, Lei Zhang, Changkun Yang, Liubo Yang, Ruichun Wang, Yuyang Gao, Jian Cui,

Shuailuo Huang, Yongqi He, Zhangyuan Chen, Juhao Li, Chunxu Zhao, Yu Tang, Shikui Shen

Abstract: Real-time MDM-WDM transmission was successfully demonstrated using commercial 400G DP-16QAM systems over weakly-coupled FMFs with 3 kinds of length.

09:30-09:45 # ID 1835

Channel Gain Correlation and Prediction for WDM Underwater Wireless Optical Communication Systems

Authors: Yafei Ma, Kai Zhang, Zhide Li and Yuhan Dong

Abstract: We propose a channel gain prediction algorithm using deep learning for wavelength division multiplexing underwater wireless optical communication systems. It outperforms prior works with the same pilot overhead and only by some reference wavelengths.

09:45-10:00 # ID 6564

Small Reservoirs Make a Mickle: Distributed Reservoir-Computing based Equalization for 100 Gb/s VCSEL-enabled Optical Interconnects

Authors: Songte Zhang, Wenjia Zhang and Zuyuan He

Abstract: We propose a distributed reservoir-computing based parallel nonlinear equalization for 100 Gb/s VCSEL enabled optical interconnects. The performance similar to NNE can be achieved but with very neat and low computational complexity training process.

10:00-10:15 # ID 2030

Insufficient Frequency Response and IQ skew Compensations for Coherent Optical Transmitters Using a Low Bandwidth Photodetector

Authors: Ziqin Yan, Zheyao Wu, Xue Chen, Jia Chai, Tao Yang, Junpeng Liang and Weiming Wang

Abstract: The scheme quasi-dynamically compensate insufficient frequency response and IQ skew of coherent optical transmitters by detecting the beat frequency signal of time-alternating IQ two-tone training sequences using a low bandwidth PD built in Mach-Zehnder M

10:15-10:30 # ID 5347

Model-Aided 4D Geometrical Shaping for Fiber Nonlinearity Mitigation in Single-Span System

Authors: Wei Ling, Bin Chen, Yi Lei, Wenkai Fang, Zhiwei Liang and Lin Sun

Abstract: A nonlinearity-tolerant 4D modulation format with SE of 10bit/4D-sym is proposed via end-to-end learning. Numerical simulations show an improved performance over 32QAM and PS-64QAM at 96GBaud with net rates 800Gbps for a single-span transmission system.

Session 26-T2: Optical Transmission Systems, Sub-systems and Technologies

Presider: Pu Li, Taiyuan University of Technology & Guangdong University of Technology

Time: 9:00-10:30 | **Room** 2-2, 2F (Zoom ID: 858 1993 0487)

09:00-09:15 # ID 8832

Experimental Demonstration of Parallel Recirculating Loop Based SDM Transmission Over 1025 km 7-core Fiber

Authors: Xuesong Zhao, Zhe Cao, Tianwai Bo, Zhongwei Tan and Yi Dong

Abstract: Real-time spatial division multiplexing (SDM) transmission of 7×10-Gb/s on-off keying (OOK) signal over 1025 km weakly-coupled 7-core fiber in a parallel recirculating-loop system is demonstrated. Inter-core crosstalk (IC-XT) induced transmission performance

09:15-09:30 # ID 3578

A Modified DFT-based Channel Estimation Algorithm for Underwater Wireless Optical Links

Authors: Xiaoqian Liu, Kai Zhang, Xinke Tang and Yuhan Dong

Abstract: We propose a channel estimation algorithm by detecting significant channel taps in time domain and applying an adaptive noise threshold based on a variable smoothing equation. It outperforms DFT-based estimation in terms of

estimation accuracy.

09:30-09:45 # ID 825

Layered Generalized Adaptively Biased Optical OFDM for IM/DD OWC Systems

Authors: Zuhang Geng, Fan Yang, Xinke Tang and Yuhan Dong

Abstract: We propose a layered generalized adaptively biased optical OFDM (LGABO-OFDM) scheme. Compared with layered asymmetrical clipped optical OFDM (LACO-OFDM), it preserves spectral efficiency with lower complexity, has lower peak-to-average power ratio and clo

09:45-10:00 # ID 8498

109.6 Tb/s Real-time SDM Transmission over 2024-km 125- μ m Cladding Diameter Weakly Coupled 4-Core MCF

Authors: Hui Yan, Wendou Zhang, Yongfu Wang, Yunlong Bai, Hao Liu, Wei Sun, Xuegang Lao, Gonghui Zhang, Yan Yao, Ze Cai, Guorui Zhang, Wenxiong Du, Shuai Yuan, Bo Xu, Yizhou Wang and Wenwei Xu

Abstract: A 109.6 Tb/s real-time SDM transmission over 2024-km weakly coupled 4-core MCF with 125- μ m diameter was demonstrated. 137-channel PS-PDM-16QAM signals were transmitted with commercial single-mode transmission platform, negligible performance degradation i

10:00-10:15 # ID 9576

Joint Recovery for Carrier Frequency Offset and Carrier Phase Noise Using Extended Kalman Filter for Nonlinear Frequency Division Multiplexing 16/64APSK System

Authors: Hongbing Gao, Hengying Xu, Chenglin Bai, Xinyu Chi, Fan Yang, Zukai Sun, Yanfeng Bi, Xue Tang and Zhiguo Wang

Abstract: We propose a joint low-complexity compensation scheme of CFO and CPE using EKF for DS-NFDM 16/64APSK systems. It can jointly compensate 200 MHz FO and 700 kHz linewidth at a convergence speed of 5000 symbols.

10:15-10:30 # ID 4887

Piecewise Linear and Nonlinearity-aware Complex-valued Decision Feedback Equalization for DML-DD Link at C Band

Authors: Yikun Zhang, Yixiao Zhu, Qi Wu, Qunbi Zhuge and Weisheng Hu

Abstract: In this work, we propose a piecewise linear (PWL) with nonlinearity-aware complex-valued decision feedback equalizer (CDFE) scheme to compensate for the impairments in dispersion-unmanaged C-band short-reach link.

Session 27-T3: Networks Architectures, Management and Applications

President: Anny Zheng

Time: 9:00-10:30 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

09:00-09:30

Invited Speaker Yongli Zhao, Beijing University of Posts and Telecommunications Optical Cloud Networks (OCN): Next-Generation Optical Networks for Cloud Service

09:45-09:45 # ID 3948

Energy Efficient Service Provisioning in Computing Power Network Over OSU-based OTN

Authors: Zeyuan Yang, Rentao Gu and Yuefeng Ji

Abstract: We investigate the complexity reduction methods for energy-efficient services provisioning in the computing power network over the OSU-based OTN. The convergence of the optimization algorithm is accelerated by 40% with

<5% performance degradations.

09:45-10:00 # ID 1893

Constellation Structure Design for LEO Mega-constellation with Optical Inter-satellite Link

Authors: Hai Yang, Bingli Guo, Kuan Yan, Xinyuan Deng, Xinbin Cui, Huilin Ren and Shanguo Huang

Abstract: This paper explores the impact of different number of orbital-planes on network performance in LEO mega-constellation. Simulation results show that the optimal hop-counts and link-use frequency can be achieved by adjusting the number of orbital-planes.

10:00-10:15 # ID 2540

Greenhouse Gas Emission Modeling and Optimization in Wavelength-switched Optical Networks

Authors: Yanran Xiao, Wei Wang, Sheng Liu, Jiayang Zhang, Qiaojun Hu, Jingjing Li, Yongli Zhao, Jie Zhang and Yunbo Li

Abstract: The paper presents a greenhouse gas (GHG) emission model for wavelength-switched optical networks and a GHG-aware routing and wavelength assignment algorithm. Simulation results show that the proposed algorithm can reduce the GHG emissions effectively.

10:15-10:30 # ID 1491

An Energy-Efficient Routing Scheme for Prolonging Lifetimes of Optical Satellite Networks

Authors: Zhenghao Yang, Yongli Zhao, Yinji Jing, Hua Wang, Wei Wang and Jie Zhang

Abstract: In this paper, the power consumption and battery life model of laser satellites are established and a routing algorithm is proposed to extend the life of satellite battery

Session 28-T4: Materials, Devices and Optoelectronics Integration

Presider: Mengyue Xu, Sun Yat-sen University

Time: 9:00-10:30 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

09:00-09:30

Invited Speaker Wei Jiang, Nanjing University

Optical Phased Arrays Based on Integrated Photonics

Abstract: Optical Phased Arrays Based on Silicon Photonics

Abstract: We will review recent progress in silicon-based optical phased arrays (OPAs), particularly half-wavelength pitch OPAs with wide scanning angles and high main beam energy ratios, and discuss advanced phase calibration technique for minimizing sidelobes.

09:30-10:00

Invited Speaker Qijie Wang, Nanyang Technological University

Mid-infrared Photonics and Optoelectronics

10:00-10:15 # ID 271

Novel concept of High-Efficiency Coupling Between Silicon Photonic Chips and Few-Mode-Fibers

Authors: Xiaolin Yi, Weike Zhao, Yaocheng Shi and Daoxin Dai

Abstract: A novel multimode coupling scheme for silicon photonic chips and Few-mode-fibers is proposed by introducing planar-lightwave-circuit-based on-chip mode (de)multiplexer, which is promising for multimode-division-multiplexing systems.

10:15-10:30 # ID 6201

Design of a Computational Microspectrometer Based on Metasurfaces and Multilayer Thin Films

Authors: Chao Hu, Shaonan Zheng, Qize Zhong, Yuan Dong, Zhengji Xu and Ting Hu

Abstract: We proposed a computational microspectrometer consisting of 36 broadband optical filters formed by dielectric metasurfaces and multilayer thin films. By utilizing the diversity filters, we reconstruct spectrum with good performance over 401-600 nm range.

Session 29-Special Session 3: Terahertz Science and Technology

Presider: Feng Lan, University of Electronic Science and Technology of China

Time: 9:00-10:30| Room 4-5, 4F (Zoom ID: 854 1284 3584)

09:00-09:30

Invited Speaker Jiayu Zhao, University of Shanghai for Science and Technology

Cladding-free Anti-Resonant Terahertz Cavity and Applications

Abstract: Core-anti-resonant reflection (core-ARR) is proposed, which validates ARR inside the central core rather than the cladding of hollow tubes, expanding the scope of materials and constructions for tubular substances, as well as corresponding applications.

09:30-10:00

Invited Speaker Jie Li, Chengdu University of Information Technology

Longitudinally Varying Structured Light Field Generation and Manipulation of Terahertz Wave Based on Dielectric Metasurfaces

Abstract: In this report, I will introduce a new method to generate and manipulate structured vector light fields along the propagation direction, which the functionality is demonstrated in terahertz band using all-silicon metasurfaces.

10:00-10:30

Invited Speaker Feng Lan, University of Electronic Science and Technology of China

Session 30-T4: Materials, Devices and Optoelectronics Integration

Presider: Ping Zhao, Chalmers University of Technology

Time: 9:00-10:30| Room 4-7, 4F (Zoom ID: 893 4541 0357)

09:00-09:30

Invited Speaker Ping Zhao, Chalmers University of Technology

Low-Noise Silicon Nitride Waveguide Phase-Sensitive Amplifiers

Abstract: Optical parametric amplification offers the ability of overcoming the quantum limit in the noise figure of conventional amplifiers. This talk includes our recent progresses in low-noise parametric amplification with low-loss nonlinear photonic silicon nitride waveguides.

09:30-10:00

Invited Speaker Wei Li, CIOMP, Chinese Academy of Sciences

Nanophotonic engineered thermal emission and energy applications

Abstract: Nanophotonics structures can have thermal emission properties that are drastically different from conventional thermal emitters. Here we discuss some progress in nanophotonic thermal emission engineering and its applications in radiative cooling and energy

10:00-10:15 # ID 4588

Compact and Low-Power Programmable Multiport Interferometer on CMOS-compatible Deuterated Silicon Nitride

Authors: Shuqing Lin, Zhaoyang Wu, Yanfeng Zhang and Siyuan Yu

Abstract: A 6-mode programmable interferometer at 1550 nm wavelength is fabricated on CMOS-compatible silicon nitride platform, showing 2-fold improvement in compactness and 10-fold in power efficiency compared to conventional devices.

10:15-10:30 # ID 8638

Theoretical Modelling of Zinc Diffusion for InGaAs/InP Planar Avalanche Photodiode

Authors: Biying Nie, Zhonghua Tong, Zongheng Xie, Jie Shan, Xi Chen, Shiyu Xie, Ruiyu Fang and Dong Xu

Abstract: We built up a Zn diffusion model to calculate Zn diffusion profile for InGaAs/InP material system and the corresponding planar APD. Our model can be exploited to optimize planar APD performances for future work.

Session 31-T8: Micro-, Nano-, and Quantum Science and Applications

Presider: Xiao Xiong

Time: 9:00-10:30 | Room 4-8, 4F (Zoom ID: 831 1366 0011)

09:00-09:30

Invited Speaker Fang-Wen Sun, University of Science and Technology of China

Quantum Sensing at The Nanoscale

Abstract: We have realized a far-field quantum optical nanoscopy with nanoscale resolution and ultra-low pump power and found that the electro-magnetic field can be localized in one millionth of its wavelength. We also demonstrated practical nanoscale measurement of electro-magnetic field, displacement, and mass with high sensitivity.

09:30-10:00

Invited Speaker Guixin Li, Southern University of Science and Technology

Geometric Phase and Nonlinear Photonic Metasurfaces

Abstract: In this talk, I will share the latest progress in nonlinear photonic metasurfaces. The concept of nonlinear geometric phase and its application in nonlinear wavefront engineering will be discussed.

10:00-10:15 # ID 7485

Quantum Timing Jitter of Dark Pulse Microcombs

Authors: Chenghao Lao, Xing Jin, Lin Chang, Weiqiang Xie, Haowen Shu, Xingjun Wang, John Bowers and Qi-Fan Yang

Abstract: We systematically study the diffusion of dark pulses under quantum fluctuations in optical microresonators, which imposes a practical limit on their application performance. Our work provides guidelines for coherence engineering of chip-scale optical freq

Session 32-T1: Optical Fibers and Fiber-based Devices

Presider: Xinyong Dong, Guangdong University of Technology

Time: 10:45-12:15 | Room 4-C, 4F (Zoom ID: 845 4370 7772)

10:45-11:15

Invited Speaker Xinyong Dong, Guangdong University of Technology

Optical Fiber Based Airflow Velocity Measurement

Abstract: Airflow velocity measurements by using optical fiber Bragg grating based hot wires are developed. Performance improvement is achieved by several different techniques.

11:15-11:30 #ID 6238

High Frequency Partial Discharge Detection by Multicore Fibe-based Hybrid Distributed Reflectometer and Interferometer

Authors: Zhengting Wu, Jialong Li, Xingliang Shen, Huanhuan Liu, Hong Dang, Jinna Chen and Perry Ping Shum

Abstract: To detect high-frequency partial discharge, which can be limited by the detection fiber length in phase-sensitive optical time-domain reflectometer (Φ -OTDR), we propose a scheme of hybrid Φ -OTDR and Mach-Zehnder interferometer based on multicore fiber.

11:30-11:45 # ID 2566

A Physics-Informed Neural Network for Higher-Order Soliton Compression in Fibers

Authors: Jinhong Wu, Zimiao Wang and Qian Li

Abstract: We construct a physics-informed neural network to predict the higher-order soliton compression. Through embedding a partial differential equation into the neural network, the evolution of soliton in nonlinear fiber can be predicted accurately and efficiently.

Session 33-T2: Optical Transmission Systems, Sub-systems and Technologies

Prsider: Bin Chen, Hefei University of Technology

Time: 10:45-12:15| Room 2-1, 2F (Zoom ID: 838 0639 6686)

10:45-11:00 # ID 6971

Gerchberg-Saxton Based Pre-Electronic Dispersion Compensation in C-band IM/DD Transmissions over 100-km Dispersion-Uncompensated SSMF

Authors: Xiong Wu, Abdullah S. Karar, Kangping Zhong, Alan Pak Tao Lau, and Chao Lu

Abstract: Using Gerchberg-Saxton-based iterative pre- electronic dispersion compensation (EDC) and 30-tap post-FFE enables up to 75-GBaud and 100-GBaud OOK transmissions over 100-km dispersion-uncompensated SSMF, under 7% HD-FEC and 20% SD-FEC, respectively.

11:00-11:15 # ID 3379

A Novel Shaping Distribution Identification Based on QPSK-assisted FFT for Probabilistic Shaping QAM OWC Systems

Authors: Hongye Li, Zhou Gan, Bo Bai, Shuang Jin and Yuhan Dong

Abstract: We propose a shaping distribution identification method based on QPSK-assisted FFT. It can blindly identify shaping rate and modulation format for probabilistic shaping quadrature amplitude modulation (QAM) optical wireless systems with less QAM symbols.

11:15-11:30 # ID 1831

High-security FMF-OFDM Optical Transmission System Based on Cascaded Chaotic Embedded Encryption

Authors: Zhiruo Guo, Bo Liu, Jianxin Ren, Qing Zhong, Xiangyu Wu, Yaya Mao, Yunyun Chen and Yiming Ma

Abstract: A cascaded chaotic embedded encryption scheme for few-mode fiber orthogonal frequency division multiplexing (FMF-OFDM) system is proposed in this paper. Experiment verifies that the system shows higher security and better transmission performance.

11:30-11:45 # ID 9363

336-Tbit/s Real-time Transmission over 332-km 7-Core Fibre Based on 400-Gbit/s CFP2-DCO Silicon Photonics Transceiver

Authors: Ming Luo, Lei Wang, Xu Zhang, Runzhe Fan, Zhixue He, Xi Xiao and Shaohua Yu

Abstract: We demonstrate 336-Tbit/s, 332-km real-time transmission of 7×120 -channel 75-GHz-spaced DWDM 400-

Gbit/s optical signals using 7-core fibre and silicon photonics-based CFP2-DCO module. The spectral efficiency of 37.3 bit/s/Hz is achieved.

11:45-12:00 # ID 6667

1.02Tb/s CPRI-Equivalent Rate Direct Detection Transmission Supporting 1024-QAM Using IQ Interleaved Digital-Analog Radio-over-Fiber for Mobile Fronthaul

Authors: Yixiao Zhu, Qunbi Zhuge and Weisheng Hu

Abstract: In this work, we propose an IQ interleaved digital-analog radio-over-fiber scheme to reduce the PAPR. With joint rounding and scaling factor optimization, 1.02Tb/s CPRI-equivalent rate supporting 1024-QAM signal transmission is experimentally demonstrated

12:00-12:15 # ID 2932

A Distributed Topology Access Strategy based on Q-learning in a WDM VLC System

Authors: Liqiang Wang, Dahai Han, Min Zhang and Qiguan Chen

Abstract: A distributed topology access strategy for mobile users is proposed in a wavelength division multiplexing visible light communications system. The results show that the proposed strategy could outperform the traditional method regarding the bandwidth occu

12:15-12:30 # ID 4769

Maximum Likelihood Estimation of Polarization States in Coherent Optical Communications

Authors: Shuai Liu, Xinwei Du and Changyuan Yu

Abstract: A ML-based polarization state estimation algorithm in coherent optical communication is proposed. The proposed estimator achieves optimum estimation and shows robustness to the additive white Gaussian noise (AWGN) and linear phase noise (LPN).

Session 34-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Kai Wang, Southern University of Science and Technology

Time: 10:45-12:15 | Room 2-2, 2F (Zoom ID: 858 1993 0487)

10:45-11:00 # ID 628

Channel Impulse Response Correlation Analysis and Channel Estimation for WDM Underwater Wireless Optical Communication Systems

Authors: Yafei Ma, Kai Zhang, Zhide Li, Xiao-Ping Zhang and Yuhan Dong

Abstract: We propose a channel impulse response correlation analysis method for wavelength division multiplexing underwater wireless optical communications. Based on that, we propose a channel estimation method which outperforms prior works under the same pilot ove

11:00-11:15 # ID 6054

A Spatial-Temporal Joint Channel Model for Underwater Wireless Optical Links

Authors: Xiaoqian Liu, Kai Zhang, Xinke Tang and Yuhan Dong

Abstract: We propose a closed-form spatial-temporal channel model of single-source underwater wireless optical communication links in case of alignment and misalignment. It fits well with Monte Carlo simulations for various water types and link distances.

11:15-11:30 # ID 5943

Performance of Few-mode Kramers-Kronig Reception for Free-Space Optical Communication

Authors: Feng Wang and Jingrui Wang

Abstract: This paper demonstrates the performance of a simplified mode diversity receiver for free-space optical communication with structure of few-mode fiber reception and Kramers-Kronig detection, which can relieve the influence of turbulence.

11:30-11:45 # ID 5200

A Frequency Offset Estimation and Compensation Scheme for ASCM Systems

Authors: Guiqing Sun, Yuchen Zhang, Zhiyuan Ji, Tao Yang and Xue Chen

Abstract: Aiming at the method of analog domain subcarrier demultiplexing in an ASCM system, this paper proposes a FO estimation and compensation scheme based on spectral dip searching and local subcarrier frequency adjusting.

11:45-12:00 # ID 3966

ML/MAP Estimation of Frequency Offset and Linear Phase Noise in Coherent Optical Communications

Authors: Xinwei Du, Qian Wang and Pooi-Yuen Kam

Abstract: We propose an ML/MAP approach for the joint estimation of frequency offset and linear phase noise in coherent optical communications. The CRLBs are derived and the optimum estimation performance are verified through simulations.

Session 35-T4: Materials, Devices and Optoelectronics Integration

Presider: Mengyue Xu, Sun Yat-sen University

Time: 10:45-12:15 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

10:45-11:15

Invited Speaker Mengyue Xu, Sun Yat-sen University

Ultra-high-speed Electro-Optic Modulation Based on Thin-Film Lithium Niobate

Abstract: We report on our advances in thin-film lithium niobate coherent modulators for next-generation optical links with COMS-compatible driving voltage and 110-GHz bandwidth, enabling a terabit-per-second transmission and driverless long-haul transmission with ultrahigh energy efficiency.

11:15-11:30 # ID 764

Over 40 GHz Bandwidth and 0.7-V $V\pi$ Compact InP-Based Electro-optic Modulator with n-i-n MQBs

Authors: Jianghao Xing, Changzheng Sun, Bing Xiong, Jian Wang, Zhibiao Hao, Lai Wang, Yanjun Han, Hongtao Li and Yi Luo

Abstract: A compact InP-based electro-optic modulator with n-i-n multiple quantum barriers is demonstrated. An ultra-low half-wave voltage-length product of 0.07 Vcm is recorded, together with over 40 GHz bandwidth for a 1-mm modulation length.

11:30-11:45 # ID 4303

High Efficiency Stimulated Brillouin Scattering in Suspended AlGaAs Waveguides

Authors: Yuqian Zhang, Changzheng Sun, Bing Xiong, Jian Wang, Zhibiao Hao, Lai Wang, Yanjun Han, Hongtao Li and Yi Luo

Abstract: A suspended AlGaAs waveguide is proposed for high efficiency stimulated Brillouin scattering. The suspension structure can guide both transverse and longitudinal acoustic modes, and the peak Brillouin gain coefficient is estimated to reach 1.14×10^{-9} m/W.

11:45-12:00 # ID 605

High Extinction Ratio Dual-Racetrack Modulator for DAC-less PAM4 Modulation

Authors: Zhaobang Zeng, Yu Xin, Fuhao Yu, Kaifei Tang, Peiyan Zhao, Dun Mao, Tingyi Gu, Wei Jiang

Abstract: A parallel-coupled dual-racetrack modulator is demonstrated with extinction ratio > 9 dB signal-to-noise ratio > 7.0 at 50Gb/s. We demonstrate 100 Gb/s PAM-4 modulation without an external digital-to-analog converter, with power consumption < 40 fJ/bit.

12:00-12:15 # ID 450

Characteristic Particle Swarm Optimization Algorithm for Nanophotonic Inverse Design with The Grating Coupler Design As An Application Case

Authors: Enge Zhang, Junjing Huang, Tongxin Yang, Liuwei Chen, Xiaoran Zhu, Shiqi Zhang, Xiaofeng Duan and Lei Zhang

Abstract: We propose the characteristic particle swarm optimization (CPSO) for the inverse design of nanophotonic devices. The proposed method can break through the limitations brought by traditional PSO algorithm to obtain better device performance.

Session 36-T4: Materials, Devices and Optoelectronics Integration

Presider: Wei Li, CIOMP, Chinese Academy of Sciences

Time: 10:45-12:15 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

11:15-11:30 # ID 9824

Phase-Controlled Four-Wave Mixing with Pump Depletion in Compact Nonlinear Silicon Nitride Waveguides

Authors: Ping Zhao, Magnus Karlsson, Peter A. Andrekson, Heng Zhou and Kun Qiu

Abstract: We demonstrate efficient pump depletion via four-wave mixing in a nonlinear photonic silicon nitride chip with three input waves, by tuning the phase of the input pump wave.

11:30-11:45 # ID 4861

Compact Ultra-broadband and Fabrication Tolerant Adiabatic 3-dB Coupler based on Silicon-on-insulator Rib Waveguides

Authors: Xiang Liu and Yingxuan Zhao

Abstract: We propose a low-loss, compact and fabrication-tolerant adiabatic 3-dB coupler based on rib waveguides. The device exhibits a minor coupling length of 78 μ m and a flat-broad bandwidth of 200nm with a loss of 0.16dB.

11:45-12:00 # ID 6585

High-Speed Modified Uni-Traveling-Carrier Photodiodes with Stepped Electric Field Distribution

Authors: Ke Li, Xiaofeng Duan, Weifang Yuan, Yu Li, Kai Liu, Yongqing Huang

Abstract: We propose a high-speed modified uni-traveling-carrier photodiode with stepped electric field distribution by designing and optimizing field-control layer parameters. It supports a 3-dB bandwidth of 61.5 GHz at low reverse bias 2V.

12:00-12:15 #9123

A New "Stepped Particle Swarm Optimization " for Inverse Design of Nanophotonic Devices

Authors: Junjing Huang, Enge Zhang, Xiaofeng Duan, Kai Liu, Yongqing Huang, and Xiaomin Ren

Abstract: We proposed a new "stepped particle swarm optimization"(SPSO) for the reverse design of nanophotonic devices. The SPSO is of great significance in the design of nanophotonic devices with large parameter space.

Session 37-Special Session 3: Terahertz Science and Technology

Presider: Yuancheng Fan

Time: 10:45-12:15 | Room 4-5, 4F (Zoom ID: 854 1284 3584)

10:45-11:15

Invited Speaker Liang Wu, Tianjin University

Stability and optical tunability of flexible BST membrane in Terahertz Frequency Range

Abstract: Ferroelectric materials are generally inflexible in their normal state, and our synthesized barium strontium

titanate ($\text{Ba}_{x}\text{Sr}_{1-x}\text{TiO}_3$, $X=0.6$, BST) films are so elastic and flexible that they can be bent at about 140° . The flexibility of the BST film prevents the material from fracturing due to mismatching forces. We demonstrate by THz-TDS (Terahertz time domain spectroscopy) system that the fabricated flexible BST film maintains a stable transmittance under different bending conditions. In addition, under an external optical pump, the transmittance amplitude can be modulated by about 90%. This property can be used in the design of tunable terahertz devices in the case of additional pumps. The film's flexibility and the possibility of further tuning will expand the range of applications for wearable terahertz devices to be developed in the near future.

11:15-11:45

Invited Speaker Longqing Cong, Southern University of Science and Technology

Control of BIC in Terahertz Metasurfaces

Abstract: I will present the recent results on BIC in terahertz metasurfaces. BIC provides a generalized theory to access ultrahigh quality factor resonances by symmetry breaking which is a powerful tool for terahertz applications.

Session 38-T7: Biophotonics and Optical Sensors

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

Time: 10:45-12:15 | Room 4-7, 4F (Zoom ID: 893 4541 0357)

10:45-11:15

Invited Speaker Haifei Lu, Wuhan University of Technology

High Performance Miniature Fiber Optic Sensors With Improved Sensing Range And Sensing Immunity

Abstract: In this talk, we will majorly present our recent progress of two types of fiber optic sensors. One of them is capable of break the constrain of sensitive and sensing range. The other one takes advantage of optical nanocavity for temperature sensing while keeping immune to the environmental pressure.

11:15-11:45

Invited Speaker Hui Yang, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

Optofluidic systems for separation and detection of biological samples

Abstract: This talk will introduce recent works of the research team in biomedical micro systems and nano devices, focusing on the new microfluidic technologies that can realize the separation and detection of biological samples.

11:45-12:00 # ID 7169

Facile Imaging-Based Plasmonic Biosensing Augmented by Deep Learning

Authors: Lan Wu and Jiawei Wang

Abstract: Herein we report a facile transmission-imaging-based label-free biosensing scheme utilizing ultra-dense plasmonic nanoparticle arrays integrated into an optofluidic chip. Rapid biomolecular surface detections with analyte concentrations around sub- $0.1 \mu\text{g/mL}$ were accomplished using a dense convolution network and a set of hyperspectral images as training data

12:00-12:15 # ID 3365

A proposal for An Ultracompact Single-Layer MOEMS Accelerometer Based on Evanescent Coupling Between Parallel Silicon Nanowaveguides

Authors: Zhongyao Zhang and Chenguang Xin

Abstract: This paper proposes a novel MOEMS accelerometer based on evanescent coupling between parallel silicon nanowaveguides with the sub-wavelength gap. This design shows high compactness with no need of assembly.

Session 39-T8: Micro-, Nano-, and Quantum Science and Applications

President: Guixin Li, Southern University of Science and Technology

Time: 10:45-12:15 | Room 4-8, 4F (Zoom ID: 831 1366 0011)

10:45-11:15

Invited Speaker Lei Bi, University of Electronic Science and Technology of China

Self-biased Nonreciprocal Metasurface for On-Demand Bi-Directional Phase Modulation

Abstract: We report a magnetic-bias free phase gradient nonreciprocal metasurface using self-biased magnetic Mie resonators. On-demand bi-directional phase modulation is experimentally demonstrated, enabling free space isolation, circulation, nonreciprocal beam focusing and holography in Ku band.

11:15-11:30 # ID 4488

Stable Packaging Method of Ultrahigh-Q Microcavity General Devices

Authors: Fangxing Zhang, Jialve Sun and Shengnan Huangfu

Abstract: To promote the practical process of microcavity devices, we propose a packaging structure with excellent characteristics such as compact structure, strong stability and good versatility. The Q factor before and after packaging reaches 10^9 .

11:30-11:45 # ID 2435

Ultrahigh-Q Packaged Microrod Resonator for Efficient FWM Wavelength Conversion

Authors: Yuanyuan Guo, Yanran Wu, Daquan Yang and Shanguo Huang

Abstract: Ultrahigh four-wave mixing wavelength conversion efficiency of -4.81 dB is achieved with an ultrahigh-Q (9.0×10^8) packaged microrod resonator, which provides a promising platform for optical signal processing.

Session 40-T1: Optical Fibers and Fiber-based Devices

President: Yiyang Luo, Chongqing University

Time: 13:30-15:00 | Room 4-C, 4F (Zoom ID: 845 4370 7772)

14:00-14:30

Invited Speaker Yiyang Luo, Chongqing University

Manipulation on Self-Assembled Pulses in Ultrafast Lasers

Abstract: The on-going discovered internal molecular dynamics of self-assembled pulses enrich the manipulation mechanism on soliton molecules. This talk presents recent achievements in phase-tailored control of molecular structures, and the applications towards soliton encoding and sensing

14:30-14:45 # ID 4258

On-line Inscribing Ultra-weak Fiber Bragg Grating Arrays in UV-transparent coating Optical Fiber

Authors: Xiangpeng Xiao, Qingguo Song, Yibo Liu, Hongbo Duan, Qizhen Sun and Zhijun Yan

Abstract:

14:45-15:00 # ID 8773

Simultaneous Measurement of Pressure, Temperature and Salinity Based on Tilted Fiber Bragg Grating and Fabry-Perot Interferometer for Marine Monitoring

Authors: Shengqi Zhang, Yongchang Mei, Titi Xia, Zihan Cao, Zhaohui Li and Zhengyong Liu

Abstract: A three-parameter sensor realized by a tilted FBG connected with a silica capillary tube-based Fabry-Perot interferometer is proposed. The sensor is promising in marine monitoring due to easy fabrication, compact size and low cost.

Session 41-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Haoshuo Chen, Nokia Bell Labs

Time: 13:30-15:00 | Room 2-1, 2F (Zoom ID: 838 0639 6686)

13:30-13:45 # ID 5829

Computational Temporal Ghost Imaging Algorithm for PAM4-based Optical Communication Systems

Authors: Li Zhang, Fanyu Liu, Zhigang Cao, Chao Li and Zhixue He

Abstract: we propose a performance enhanced algorithm based on computational temporal ghost imaging (CTGI) technique for PAM4-based optical communication systems, which verified by numerical and experimental results.

13:45-14:00 # ID 9148

Linewidth Tolerant and Modulation-Transparent Carrier Recovery Scheme Using Kurtosis-Based Dichotomy Followed by BPS

Authors: Siyu Gong, Yanfu Yang, Qian Xiang, Linsheng Fan and Yong Yao

Abstract: A modulation format transparent carrier phase recovery scheme is proposed and demonstrated via numerical simulation. The proposed scheme can provide 0.5 dB OSNR sensitivity gain and 4.5 times linewidth tolerance improvement over the previous scheme.

14:00-14:15 # ID 3837

Fiber-optic Time Transmission with High Robustness and Flexibility

Authors: Kunfeng Xie, Faxing Zuo, Liang Hu, Jianping Chen and Guiling Wu

Abstract: We propose a multi-access fiber-optic time transmission scheme with high scalability and robustness, which is flexible for client expansion and reliable in the event of partial network damage.

14:15-14:30 # ID 4262

Hybrid Digital-Analog Mobile Fronthaul over Free Space Optical Channel with Flexible Carriers Allocation

Authors: Qiming Sun, Yejun Liu, Xiong Liu, Song Song and Lei Guo

Abstract: A flexible hybrid mobile fronthaul scheme is proposed to achieve trade-off between signal bit-error-rate and link bandwidth utilization according to the dynamic channel state.

14:30-14:45 # ID 4272

Security and Spectral Efficiency Enhanced OQAM/FBMC Based on a Chaotic Trellis Coded Modulation Encoder

Authors: Yu Bai, Bo Liu, Jianxin Ren, Shuaidong Chen, Xiangyu Wu, Yaya Mao, Lei Jiang and Yiming Ma

Abstract: A novel encrypted PS OQAM/FBMC scheme based on the chaotic TCM encoder is proposed. The transmission experiment is demonstrated and the results verify the scheme shows higher spectral efficiency and security performance simultaneously

14:45-13:30 # ID 212

Risk Prediction-based Dynamic Resource Allocation in Optical Communication Networks for Multi-energy Power System

Authors: Bohan Zhu, Yongli Zhao and Meng Lian

Abstract: We proposed a dynamic resource allocation algorithm in power optical communication networks based on risk prediction. Simulation result shows that blocking probability and average importance can be reduced, and link risk can be balanced.

Session 42-T3: Networks Architectures, Management and Applications
President: Jiawei Zhang, Beijing University of Posts and Telecommunications
Time: 13:30-15:00 | Room 2-2, 2F (Zoom ID: 858 1993 0487)

13:30-14:00

Invited Speaker Dezhi Zhang, China Telecom Research Institute
50G-PON for Broadband Access and Beyond

Abstract: Introduce the progress of 50G PON, including the overall progress of standard development, key technology content, and practice in the industry

14:00-14:30

Invited Speaker Shikui Shen, China Unicom
Discussion of Digital Twin In Optical Networks

Abstract: Digital twin is the promising technique in the future, and has been discussed and deployed in many fields. Optical networks become more and more complicated, digital twin would bring great benefits in the future optical networks. The potential applications of digital twin in optical networks are discussed in the report.

14:30-14:45 # ID 5309

High-Precision Double-Frequency Delay Skew Measurement Method for Coordinated Multipoint Transmission in 5G Flexible Fronthaul Networks

Authors: Pinru Chen, Nan Hua, Kangqi Zhu, Zhenrong Zhang and Xiaoping Zheng

Abstract: We propose a low-cost, high-precision double-frequency delay skew measurement method for coordinated multipoint transmission in 5G flexible fronthaul networks. Experimental results show that 0.07-ns measurement accuracy can be achieved in a prototype flexible fronthaul network.

Session 43-T4: Materials, Devices and Optoelectronics Integration
President: Xiaolong Chen, Southern University of Science and Technology
Time: 13:30-15:00 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

13:30-14:00

Invited Speaker Ruijun Wang, Sun Yat-sen University
Heterogeneously Integrated Photonic Circuits For Optical Communication And Sensing

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

14:00-14:30

Invited Speaker Wei Chen, Fudan University

14:30-14:45 # ID 5206

Manipulations of Optical Resonances from Visible to Near-IR Based on a-Si Elliptic Nanopillar Arrays

Authors: Qingcheng Song, Wenlin Luan, Yuanhong Yang and Xia Yu

Abstract: The characteristics of polarization dependent a-Si elliptic nanopillars array is studied and fabricated. The influence of structural parameters are analysed with scattering perspective. Regularities obtained can be used for designing fabricating-friendly nanodevices.

14:45-15:00 # ID 4479

Automated Optimization Algorithm for 16-channel Silicon WDM System Using 4-level Cascaded Mach-Zehnder Interferometers

Authors: Yichen Wu, Zihan Tao, Qipeng Yang, Bitao Shen, Ming Jin, Haowen Shu, Bowen Bai and Xingjun Wang

Abstract: We demonstrate an automated optimization control method based on the Gradient-Descent algorithm and verify the good performance on a silicon photonic 16-channel WDM device utilizing 4-level cascaded tunable Mach-Zehnder interferometers.

Session 44-T4: Materials, Devices and Optoelectronics Integration

Presider: Yaocheng Shi

Time: 13:30-15:00 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

13:30-13:45 # ID 6036

Optical Feedback Dynamics in Dual-State Quantum Dot Lasers

Authors: Zhiyong Jin, Shiyuan Zhao, Heming Huang, Frederic Grillot, Xiaochuan Xu, Yong Yao and Jianan Duan

Abstract: The dynamics of dual-state quantum dot lasers under optical feedback are investigated. It shows that the high excited-to-ground-state energy separation leads to a high threshold ratio hence strengthening the feedback resistance, which benefits isolator-free applications.

13:45-14:00 # ID 1034

Multi-ring Beam Sensing System for Three-dimensional Measurement of the Narrow Inner Surface Profiles

Authors: Xiang Li, Yuezhi Wang, Na Ni, Rui Yang and Guangping Xie

Abstract: A multi-ring optical sensor that can measure large depth-to-diameter ratio pipes is proposed. The instrument can detect narrow internal cavities realizing a measurement accuracy of 50 μ m and a repeatability of 15 μ m.

14:00-14:15 # ID 6837

High-speed Tunable Hybrid external-cavity laser with Photonic Wire Bonds

Authors: Chen Liu, Guangcan Mi, Yupeng Li, Guangcan Chen, Yanbo Li, Yuanbing Cheng and Zhaoming Li

Abstract: We demonstrated a high-speed tunable hybrid silicon-based laser using photonic wire bonds (PWB) as intra-cavity coupling element. The laser had a wavelength tuning range of 22nm with output power of 10mW, and a switching time of 8.7ns was also experimentally demonstrated.

14:15-14:30 # ID 1482

High Order Colliding Pulse Mode-Lock Laser for WDM Interconnects

Authors: Jingzhi Huang

Abstract: We report an O-band QD 4th order colliding pulse mode-locked laser both on GaAs and Si substrate, which can generate stable optical frequency combs in O-band with 100 GHz spacing.

Session 45-Special Session 3: Terahertz Science and Technology

Presider: Jiayu Zhao, University of Shanghai for Science and Technology

Time: 13:30-15:00 | Room 4-5, 4F (Zoom ID: 854 1284 3584)

13:30-14:00

Invited Speaker Shan Yin, Guilin University of Electronic Technology

14:00-14:30

Invited Speaker Su Xu, Jilin University

Abstract: A terahertz TFI-OFDM chip compatible with cmos process is realized based on the topological phase regulation in valley Hall topological photonic crystals. Our work provides a new platform for compact integration of on-chip tunable devices.

14:30-15:00

Invited Speaker Yuancheng Fan

Active Modulation of Terahertz Wave in Metasurface Containing Phase Change Films

Abstract: Media with alterable mechanisms or reconfigurable structures are being introduced into metasurface for tunable optical properties. Here, we will report our recent work on achieving tunable modulation of terahertz wave by precisely controlling the optical phase transition of the incorporated phase change films.

Session 46-T7: Biophotonics and Optical Sensors

Presider: Zhen Gao, Southern University of Science and Technology

Time: 13:30-15:00 | Room 4-7, 4F (Zoom ID: 893 4541 0357)

13:30-14:00

Invited Speaker Jun Qian

Deep-tissue and High-Resolution in Vivo Microscopy Based on NIR-II Tissue Window

Abstract: The second near infrared region (NIR-II) is defined as the spectral range of 900-1880 nm. It is regarded as an ideal optical tissue window for bioimaging, due to the suppressed tissue scattering of light (caused by the moderate tissue absorption) compared with that in the visible and the first near infrared region (NIR-I, 760-900 nm). In vivo fluorescence bioimaging technology with NIR-II emission, which has experienced rapid development during past few years, provides large imaging depth, high contrast, low autofluorescence and minimal biological damage. Our group has carried out in vivo fluorescence microscopy based on the NIR-II window. Up to now, functional imaging of various organs in rodents and non-human primates has been successfully demonstrated.

14:00-14:30

Invited Speaker Kebin Shi, Peking University

High Spatiotemporal Label Free Imaging for Photonic Devices and Live Cells

Abstract: Tomographic imaging is one of the most developing imaging technologies in recent years. It has great capability for label-free imaging. The recent advance of the optical diffraction tomography imaging based on scattering theory has greatly promoted the resolution of tomographic imaging. The need to visualize three-dimensional (3-D) structures noninvasively using this method is growing rapidly. In this work, a holographic tomography microscope is built by combining digital holography and precise stitching of varying angle of tomographic scan. The imaging speed is greatly boosted by simultaneously controlling the rotation of light and raw imaging logging. In the image processing stage, a fast and robust algorithm is used to mapping the data in frequency domain to reconstruct the 3-D refractive index. The resulting 3-D refractive index measurement with time lapsed scheme reveals the holistic 3-D super-resolution imaging of photonic devices and organelle interactions in live cells.

14:30-14:45 # ID 187

Ultrasensitive Plasmonic Biosensing Based on Critical Tuning of Phase Change Materials

Authors: Yuye Wang, Yurui Hu, Shuwen Zeng, Aurelian Crunteanu, Yi Zhang and Hui Yang

Abstract: We revealed the potential of exploiting phase change materials (PCM) for ultrasensitive biosensing. Theoretical analysis showed that the detection sensitivity can be improved by four orders of magnitude through precisely engineering the configuration of PCM.

14:45-13:30 # ID 4111

Selective Multiple Gas Tracing Using Graphene Based Microlaser Sensor

Authors: Yanhong Guo, Zhaoyu Li, Ning An, Hao Zhang, Yupei Liang, Yunjiang Rao and Baicheng Yao

Abstract: Leveraging versatile mode interactions of microcavity, we realize an actively graphene functionalized

microlaser sensor with rich mode splitting, enabling label-free gas detection in mixtures with sensitivity down to ppb-level.

Session 47-Special Session 1: Hollow Core Optical Fibers and Applications

President: Yingying Wang, Jinan University, China

Time: 15:15-17:30 | Online Room 4, ID: 846 1762 4368)

15:15-15:45

Invited Speaker Greg Jasion, University of Southampton

Recent Advances in Hollow Core Fibres

Abstract: Recent years have seen rapid reduction in the loss of hollow core optical fibres culminating in Double Nested Anti-resonant Nodeless Fibre, the first HCF with loss below that of commercial SMF. The design, modelling and fabrication of these fibres will be presented.

15:45-16:15

Invited Speaker Dawei Ge

Hollow-core fiber's Applications in Optical Communications and Its Potential

Abstract: Why hollow-core fiber (HCF) is a game-changer in optical communications is analyzed. Possible applications in optical communications are presented. Capacity limitation of HCF with current commercial amplifiers and loop setup is calculated. Characteristic Measurement study and 800G real-time transmission experiments on HCF are presented.

16:15-16:45

Invited Speaker Wei Ding, Jinan University

Advanced Techniques for Anti-Resonant Hollow-Core Fiber

Abstract: For the better utilization of anti-resonant hollow-core fibers, a compilation of unprecedented techniques of low-loss interconnection, precise control of fiber-optic sensitivities, and non-invasive characterization of internal structure are developed and reported in this talk.

16:45-17:00 # ID 3367

Four-ray Interference Model for Non-Invasive Characterization of Tubular Anti-Resonant Hollow-Core Fibers

Authors: Yifan Xiong, Shixian She, Yizhi Sun, Yingying Wang, Maochun Li, Kun Zhao, Miao Yan and Wei Ding

Abstract: We propose a comprehensive four-ray interference model based on simple geometric optics that can be employed to characterize all the structural parameters of an anti-resonant hollow-core fiber in a non-invasive and fast way.

17:00-17:15 # ID 6705

Hundred-watt level fiber gas Raman lasers filled with H₂

Authors: Yulong Cui, Wei Huang, Hao Li, Wenxi Pei, Ziyang Li, Meng Wang and Zefeng Wang

Abstract: Here, we report a hundred-watt fiber gas Raman laser at 1135 nm filled with high pressure H₂. It is pumped by narrow linewidth fiber oscillator based on hollow-core fiber end-cap.

17:15-17:30 # ID 1353

Output Characteristics of Acetylene-Filled Hollow-Core Fiber Laser Seeded by Different P(R)-Branch Lines at 3.1 μm

Authors: Wei Huang, Zhiyue Zhou, Yulong Cui, Zefeng Wang and Jinbao Chen

Abstract: The seed at other emission lines can be amplified a little in an acetylene-filled HCF pumped by P17 absorption line. The threshold can be lowered by introducing feedback at the input end.

Session 48-T1: Optical Fibers and Fiber-based Devices

President: Hongbin Song, the Chinese University of Hong Kong, Shenzhen

Time: 15:15-16:45 | Room 4-C, 4F (Zoom ID: 845 4370 7772)

15:15-16:45

Invited Speaker Fei Yu, Shanghai Institute of Optics and Fine Mechanics

Computer-aided Dispersion-Oriented Inverse Design Of Photonic-Crystal Fiber

Abstract: Photonic-crystal fiber (PCF) offers an efficient way of tailoring the fiber dispersion in a much extended range. We report the dispersion-oriented inverse PCF design via computer algorithm for novel fiber laser and four-wave mixing applications.

15:45-16:15

Invited Speaker Wei Jin, The Hong Kong Polytechnic University

Spectroscopic Gas Sensing with Micro/Nano Structured Optical Fibers

Abstract: Micro and nano structured optical fibers have special optical, acoustic and thermal properties, which enable highly sensitive and selective spectroscopic gas sensors and instrument with compact size. In this talk, I will report recent progress and focus on the new detection techniques enabled by these novel fibers, including fiber-enhanced photothermal spectroscopy, mode-phase-difference photothermal spectroscopy, photoacoustic Brillouin spectroscopy, and stimulated Raman gain and dispersion spectroscopy.

16:15-16:30 # ID 415

Supermode Bragg Grating Inscribed in a Strongly Coupled Seven-Core Fiber for Multi-Parameter Sensing Applications

Authors: Xian Dong, You-Hang Xie, Jia-Le Ou, Chuang Wu, Jie Li and Bai-Ou Guan

Abstract: A supermode Bragg grating inscribed in a strongly coupled seven-core fiber for multi-parameter sensing is proposed and demonstrated. There are two Bragg resonance notches observed in the transmission spectrum, corresponding to HE₁₁-like and HE₁₂-like supermodes.

16:15-16:30 # ID 3154

Ultra-sensitive All-Optical Anemometer Based on Dispersion Turning Point

Authors: Yaqi Tang, Chao Wang, Pengfei Zhang, Chi Chiu Chan and Junda Lao

Abstract: An optical fiber hot wire anemometer which operating near the dispersion turning point is comprised by splicing an attenuation optical fiber between SMFs. The sensitivity of -1.01nm/(m/s) is obtained when the wind speed is 1.0m/s.

Session 49-T7: Biophotonics and Optical Sensors

President: Yang Yi

Time: 15:15-16:45 | Room 2-1, 2F (Zoom ID: 838 0639 6686)

15:15-15:45

Invited Speaker Peng Xi, Peking University

Polarized Structured Illumination Microscopy

Abstract: We developed polarized structured illumination microscopy, which achieves super-resolution imaging of dipoles in spatio-angular hyperspace. We further report Spectrum and Polarization Optical Tomography to study the subcellular organelle interactions in live cells.

15:45-16:00 # ID 1665

A Quantitative Analysis Model of Flow Induced Vibration Noise in the Pipe for Distributed Flowrate Detection

Authors: Keqing Zhang, Xiangpeng Xiao, Baoqiang Yan, Hao Li, Zhijun Yan and Qizhen Sun

Abstract: We proposed a standard model to quantitatively calculate flow-induced vibration noise in the pipe for flow rate detection. We have used distributed optical fiber acoustic sensing system to verify the proposed model with good result.

16:00-16:15 # ID 8838

Refractive Index Sensor Based on A Chip of Etched Thin Cladding Waveguide Bragg Grating

Authors: Heyi Cai, Xiangpeng Xiao, Yuze Dai, Fanglei Huang, Qizhen Sun and Zhijun Yan

Abstract: We demonstrate the fabrication of refractive index sensor based on a chip of etched thin cladding waveguide Bragg grating, the measured refractive index sensitivity can be up to 10.9 nm/RIU.

16:15-16:30 # ID 7904

LIA-free Brillouin Optical Correlation Domain Analysis Enabled by Multi-core Fiber

Authors: Huan He, Shuyan Chen, Zhiyong Zhao, Can Zhao, Songnian Fu, Ming Tang

Abstract: A Brillouin optical correlation-domain analysis sensor without lock-in-amplifier based on the multi-core fiber is proposed and demonstrated, which is very promising for dynamic bending measurement and shape sensing with high spatial resolution and measurement accuracy.

16:30-16:45 # ID 5318

Solid-state Multi-Beam Scanning Single-Photon Lidar System Based on Cascaded VIPA and SPAD Array

Authors: Ziwen Long, Xinyu Fan and Zuyuan He

Abstract: A solid-state multi-beam scanning single-photon light detection and ranging (Lidar) system based on virtually imaged phased array (VIPA) and single-photon avalanche diode (SPAD) array is proposed.

Session 50-T2: Optical Transmission Systems, Sub-systems and Technologies

Presider: Chenhui Li, Zhejiang University

Time: 15:15-16:45 | Room 2-2, 2F (Zoom ID: 858 1993 0487)

15:15-15:45

Invited Speaker Chenhui Li, Zhejiang University

Co-Packaged Optics Leveraging Space Division Multiplexing

Abstract: A mode-multiplexed transmitter combining a 2-D VCSEL matrix on a Si interposer and a multi-plane light converter is demonstrated, which enables 200-Gb/s transmission using 10G-class VCSELs and spatial fiber modes. The results confirm the potential of employing spatial multiplexing to scale CPO and transceiver capacity while reducing cost per bit and power consumption through integration and component parallelism

15:45-16:00 # ID 9404

Power Optimization for C+L-band Signal Transmission

Authors: Ningning Guo, Yifan Yu, Kai Zhang, Ning Deng, Tianhai Chang and Gangxiang Shen

Abstract: We propose a novel power optimization strategy for better signal transmission in a C+L-band system. Simulation results show that our strategy can achieve a higher system capacity than other benchmark strategies.

16:00-16:15 # ID 5731

Channel Modeling for Indoor Visible Light Communication Enabled by Digital Twin

Authors: Yi Huang, Min Zhang, Yanwen Zhu, Qifan Wang, Chihyung Yang and Liqiang Wang

Abstract: This paper presents a dynamic transmission model of indoor visible light communication (VLC) system using digital twins (DT), and establishes a channel model based on two different deep learning (DL) algorithms, BiGRU and BiLSTM. The experimental results show that both the BiGRU model and BiLSTM model can fit the real channel well, and the mean square errors are $6.57e-05$ and $6.54e-05$ respectively. Through comparative analysis, the amount of computation of BiGRU is about 25% less than that of BiLSTM.

16:15-16:30 # ID 1604

Cost-effective IFDMA-PON enabled by Bidirectional Long Short-Term Memory

Authors: Hui Yang, Pengcheng Deng, Li Chen and Xiaoyu Lu

Abstract: we proposed a bidirectional long short-term memory (BiLSTM)-based detection method for IFDMA-PON. The results showed that BiLSTM could compensate the system impairments more effectively than traditional least square-based method.

16:30-16:45 # ID 1979

Low-Complexity NN-equalizer based on Spectrum Segmentation in Underwater Visible Light Communication

Authors: Hui Chen, Fangchen Hu, Chao Li, Ziwei Li, Zhixue He and Nan Chi

Abstract: We proposed a low-complexity NN-equalizer based on spectrum segmentation and a modified loss function to mitigate the nonlinear distortion in high-speed UVLC system. Experiments demonstrate that the proposed scheme achieves similar performance compared with classical NN-equalizer, and with a 43.1% network complexity reduction.

16:45-17:00 # ID 264

Carrier-Assisted Phase Retrieval with Multiple Projections

Authors: Qi Wu, Yixiao Zhu, Qunbi Zhuge and Weisheng Hu

Abstract: We experimentally demonstrate the edge carrier-assisted phase retrieval scheme with multiple projections. 56 GBd 16-QAM signal is successfully transmitted over 80-km SMF with a carrier-to-signal power ratio of -3 dB and 5 iterations.

Session 51-T4: Materials, Devices and Optoelectronics Integration

President: Jiawei Wang

Time: 15:15-16:45 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

15:15-15:45

Invited Speaker Yaocheng Shi, Zhejiang University

Silicon-Based On-Chip Reconfigurable Optical Add-Drop Multiplexer

Abstract: Reconfigurable optical add-drop multiplexer (ROADM) which enables any channel to be switched and routed flexibly is a key element in the multiplexing system. For an MDM-PDM-WDM hybrid system, mode, polarization as well as wavelength are involved, thus it becomes a challenge to develop a novel ROADM enabling the add/drop of any channels of mode/polarization/wavelength. We will present a 96 channels ROADM for the hybrid MDM/PDM/WDM system and also direct-access mode-division multiplexing switches.

15:45-16:15

Invited Speaker Xuhan Guo, State Key Laboratory of Advanced Optical Communication Systems and Networks, Shanghai Jiao Tong University

Metamaterial Enabled Light Manipulation in Silicon Photonic Devices

Abstract: We demonstrate some new kinds of subwavelength-scale optical metamaterials patterns on a silicon waveguide to realize optical signal manipulations in modes, wavelengths, couplers and optical neural network in the silicon photonic devices

16:15-16:30 # ID 5075

High-resolution On-Chip Fourier Transform Spectrometer Based on MZI Array and PCSBL Reconstruction Algorithm

Authors: Xiaoqing Long, Zhuli Huang, Huaijian Luo, Changyuan Yu, Heng Zhao and Yufei Liu

Abstract: A compact on-chip spectrometer based on the Mach-Zehnder interferometer array and PCSBL algorithm is proposed. It can reconstruct narrowband signals with FWHM of 0.5 nm and a triplex-peak signal separated by 3-nm distance.

16:30-16:45 # ID 1154

High-Q Subwavelength Grating Racetrack Micro-Ring Resonators Based on Bound State in Continuum

Authors: Chongbao Fang, Xiaoxuan Wu, Junjia Wang, Na Dong, Weifeng Jiang, Zhaofu Chen, Ningfeng Bai and Xiaohan Sun

Abstract: In this work, we demonstrate a high-Q subwavelength grating racetrack micro-ring resonator based on bound state in continuum waveguides with quality factors up to 7000, which is highly useful for BIC-based photonic integrated circuits.

Session 52-T4: Materials, Devices and Optoelectronics Integration

President: Feng He, HIT (Shen Zhen)

Time: 15:15-16:45 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

15:15-15:45

Invited Speaker Qiang Lin, University of Rochester

15:45-16:15

Invited Speaker Zejie Yu, Zhejiang University

Compact and High-Speed Integrated Lithium Niobate Electro-Optic Modulator

Abstract: Thin film lithium niobate on insulator (LNOI) attracts extensive attention for electro-optic (EO) modulation because of subwavelength scale confinement of light. Recent progress on different kinds of EO modulators with different kinds of passive structures will be introduced at first. A compact and high-speed electro-optic modulator based on a new 2×2 Fabry–Perot cavity will be presented in detail, including its unique properties, design rule, measured performance, and applications. At last, perspectives of EO modulators based on LNOI will be discussed.

16:15-16:30 # ID 4776

Theoretical Analysis for Radiant Mode of Tilted Waveguide Grating

Authors: Yuze Dai, Xiangpeng Xiao, Qingguo Song and Zhijun Yan

Abstract: An theoretical analysis has been carried out for the radiation mode of tilted waveguide grating (TWG) using volume current method (VCM). Compared with tilted fiber grating, TWG has a smaller and adjustable radiation divergence angle.

16:30-16:45 # ID 6251

Design of Partially Etched GaP-OI Microresonators for Two-Color Kerr Soliton Generation at NIR and MIR

Authors: Houling Ji, Zhaoting Geng, Weiren Cheng, Zhuoyu Yu, Pengzhuo Wu, Yi Li and Qiancheng Zhao

Abstract: We investigate a concentric GaP-OI microresonator with an extended anomalous dispersion region that is enabled by a partially-etched gap. The resonator can support Kerr soliton comb generation around 1550 nm and 3100 nm wavelengths.

Session 53-Special Session 3: Terahertz Science and Technology

Presider: Longqing Cong, Southern University of Science and Technology

Time: 15:15-17:15| Room 4-5, 4F (Zoom ID: 854 1284 3584)

15:15-15:45

Invited Speaker Tian Jiang, National University of Defense Technology

Title: Ultrafast spectroscopic investigation of low-dimensional semiconductor cavity quantum electrodynamics

Abstract: We thoroughly study the light-matter interaction processes in low-dimensional semiconductor-optical cavity systems by using transient reflectance spectrum measurements, and unveil the ultrafast photodynamic mechanisms of the interaction processes under different coupling strengths.

15:45-16:15

Invited Speaker Tingting Lv, Northeast Petroleum University

Polarization and Absorption Functional Devices of Terahertz Metamaterials

Abstract: High-performance terahertz polarization and absorber devices is extremely important in the application of terahertz technology. This report focuses on terahertz wave plate, absorber and asymmetric transmission devices.

16:15-16:45

Invited Speaker Yizhu Zhang, Tianjin University

Intensity-surged and Bandwidth-extended Terahertz Radiation in Two-foci Cascading Plasmas

16:45-17:15

Invited Speaker Jiang Li, Institute of Fluid Physics, China Academy of Engineering Physics

Terahertz computational ghost microscopy with deep sub-wavelength resolution

Abstract: The diffraction limit prevent terahertz imaging resolution down to micro-scale or even to nano-scale. This talk presents terahertz computational ghost microscopy to improve the spatial resolution. THz near-field imaging with spatial resolution of over $\lambda/100$ was demonstrated without mechanical scanning.

Session 54-T6: LEDs, Photovoltaics, and Optoelectronics in Energy

Presider: Aung Ko Ko Kyaw, Southern University of Science and Technology

Time: 15:15-16:45| Room 4-7, 4F (Zoom ID: 893 4541 0357)

15:15-15:45

Invited Speaker Xuming Zhang, Hong Kong Polytechnic University

Plasmonic Nanohole Arrays as Photoelectrodes for Enhanced Hot Carrier Generation

Abstract: We have integrated Au nanohole arrays (AuNHAs) with different thin TiO₂ layers to exert the combined effect of various plasmonic modes to enhance the visible photocatalytic activities for photocurrent generation, organic degradation and water splitting.

15:45-16:15

Invited Speaker Baiquan Liu, Sun Yat-sen University

Manipulation of Charge And Exciton Distribution for White OLEDs/colloidal Quantum Well LEDs

16:15-16:45

Invited Speaker Ravi Silva, University of Surrey

Halide Perovskites for Next Generation Flexible Opto-Electronics for a Green Energy Future

Abstract: Rise in global energy consumption and demand requires a faster expansion in renewable energies, to avoid further inclusion of fossil fuels in electricity generation that will increase the CO₂ emissions

Session 55-T5: Microwave Photonics and Optical Signal Processing

President: Yanling Xue

Time: 15:15-16:45 | Room 4-8, 4F (Zoom ID: 831 1366 0011)

15:15-15:30 # ID 5517

Tunable Microwave Photonic Filter Based on an Ultra-high-Q Mach-Zehnder Interferometer Coupled Microring Resonator

Authors: Hao Yan, Yiwei Xie, Long Zhang and Daoxin Dai

Abstract: A high-Q Mach-Zehnder interferometer (MZI) coupled micro-ring resonator (MRR) is demonstrated as a microwave photonic band-pass filter with tuning range of 3-dB bandwidth 150 MHz - 2 GHz and central frequency 500 MHz - 40 GHz.

15:30-15:45 # ID 3376

High Power, Narrow Linewidth, High Speed 1.55- μ m Direct Modulation DFB Laser

Authors: Hao Wang, Ruikang Zhang, Dan Lu, Qiang Kan, Lingjuan Zhao and Wei Wang

Abstract: We demonstrate a 220 mW, InGaAlAs/InP quantum-well distributed feedback (DFB) laser emitting at 1.55 μ m with 178 kHz linewidth, 9 GHz bandwidth, which are well suited for microwave photonics or free space optical communication applications.

15:45-16:00 # ID 2093

Interdigital Structure Coplanar Waveguide Based Broadband Bias Tee for G-band Photodetector Module

Authors: Yuxin Tian, Bing Xiong, Changzheng Sun, Zhibiao Hao, Jian Wang, Lai Wang, Yanjun Han, Hongtao Li and Yi Luo

Abstract: A novel broadband bias-tee is proposed and fabricated based on interdigital structure coplanar waveguide. The fabricated G-band bias-tee exhibits an insertion loss below 4 dB over 140~220 GHz.

16:00-16:15 # ID 7873

AI-enabled Fast and Accurate Modeling for Femtosecond Chirped-pulse Amplification

Authors: Tong Chu, Guoqing Pu, Hang Yang, Weisheng Hu and Lilin Yi

Abstract: A long short-term memory (LSTM) model to accelerate the simulation of pulse propagation in the gain fiber of a chirped-pulse amplification (CPA) system is demonstrated, which is ~84 times faster than the traditional method.

Session 56-T1: Optical Fibers and Fiber-based Devices

President: Xinhai Zhang, Southern University of Science and Technology

Time: 9:00-10:00 | Room 4-C, 4F (Zoom ID: 845 4370 7772)

09:00-09:30

Invited Speaker Junqing Zhao, Shenzhen Technology University

High Power Fiber Sources with Wavelength Accessible to Mid-IR

Abstract: In this short talk, I will discuss on some of our works relating to the near IR high power fiber sources. Especially, I will show how they can be applied for further spectral spanning to the mid-IR region.

09:30-09:45 # ID 9340

Comparison of Measured Inter-core Skews of Group Delay in MCF, Ribbon Fiber, and SMF Using Frequency Domain Method

Authors: Haolei Gao, Tianwai Bo, Zhongwei Tan and Yi Dong

Abstract: The inter-core skew (ICS) of group delay in multicore fiber (MCF), ribbon fiber (RF), single-mode fiber was experimentally measured. The results show that the ICS of MCF and RF with neighboring cores are the smallest.

09:45-10:00 # ID 6163

Kerr-Brillouin Dual-Soliton Synchronization in a Micro-Fiber Resonator for Mechanics Sensing

Authors: Junting Du, Chenye Qin, Yupei Liang, Teng Tan, Yanhong Guo, Yunjiang Rao, Baicheng Yao, Kunpeng Jia and Zhenda Xie

Abstract: Via exciting an orthogonal Brillouin laser in a high Q monolithic fiber resonator, we generate a pair of orthogonal Kerr soliton combs. It demonstrates a high sensitivity of 0.3 kHz/ μ N, with a linear measurement range up to 7.3 mN for mechanical force sensing. Leveraging the noise-filtering and lock-in heterodyne measurement, we obtain a detect limit down to 520 pN

Session 57-T8: Micro-, Nano-, and Quantum Science and Applications

President: Danyuan Lei, City University of Hong Kong

Time: 9:00-10:30 | Room 2-1, 2F (Zoom ID: 838 0639 6686)

09:00-09:30

Invited Speaker Ling Lu, Institute of Physics, Chinese Academy of Sciences

Topological-cavity Surface-Emitting Laser

Abstract: We invent topological-cavity surface-emitting laser (TCSEL) that is capable of 10W peak power, sub-1° divergence angle, 60dB side-mode suppression, and multi-wavelength 2D arrays at 1550nm.

09:30-10:00

Invited Speaker Qifan Yang, Peking University

10:00-10:30

Invited Speaker Di Zhang, Nankai University

Polarization-entangled State Modulation Using Nonlinear Optical Metasurface

Abstract: We investigated a method for all-optical modulation of polarization-entangled photonic states using a nonlinear metasurface. The quantum distillation has been further performed based on this strategy.

Session 58-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Hongyan Fu, Tsinghua-Berkeley Shenzhen Institute, Tsinghua University

Time: 9:00-10:30 | Room 2-2, 2F (Zoom ID: 858 1993 0487)

09:00-09:15 # ID 4359

Improved Dual-Reference-Subcarrier Carrier Phase Estimation with Suppressed Noise Amplification

Authors: Shen Wang, Shuhua Song, Miaowen Wen, Jie Tang, Shifeng Zhou and Jian Zhao

Abstract: We propose an improved dual reference subcarrier carrier phase estimation method, which suppresses the noise amplification. The proposed method achieves the better performance and relaxes the sensitivity to the DRS interval.

09:15-09:30 # ID 8157

20.48 Tb/s over 1200km WDM Transmission with Nonlinear Frequency Division Multiplexing

Authors: Xinyu Chen, Xu Zhang, Fan Zhang, Ming Luo and Zhixue He

Abstract: We experimentally demonstrate nonlinear frequency division multiplexing WDM transmission over 1200 km G.654E fiber with Raman amplification, achieving a record data capacity of 20.48 Tb/s by employing the continuous nonlinear spectrum.

09:30-09:45 # ID 7887

CRIP-OFDM with Index Modulation for Visible Light Communication System

Authors: Yibin Li, Zixian Wei, Zhaoming Wang and H. Y. Fu

Abstract: A combining real and imaginary parts OFDM with index modulation (CRIP-OFDM-IM) is employed to a bandlimited 2-m visible communication (VLC) system to verify the superiority of the proposed CRIP-OFDM-IM over Hermitian symmetry based OFDM-IM.

09:45-10:00 # ID 8815

An Optically-Powered Cost-efficient Fiber-Wireless Mobile Fronthaul System Based on Delta-Sigma Modulation

Authors: Linsheng Zhong, Yang Zou, Xinyu Chang, Xiaoxiao Dai, Chen Liu, Mengfan Cheng, Lei Deng, Qi Yang, Deming Liu, Hailin Yang and Songnian Fu

Abstract: We demonstrate a PWoF assisted MFH based on delta-sigma modulation. Optically carried delta-sigma modulated 64-QAM OFDM signal and 5-W feed light are co-transmitted. The full optical-wireless link consists of 4-km SSMF and 1-m air medium.

10:00-10:15 # ID 7259

Real-time Demonstration of SDM-WDM Transmission Using Weakly-coupled 7-core Fiber and Commercial 400G WDM Equipment

Authors: Yu Tang, Chunxu Zhao, Shikui Shen, Xiongyan Tang, Lei Shen, Lei Zhang, Changkun Yan, Liubo Yang, Ruichun Wang, Jun Chu and Zhiguo Zhang

Abstract: A DP-16QAM SDM-WDM system using commercial 400G WDM equipment over 60-km weakly-coupled 7-core fiber is successfully demonstrated. The effect of splicing on transmission performance is also investigated.

10:15-10:30 # ID 8124

Security Enhancement Based on Input-output Correlation Protection of Nonlinear Combinatorial Function in Quantum Noise Stream Cipher

Authors: Guoli Feng, Chaofeng Cheng, Lizhong Zhang, Kun Xia, Jun Liu, Feng Liu, Shengjie Wang, Yajie Li, Yongli Zhao and Jie Zhang

Abstract: We propose a method to protect the input-output correlation of the nonlinear combinatorial function in quantum noise stream cipher to prevent eavesdropper from attacking successfully. Simulation results show that this method can effectively resist attack.

10:30-10:45 # ID 3559

Pairwise Coding for Polarization Multiplexing Turbid UOWC Systems

Authors: Bohua Deng, Jiwei Wang, Zhaoming Wang, Chen Chen and H. Y. Fu

Abstract: We introduce and experimentally demonstrate a polarization division multiplexing (PDM) based varying

degrees of turbid underwater optical wireless communication (UOWC) system with subcarrier pairwise coding (SC-PWC) and subchannel pairwise coding (SCH-PWC) schemes.

Session 59-T6: LEDs, Photovoltaics, and Optoelectronics in Energy

President: Gongqiang Li, Nanjing Tech University

Time: 9:00-10:30 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

09:00-09:30

Invited Speaker Xiaofeng Li, Soochow University

Multiphysics simulation, Manipulation, and Experiment of Perovskite Solar Cells

09:30-10:00

Invited Speaker Xiao Wei Sun, Southern University of Science and Technology

QD DISPLAYS

10:00-10:30

Invited Speaker Feng He, Southern University of Science and Technology

Session 60-T4: Materials, Devices and Optoelectronics Integration

President: Xiaolong Chen, Southern university of Science and Technology

Time: 9:30-10:30 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

09:30-10:00

Invited Speaker Xiaolong Chen, Southern University of Science and Technology

Black Phosphorus Mid-Infrared Optoelectronics

Abstract: I will review a promising material platform, black phosphorus, for the next-generation mid-infrared optoelectronics, due to its high carrier mobility, tunable bandgap, and desirable mid-infrared optoelectronic properties.

10:00-10:15 # ID 1540

TE-Pass Polarizer Based on Asymmetrical Directional Couplers on Thin-Film Lithium Niobate

Authors: Lu Qi, Ziliang Ruan, Kaixuan Chen, Liu Liu and Gengxin Chen

Abstract: A TE-pass polarizer is proposed based on asymmetrical directional couplers on the TFLN platform. The measured insertion losses of < -0.4 dB over a bandwidth of 60 nm and PER = 25 dB at 1550 nm are obtained.

10:15-10:30 # ID 3507

A 128 Gbit/s 3D-Integrated Silicon Photonics Receiver with 1.5 pJ/bit Power Consumption

Authors: Dingyi Wu, Dong Wang, Xiao Hu and Xi Xiao

Abstract: A 100 Gbit/s NRZ and 128 Gbit/s PAM-4 silicon photonics receiver with low power consumption is reported. The receiver is implemented based on flip-chip 3D integration with a Ge-Si PD and a commercial linear TIA.

Session 61-Postdeadline Paper Session 1: Fiber optics and optoelectronic devices

President: Zhijun Yan

Time: 9:00-10:30 | Room 4-5, 4F (Zoom ID: 854 1284 3584)

09:00-09:15 # ID 608

Up to 170 Gbaud Optical Interconnects with Integrated CMOS-Silicon Photonics Transmitter

Authors: Xiansong Fang, Ke Li, David J. Thomson, Fan Yang, Shenghao Liu, Weiwei Zhang, Wei Cao, Callum G. Littlejohns, XingZhao Yan, Martin Ebert, Mehdi Banakar, Dehn Tran, Fanfan Meng, Han Du, Graham T. Reed, Fan Zhang

Abstract: We investigate the performance boundary of integrated CMOS silicon photonics transmitters with DSP techniques. 170Gbaud OOK generation and 120Gbaud 20km transmission is achieved with a CMOS-silicon transmitter, provided that the driver amplifier only consumes 158mW.

09:15-09:30 # ID 3499

Submonolayer Biolasers for Parkinson's Disease Biomarker Detection

Authors: Chaoyang Gong, Xi Yang, Shui-Jing Tang, Qian-Qian Zhang, Yanqiong Wang and Yi-Ling Liu, Yu-Cheng Chen, Gang-Ding Peng, Xudong Fan, Yun-Feng Xiao, Yun-Jiang Rao and Yuan Gong

Abstract: We report submonolayer lasers on optical fibers as ultrasensitive and disposable biosensors. An ultimate sensitivity with over six orders of magnitude enhancement over the saturated monolayer lasers was achieved.

09:30-09:45 # ID 6866

Ring Core Fiber Based Robust Super-Resolution Imaging with Orbital Angular Momentum

Authors: Zheyu Wu, Ran Gao, Sitong Zhou, Shuhan Lyu, Xinhua Shi and Xiangjun Xin

Abstract: Multimode fibers based imaging are very sensing to perturbation. Ring core fibers supporting a few weakly-coupled mode groups of orbital angular momentum (OAM) provide a more robust imaging method with super-resolution capability.

09:45-10:00 # ID 9797

Ultra-Compact Integrated Graphene-Silicon Slot-Waveguide Electro-Optic Modulator

Authors: Chao Luan, Deming Kong, Yunhong Ding and Hao Hu

Abstract: We demonstrate an ultra-compact, waveguide integrated, and slot-waveguide enhanced graphene-silicon micro-ring modulator featuring a large modulation bandwidth beyond 40 GHz and a high extinction ratio of 22 dB, with 6-V driving voltage and only 2- μ m-long graphene.

Session 62-T7: Biophotonics and Optical Sensors

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

Time: 9:00-10:30 | Room 4-7, 4F (Zoom ID: 893 4541 0357)

09:00-09:30

Invited Speaker Yi Yang, Wuhan University

Smart Optofluidic Blood Health Care Sensor

Abstract: We propose a smart optofluidic system to provide a differential diagnosis for blood testing via precise cell biophysics property recognition both mechanically and morphologically. We currently achieve 100% diagnostic accuracy for five typical clinical blood diseases via real-world prospective implementation. This work suggests a potential basis for next-generation blood smart health care devices.

09:30-09:45 # ID 232

A Two-stage Raman Imaging Denoising Algorithm Based on Deep Learning

Authors: Quan Tang, Jiaqi Hu, Jinna Chen, Chenlong Xue, Junfan Chen, Hong Dang, Dan Lu, Huanhuan Liu, Qizhen Sun, Qiaozhou Xiong, Longqing Cong and Perry Ping Shum

Abstract: As a molecular fingerprint, each Raman peak represents a specific molecular vibration. Therefore, Raman spectrum can detect molecule in a highly specific, label-free and non-invasive way, is widely used in the fields of life science, material chemistry and clinical medicine.

09:45-10:00 # ID 3426

Field Trail of Shared Risk Optical Fiber Links Detection Based on OTDR and AI Algorithm

Authors: Zhiyong Zhao, Zhongshu Zhang, Hu Shi, Yinqiu Jia, Yiqi Li, Yan Zhao and Zhenhua Feng

Abstract: A shared risk optical fiber links detection scheme based on OTDR curve and AI algorithm is proposed and verified to identify the risk of simultaneous failure of working and standby routes with 100% recognition accuracy.

10:00-10:15 # ID 7061

Refractive Index Detection of Liquid Analyte in Broad Range Using Multimode Fiber Speckle Sensor

Authors: Penglai Guo, Zhitai Zhou, Jie Hu, Xiaoling Peng, Chenlong Xue, Jiaqi Hu, Jialong Li, Hong Dang, Jinna Chen, Liyang Shao, Jianqing Li, Huanhuan Liu and Perry Ping Shum

Abstract: We investigate a multimode fiber (MMF) speckle sensor applied to measure the refractive index (RI) of liquid analyte. A large range linear correlation over refractive index variations, i.e., from 1.3449 to 1.4323 is achieved.

10:15-10:30 # ID 9189

High-resolution Interferometric Vector Bending Sensor Based On Seven-Core Fiber Enabled Single-Passband Microwave Photonics Filter

Authors: Yucheng Yao, Weilun Wei, Can Chen, Zhiyong Zhao, Weijun Tong and Ming Tang

Abstract: A high-resolution vector bending sensor based on a seven-core fiber Mach-Zehnder interferometer has been proposed and experimentally demonstrated. The sensor is interrogated by microwave photonics single-passband filter. The curvature sensitivity shows strong direction dependence.

Session 63-T1: Optical Fibers and Fiber-based Devices

President: Wei Jiang, Nanjing University

Time: 10:45-12:15 | Room 4-C, 4F (Zoom ID: 845 4370 7772)

10:45-11:15

Invited Speaker Xinhai Zhang, Southern University of Science and Technology **Mode-locking of ultrafast fiber lasers based on InP QDs saturable absorbers**

Abstract: Mode-locked fiber lasers have a wide range of applications. In this talk, we present our results of passive mode-locking and spatiotemporal mode-locking in ultrafast fiber lasers using InP/ZnSeS/ZnS core-shell quantum dots as saturable absorbers.

11:15-11:45

Invited Speaker Wu Zhang, Guangzhou University **An Integrated Optical Fiber Tweezer System for Sensing Applications**

Abstract: We will report on the optical manipulation in a miniaturized, low cost and integrated microfluidic chip based on tapered optical fiberS trapping, which is applied for different sensing applications.

14:45-12:00 # ID 7461

High Performance Marine Towing Cable System based on Ultra-Sensitive Fiber-Optic Distributed Acoustic Sensing

Authors: Guofeng Yan, Minxing Zhang, Junqiu Long, Lang Jiang, Delin Wang and Yunjiang Rao

Abstract: A high performance marine towing cable system based on ultra-sensitive fiber-optic distributed acoustic sensing (uDAS) is demonstrated and tested in field. The towing cable is specially designed with 15 sensing units arranged at equal intervals of 0.6 m. The sensitivity of the sensing unit is greatly enhanced to -130 dB re rad/ μ Pa at frequency from 4 Hz to 700 Hz. For the first time, sea trial is carried out to test the flow noise, underwater acoustic signal capture and beamforming capacity. The proposed towing cable system with high sensitivity, a simple structure and light weight, opens up a new way for light-weighting unmanned towing applications.

Session 64-T8: Micro-, Nano-, and Quantum Science and Applications

Presider: Ling Lu, Institute of Physics, Chinese Academy of Sciences

Time: 10:45-12:15 | Room 2-1, 2F (Zoom ID: 838 0639 6686)

10:45-11:15

Invited Speaker Lei Shi, Fudan University

Singular Optics in Momentum Space

Abstract: Bound states in the continuum in periodic photonic systems like photonic crystal slabs are proved to be accompanied by vortex polarization singularities on the photonic bands in the momentum space. In this talk, I will show that the winding structures of polarization states not only widen the field of topological physics but also show great potential that such systems could be applied in light beam manipulating.

11:15-11:45

Invited Speaker Danyuan Lei, City University of Hong Kong

Probing and Manipulating 2D Dark Excitons With Plasmon Nanocavities

Abstract: In this talk, I will discuss several elegant nano-plasmonic approaches for probing and manipulating spin-forbidden dark excitons in two-dimensional semiconductors.

14:45-12:00 # ID 2715

Acousto-optic Interaction and Ultrasound Detection Using Dissipative Optical Microcavities

Authors: Jia-Wei Meng, Shui-Jing Tang, Jialve Sun, Ke Shen, Changhui Li, Qihuang Gong and Yun-Feng Xiao

Abstract: We propose an ultrasound sensor using the dissipative acousto-optic interaction in an optical microcavity-microfiber coupling system. Its detection sensitivity shows a two-orders-of-magnitude advance over the dispersive mechanism, which is insensitive to Q factors.

12:00-12:15 # ID 2348

Inverse Design Local-Density-of-States via Deep Learning in Quantum Nanophotonics

Authors: Guang-Xin Liu, Wen-Jie Zhou, Jing-Feng Liu and Lin Wu

Abstract: In this manuscript, we apply a fully-connected neural network to approximate the local-density-of-states of the quantum nanophotonic system consisting of a multilayer shell metallic nanoparticle and two quantum emitters.

Session 65-T7: Biophotonics and Optical Sensors

Presider: Qiaoqiang Gan, KAUST

Time: 10:45-11:45 | Room 2-2, 2F (Zoom ID: 858 1993 0487)

10:45-11:15

Invited Speaker Yan Hong, University of Electronic Science and Technology

Optoplasmonic nano-composites: design, fabrication and application in chemical- & bio-analysis

Abstract: Optoplasmonic materials embrace the interaction between plasmonic components and peripheral photonic landscape, enabling the corresponding probes with improved capacity in chemical- & bio- analysis.

11:15-11:30 # ID 2265

Structure Failure Analysis of The Tunnel Reinforcement Steel Ring

Authors: Qizhen Sun, Zhichao Zeng, Baoqiang Yan, Tao He, Ziyun Yang and Zhijun Yan

Abstract: We built a simulation model for analyzing the tunnel reinforcement steel ring structure failure by analyzing the pressure distribution and vibration amplitude of the steel ring under a given vibration signal.

11:30-11:45 # ID 1663

Cladding Etched Strongly Coupled Seven-Core Fiber Modal Interferometer for Highly Sensitive Refractive Index Sensing

Authors: You-Hang Xie, Jia-Le Ou, Chuang Wu, Jie Li and Bai-Ou Guan

Abstract: We have proposed and demonstrated a highly sensitive refractive index sensor based on cladding-etched strongly-coupled seven-core fiber. The characteristics of the sensor is studied theoretically and experimentally and the results agree well with each other.

Session 66-T6: LEDs, Photovoltaics, and Optoelectronics in Energy
Presider: Kai Wang, Southern University of Science and Technology
Time: 10:45-12:30 | Room 2-3, 2F (Zoom ID: 873 1845 7907)

10:45-11:15

Invited Speaker Xiaoyu Zhang, Jilin University

Low-dimensional Perovskite Light-Emitting Diodes

Abstract: A unique approach has been taken to probe the growth mechanism of perovskite nanocrystals with the help of water molecules who can decompose the perovskites; the influence of ion doping and surface states on the luminescence property of nanocrystals was uncovered, and design rules for the synthesis of high-quality nanocrystals were established; new methods that can improve the emitters' optical property combining with device interface modification have led to high performing perovskite LEDs, with record efficiency and operational stability being reported for several times.

11:15-11:45

Invited Speaker Weidong Xu, Northwestern Polytechnical University

Perovskite Light-Emitting Diodes

Abstract: We have demonstrated that the halide vacancies generated at the perovskite/hole transport interface during device operation are critical to electroluminescence quenching. This is on the basis of our deep understanding of an intriguing self-repairing phenomenon.

11:45-12:15

Invited Speaker Liangcheng Wang, Central South University

Recent research progress on GaN-based resonant cavity Micro-LEDs for AR application

Abstract: Here, we numerically and experimentally demonstrate resonant cavity Micro-LEDs (RC Micro-LEDs) by incorporating SiO₂/TiO₂ DBRs, exhibiting narrow spectrum width down to 6.82nm and decreased emission angle of 78.7°, which should have the potential to be used in AR system.

Session 67-T4: Materials, Devices and Optoelectronics Integration
Presider: Xianfeng Chen
Time: 10:45-12:15 | Room 4-9, 4F (Zoom ID: 846 6291 4130)

10:45-11:15

Invited Speaker Yanjun Liu, Southern University of Science and Technology

Liquid Crystalline Optoelectronic Materials and Devices

Abstract: In this talk, we briefly summarize the recent development of organic and inorganic liquid crystalline materials and devices in our group, mainly including: 1) tunable metasurfaces based on liquid crystals and their applications; and 2) self-assembly of upconversion nanorods. These works have potential applications in the fields of micro/nano-photonics devices, display and imaging, etc.

11:15-11:45

Invited Speaker Chao Xiang, The University of Hong Kong

Heterogeneous Laser Integration for Silicon Nitride Photonics

Abstract: Silicon nitride used to be a passive-only photonics platform. In this talk, I'll introduce the recent progress of heterogeneous integration of III-V and silicon with ultra-low-loss silicon nitride for lasers and active photonic integrated circuits.

14:45-12:00 # ID 6777

Ultralow-threshold Continuous-Wave Quantum Dot Lasers Based on Miniaturized Bound States In The Continuum

Authors: Hancheng Zhong, Ying Yu and Siyuan Yu

Abstract: Here, we demonstrate the room temperature and CW operated BIC lasers working at O-band, by utilizing the cavity design of miniaturized bound states in the continuum (mini-BICs) able to trap light in all three dimensions and the active materials of InAs/GaAs quantum dots (QDs) with high threshold gain and defect-insensitivity. Our mini-BIC laser exhibits an ultra-low threshold of 52 μW and small mode-volumes of $7.46(\lambda/n)^3$. With the advantages in terms of a small footprint, flexibility of integration, robustness of fabrication and low power consumption, the mini-BIC laser presented in this work has the potential to be a next-generation on-chip nanoscale light source.

12:00-12:15 # ID 9203

High-efficiency High-speed UV Bandpass GaN/AlGaIn Heterojunction Photodetectors using Polarization Induced Potential Barrier

Authors: Keqi Liu, Zesheng Lv and Hao Jiang

Abstract: A GaN/AlGaIn heterojunction UV photodetector using polarization-induced potential barrier was proposed and fabricated in this work, resulting in a low dark current and a bandpass spectral response. The detector also demonstrates stable and fast photoresponse.

Session 68-Postdeadline Paper Session 2: Transmission and access systems

Presider: Songnian Fu, Guangdong University of Technology

Time: 10:45-12:15 | Room 4-5, 4F (Zoom ID: 854 1284 3584)

10:45-11:00 # ID 4766

54.07 Tb/s Transmission over 12,057 km Single Mode Fiber Using C+L Band EDFA Amplification with 75.36-km Span Length

Authors: Lin Jiang, Anlin Yi, Xingchen He, Jie Luo, Liangming Xiong, Chengpeng Fu, Qianggao Hu, Zhengyu Pu, Youren Yu, Wei Pan and Lianshan Yan

Abstract: We report on 54.07Tb/s over 12057km transoceanic transmission with C+L band EDFA and 75.36km span length, which is the longest span length for transoceanic distance ($\geq 6000\text{km}$) and ultra-high capacity ($\geq 50\text{Tb/s}$).

11:00-11:15 # ID 5482

3.03 Pbit/s S, C, and L-Band Transmission in Uncoupled 19-core Fiber

Authors: Xu Zhang, Ming Luo, Chao Li, Qibing Wang, Zicheng Liu, Hao Guo, Chuyu Peng, Huang Yu, Zhixue He, Xi Xiao, Weisheng Hu and Shaohua Yu

Abstract: We experimentally demonstrated a 3.03 Pbit/s WDM/SDM combined transmission over 19-core fiber by using 680 wavelength channels with 25-GHz spacing, covering 17 THz bandwidth of S, C and L-band.

11:45-12:00 # ID 6266

High-Pass Delta-Sigma-over-Fiber-based 1048576-QAM Delivery above 24GHz for 5G New Radio

Authors: Yixiao Zhu, Xiaobo Zeng, Qi Wu, Hexun Jiang, Qunbi Zhuge and Weisheng Hu

Abstract: Based on 2-bit, 1.5-bit, and 1-bit high-pass delta-sigma modulator, we transmit 1048576-QAM at 25GHz,

262144-QAM at 28GHz, and 16384-QAM at 30GHz over 10km SMF, respectively. Skew-enabled vestigial-sideband shaping is utilized to suppress power fading.

12:00-12:15 # ID 6860

Record Ultra-high Capacity 50.7-Tbit/s WDM Coherent Transmission in Hollow-core Fiber

Authors: Bowen Zhu, Caoyuan Wang, Jie Zhu, Yi Wei, Junjie Ding, Limin Xiao, Yiwei Shi, Wen Zhou, Jianjun Yu and Zhende Zhai

Abstract: We experimentally demonstrated wavelength division multiplexing (WDM) coherent transmission of probabilistically shaped (PS) 64-quadrature amplitude modulation (64QAM) signal through a 1.1 km hollow-core fiber (HCF) over the entire extended C-band. To our best knowledge, the result achieves a record-breaking transmission capacity, i.e., 50.7-Tbit/s, for low-latency, high-speed and ultra-high-capacity optical communication in HCFs.

12:15-12:30 # ID 7034

Real-time Unrepeated Transmission Over 500-km SMF of 4×10G PDM-QPSK with EDFA Amplification Only

Authors: Junyu Wu, Xueyuan Ao, Jie Zhang, Xiaoxiao Dai, Qi Yang, Lei Deng, Mengfan Cheng, Deming Liu, Mingyi Gao, Gangxiang Shen, Songnian Fu, Guoxiang Xu, Rendong Xu, Yucheng Fa and Haiming Yu

Abstract: We have successfully realized a real-time 4×10Gb/s PDM-QPSK unrepeated transmission over 500km standard single mode fiber (SSMF) with the only use of erbium doped fiber amplifier (EDFA), where the total transmission loss of G.654B SSMF is 75 dB. Since the PDM-QPSK signal is only amplified by an EDFA at the transmitter side, coherent detection is helpful to realize a record receiver sensitivity of -53.5 dBm. After 500 km SSMF transmission without any supports of Raman or remote forward and backward remote optical pump amplifiers (ROPA), Four wavelength channels are fully recovered by a field programmable gate array (FPGA) based real-time PDM-QPSK transponder.

Session 69-T1: Optical Fibers and Fiber-based Devices

President: Junqing Zhao, Shenzhen Technology University

Time: 10:45-11:45 | Room 4-7, 4F (Zoom ID: 893 4541 0357)

10:45-11:15

Invited Speaker Luming Zhao, Huazhong University of Science and Technology

Characterization of High-Order Solitons Based on Nonlinear Fourier Transformation

Abstract: Nonlinear Fourier transform can be used to describe soliton features for both fundamental order soliton and high-order solitons. Soliton order can be confirmed by either the number of eigenvalues or the discrete spectrum rotation.

11:15-11:45

Invited Speaker Meng Pang, Shanghai Institute of Optics and Fine Mechanics

Soliton Dynamics in Optomechanically Mode-Locked Fiber Lasers

Abstract: A three-stage fiber laser system at 2.8 μm was built up, delivering high-performance mid-IR pulses with W-level average power, few-cycle pulse duration and octave spectral width.

Session 70-T2: Optical Transmission Systems, Sub-systems and Technologies
Presider: Hongyan Fu, Tsinghua-Berkeley Shenzhen Institute, Tsinghua University
Time: 9:00-10:30 | Online Room 1, ID: 863 2270 8565

09:00-09:15 # ID 4541

Dynamic Bandwidth Assignment with Upstream Crosstalk Control in Passive Optical Network Coexistence

Authors: Yuanqiu Luo, Andy Shen and Frank Effenberger

Abstract: This paper proposes a crosstalk control mechanism for coexisting PON upstream transmission. It improves upstream dynamic bandwidth assignment by taking received signal BER into consideration. Simulation results validate its performance in crosstalk control.

09:15-09:30 # ID 2927

High Capacity Bidirectional Analog Radio-over-Fiber System based on Wavelength Reuse and Frequency Multiplexing

Authors: Haixuan Xu, Amol Delmade, Colm Browning, Liam P Barry and Yonglin Yu

Abstract: We demonstrate a practical wavelength reuse bidirectional Analog Radio-over-Fiber system using frequency multiplexing. Asymmetric transmission over 25 km fiber with 20 Gb/s downlink and 10 Gb/s uplink data rate is implemented.

09:30-09:45 # ID 733

On Comparison Between Cut-off and nth Root Transmitter S21 Precompensation

Authors: Tianyu Zhao, Wing Chau Ng, Xuefeng Tang, Zhiping Jiang and Chuandong Li

Abstract: We experimentally compare two types of transmitter S21 precompensation, cut-off approach and nth root approach for single-carrier dual-polarization 77GBaud QPSK signal. Combined approach is proposed to further enhance back-to-back performance, while further reducing implementation complexity.

09:45-10:00 # ID 9894

Compact Agnostic Nyquist WDM Transmission System based on Cascaded Silicon Ring Modulators

Authors: Mohammed Ibrahim Hosni Elsayed, Karanveer Singh, Younus Mandalawi, Ayman Mokhtar and Thomas Schneider

Abstract: We present a new concept for a simple and compact agnostic Nyquist wavelength division multiplexing (ANY-WDM) transmission system based on cascaded silicon ring modulators without the need for any optical filters, special electronics or photonics

10:00-10:15 # ID 1217

Numerical Study on Coherent O-Band Transmission for Data Center Campus Interconnects

Authors: Adrian Juarez, Yanjun Zhu, Xin Chen, Hao Dong, Ming-Jun Li and Jianwei Mu

Abstract: A numerical study on coherent O-Band transmission using LAN-WDM wavelengths at 800G/Lane for distances up to 10km has been conducted to understand the limitations imposed by fiber nonlinearities, laser-linewidth and equalization length on the power budget.

10:15-10:30 # ID 8971

Optical Conversion of Phase-to-Intensity-Modulated Signals Based on Delay Line Interferometer and Phase-Sensitive Amplification

Authors: Qiankun Li, Qi Xu, Xiongwei Yang, Jiali Yang and Huajun Yang

Abstract: An all-optical format conversion scheme from differential quadrature phase shift keying (DQPSK) signals to 4-ary pulse amplitude modulation (PAM4) signals is proposed and simulated based on delay line interferometer and partial phase-sensitive amplification.

10:30-10:45 # ID 8268

A Low Complexity Timing Recovery Scheme for Digital Subcarrier Multiplexing Systems

Authors: Yuchen Zhang, Xue Chen, Zhiyuan Ji, Guiqing Sun, Tao Yang, Liangjun Zhang and Weiming Wang

Abstract: A low computational complexity timing recovery scheme for DSCM systems is proposed and simulated in this paper. The computational complexity analyzation shows that the proposed timing recovery scheme could reduce the computational complexity by 43%

Session 71-T4: Materials, Devices and Optoelectronics Integration

President: Rui Chen, Southern university of Science and Technology

Time: 9:00-10:30| Online Room 2, ID: 836 5238 9479

09:00-9:30

Invited Speaker Weihua Guo, Huazhong University of Science and Technology

09:30-10:00

Invited Speaker Cheng Wang, City University of Hong Kong

Lithium Niobate Photonic Integrated Circuits for Future Optical and Microwave Links

Abstract: In this talk, I will discuss our recent developments on integrated lithium niobate photonic devices, including broadband and high-linearity electro-optic modulators, power-efficient electro-optic frequency comb sources, and their applications in future optical and microwave links.

10:00-10:15 # ID 9591

Monolithically Integrated Microcavity Lasers on Silicon

Authors: Yuanhao Gong, Wentao Xie, Yaoran Huang, Taojie Zhou, Jingwen Ma, Mingchu Tang, Xiankai Sun, Siming Chen, Huiyun Liu and Zhaoyu Zhang

Abstract: Highly integrated III-V lasers on silicon are promising candidates for ultra-compact light sources of the next generation on-chip optical interconnect. Here, we present various InAs/GaAs quantum dot microcavity lasers monolithically grown on silicon.

10:15-10:30 # ID 5366

Research on Integrated Optics Interferometric Imaging Reconstruction

Authors: Xiaohan Song, Yong Zuo, Yingying Zhou, Yuhao Wang, Xiaobin Hong and Jian Wu

Abstract: Proposed an integrated optical interferometric imaging system based on compressed sensing. A real-time gating lens array is used to adjust the interferometric baseline pairing mode, which can carry more original target information.

Session 72-T6: LEDs, Photovoltaics, and Optoelectronics in Energy

President: Abhishek Srivastava, Hong Kong University of Science and Technology

Time: 9:00-10:30| OnlineRoom 3, ID: 842 7075 7440

09:00-9:30

Invited Speaker Dongling Ma, Institut national de la recherche scientifique (INRS)

Towards High-Performance Flexible Optoelectronic Devices

Abstract: In this talk, I will present some of our recent results on the non-fullerene organic solar cells as well as the preparation of cost-effective, stable, high-performance nanowire TCEs achieved by carefully designing the structure of nanowires (such as a core/shell structure) and their film deposition process, and on their application in smart windows, electrochromic devices and solar cells.

9:30-10:00

Invited Speaker Juan-Pablo Correa-Baena, Georgia Institute of Technology

Interfacial Dynamics in Metal Halide Perovskites

Abstract: In this presentation, I will discuss the role of crystal surface structural defects on optoelectronic properties of lead halide perovskites through synchrotron-based techniques. The importance of interfaces and their contribution to detrimental recombination will also be discussed. As a result of these contributions to better understanding 2D and 3D defects, the perovskite solar cell field has been able to improve device performance. Albeit the rapid improvements in performance, there is still a need to understand how these defects affect long term structural stability and thus optoelectronic performance over the long term."

10:00-10:30

Invited Speaker Gongqiang Li, Nanjing Tech University

Design of Hole Transporting Materials for High-Performance Perovskite Solar Cells

Abstract: Perovskite Solar cells (PSCs) is one of the most promising novel solar cells, and the hole transporting materials (HTMs) play key roles in PSCs. Our group developed several new hole transporting materials with a based on cyclooctatetrathiophenes (COTs) and its derivatives, and the new HTMs with a tunable conformation of flexible core led to high performance perovskite solar cells.

Session 73-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Changyuan Yu, The Hong Kong Polytechnic University

Time: 10:45-12:15 | Online Room 1, ID: 863 2270 8565

10:45-11:00 # ID 3156

Experimental Demonstration of Improved DDFTN Algorithm for Strictly Band-Limited IM/DD System

Authors: Shaonan Liu, Jiahao Huo, Xiaoying Zhang and Wei Huangfu

Abstract: We proposed a modified DDFTN algorithm, added a least squares channel estimation after the postfilter. Compared with the traditional DDFTN algorithm, this new algorithm significantly improved the performance of system.

11:00-11:15 # ID 3038

Carrier Polarization Fading Free Self-Coherent System Based on Optical Injection Locking and Polarization Scrambler

Authors: Ziwen Zhou, Tianhao Tong, Weihao Li, Junda Chen, Zihe Hu, Siqi Yan, Songnian Fu and Ming Tang

Abstract: We propose a carrier polarization fading free self-coherent transmission architecture based on optical injection locking and polarization scrambler. Experiments are carried out to verify the performance of the injection locking module and the polarization scrambler, respectively. All the results prove that the utilization of the two modules can ensure the stability of the system. Moreover, the scheme is experimentally verified in a 50GBaud PDM-16QAM system

11:15-11:30 # ID 7370

Peak-to-average Power Ratio Constrained Digital Pre-emphasis for Short-reach Coherent Systems with Transmitter Bandwidth Limitation

Authors: Qiang Zheng, Hong Yang and Huijian Zhang

Abstract: A PAPR constrained DPE method for short-reach coherent systems is proposed and experimentally validated, which can improve the transmitter output power by ~0.5 dB without receiver sensitivity degradation in a 96-GBaud 32QAM transmission experiment.

11:30-11:45 # ID 1283

Convolutional Neural Network Based Intensity-Only Orbital Angular Momentum Mode

Decomposition for Free-space Turbulence Compensation

Authors: Wuli Hu, Long Zhu, Bing Lu, Mingliang Deng, Xiaojin Guo and Andong Wang

Abstract: An orbital angular momentum mode decomposition technique based on convolutional neural network is proposed for the free-space atmospheric turbulence compensation. The compensation method performs high accuracy in the free-space optical link under turbulence in simulation.

11:45-12:00 # ID 4449

Free-Space Turbulence Resistance Transmission with Multiple Quasi-Ring Airy Vortex Beams under Limited Receiving Aperture

Authors: Jiaxiong Yang, Andong Wang, Bing Lu, Mingliang Deng, Xiaojin Guo and Long Zhu

Abstract: Under turbulence strength $D/r_0 = 3.3$ and receiving aperture of 0.03, the received power of MQRABs is improved by about 8 dB in the simulation, compared with traditional OAM beams when the cumulative probability is 0.1.

12:00-12:15 # ID 6960

Wideband Flat and Stable Supercontinuum from 1550nm to 1850nm Generated by ASE Pumping at C-band

Authors: Baining Ye, Jiangbing Du, Zhaonian Wang and Zuyuan He

Abstract: Wideband flat and stable supercontinuum (SC) from 1550-to-1850 nm with 2.51-dB flatness is generated by CW ASE pumping. Improved spectroscopy precision was obtained for HCN absorption measurement by the proposed truly-continuous SC.

12:15-12:30 # ID 6162

Unified Waveform for Free Space Optical Lidar-Communication

Authors: Minghua Cao, Ying Wang, Yue Zhang, Daqing Gao and Hongtao Zhou

Abstract: A unified waveform for optical wireless integrated sensing and communication is proposed based on quadrature phase shift keying and direct sequence spread spectrum. Our proposal can achieve reliable transmission at ranging accuracy of 11mm.

Session 74-T5: Microwave Photonics and Optical Signal Processing

President: Rui Chen, Southern university of Science and Technology

Time: 10:45-12:15 | Online Room 2, ID: 836 5238 9479

10:00-10:30

Invited Speaker Chengying Bao, The Chinese University of Hong Kong

An Efficient Silica Microcavity Soliton Spectral Broadener

Abstract: Microcavities can emit ultralow noise soliton lightwaves and microwaves, but these sources suffer from low conversion efficiency from the pump. Here we harness the synchronization dynamics between pulsed pump and microcavity solitons and show that conversion efficiency up to 54% is possible.

10:30-11:00

Invited Speaker Chao Wang, University of Kent

An All-Optical Reservoir Computing Approach for High-Thought Imaging and Measurement

Abstract: Reservoir Computing (RC) is a highly efficient bio-inspired machine learning approach for processing high-speed time dependent sequential data. Here a novel all-optical RC approach based on time-stretch and spectral mixing is introduced.

11:00-11:30

Invited Speaker Xingyuan Xu, Beijing University of Posts and Telecommunications

Self-calibrating Programmable Photonic Integrated Circuits

Abstract: This talk presents a self-learning programmable PIC with full control of its complex impulse response, and

associated spectral phase and amplitude responses in the presence of thermal-crosstalk between the phase-tuning elements. This approach offers stable and accurate control of large-scale PICs, for demanding applications such as communications-network reconfiguration, neuromorphic hardware accelerators and quantum computers.

Session 75-T3: Networks Architectures, Management and Applications

President: Yongli Zhao, Beijing University of Posts and Telecommunications

Time: 10:45-12:15 | Online Room 3, ID: 842 7075 7440

10:45-11:00 # ID 3044

Delay-aware Rate Adjusting Scheme in Higher Speed Passive Optical Networks

Authors: Xinshui Wei, Jun Li, Xiang Lu, Liangchuan Li, Guanyu Wang, Rui Lin and Gangxiang Shen

Abstract: Xinshui Wei, Jun Li, Xiang Lu, Liangchuan Li, Guanyu Wang, Rui Lin and Gangxiang Shen

Abstract: Flexible rate is a new desirable operational feature of next-generation higher speed passive optical networks (e.g., ITU-50G PON). In this context, this paper proposes a delay-aware rate adjusting scheme, in which the line rate can be adjusted following the traffic load varying to save energy without degrading delay performance. Simulation results show that the proposed scheme has a similar performance with the benchmark in the aspect of energy saving, while the delay performance of time-sensitive services can be improved significantly, which can be up to 36%.

11:00-11:15 # ID 6598

Fine-Granularity Bandwidth Allocation for Diverse Low-Latency Services in Higher Speed Passive Optical Networks

Authors: Xiang Lu, Jun Li, Liangchuan Li, Guanyu Wang, Rui Lin and Gangxiang Shen

Abstract: To support time-sensitive (TS) services with differential low latency requirements, this paper proposes a fine-granularity bandwidth allocation algorithm (FgBA) in higher speed passive optical networks (i.e., ITU-T 50G PON). Simulation results show that FgBA can meet the diverse low latency requirements of TS services regardless of traffic load.

11:15-11:30 # ID 9361

Comparative Assessment of 800G-Capable Embedded and Pluggable Coherent Line Interfaces over the Optical Network Lifecycle

Authors: Joao Pedro

Abstract: This paper presents a framework to compare the effectiveness of deploying 800G-capable embedded and pluggable interfaces over the network lifecycle. Simulation results highlight that state-of-the-art embedded interfaces are competitive over an extended period of operation.

11:30-11:45 # ID 3590

Service Provisioning in WSS-based All-Optical Data Center Network with Dragonfly Topology

Authors: Ershuai Meng, Yongcheng Li, Jiemin Lin, Jun Li, Sanjay Kumar Bose and Gangxiang Shen

Abstract: Dragonfly is an important network topology for data centers to efficiently serve high-performance computing (HPC) traffic flows. In this paper, we construct a WSS-based all-optical data center network (DCN) with Dragonfly topology and investigate its routing, wavelength, and time slot allocation (RWTA) problem. Two heuristic algorithms, including the shortest-path-based (SP) algorithm and the least-delay-path-based (LDP) algorithm, are proposed. Simulation results show that the LDP algorithm is efficient in improving the performance of the proposed all-optical DCN with Dragonfly topology in terms of task completion time (TCT).

11:45-12:00 # ID 6471

Traffic Prediction for Optical Fronthaul Network Using Self-Attention Mechanism-based Transformer

Authors: Xujun Zhao, Yonghan Wu, Xue Hao, Lifang Zhang, Danshi Wang and Min Zhang

Abstract: A model for traffic analysis using self-attention mechanism-based Transformer is proposed to improve the transmission performance of delay sensitive services in optical fronthaul network, the results verify its Effectiveness.

12:00-12:15 # ID 8219

Optical Bandwidth Enhancement Modelling for Cascaded WSS

Authors: Patrick Blown, Yiran Ma, Ian Clarke, Boris Kuhlmeiy and Martijn de Sterke

Abstract: A new analytical model is proposed for bandpass filter shapes for Wavelength Selective Switches (WSS) with optical bandwidth enhancement. The new model better predicts cascaded WSS compared with the current state-of-the-art model.

Session 76-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Luming Zhao, Huazhong University of Science and Technology, China

Time: 13:30-15:00 | **Online Room 1, ID:** 863 2270 8565

13:30-14:00

Invited Speaker Lilin Yi, Shanghai Jiao Tong University

Intelligent Fiber Transmission Simulation Platform

Abstract: The intelligent fiber transmission simulation platform based on Python and Pytorch includes the basic modules of transceiver, channel, and DSP, which naturally supports AI algorithms. Specifically, channel module can be accelerated by deep learning method.

14:00-14:15 # ID 9914

Statistical Analysis of PDL Penalty on Coherent Transmission Technologies Based on WSS Experimental Characterization

Authors: Andrea D'Amico, Giacomo Borraccini, Stefano Straullu, Francesco Aquilino, Stefano Piciaccia, Alberto Tanzi, Gabriele Galimberti and Vittorio Curri

Abstract: We experimentally characterize the LCoS WSS PDL varying the attenuation and the port/frequency configuration. We perform Monte Carlo analyses of cascaded WSS penalty on coherent technologies showing the combined effect of PDL and ASE noise.

14:15-14:30 # ID 8766

An Experimental Observation of the Disaggregated Nonlinear Interference Noise Generation

Authors: Andrea D'Amico, Bertrand Le Guyader, Florian Frank, Esther Le Rouzic, Erwan Pincemin, Nicolas Brochier and Vittorio Curri

Abstract: We experimentally measure the independent cross-channel NLI components in WDM flex-grid flex-rate multi-vendor comb at symbol rate up to 90 Gbaud propagating on a multi-span amplified line and compare the results to the GNP prediction.

14:30-14:45 # ID 499

Mitigate The Inter-Channel Interference in Coherent Sampling-Based Nyquist OTDM Demultiplexer Using KNN Classifier

Authors: Lei Yue, Wangyang Cai, Dun Cao, Yuyang Liu, Yan Li and Jian Wu

Abstract: We propose and experimentally demonstrate a simple KNN classifier to mitigate the inter-channel interference in coherent sampling-based Nyquist OTDM demultiplexer. About 4 dB required-OSNR improvement (@BER=10⁻⁴) is observed compared with traditional DD-LMS equalization method

14:45-15:00 # ID 8706

Coverage Improvement of Visible Light Communications using an Engineered Diffuser

Authors: Krishnendu Bera, Guanghui Ma and Nemai Karmakar

Abstract: A practical VLC system should have a significant coverage area. In this paper, a top-hat engineered diffuser is used to improve the coverage probability from 31.91% to 67.55% when compared to a Lambertian light source.

Session 77-T5: Microwave Photonics and Optical Signal Processing

Presider: Nuannuan Shi, Institute of Semiconductors, Chinese Academy of Sciences

Time: 13:30-15:00 | Online Room 2, ID: 836 5238 9479

13:30-14:00

Invited Speaker Nuannuan Shi, Institute of Semiconductors, Chinese Academy of Sciences
Time-dependent Photonics-enabled Convolution Neural Networks for Image Processing

Abstract: The optical computing breaks the digital computing paradigm with the wideband, low loss and high-speed. we proposed and demonstrated the Spiking Timing-dependent Convolutional Neural Network (CNN) for Image Classification and the incoherent optical matrix operator for both perceptron and convolutional processor.

14:00-14:15 # ID 8647

An analytical model of OSNR and SNR for Short Reach IM-DD Systems with MZM

Authors: Yapeng Xie, Ke Wang and Sithamparanathan Kandeepan

Abstract: A theoretical framework based on power spectrum analysis is developed for linking OSNR with SNR/BER for accurate data transmission quality estimation in IM-DD based short-reach optical communication systems under various limitations.

14:15-14:30 # ID 8102

A Low Phase Noise System for QAM Signal Generation and Transmission With The Carrier Of Mm-Wave

Authors: Kaiyu Zhang, Dong Wang, Shangyuan Li, Zhengyang Xie and Zheng Zheng

Abstract: A microwave-photonic scheme base on an optoelectronic oscillator (OEO) is proposed to achieve the generation and transmission of the QAM signal with the carrier of mm-wave.

14:30-14:45 # ID 4163

All-optical Special Unitary Group of Degree Two (SU(2)) Unit and Splitter Based on MZI and Nonvolatile Phase-Change Material

Authors: Yubao Deng, Pengxing Guo, Sijing Yu, Weigang Hou and Lei Guo

Abstract: his paper proposes a nonvolatile optical signal processing structure based on PCM Sb₂Se₃ and Mach-Zehnder interferometer (MZI), which can achieve arbitrary rotation of optical special unitary group of degree two (SU(2)) and achieve an all-optical splitter with arbitrary splitting ratio by configuring PCM

14:45-15:00 # ID 3138

Performance Investigation of OFDM-based Serial Relay UWOC System Over The Generalized Gamma Distribution

Authors: Yuanhao Nie, Weina Pang, Shuang Li, Ping Wang and Ting Zhang

Abstract: An OFDM-based serial relay UWOC system has been investigated over the combined GGD oceanic fading channel under different modulation schemes, temperature gradients, water types. Besides, RS codes are applied to enhance the ABER performance.

Session 78-T1: Optical Fibers and Fiber-based Devices

President: Yu Xia, Beihang University

Time: 13:30-15:00 | Online Room 3, ID: 842 7075 7440

13:30-14:00

Invited Speaker Fanchao Meng, Jilin University

Real Time Measurements of Ultrafast Instabilities in a Dissipative Soliton System

Abstract: We report real-time measurements of instability dynamics in a broadband noise-like pulse laser and the characterisation reveals that intracavity extreme events satisfy statistical rogue wave criteria.

14:00-14:30

Invited Speaker Yongkang Dong, Harbin Institute of Technology

Ultrafast Distributed Brillouin Optical Fiber Sensors

Abstract: The OCC Brillouin optical fiber sensing can be able to realize fast measurement, the sample rate can be up to MHz, 150-km sensing range in a few seconds and the one-end-access measurement.

14:30-14:45 # ID 6093

Measurement of The Attosecond-Level Timing Jitter Based on The Time-Stretched Coherent Detection

Authors: Yujia Li, Dongmei Huang and Feng Li

Abstract: Attosecond timing jitter is retrieved in a time-stretched self-coherent system. The amplitude of timing jitter obtained is linearly related to driven voltages of the piezoelectric transducer. The amplitude of the 1-attosecond level can be identified.

14:45-15:00 # ID 6718

400G Coherent and IMDD Transmission over 50 um Core Multimode Fiber Links with Multiple Connector Junctions using LP01 Mode-Matching Adapters

Authors: Xin Chen, Qi Wu, Jeffrey Clark, Jason Hurley, Jeffery Stone, John Downie, Hao Chen and Ming-Jun Li

Abstract: We studied the fundamental mode transmission over 200-320 m 50 um core OM2 multimode fiber with up to six connector junctions enabled by LP01 mode matching adapters using 400G coherent and IMDD transceivers.

Session 79-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Si-cong Tian

Time: 15:15-16:45 | Online Room 1, ID: 863 2270 8565

15:15-15:45

Invited speaker Kumar Appaiah, Indian Institute of Technology Bombay

15:45-16:00 # ID 4420

Performance Enhancement of MRR Underwater Optical Communications using LQAM-MPPM

Authors: Amr Abdelkader, Ahmed Allam, Kazutoshi Kato and Hossam Shalaby

Abstract: The performance of modulating retro-reflector underwater optical wireless communication systems with the spectra-power-efficient L-ary quadrature amplitude modulation multi-pulse pulse-position modulation (LQAM-MPPM) technique is investigated. Our results reveal that the LQAM-MPPM technique outperforms conventional ones.

16:00-16:15 # ID 2721

Low-Complexity Chromatic Dispersion Estimation for Faster than Nyquist Coherent Optical Systems

Authors: Yu Jiang, Tao Yang, Jialin You, Xue Chen and Yongben Wang

Abstract: A low-complexity chromatic dispersion (CD) estimation (CDE) scheme is proposed for Faster than Nyquist Wavelength Division Multiplexing (FTN-WDM) coherent optical transmission systems. The computational complexity (CC) is reduced by about 97.3%.

16:15-16:30 # ID 5723

A Scalable Matrix for Low-Penalty Equalization in Space-Division Multiplexing Transmission

Authors: Mingqi Wu and Kohei Hosokawa

Abstract: An Hadamard matrix based equalization method is proposed to mitigate performance difference in uncoupled multi-core fiber. Scalability and minimum penalty are confirmed theoretically. Numerical evaluation of 4-core example shows up-to-0.4dB higher Q-factor than prior work.

16:30-16:45 ID 8757

Implementation of Noise-Resistant Crowd Equalisation in Optical Communication Systems with Machine Learning DSP

Authors: Karina Nurlybayeva, Diego Argüello Ron, Morteza Kamalian-Kopae, Elena Turitsyna and Sergei Turitsyn

Abstract: We propose a solution to the noise accumulation in the physical implementation of neural networks used in optical communication systems, which includes breaking down large equalisers into smaller ones forming "crowds" using these elementary networks.

Session 80-T5: Microwave Photonics and Optical Signal Processing

President: Qunbi Zhuge, Shanghai Jiao Tong University

Time: 15:15-16:45 | Online Room 2, ID: 836 5238 9479

15:15-15:45

Invited Speaker Pu Li, Taiyuan University of Technology and Guangdong University of Technology

Wideband and Frequency-Tunable Photonic Microwave Generator: A Monolithically Integrated Two-Section Laser Diode

Abstract: We propose and demonstrate a two-section laser with a mutually coupled structure for photonic microwave generation. By adjusting bias currents, the laser can exhibit period-one oscillation with a tunable range from 12.45 to 80.30 GHz.

15:45-16:00 # ID 8009

Improving Noise Resilience in End-To-End Deep Learning Optical Fiber Transmission Links

Authors: Lorenzo De Marinis, Ioannis Roumpos, George Mourgias-Alexandris, Manos Kirtas, Nikolaos Passalis, Anastasios Tefas, Giampiero Contestabile, Konstantinos Vyrsoinos, Nikos Pleros and Miltos Moralis-Pegios

Abstract: We demonstrate the enhanced performance of End-to-End deep learning in optical links when using a Photonic sigmoid activation function. Experimental results at 48Gb/s reveal BER values below the FEC-Threshold up to 3.5x higher transmission distances

16:00-16:15 # ID 331

A Photonic in-Memory Analog Matrix-Vector-Multiplier Based on Passive Microring Resonator and Photonic Nonvolatile Memory

Authors: Niujie Zhou, Pengxing Guo, Jiahao Zhou, Weigang Hou and Lei Guo

Abstract: This paper proposes a low power consumption photonic matrix-vector multiplier based on MR and Ge₂Sb₂Te₅. The simulation result shows that, with acceptable accuracy, the computational efficiency of our proposed structure can reach 1.2×10^{12} MACs/s/mm².

16:15-16:30 # ID 8019

Real-Time Photonics-Aided MMW Mobile Communication Based on Integrated 256-Element Phased Array Antenna

Authors: Yuancheng Cai, Sheng Liang, Mingzheng Lei, Jiao Zhang, Bingchang Hua, Liang Tian, Yucong Zou, Jianjun Yu and Min Zhu

Abstract: We propose and realize the bi-directional self-steering beamforming of 256-element phased array antennas based on automatic beam tracking technique, the real-time photonics-aided 28 GHz MMW mobile communication over 1.5 m wireless distance within $\pm 25^\circ$ range is achieved.

16:30-16:45 # ID 7549

High Resolution Parallel Coherent Laser Ranging Using an EO Frequency Comb

Authors: Bibo He, Chenbo Zhang, Rongwei Liu, Peng Lei, Zhangyuan Chen and Xiaopeng Xie

Abstract: We perform a 31-channel FMCW lidar with a 9.7 GHz sweep frequency bandwidth and achieve a high resolution of 1.54 cm. This approach allows for massively accurate ranging for fast three-dimensional imaging.

Session 81-T4: Materials, Devices and Optoelectronics Integration

President: Yanjun Liu, Southern University of Science and Technology

Time: 15:15-16:45 | Online Room 3, ID: 842 7075 7440

15:15-15:45

Invited Speaker Jingshu Guo, Zhejiang University

Silicon Integrated 2D-material Photodetectors: From Near-Infrared To Mid-Infrared

15:45-16:00 # ID 7815

Two Modes Unscrambling using a Coherent Micro-ring Resonator Network

Authors: Dan Yi and Hon Ki Tsang

Abstract: We propose and demonstrate the use of a micro-ring resonator (MRR) based coherent network for unitary matrix operations. We demonstrated the MRR-based coherent network for polarization mode switching and mode unscrambling.

16:00-16:15 # ID 8036

Broadband and Polarization-insensitive Cyclic Polymer Waveguide Three-mode Converter Based on Tapered Directional Couplers

Authors: Yongchen Wang, Zhe Yuan, Mengfan Cheng, Qi Yang, Deming Liu and Lei Deng

Abstract: A novel cyclic mode converter (CMC) based on polymer material is proposed. The simulation results show that the conversion loss and crosstalk are lower than 0.7dB and -20.47dB in the C+L band, respectively.

16:15-16:30 # ID 2692

High-efficiency Beam Splitters Based on Metasurfaces Integrated With Half- And Quarter-Wave Plates

Authors: Yuhang Sun and Yumin Liu

Abstract: The metasurface-based broadband beam splitters integrating half-wave and quarter-wave plates are designed and verified, which can effectively split vertically incident light into two reflected beams with a well-defined linear polarization state.

16:30-16:45 # ID 2701

Silicon Integrated Continuously Tunable Dispersion Compensator Based on Cascaded Micro-Ring Resonators

Authors: Yuanbin Liu, Liangjun Lu, Ziheng Ni, Jiaqi Chen, Jianping Chen and Linjie Zhou

Abstract: We demonstrate a continuously tunable optical dispersion compensator based on cascaded micro-ring resonators. The dispersion ripple is $< \pm 24$ ps/nm in a 25-GHz bandwidth. A 25 Gb/s OOK signal is transmitted over a 40-km-long SMF.

Session 82-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Kumar Appiah, Indian Institute of Technology Bombay

Time: 17:00-18:30 | Online Room 1, ID: 863 2270 8565

17:00-17:30

Invited speaker Hoon Kim, Korea Advanced Institute of Science and Technology
Beam Steering and Divergence Control Using Variable Focus Liquid Lenses for Free-Space Optical Communication Systems

Abstract: We present our recent research progress on the beam steering and adaptive divergence control technique implemented by using variable focus lenses for free-space optical communications.

17:30-17:45 # ID 1757

Joint FFE and Error-based-FFE algorithm for 100 Gb/s Bandwidth-Limited IMDD Optical System

Authors: Di Zhang, Shu Wang, Pengxiang He, Minming Zhang and Deming Liu

Abstract: A joint feedforward equalizer and an error-based feedforward equalizer can eliminate the serious inter-symbol interference and high-frequency colored noise for PAM4-based IMDD systems is proposed. This technique has both low computational complexity and excellent performance.

17:45-18:00 # ID 1499

Deep Learning Based Post-Equalization for Multi-Wavelength Visible Light Communication

Authors: Mei Wang, Chihyung Yang, Qifan Wang, Liqiang Wang, Min Zhang and Peiyu Jia

Abstract: This paper proposes a scheme of deep learning (DL) based post-equalization for multi-wavelength visible light communication. The effects of three algorithms in different channels are compared and the green light channel based on gated recurrent unit (GRU) fits best.

18:15-18:30 # ID 3128

CAZAC Precoding-enabled OFDM with Multiple Mode Index Modulation for VLC

Authors: Kunping Luo, Hong Wen, Qinghui Chen, Jie Ma, Ming Chen and Luoxiang Chen

Abstract: Constant amplitude zero autocorrelation precoding-enabled orthogonal frequency division multiplexing with multiple mode index modulation (CAZAC-OFDM-MMIM) is proposed and demonstrated in visible light communication. Results show that CAZAC-OFDM-MMIM outperforms conventional OFDM-MMIM on PAPR and BER performance.

Session 83-T1: Optical Fibers and Fiber-based Devices

President: Fanchao Meng, Jilin University

Time: 17:00-18:30 | Online Room 2, ID: 836 5238 9479

17:00-17:30

Invited Speaker Kenneth Grattan, City University of London

Optical Fiber Sensors - A Key Tool for Sustainability Engineering

Abstract: This talk will review the essential background to and history of optical fibre sensors and then look at how a range of optical fibre-based techniques can be applied to problems such as those highlighted and offer alternative, and better solutions to those from current technologies be they electronic, hydraulic, electrochemical, and analogue or digital – revealing solutions which have the potential readily to be adopted by industry. The work will review a number of ‘case studies’, where working in collaboration with industry and researchers across the world, new and practical solutions to key problems have been found and implemented in-the-field, not just as laboratory demonstrations."

17:30-18:00

Invited Speaker Fufei Pang, Shanghai University

OAM Fibers and Sensing

Abstract: In this talk, we will briefly review advances of the OAM fibers first, and then focus on the optical fiber sensing based on OAM modes. Some results will be demonstrated based on OAM modes including electric current sensing, strain sensing and so on.

18:00-18:30

Invited Speaker Dora Juan Juan Hu, Institute for Infocomm Research

Photonic Technologies for Achieving an Intelligent and Sustainable Built Environment

Abstract: In this talk, I would like to present an overview of our photonic technologies and solutions for improved buildings and infrastructure, as well as more productive and efficient facility management.

Session 84-T3: Networks Architectures, Management and Applications

President: Gangxiang Shen, Soochow University

Time: 17:00-18:30 | Online Room 3, ID: 842 7075 7440

17:00-17:30

Invited Speaker Cristina Rottondi, Politecnico di Torino, Dept. of Electronics and Telecommunications

On the Application of Explainable Artificial Intelligence to Lightpath QoT Estimation

Abstract: In this talk, we focus on the application of XAI to lightpath QoT estimation and exploit Shapley Additive Explanations (SHAP) as a XAI framework. We model the problem as a supervised binary classification task and demonstrate how to apply SHAP to extract insights about the behavior of the classification model and to inspect misclassifications."

17:30-18:00

Invited Speaker Admela Jukan, TU Braunschweig

Future Optical Control Plane: Smarter, Faster and Pervasive

18:00-18:30

Invited Speaker Tarik Taleb, University of Oulu

Towards 6G Deterministic Optical Networking

Session 85-T1: Optical Fibers and Fiber-based Devices

Presider: Deepak Jain, Indian Institute of Technology Bombay

Time: 9:00-10:15 | Online Room 1, ID: 863 2270 8565

09:00-09:30

Invited Speaker Anirban Dhar, CSIR-Central Glass & Ceramic Research Institute

Specialty optical Fiber for High Power Laser Application

Abstract: The present talk will highlight some of the potential solutions in terms of waveguide designing and first-hand results to overcome the existing challenges towards further power scaling.

09:30-10:00

Invited Speaker Kenneth Kin-Yip Wong, The University of Hong Kong

Shortwave Infrared Laser (SWIRL) for Versatile Optical Imaging Applications

Abstract: This talk will present our recent progress for shortwave infrared wavelength (1.7 μm to 2 μm) laser sources for versatile optical imaging applications in multi-time scale.

10:00-10:15 # ID 3464

Torsion Sensor Based on In-line Mach-Zehnder Interferometer Via Femtosecond Laser Inscription

Authors: Tianhao Wu and Zhifang Wu

Abstract: An in-line Mach-Zehnder interferometer based on an S-shaped waveguide beside the core of a single-mode fiber is demonstrated. It shows good performance in torsion sensing with the neglectable crosstalk of axial strain and temperature.

Session 86-T2: Optical Transmission Systems, Sub-systems and Technologies

Presider: Xuwei Xue

Time: 9:00-10:30 | Online Room 2, ID: 836 5238 9479

09:00-09:15 # ID 6579

Analysis of Mutual Information in Symbol Retention Masked Coherent M-QAM Signal Using Joint-multiple Cipher Key

Authors: Keiji Shimada and Takahiro Kodama

Abstract: A symbol retention masking is applied to M-QAM (M=4 and 16) signal for the first time. A generalized mutual information evaluation model is constructed and the amount of information restored by an eavesdropper is analyzed.

09:15-09:30 # ID 5625

Review of All-Optical Modulation Format Conversion for 8QAM Signal Based on Nonlinear Effects

Authors: Li Qiankun and Lin Hai

Abstract: This paper reviews the recent all-optical modulation format conversion (MFC) schemes for the 8-ary quadrature amplitude modulation (8QAM) signal based on nonlinear effects in HNLF, SOA and PPLN.

09:30-09:45 # ID 6690

Minimum-Transitions Maximum Likelihood Sequence Estimation Enabled 130Gbit/s PAM4 IM-DD System

Authors: Weihao Ni, Wei Wang, Simiao Qin, Zhiwei Chen, Zhaohui Li, Qi Sui and Fan Li

Abstract: A simplified MLSE based on cascading threshold detectors is proposed in a bandwidth-limited IM/DD system. Experimental results show that total computational complexity can be reduced by 81.25% with negligible ROP penalty at the HD-FEC threshold.

09:45-10:00 # ID 9422

Ultra-long Single Carrier Unrepeated Transmission of 400 Gb/s over 542 km, 600Gb/s over 489 km, and 800 Gb/s over 437 km

Authors: Hans Bissessur, Alexis Busson, Daryna Kravchenko, Farana Hedaraly and Juan Esparza

Abstract: We demonstrate record unrepeated transmission of 400Gb/s QPSK over 542.4km, 600Gb/s PCS-16QAM over 489.4km, and 800Gb/s 16-QAM over 437.7km, with low-loss high effective-area fiber, co-directional Raman amplification and a receiver ROPA with third order pumping

10:00-10:15 # ID 367

Polarimetric Direct Detection for Spatial Superchannels

Authors: Jaroslaw Kwapisz, Ioannis Roudas, Eric Fink

Abstract: Polarimetric direct-detection receivers retrieve amplitude and phase information sent jointly over a spatial superchannel. Exploiting the interdependence of Stokes parameters, we propose a receiver design where the complexity scales linearly with the degrees of freedom.

Session 87-T8: Micro-, Nano-, and Quantum Science and Applications

Presider: Xifeng Ren, University of science and technology of China

Time: 9:00-10:30 | **Online Room 3, ID: 842 7075 7440**

09:00-09:30

Invited Speaker **Kejie Fang, University of Illinois at Urbana-Champaign**

Towards Single-photon Nonlinearity in Photonic Integrated Circuits

Abstract: Realizing single-photon nonlinearity without quantum emitters is a holy grail in quantum optics and will have a profound impact for quantum information processing. Based on an integrated photonic platform with a record-high nonlinearity, I will talk about our recent work towards photon-photon interactions without quantum emitters.

09:30-10:00

Invited Speaker **Dawn Tan, Singapore university of Technology and Design**

Nonlinear Integrated Optics in Ultra-Silicon-Rich Nitride Devices

Abstract: We report recent progress on ultra-silicon-rich nitride based nonlinear photonic devices. High spectro-temporal compression and Bragg soliton phenomena including optical parametric Bragg amplification and low power picosecond pulse generation are successfully demonstrated.

10:00-10:15 # ID 6829

Design of Electrochromic Asymmetric Multilayered Structure for Smart Windows

Authors: Xueyu Wang and Yumin Liu

Abstract: We designed a multilayer thin-film structure of an electrochromic smart window that can effectively regulate the transmission and absorption by rotating the sample and adjusting the bias voltage.

10:15-10:30 # ID 1621

Stimulated Scattering in Supermode Microcavities: Single- or Dual-Mode Lasing?

Authors: Pei-Ji Zhang, Qing-Xin Ji, Qi-Tao Cao, Heming Wang, Wenjing Liu, Qihuang Gong and Yun-Feng Xiao

Abstract: We investigate the supermode Raman laser in a whispering-gallery microcavity and experimentally demonstrate its single-mode lasing behavior, and recognize the beating signal as transient interference during the switching process between the two supermode lasers.

Session 88-T5: Microwave Photonics and Optical Signal Processing
President: Dongmei Huang, The Hong Kong Polytechnic University
Time: 9:00-10:30 | Online Room 4, ID: 846 1762 4368

09:00-09:30

Invited Speaker Xiaoke Yi, University of Sydney, Australia

Advancement of Integrated Microwave Photonic Signal Processing

Abstract: Recent advances in integrated microwave photonics are presented with a focus on microwave photonic sensing, photonic-assisted frequency measurement and tunable microwave photonic phase shifters with an overview of some emerging integrated microwave photonic technologies.

09:30-10:00

Invited Speaker Mable Fok, University of Georgia

Biomimicry and Photonics

Abstract: Biomimicry offers novel and effective solution to critical challenges in human society. Biomimicry in microwave photonics and fiber-embedded soft robotics that offer security in our communication systems and provide safe robot-to-human interaction will be introduced.

10:00-10:30

Invited Speaker Guiling Wu, Shanghai Jiao Tong University

Session 89-T3: Networks Architectures, Management and Applications
President: Liang Dou, Alibaba Cloud.
Time: 9:00-10:30 | Online Room 5, ID: 836 8564 2371

09:00-09:30

Invited Speaker Jesse Simsarian, Nokia Bell Labs

Data Fusion and Spatial Scaling for Optical Networks

Abstract: Future networks will be increasingly dynamic and adaptable to traffic demands and environmental conditions, as well as massively scalable in capacity. By combining environmental sensing and data processing from multiple sources, i.e., data fusion, on a steam processing platform with machine learning capabilities, we show that optical network reliability can be improved. Furthermore, we discuss strategies for achieving capacity scaling with spatial multiplexing.

09:30-10:00

Invited Speaker Maite Brandt-Pearce, University of Virginia

Cross-Layer Design and Optimization of Optical Networks Using Heuristic and Machine Learning Algorithms

Abstract: Q-learning-based and heuristic approaches are proposed to solve the routing, modulation, and spectrum assignment (RMSA) problem for elastic optical networks. Furthermore, an artificial neural network-based Quality-of-Transmission estimator is presented to help improve the RMSA performance.

10:00-10:15 # ID 5110

Network and Computing-Aware Edge Datacenter Placement and Content Placement in Edge Compute First Networking

Authors: Zhen Liu, Jiawei Zhang and Zhiqun Gu

Abstract: In edge compute first networking (CFN), edge datacenter and content placement are coupling issues. An edge datacenter placement algorithm based on Kuhn-Munkres and a content placement algorithm based on K-Means are proposed in CFN.

10:15-10:30 # ID 7343

Optical Path Design Method for Reducing Maximum Spectrum Slot Number by Selecting Alternative Routes and Using GNPY

Authors: Hanami Yokoi, Kohjun Koshiji, Tatsuya Matsukawa, Takashi Miyamura and Eiji Oki

Abstract: We propose an optical path design method in consideration of transmission quality and transmission parameters by GNPY. We can obtain more realistic and highly efficient optical path design in consideration of requirements in operational networks.

10:30-10:45 # ID 2599

Deep Reinforcement Learning-Based Satellite-Ground Links Scheduling for Mega Satellite Constellations

Authors: Bo Yang, Chao Xi, Gong Li, Peizhang Liu, and Ruijie Zhu

Abstract: We propose a satellite-ground links scheduling algorithm (DRSGLS) based on deep reinforcement learning. Simulation results show that the DRSGLS algorithm outperforms the other two algorithms in average resource utilization, average switch times, and scheduling runtime.

Session 90-T4: Materials, Devices and Optoelectronics Integration

President: Xuhan Guo, Shanghai Jiao Tong University

Time: 9:00-10:30 | Online Room 6, ID: 827 1560 8818

09:00-09:30

Invited Speaker Hugo Enrique Hernandez-Figueroa

Enabling Photonic Integrated Nonreciprocal Devices using Magnetless Optical Materials

Abstract: The typical operating principle of nonreciprocal optical devices is related to the breaking of the time-reversal symmetry due to the application of an external DC magnetic field responsible for keeping the magneto-optical material that constitutes such devices magnetically saturated.

09:30-10:00

Invited Speaker Pavel Cheben, National Research Council

Metamaterial Integrated Photonics

10:00-10:15 # ID 5852

Sub-terahertz Emission in Multi-Section Quantum Dot Ring Lasers: A Delayed Differential Equations Approach

Authors: Emanuele Groppo and Paolo Bardella

Abstract: We study the generation of sub-terahertz pulses in multi-section quantum-dot ring lasers, using a multi-section delayed-differential-equation model including an arbitrary number of electrodes, providing insights on the onset of high-frequency harmonic mode-locking.

10:15-10:30 # ID 7492

The Development and Performance of InGaP/GaAs Single-Quantum-Well Heterojunction Phototransistors

Authors: Sheng-Wen Cheng, Ying-Tzu Chen, Mukul Kumar and Chao-Hsin Wu

Abstract: This study investigates the current gain and photocurrent with the different base region sizes of InGaP/GaAs Single-Quantum-Well heterojunction phototransistors at ambient temperature, which is beneficial for application in optoelectronic integrated circuits.

Session 91-T5: Microwave Photonics and Optical Signal Processing

Presider: Min Xue, Nanjing University of Aeronautics and Astronautics

Time: 9:00-10:30 | Online Room 7, ID: 881 1220 7791

09:00-09:30

Invited Speaker Lin Chang, Peking University

The New Generation of Integrated Light Source for Microwave Photonics

09:30-10:00

Invited Speaker Pei Zhou, Soochow University

Wideband Microwave Signal Generation Based on Period-One Nonlinear Dynamics of Semiconductor Lasers

Abstract: In this talk, we concentrate on photonic microwave generation using period-one (P1) laser dynamics. To begin with, wideband microwave signal generation is introduced by exploring the controlled P1 dynamics of semiconductor lasers. Then, photonic microwave stabilization methods to improve the spectral purity and phase coherence of the generated wideband signal are reviewed with an emphasis on the delayed feedback stabilization approach. After that, bandwidth enhancement of the generated microwave signal is demonstrated by synchronously manipulating both the injection strength and the detuning frequency of an optically injected semiconductor laser.

10:00-10:15 # ID 1736

Study of the Rydberg Atom Cell Nonlinear Distortion in the Demodulation Amplitude Modulation Microwave

Authors: Ruijian Rao, Jinyun Wu and He Xuan

Abstract: The Rydberg atom cell nonlinear distortion in demodulating amplitude modulation microwave is analyzed. Simulation suggests that total harmonic distortion can be efficiently depressed by adjusting the coupling laser and the local microwave Rabi frequencies.

10:15-10:30 # ID 1812

Silicon Integrated Microwave Photonic Mixer

Authors: Fengyuan Liu, Liangzun Tang, Zhenzhou Tang, Dries Van Thourhout and Shilong Pan

Abstract: By integrating cascaded silicon microring resonator modulators and a silicon-germanium photodetector on a single chip, an ultra-compact integrated microwave photonic mixer is proposed. Experimental results show that the conversion efficiency is high than -12 dB.

Session 92-T7: Biophotonics and Optical Sensors

Presider: Aaron Ho-Pui Ho, The Chinese University of Hong Kong

Time: 9:00-10:30 | Online Room 8, ID: 831 1366 0011

09:00-09:30

Invited Speaker Aaron Ho-Pui Ho, The Chinese University of Hong Kong

In Vivo Detection of Circulating Tumour Cells using a Plasmonic Nano-islands Coated Optical Fibre

Abstract: It has been reported that early diagnosis of cancers can be achieved by monitoring the trace concentration of circulating tumour cells (CTCs) or DNAs. However typical concentration levels of CTCs are in the order of less than 10 cells per mL. We have been exploring the possibility of performing pre-concentration of CTCs by inserting a fibre in a blood vessel through a infusion catheter. With blood flowing over the surface of the sensing fibre continuously, CTCs will be immobilised to the sensing sites with population increases with time. The presence of CTCs will then be reported through monitoring the surface plasmon spectral absorption dip in the fibre. In this presentation, we shall report an overview and latest progress of this work.

09:30-09:45 # ID 6298

Microsphere-enhanced Raman Spectroscopy Applied to Microfluidic Detection Technology for Long Working Distance and Stable Confocal Detection

Authors: Yifan Zhu, Song Zhou, Haonan Ding, Xiaoxian Liu and Guanghui Wang

Abstract: We have proposed an enhanced Raman detection device based on microfluidic chip with arrays of microsphere, in which method the signal will increase by 6 times at different distances and angles.

9:45-10:00 # ID 1628

An Efficient Ternary Search for Dynamic Brillouin Frequency Shift in BOTDA

Authors: Di Qi, Xun Guan and Chun-Kit Chan

Abstract: We propose an efficient ternary searching scheme for dynamic Brillouin frequency shift in BOTDA. It establishes a feedback loop between the chosen frequency and the measured Brillouin gain. Experimental verification showed over 80% frequency reduction.

10:00-10:15 # ID 2013

Fluorescence Detection of Hg²⁺ based on Metal-lined Hollow Core Fiber

Authors: Haonan Ding, Yifan Zhu, Xiaoxian Liu and Guanghui Wang

Abstract: We have designed a structure for the sample trace detection on metal-lined hollow core fiber. The fluorescence reaction of rhodamine derivatives with Hg²⁺ as the detection substance was used to detect the concentration of Hg²⁺. Abstract: The Rydberg atom cell nonlinear distortion in demodulating amplitude modulation microwave is analyzed. Simulation suggests that total harmonic distortion can be efficiently depressed by adjusting the coupling laser and the local microwave Rabi frequencies.

Session 93-T1: Optical Fibers and Fiber-based Devices

President: Anirban Dhar, CSIR-Central Glass & Ceramic Research Institute

Time: 10:45-12:15 | Online Room 1, ID: 863 2270 8565

10:45-11:15

Invited Speaker Deepak Jain, Indian Institute of Technology Bombay

Next Generation Specialty Optical Fibers For Communication And Light Sources

Abstract: In this talk, I will discuss novel specialty optical fibers, which have emerged in the last decade, including a few of my inventions.

11:15-11:45

Invited Speaker Ju Han Lee, University of Seoul

Saturable Absorbers for Ultrafast Fiber Laser Mode-Locking

Abstract: Our recent investigation results on saturable absorption properties of nanomaterials for ultrafast fiber laser mode-locking are reviewed. The impacts of modulation depth and recovery time of saturable absorbers on the mode-locking performance are discussed.

11:45-12:00 # ID 4276

Real-time 4-mode MDM Transmission using Triple-ring-core FMF and All-fiber Mode Multiplexers

Authors: Jian Cui, Shuailuo Huang, Yuyang Gao, Yongqi He, Zhangyuan Chen, Lei Shen, Lei Zhang, Changkun Yan, Liubo Yang, Ruichun Wang, Chunxu Zhao, Yu Tang, Shikui Shen and Juhao Li

Abstract: Enabled by newly designed weakly-coupled triple-ring-core FMFs and all-fiber mode multiplexers, a 4-mode real-time MDM transmission is experimentally demonstrated using commercial 400G WDM OTN transceivers.

12:00-12:15 # ID 7339

Design of Three Mode Groups EDFA for Modal Gain Equalization and Wavelength Gain Flatness in the C+L Band

Authors: Hangming Fan, Ziheng Zhang, Lei Deng, Mengfan Cheng, Qi Yang and Deming Liu

Abstract: A novel three-mode Erbium-doped fiber amplifier for modal-gain equalization and wavelength-gain flatness in C+L band is proposed. The differential modal-gain is less than 0.7dB and the wavelength-gain difference is less than 1.1dB.

Session 94-T6: LEDs, Photovoltaics, and Optoelectronics in Energy
President: Aung Ko Ko Kyaw, Southern University of Science and Technology
Time: 10:45-12:15 | Online Room 2, ID: 836 5238 9479

10:45-11:15

Invited Speaker Jonathan Halpert, The Hong Kong University of Science and Technology **Perovskites to Self-Trapping Excitonic Materials: Hybrid Organic-Inorganic Crystals for RGB LEDs**

Abstract: Lead-based perovskites have advanced tremendously over the last decade, producing solar cells with PCE > 24% and LEDs with EQE over 20 % for both red and green. However, the toxicity and instability of lead based perovskites will likely limit their use in many instances. Here we report success at synthesizing lead-free perovskites and perovskite "inspired" materials, and using them to replace lead perovskites in some applications, including LEDs, solar cells and solar batteries. We show that although blue and sky-blue perovskite LEDs can reach >7%, direct charge injection LEDs have short lifetimes that need to be improved.

11:15-11:45

Invited Speaker Abhishek Srivastava, Hong Kong University of Science and Technology **Quantum Rods LEDs: A way to achieve LED Efficacy of >200 lm/W**

11:45-11:15

Invited Speaker Yuxi Tian, Nanjing University **Quenching Defects in Perovskite Materials Revealed by Microscopy**

Abstract: In this talk I will present our understanding on quenching defects in perovskite materials by investigating their photoluminescence intensity, spectra, lifetime and variation dependence on electric field or atmospheres together with theoretical calculation.

Session 95-T8: Micro-, Nano-, and Quantum Science and Applications
President: Ren-Min Ma (Peking University), Lan-Tian Feng (University of Science and Technology of China)
Time: 10:45-12:15 | Online Room 3, ID: 842 7075 7440

10:45-11:15

Invited Speaker Xiulai Xu, Peking University **Spin-photon Interfaces on Chip**

Abstract: We demonstrated deterministic circularly polarized chiral routing and beamsplitting using waveguides coupled with quantum dots with a high chiral contrast, which shows a great potential to implement spin-photon interfaces on chip.

11:15-11:45

Invited Speaker Lan-Tian Feng, University of Science and Technology of China

Entanglement Generation Using Cryogenic Integrated Four-Wave Mixing

Abstract: Spontaneous four-wave mixing effect in one silicon waveguide is investigated with cryogenic operation condition (4 K) and employed to generate entangled photon pairs, which advances the cryogenic nonlinear photonics and scalable integrated quantum information processing.

11:45-12:00 # ID 8132

Bell State Measurement between Two Spectrally Multiplexed Elementary Quantum Links

Authors: Ruiming Zhang, Chen-Zhi Yuan, Yun-Ru Fan, You Wang, Hai-Zhi Song, Guang-Wei Deng, Guang-Can Guo, Qiang Zhou, Hao Li and Li-Xing You

Abstract: We demonstrate a Bell state measurement (BSM) between two spectrally multiplexed elementary quantum links by using two time-bin photonics qubit generators with different spectral channels. A projection fidelity of >95% is achieved by erasing the spectral distinguishability between adjacent nodes of the two links with single-photon frequency shifting while the separation between spectral channels is carefully designed according to parameters of time-bin qubits.

12:00-12:15 # ID 9769

Efficient Second Harmonic Generation in Semi-Nonlinear Etchless Lithium Niobate Waveguide

Authors: Dunzhao Wei

Abstract: We have proposed and experimentally demonstrated on-chip semi-nonlinear photonic waveguides on etchless silicon nitride/lithium niobate thin films based on the theory of bound states in the continuum for efficient second-harmonic generation.

12:15-12:30 # ID 956

Smith-Purcell Radiation from Highly Mobile Carriers in 2D Quantum Materials

Authors: Shengyuan Lu, Xiao Xiong, Ayan Nussupbekov, Wen Jun Ding, Ching Eng Png, Zi-En Ooi, Jing Hua Teng, Liang Jie Wong, Yi Dong Chong and Lin Wu

Abstract: We propose using mobile charge carriers within 2D materials for generating terahertz (THz) Smith-Purcell radiation and analyze an exemplary device consisting of doped monolayer graphene atop a silicon grating, showing the possibility for compact, tunable, and low-cost THz sources.

Session 96-Special Session 3: Terahertz Science and Technology

Presider: Liyuan Liu

Time: 10:45-12:15 | Online Room 4, ID: 846 1762 4368

10:45-11:15

Invited Speaker Yuye Wang, Tianjin University

Study of Blast-induced Traumatic Brain Injury in Rat model using Terahertz-Raman spectroscopy Technology

Abstract: The THz spectra of serum and cerebrospinal fluid (CSF) and Raman spectra of hippocampus tissue after mild and moderate bTBI at different times have been studied based on Blast-induced Traumatic brain injury (bTBI) in rat models.

11:15-11:30 # ID 6367

Topological Valley Photonic Crystals with Photonic Bandgap Tuned with Dual-parameter method at Terahertz Frequencies

Authors: Jiajun Ma, Chunmei Ouyang and Liu Yi

Abstract: We present the THz valley topological photonic crystals with the broad hybrid edge states and photonic bandgap that the inversion symmetry is broken by dual parameter tuning, which are promising in designing THz functional devices.

11:30-11:45 # ID 272

Anomalous Wave Propagation in Magnetic Hyperbolic Metasurfaces

Authors: Yi Liu and Chunmei Ouyang

Abstract: We propose and numerically investigate an integrated magnetic topological transition metasurface based on the double-split ring resonator arrays, which enables anomalous wave transmissions at the transition interfaces.

11:45-12:00 # ID 4569

Broadband Beam Steering Based on Programmable VO₂ Metasurface at Terahertz Frequencies

Authors: Weiguang Wang, Erpeng Lv, Yanzhao Hou and Daquan Yang

Abstract: We demonstrate broadband beam steering based on a programmable THz metasurface integrated VO₂. The deflection angles can be manipulated dynamically in 0.218-0.232 THz frequencies. By changing coding sequences, the maximum deflection angle is 53°.

12:00-12:15 # ID 8316

Spectrally Efficient Direct-Detection THz Communication System Enabled by Twin Single-Sideband Modulation and Polarization Division Multiplexing Techniques

Authors: Mengfan Sun, Yuancheng Cai, Bingchang Hua, Jiao Zhang, Mingzheng Lei and Min Zhu

Abstract: We propose and demonstrate a spectrally efficient direct-detection THz communication system based on photonics. The direct detection of PDM-twin-SSB signals without active polarization control can be realized by adding the optical carrier at the optical receiving side.

Session 97-T2: Optical Transmission Systems, Sub-systems and Technologies
President: Longqing Cong, Southern University of Science and Technology
Time: 10:45-12:30 | Room 13, ID: 836 8564 2371

10:45-11:00 # ID 7829

DNN Based Transfer Learning Scheme for DML-IMDD Transmission Systems Equalization

Authors: Yutong Sun, Zexuan Yang, Meihua Bi, Miao Hu, Zheyi Jin and Weisheng Hu

Abstract: A simplified deep neural network (DNN)-based equalizer with transfer learning scheme was presented. Its outstanding equalization performance with less training epochs and data was manifested in an 80Gb/s transmission system with 10G optics experiment setup.

11:00-11:15 # ID 1655

Advanced Underwater Wireless Optical Communication System Assisted by Deep Echo State Network

Authors: Kexin Wang, Yihong Gao, Mauro Dragone, Yvan Petillot and Xu Wang

Abstract: We applied the DeepESN in a high-speed UWOC system to assist its signal processing for both PAM and QAM-OFDM signals over 40.5 metres error-free underwater transmission with 100-167 Mbps data-rate.

11:15-11:30 # ID 3908

Channel Response-dependent Noise Shaping Technique for High-speed Pre-equalized DMT Signal with 3-bit DAC

Authors: Mingzhu Yin, Wei Wang, Dongdong Zou, Fan Li and Dongxiang Luo

Abstract: A channel response-dependent noise shaping (CRDNS) technique is experimentally demonstrated for the pre-equalized 16 quadrature amplitude modulation discrete multitone (QAM-DMT) signal transmission with a 3-bit digital-to-analog converter (DAC) in this paper

11:30-11:45 # ID 7766

Modified Frequency-domain MIMO Processing in 80-km Few-mode Fiber Transmissions

Authors: Liuzhu Wang, Hui Yan, Zhilong Zheng, Yulin Xue, Jing Zhang, Shaohua Hu, Shuai Yuan, Wendou Zhang and Kun Qiu

Abstract: We propose a modified frequency-domain MIMO with cyclic prefix to combat the temporal spread for different modes and largely reduce the complexity of the equalization. After 80-km FMF transmission, the proposed MIMO has almost the same performance as conventional FDE with a proper CP length while the complexity is reduced by 7.4 times.

11:45-12:00 # ID 8726

Experimental Demonstration of Optical Eavesdropping Detection based on the Back Propagation Neural Network for Coherent Optical Communication Systems

Authors: Xiaoxue Gong, Mingqiang Zhou, Qihan Zhang, Jiahao Pang and Lei Guo

Abstract: We propose an optical eavesdropping detection scheme based on the back propagation neural network for 16QAM coherent optical communication systems. Experimental results demonstrate that the proposed scheme have detection accuracy more than 99%.

Session 98-T4: Materials, Devices and Optoelectronics Integration

Presider: Hugo Enrique Hernandez-Figueroa, Enabling Photonic Integrated Nonreciprocal Devices using Magnetless Optical Materials

Time: 10:45-12:15 | Online Room 6, ID: 827 1560 8818

10:45-11:15

Invited Speaker Yanping Li, Peking University

Broadband Thin Film Lithium Niobate Electro Optic Modulators

Abstract: UV lithography and wet etching are employed to fabricate LNOI modulator. The 3dB electro-optic bandwidth of the modulator exceeds 110GHz, the half-wave voltage-length product is 2.37Vcm and the extinction ratio is 23dB.

11:15-11:45

Invited Speaker Jianji Dong, Huazhong University of Science and Technology

Roadmap of Photonic and Eletronic Hybrid Digital Computing

Abstract: In this talk, I will introduction the history and timeline of photonic logic computing, and present some advices for future digital computing with photonic and electronic hybrid system.

11:45-12:00 # ID 4437

Optimizing Perfomance of Modified Uni-Travelling-Carrier Photodiodes with Severe Zinc Diffusion

Authors: Wanshu Xiong, Zhangwan Peng, Ruoyun Yao, Qianwen Guo, Chaodan Chi and Chen Ji

Abstract: The zinc diffusion effect is an essential factor in high-speed InP based Modified Uni-Travelling-Carrier photodiode (MUTC-PD) performance. We analyzed the energy band structure, electric field and electron distribution of the MUTC-PD structure with three zinc diffusion profiles. Electrical field-assisted electron transport inside the absorber region is demonstrated. Moreover, a small conduction band energy barrier in the transition layer due to zinc diffusion during growth leading to electrons heap up can dramatically degrade MUTC-PD high-frequency response. Finally, we shown that a proper revision bias and optimized structure could suppress the electron buildup in the transition layer and reduce the impact due to the zinc diffusion to achieve high-speed performance.

12:00:12:15 # ID 1455

An Optical Temporal Differentiator Based on Microring Resonator and Optical Nonvolatile Phase-Change Material

Authors: Sijing Yu, Pengxing Guo, Peng Zhao, Weigang Hou and Lei Guo

Abstract: This paper proposes a novel all-optical temporal differentiator based on nonvolatile phase-change material Ge₂Sb₂Te₅ and Microring Resonator. Simulations realize 0.42-1.86 order differentiation of Gaussian pulse. This structure can effectively reduce chip area and power consumption.

12:15-12:30 # ID 2552

Study of Zinc Diffusion Effect in High-Speed InP-Based Mach-Zehnder Modulators

Authors: Ruoyun Yao, Wanshu Xiong, Zhangwan Peng, Xiaojun Ying, Yiti Xiong and Chen Ji

Abstract: We quantitatively investigate the impact of Zinc diffusion on the modulation efficiency, absorption loss and 3-dB modulation bandwidth of high-speed InP-based Mach-Zehnder modulators with various waveguide structures by commercial simulation software.

Session 99-T8: Micro-, Nano-, and Quantum Science and Applications

President: Mengxin Ren, Nankai University

Time: 10:45-12:30 | Online Room 7, ID: 881 1220 7791

10:45-11:15

Invited Speaker Weibo Gao, Nanyang Technological University

11:15-11:45

Invited Speaker Satoshi Iwamoto

Topological Slow-Light Waveguide Based On Semiconductor Valley Photonic Crystal

Abstract: We designed and fabricated a valley photonic crystal waveguide using a bearded-type interface, which can host a slow-light valley kink state. Efficient guiding of slow light under the presence of sharp turns was experimentally demonstrated.

11:45-12:15

Invited Speaker Donguk Nam, Nanyang Technological University

Strain-engineered Optoelectronic Devices for Photonic-Integrated Circuits

Abstract: In this talk, we will discuss two recent experimental results from our research lab on strain-engineered nanostructures: direct bandgap Ge (Sn) for laser applications and Landau-quantized graphene under giant pseudo-magnetic fields.

12:30-12:45 # ID 9185

Multiple Toroidal Dipole Resonances in All-Dielectric Dimer Metasurfaces

Authors: Hongjie Fan and Yumin Liu

Abstract: We present an all-dielectric metasurface consisting of an array of crosses. By introducing the in-plane perturbation, our proposed metasurface supports sharp toroidal dipole resonances in the near-infrared range, which are governed by symmetry-protected BICs.

Session 100-T4: Materials, Devices and Optoelectronics Integration

President: Pavel Cheben

Time: 10:45-12:15 | Online Room 8, ID: 831 1366 0011

10:45-11:15

Invited Speaker Jinghua Teng, IMRE, A*STAR

2D Transition Metal Dichalcogenides for Infrared Photonics

Abstract: In this talk, I will give a brief overview of interlayer excitons in 2D van der Waals heterostructures and introduce our works in exploring interlayer excitons in WS₂/HfS₂ heterostructure for high responsivity room temperature mid-IR photodetection and the near-IR electrostatically tunable plasmonic response in 2D NbSe₂.

11:15-11:30 # ID 6419

Demonstration of a Silicon Photonic Mode Coupler Using Periodic Grating Structures

Authors: Manoranjan Minz, Soibam Aruna Chanu, Darpan Mishra and Ramesh Kumar Sonkar

Abstract: A grating-assisted mode coupler is experimentally demonstrated on the silicon-on-insulator platform. The mode coupling occurs at 1543 nm with a 3 dB bandwidth of ~5.5 nm and extinction ratio of ~20 dB

11:30-11:45 # ID 3222

2.2 km Ranging Based on Hybrid Integrated FMCW Laser

Authors: Liwei Tang, Liangbo Li and Minghua Chen

Abstract: This paper reports a long-distance LiDAR experiment based on our proposed hybrid integrated FMCW laser. It demonstrates a resolution of 0.67 m with SNR higher than 5 dB at 2.2 km measurement.

11:45-12:00 # ID 3048

Ultra-High Dynamic Extinction Ratio Electro-Optical Modulator with Coupled Microrings on SOI Platform

Authors: Cheng Zhuo, Chen Bigeng, Sun Chunlei, Wei Maoliang, Yu Shaoliang, Li Lan, Lin Hongtao and Rao Yunjiang

Abstract: A coupled microring PIN electro-optical modulator is demonstrated with dynamic extinction ratio up to 60 dB. The modulator would be promising in building compact and low-power distributed optical fiber sensing systems.

12:00-12:15 # ID 6944

One-Dimensional Grating Coupler on Thin Film Lithium Niobate for High-Efficiency and Polarization-Independent Coupling

Authors: Bin Chen and Liu Liu

Abstract: A one-dimensional grating coupler on x-cut lithium niobate for polarization independent coupling is proposed. By utilizing the metal-based grating and its plasmonic mode, the polarization dependent loss can be effectively reduced.

Session 101-T1: Optical Fibers and Fiber-based Devices

Presider: Huanhuan Liu, Southern University of Science and Technology

Time: 13:30-15:00 | Online Room 1, ID: 863 2270 8565

13:30-13:45 # ID 2563

Quadratically Suppressed Accumulation of Crosstalk Between Second Neighboring Cores of Multi-Core Fiber Measured by Commercial Single-Channel OTDR

Authors: Yuto Kobayashi, Ayumi Inoue, Takuji Nagashima and Tetsuya Hayashi

Abstract: We experimentally confirmed that crosstalk between diagonal cores in 4-core fiber with 2x2-layout are suppressed quadratically compared to the crosstalk between nearest neighboring cores, with the distributed crosstalk measurement using commercial single-channel OTDR.

13:45-14:00 # ID 965

Ultra-narrow Linewidth Single Longitudinal Mode Erbium-Doped Fiber Laser With Four-Ring Passive Subring Resonator

Authors: Yaru He, Zhengkang Wang and Yaojun Qiao

Abstract: We investigated a single longitudinal mode erbium-doped fiber laser based on a high-quality four-ring passive subring resonator. An ultra-narrow linewidth of 229.5 Hz and a high OSNR of 71 dB were achieved.

14:00-14:15 # ID 7227

Simulative Analysis of InP-based Dual Polarization IQ Mach-Zehnder Modulators

Authors: Rocco D'Ingillo, Giacomo Borraccini, Emanuele Virgillito, Vittorio Curri, Stefano Straullu, Rocco Siano and Michele Belmonte

Abstract: A realistic model of an Indium-Phosphide Dual Polarization IQ Mach-Zehnder modulator is introduced within a time-domain simulator. BER vs OSNR results are obtained under different operative conditions. The intrinsic modulator SNR is estimated.

14:15-14:30 # ID 9560

Detection and Simulation of Partial Discharge with Different Electrode Spacing based on Crystal Fluorescent Fiber

Authors: Yongkang Cheng, Taiqi Wang, Chao Xu, Luchuan Zheng, Qiang Guo and Gangding Peng

Abstract: A crystal fluorescent fiber is used for Partial Discharge (PD) detection with different electrode spacing. Based on simulation and experiments, the variation trend of electron density and sensing response are analyzed.

14:30-14:45 # ID 3063

25 Gb/s Two-Mode Transmission over 1-km Standard-Single Mode Fiber around 1060 nm with High Modal Bandwidth

Authors: Xin Chen, Jason Hurley, Jeffery Stone and Ming-Jun Li

Abstract: We report that a step-index standard single mode fiber as a two-mode fiber at 1060 nm can have high modal bandwidth. 25 Gb/s NRZ transmission over 1-km of the fiber around 1060 nm was demonstrated.

14:45-15:00 # ID 7935

Coupled Multi-core Fiber Design with Low Spatial Mode Dispersion for Long-haul Submarine Transmission

Authors: Michal Mlejnek, John D. Downie and Wei C. Jiang

Abstract: We consider coupled multi-core fiber designs for long-haul submarine transmission based on expected effective bend radius in a submarine cable with different core effective areas. Simulation results show that low spatial mode dispersion (SMD) $< 2.0 \text{ ps/km}^{1/2}$ can be achieved at 1550 nm.

Session 102-T2: Optical Transmission Systems, Sub-systems and Technologies
Prsident: William Shieh, The University of Melbourne
Time: 13:30-15:00 | Online Room 2, ID: 836 5238 9479

13:30-14:00

Invited speaker William Shieh, The University of Melbourne

On the Computational Complexity of Artificial Neural Networks for Short-reach Optical Communications

Abstract: Artificial Neural Networks (ANN) hold great promises in mitigating nonlinearity in short-reach networks. However, computational complexity (CC) may be an important stumbling block along the way. In this talk, we focus on the computational complexity analysis and reduction methods on various Artificial Neural Networks.

14:00-14:15 # ID 5362

Bandwidth-Efficient and Low-Complexity Mobile Fronthaul Transmissions Utilizing Phase Modulation and Direct Detection

Authors: Mingliang Deng, Lian Qing and Timera Mamadou

Abstract: By making use of MZI-based PM-to-IM conversion, PMDD is proposed to replace the traditional IMDD to not only omit the active transmitter bias but also improve the link gain of the MFH transmission.

14:15-14:30 # ID 6898

Real-time 100G Heterodyne Coherent PON with 36-dB Power Budget based on Hybrid Optoelectronic Down-conversion

Authors: Yingxin Wei, Jiao Zhang, Min Zhu, Weidong Tong, Shuang Gao, Qinru Li, Xiang Liu, Bingchang Hua, Mingzheng Lei, Yuancheng Cai, Liang Tian and Yucong Zou

Abstract: We experimentally demonstrate a real-time 100G heterodyne coherent PON based on hybrid optoelectronic

down-conversion to replace traditional analog down-mixing devices. 100GbE commercial digital coherent optics are used for digital baseband signals processing to achieve 36 dB power budget over 20-km fiber.

14:30-14:45 # ID 4192

88 Tb/s Extended C plus L band Transmission over 300-km SMF using 800G Real-time Transponders and Commercial EDFAs and WSSs

Authors: Zhenhua Feng, Rui Tang, Anxu Zhang, Yuting Du, Huan Chen, Wendong Shang and Hu Shi

Abstract: We demonstrate an error-free 88-Tb/s real-time transmission over 300-km G.652 fiber employing 800-Gb/s probabilistically shaped 64QAM transponders and 11-THz super C plus L band commercial EDFAs and WSSs, achieving a spectral efficiency of 8 bits/s/Hz.

14:45-15:00 # ID 505

Performance Characterisation of Long Distance 7-Core MCF Transmission with Crosstalk Reducing Bidirectional Assignment

Authors: Lukasz Krzczanowicz, Deming Kong, Michael Galili, Leif Oxenløwe and Yabin Ye

Abstract: We experimentally evaluate the transmission performance of a long-distance multi-core fiber link with bidirectional 7-core assignment, showing a reduction of inter-core crosstalk when benchmarking against a fully co-propagating system, which corresponds to extended transmission reach.

Session 103-T8: Micro-, Nano-, and Quantum Science and Applications

Presider: Weibo Gao, Nanyang Technological University

Time: 13:30-15:00 | Online Room 3, ID: 842 7075 7440

13:30-14:00

Invited Speaker Hansuek Lee, Korea Advanced Institute of Science and Technology On-chip low-loss Chalcogenide Glass Waveguides/Resonators and Their Applications

Abstract: We present the fabrication and application results of chalcogenide glass waveguides and resonators having extremely low loss prepared by a method to form a light-guiding geometry by depositing core materials without the following etching process.

14:00-14:30

Invited Speaker Ren-Min Ma, Peking University

Magic Angle Nanolasers

Abstract: Here we report magic-angle nanolasers, where the localization is realized in periodic twisted photonic graphene superlattices. We find that the confinement mechanism of magic-angle lasers does not rely on a full bandgap but on the mode coupling between two twisted layers of photonic graphene lattice. Without any fine-tuning in structure parameters, a simple twist can result in nanocavities with strong field confinement and a high quality factor.

14:30-14:45

Invited Speaker Xifeng Ren, University of science and technology of China

On-chip Photonic Quantum Sources and Quantum Logic Gates

Abstract: I will introduce our recent works on photonic quantum source based on nanostructures and on-chip quantum logic gates: an ultra-compact quantum CNOT gate and a waveguide-mode encoded quantum CNOT gate.

Session 104-T4: Materials, Devices and Optoelectronics Integration

Presider: Ching Eng PNG, Institute of High Performance Computing (IHPC), A*Star

Time: 13:30-15:00 | Online Room 4, ID: 846 1762 4368

13:30-14:00

Invited speaker Ching Eng PNG, Institute of High Performance Computing (IHPC), A*Star
Discovery of Optoelectronic Devices using Inverse Design

Abstract: In this talk, we demonstrate via modeling our recent works in this field, including optical mode solving using machine learning, group index predictions, and deep learning discovered power dividers. The use of the Bayesian inference methods to design photonics devices will also be demonstrated in this talk. We will also illustrate the use of the Bayesian inference method to estimate the waveguide geometry parameters of a fabricated optical filter device.

14:00-14:15 # ID 6490

Autonomous Data-driven Model for Extraction of VCSEL Circuit-level Parameters

Authors: Ihtesham Khan, Lorenzo Tunesi, Muhammad Umar Masood, Enrico Ghillino, Vittorio Curri, Andrea Carena and Paolo Bardella

Abstract: We propose a Machine learning framework to extract the physical parameters of VCSEL. The proposed approach exploits the parametric dataset from Light-current and Small-signal modulation responses to extract the required VCSEL parameters.

14:15-14:30 # ID 6200

Design of A MMI-Based All-Optical AND-NAND-NOT and NOR-OR Multilogic Gate for Binary-Phase-Shift-Keyed Signal

Authors: Zihan Yang, Deji Li and Kiyoto Takahata

Abstract: All optical multilogic gate functions, AND, NAND, NOT, NOR, and OR, are numerically demonstrated with an identical 3×3 multimode interference coupler. A contrast ratio of greater than 9.5 dB is achieved for all functions.

14:30-14:45 # ID 4429

PCB Lamination Process Compatible Low-Loss Single-Mode Polymer Waveguides

Authors: Xu Liu, Lin Ma, Ying Shi, Yudi Zhuang and Zuyuan He

Abstract: We demonstrate low-loss single-mode polymer waveguides compatible with the PCB lamination process. In the experiment, fabricated waveguides have an average transmission loss of 0.3 dB/cm at 1310 nm and survived a regular PCB lamination process.

14:45-15:00 # ID 1483

Engineering of Acousto-Optic Modulator Based On Thin-Film Lithium Niobate-Chalcogenide Hybrid Waveguides

Authors: Wenfeng Zhou, Lei Wan and Meixun Wen

Abstract: In this work, the waveguide width of 1.6 μm and the relative distance of 11.4 μm are delicately optimized to obtain better modulation efficiency based on our proposed nonsuspended heterogeneous-integration acoustic-optic modulator.

Session 105-T5: Microwave Photonics and Optical Signal Processing

President: Lin Chang, Peking University

Time: 13:30-15:00 | Online Room 5, ID: 836 8564 2371

13:30-14:00

Invited Speaker Min Xue, Nanjing University of Aeronautics and Astronautics

Ultrahigh-Resolution Optoelectronic Vector Analysis Based on Microwave Photonics

Abstract: Optoelectronic vector analysis (OEVA) based on microwave photonics (MWP) is discussed, which focuses on the improvement of the optoelectronic frequency measurement range, precision, and dynamic range. Possible future research directions are also discussed.

14:00-14:30

Invited Speaker Shilong Pan, Nanjing University of Aeronautics and Astronautics
Combined Radar/Lidar Systems Enabled By Microwave Photonics

Abstract: Microwave photonics enables radar-lidar integrated systems with signal fusion. The radar subsystem and the lidar subsystem share a signal generation module and a data processing module, which can be used for high-performance multi-domain detection.

14:30-14:45 # ID 7309

Normal Dispersion Fiber-Based Nonlinear Pulse Compressor for Generating 2- μ m Watt-scale ~100-MHz, Few-Cycle Laser Pulse

Authors: Jingcheng Shang, Shengzhi Zhao, Yizhou Liu, Kejian Yang, Chun Wang, Tao Li and Tianli Feng

Abstract: We firstly report a 2- μ m ~100-MHz nonlinear pulse compressor based on the two pieces of normal dispersion fiber (NDF). With the assistance of dispersion compensation of chirped mirror pair, the 450-fs ultrafast laser pulse is compressed to 28.3 fs (4.2-cycle), corresponding to a compression ratio of 16. The output average power exceeds 1 W, which is believed to be the highest power never achieved from the previously reported 2- μ m fiber-based nonlinear pulse compressors with > 100-MHz repetition rate.

Session 106-T7: Biophotonics and Optical Sensors

President: Luo Dan

Time: 13:30-15:00 | Online Room 6, ID: 827 1560 8818

13:30-14:00

Invited speaker Neil Broderick, University of Auckland
SERS Based Sensors for Medical Diagnostics

Abstract: We report of our recent work looking at a combining SERS with machine learning to detect differences in extracellular vesicles resulting from different diseases. Using novel SERS substrates formed by femtosecond laser ablation good results are obtained.

14:00-14:15 # ID 4087

Accurate Recognition of Mixed Events Using Two-dimensional Time-frequency Domain Feature and Data Augmentation for Phase-OTDR Sensing System

Authors: Yiyi Zhou, Liu Shang, Liang Wang, Ming Tang, Deming Liu, Jiang Mi and Ling Wan

Abstract: Mixed events at the same location have been successfully identified for the first time by using two dimensional time-frequency domain feature in phase-OTDR. Average classification accuracy for three events and their mixtures achieves at 92%.

14:15-14:30 # ID 3388

An electro-optical approach for monitoring the fabrication of silicon nanopores

Authors: Jianxin Yang and Ho-Pui Ho

Abstract: In this work, we exhibit that one can use the optical transmission characteristics of the silicon nanopore to provide in situ real time feedback of the wet-etching process.

14:30-14:45 # ID 6924

Research on Mercury Ion Sensor Based on Whispering Gallery Mode

Authors: Mingyue Wang, Shengjie Yang, Ning Kang and Ya-Nan Zhang

Abstract: This paper presented a mercury ion (Hg^{2+}) sensor based on the whispering gallery mode. The experimental results show that when the concentration of Hg^{2+} is 19.80 μ M, the shift of the wavelength is ~22 pm.

Session 107-T6: LEDs, Photovoltaics, and Optoelectronics in Energy

Presider: Abhishek Srivastava, Hong Kong University of Science and Technology

Time: 13:30-15:00| Online Room 7, ID: 831 1366 0011

13:30-14:00

Invited speaker Nripan Mathews, Nanyang Technological University

Quasi 2D Perovskite for Blue Emission and Beyond

Abstract: The talk will cover our group's efforts on modulating the ionic constituents of halide perovskite materials for various devices including light emitting diodes.

14:00-14:30

Invited speaker Zi-Hui Zhang, Hebei University of Technology

GaN-based Optoelectronic Devices

Abstract: In this report, we will present our recent progress on AlGaIn-based DUV LEDs, GaN-based laser diodes, UV photo-detectors and GaN-based microLEDs. The content will cover both the device simulation and fabrication.

14:30-15:00

Invited speaker Kuan Liu

In-situ Investigations on Printable Perovskite Solar Cell

Abstract: "Hybrid organo-metal halide perovskite solar cells (PSCs) is viewed as the most promising candidates for next generation photovoltaic device primarily due to their high efficiency, printability and low cost. While outstanding progress in boosting PSCs efficiency in the lab via materials and device engineering has been achieved, understanding the perovskite film formation in printing process in situ is still lacking and of great interest.

Session 108-T1: Optical Fibers and Fiber-based Devices

Presider: Wonkeun Chang

Time: 15:15-16:45| Online Room 1, ID: 863 2270 8565

15:15-15:45

Invited Speaker Wonkeun Chang, Nanyang Technological University

Fiber-based Ultrafast Mid-Infrared Source at Unprecedented Power Levels

Abstract: We present a fiber-based approach for generating femtosecond pulses in 3–4 μm in at unprecedented power levels. This is achieved by frequency-down converting near-infrared pump in a gas-filled hollow-core fiber via nonlinear effects.

15:45-16:15

Invited Speaker Sulaiman Wadi Harun, University of Malaya

New Innovations in Fiber Laser Technology

Abstract: Our research focus primarily on development of new saturable absorber materials for pulse generation as well as exploring novel fiber laser architectures. In this presentation, the milestones of silica fiber laser development are briefly reviewed and recent advances of high-power continuous wave, Q-switched and mode-locked fiber lasers in the 1, 1.5 and 2 μm regions are addressed in detail. To date, more end products are integrating lasers with sensors and optics, opening new opportunities for photonics manufacturers.

16:15-16:30 # ID 8940

Effects of Imperfection and Noise on The Image Reconstruction Through a Multimode Fiber with A Neural Network

Authors: Mengchao Cao and Xiaosheng Xiao

Abstract: For image transmission with multimode fibers, the effects of imperfection and noise of the image reconstruction with neural networks are investigated. We find that the reconstruction is immune to most of the noise.

16:30-16:45 # ID 3092

Study on The Characteristics of Randomly Coupled Multi-Core Fibers with Different Core Structures

Authors: Yongneng Jiang, Jiajing Tu, Weiping Liu and Zhaohui Li

Abstract: In this work, two structures including trench-assisted and the large-depression-assisted type are compared to investigate how the low index structure can be taken advantage to increase the fabrication tolerance. It is found that the trench-assisted structure can effectively reduce the manufacturing error on the group index and obtain lower group delay spread; the large-depressed-assisted structure cannot regulate the group index, but a random coupling state can be obtained by using a lower core pitch, thus effectively increasing the cladding utilization of the fiber.

Session 109-T2: Optical Transmission Systems, Sub-systems and Technologies

President: William Shieh, The University of Melbourne

Time: 15:15-16:45 | **Online Room 2, ID: 836 5238 9479**

15:15-15:45

Invited speaker Gordon Ning Liu, Soochow University

Retiming and Equalization Technique for Bandwidth-Limited PAM-4 Systems

Abstract: A stabilization method using moving average filter for Gardner retiming is proposed. It exhibits a reduced retiming jitter for a bandwidth-limited PAM-4 system and is beneficial to the performance of the decision feedback equalizer.

15:45-16:00 # ID 9621

DGD Tolerant Fast RSOP Tracking Scheme based on Multi-symbol Extended Kalman Filter in 16QAM Coherent Optical Systems

Authors: Mengli Yue, Tao Yang, Xue Chen and Lei Yuan

Abstract: This paper proposes a scheme of tracking fast rotation of the state of polarization, which uses multi symbols to update the parameters of extended Kalman filter and thus significantly improves differential group delay tolerance.

16:00-16:15 # ID 2397

Comparison of Data-Aided SFO Estimation Algorithms in DDO-OFDM

Authors: Xu Gao, Ming Chen, Xiaoli Zhu, Shishi Huang, Jie Zhou and Yuxin Cai

Abstract: We compare three SFO estimation algorithms based on training sequence, cyclic prefix and pilot subcarrier under different SNRs and ROPs by numerical simulation and offline experiment in a short-reach DDO-OFDM transmission system.

16:15-16:30 # ID 5139

Optical Data Communications Using Integrated Soliton Microcomb Laser Source

Authors: Yanlan Xiao, Yong Geng, Xinjie Han, Jiahao Hu, Kun Qiu and Heng Zhou

Abstract: We investigate the feasibility and performance of wavelength division multiplexed optical data interconnects using integrated Kerr soliton micro-combs as the multi-channel laser source which are advantageous and viable for optical data communications and interconnects.

15:30-15:45 # ID 4115

Pattern-dependent Equalization for PAM-4 IM/DD System with Severe Bandwidth Limitation

Authors: Wei Wang, Dongdong Zou, Weihao Ni, Zhaohui Li, Qi Sui, Yi Cai and Fan Li

Abstract: In this paper, an LUT enabled pattern-dependent equalization combined with MLSE is proposed for IM/DD system with severe bandwidth limitation. Compared to the conventional MLSE, the experimental results show that the proposed method can provide 1.25 dB receiver sensitivity gain for 65Gbaud PAM-4 signal over 2-km SMF.

Session 110-T4: Materials, Devices and Optoelectronics Integration

President: Jinghua Teng

Time: 15:15-16:45 | Online Room 3, ID: 842 7075 7440

15:15-15:45

Invited Speaker Boon S. Ooi, King Abdullah University of Science & Technology (KAUST), KSA
Wide-Field-of-View Optical Detectors for High-Speed Optical Wireless Communication

Abstract: Optical wireless communication (OWC) is envisioned to become an indispensable technology in future wireless networks. However, one of the main issues hindering the widespread of OWC systems is the strict alignment required to maintain connection. This is due to the tradeoff between the receiver's active area and its response speed, which necessitates the use of a lens to focus the light, limiting the field of view (FOV). In this paper, we will present recent advances in wide-FoV detectors that relax the strict alignment requirement between the transmitter and the receiver in OWC links. Wide-FoV detection methods recently developed at KAUST using perovskite nanocrystals scintillating fibers, convex-surface fused fiber-optic taper, and broad area micro-photodetector array will be discussed.

15:45-16:00 # ID 4691

Modulation Bandwidth Enhancement for Dual DFB Lasers Coupled with a High-Q Microring Resonator

Authors: Shuai Shao, Jiachen Li, Sigang Yang, Hongwei Chen and Minghua Chen

Abstract: Mutually injection-locked lasers by butt coupling two distributed feedback lasers with a high-Q microring resonator is proposed. A theoretical model based on coupled-mode rate equations is established to investigate the modulation characteristics.

16:00-16:15 # ID 1694

Optimization of Suspended Phononic Crystal Brillouin Waveguides Using Genetic Algorithm

Authors: Peng Lei, Mingyu Xu, Rongwei Liu, Bibo He, Zhangyuan Chen and Xiaopeng Xie

Abstract: In this contribution, we use the genetic algorithm to optimize the suspended phononic crystal Brillouin optical waveguide. With this method, we can obtain the optimized waveguide design more simply and accurately.

16:15-16:30 # ID 6184

Investigation and Evaluation of Key Parameters of 100Gb/s ZR4 80km Optical Transceiver Modules

Authors: Bingbing Wu, Junjie Xie, Lu Liu and Wenyu Zhao

Abstract: 100Gb/s ZR4 80km optical modules from 3 vendors are evaluated. The electrical interface, transmission performance, interoperability performance and equipment compatibility are qualified. Optical interface test can provide reference for the formulation of industry standards.

16:30-16:45 # ID 1995

Quantitative Analysis on Temperature-dependent Raman Scattering of InP-OI Films and InP Nanostructures

Authors: Pengyan Wen, Preksha Tiwari, Markus Scherrer, Emanuel Lörtscher, Kirsten E. Moselund and Bernd Gotsmann

Abstract: Raman scattering of InP-OI films are studied over temperature range of 300-800 K. The Stokes peak linewidth results in the best fit and is the most appropriate method for thermal calibration on InP nanostructures.

Session 111-T8: Micro-, Nano-, and Quantum Science and Applications

President: Lin Wu, Singapore University of Technology and Design

Time: 15:15-16:45 | Online Room 4, ID: 846 1762 4368

15:15-15:45

Invited Speaker Johannes Fink, IST Austria

An Electro-Optic Interconnect for Quantum Microwave Photonics

Abstract: We introduce a multi-mode cavity electrooptic system that exhibits the physics known from cavity optomechanics with electromagnetic fields. We show efficient (~15%) and quantum-enabled ($N_{in} < 1$) conversion between microwave and telecom wavelength photons, as well as dynamical and quantum back-action that gives rise to two-mode squeezing between GHz and THz fields. Such entangled states can form the basis for fiber-based quantum networks linking superconducting processing nodes.

15:45-16:15

Invited Speaker Junsuk Rho, Pohang University of Science and Technology (POSTECH)

Dynamic Metaphotonics for Structural Colors and Holographic Displays

Abstract: In this talk, I will discuss the recent advancements using deep learning for nanophotonics design and fabrication. Inverse design and forward modelling will be introduced with a variety of examples of theoretical/experimental demonstrations.

16:15-16:45

Invited Speaker Wakana Kubo, Tokyo University of Agriculture and Technology

Session 112-T5: Microwave Photonics and Optical Signal Processing

President: Ruoming Li, Aerospace Information Research Institute, Chinese Academy of Sciences

Time: 15:15-16:45 | Online Room 5, ID: 836 8564 2371

15:15-15:45

Invited Speaker Houxiao Wang, Shandong University of Technology

Recent Advances in Transient In-Process Detection for Hole Fabrication Using Lasers

Abstract: The laser-based hole generation technology has been widely used in many different industrial fields, but it has been developed and investigated primarily by totally using the conventional indirect methods such as the metallographic analysis or the microscopic measurements.

15:45-16:00 # ID 4878

All-optical Format Conversion from QPSK to PAM4 based on Vector Phase-sensitive Amplifiers

Authors: Zhaoyang Liu, Jiabin Cui and Yuefeng Ji

Abstract: An all-optical conversion system based on vector phase-sensitive amplifiers is proposed. The system realizes the conversion from one quadrature phase shift keying signal to one 4-level pulse amplitude modulation signal.

16:00-16:15 # ID 4270

Prediction of Chaotic Intensities and Dynamics for an Optically Injected Semiconductor Laser Using Reservoir Computing

Authors: Bin Sheng, Bo Li, Xiao-Zhou Li, Yiyang Gu, Xiuyou Han and Mingshan Zhao

Abstract: Prediction of chaotic intensities and dynamical behaviors are investigated for optically injected lasers by reservoir computing. Upon careful optimization of the reservoir parameters, continuous intensity time series is successfully predicted for over 0.8ns.

16:15-16:30 # ID 5744

Wideband SFCW and Local Oscillation Signal Generation Using Polarization-Based Dual-loop OEO

Authors: Zhijian Zhang, Changlong Du, Mingzhen Liu, Xiangchuan Wang, Shifeng Liu and Shilong Pan

Abstract: A polarization-based dual-loop optoelectronic oscillator (OEO) is proposed and demonstrated to simultaneously generate a high-quality local oscillation (LO) signal and wideband step frequency continuous wave (SFCW) signal.

16:30-16:45 # ID 4095

Photonics Generation of Background-Free and Multi-Band Phase-Coded Signals

Authors: Penghui Gao, Kunlin Shao, Yamei Zhang and Shilong Pan

Abstract: A multi-band phase-coded signal generator is proposed and demonstrated based on cascaded Mach-Zehnder modulator and dual-polarization dual-parallel Mach-Zehnder modulator. A triple-band phase-coded signal with frequencies of 5.5 GHz, 11.5 GHz and 22.5 GHz is obtained.

Session 113-T3: Networks Architectures, Management and Applications

Presider: Vittorio Curri, Politecnico di Torino

Time: 15:15-16:45 | **Online Room 6, ID: 827 1560 8818**

15:15-15:45

Invited Speaker Nicola Sambo, Scuola Superiore Sant'Anna

15:45-16:00 # ID 9498

Photonics Integrated Multiband WSS Based ROADM Architecture: A Networking Analysis

Authors: Muhammad Umar Masood, Lorenzo Tunesi, Bruno Correia, Ihtesham Khan, Enrico Ghillino, Paolo Bardella, Andrea Carena and Vittorio Curri

Abstract: This paper proposes a network-level analysis of a novel modular photonic integrated multiband wavelength selective switch (WSS) architecture for reconfigurable optical add-drop multiplexer (ROADM). Networking analysis is also presented on the device.

16:00-16:15 # ID 2966

Polyhedron-Protection-Oriented Routing and Resource Allocation Using Q-Learning in Optical Networks

Authors: Yu Liu, Xin Li, Wei Xu, Lu Zhang and Shanguo Huang

Abstract: This paper proposes polyhedron-protection-oriented routing and resource allocation based on Q-learning to reduce resource consumption. Simulation results show that this scheme can reduce the resource consumption about 15% in polyhedron protection.

16:15-16:30 # ID 5842

Fair Bandwidth Allocation in Higher Speed Passive Optical Networks with Flexible Rate

Authors: Jun Li, Xiang Lu, Guanglun Sun, Liangchuan Li, Guanyu Wang and Gangxiang Shen

Abstract: Flexible rate is a new desirable operational feature of next-generation higher speed passive optical networks (e.g., ITU-50G PON). In this context, a new dynamic bandwidth algorithm called Fair Bandwidth Allocation (FaBA) is proposed to allocate bandwidth for optical network networks (ONUs) with flexible-rate transceivers. Simulation results show that FaBA can significantly outperform two benchmarks while effectively guaranteeing the average delay of each ONU within 1 ms, and can do this for transceivers at different rates, regardless of their traffic loads.

16:30-16:45 # ID 4119

Performance Analysis of Transfer-learning Approaches for QoT Estimation of Network Operating with 40ZR

Authors: Fehmida Usmani, Ihtesham Khan, Hafsa Tariq, Muhammad Umar Masood, Muhammad Shahzad, Arsalan Ahmad and Vittorio Curri

Abstract: We demonstrate the detailed analysis of two major transfer learning approaches in minimizing the uncertainties in quality of transmission estimation in comparison with standard baseline models like Artificial neural network (ANN) and Convolutional-neural network (CNN).

Session 114-T4: Materials, Devices and Optoelectronics Integration
Presider: Jianji Dong, Huazhong University of Science and Technology
Time: 15:15-16:45 | Online Room 7, ID: 881 1220 7791

15:15-15:45

Invited Speaker Richard Hu, Synopsys, Inc.

Fully Automated Solution for Metalenses/Metasurfaces With Inverse Design Capability

Abstract: A fully automated solution to design metalenses/metasurfaces has been developed using inverse design techniques adapted for systems containing cascaded metasurfaces with free-form parameterized meta-atoms.

15:45-16:00 # ID 9571

Heteroepitaxial Integration of III-V quantum Dot Lasers and Silicon Waveguides on SOI Substrate for Silicon Photonics

Authors: Wenqi Wei, Zihao Wang, Ting Wang and Jianjun Zhang

Abstract: An embedded InAs/GaAs QD laser directly grown on a trenched SOI platform with monolithically integrated silicon waveguides is first demonstrated here, which owns a 6.8 mW output power and -7.35 dB coupling efficiency.

16:00-16:15 # ID 8669

High-Performance Black Phosphorus Photodetector on Thin Film Lithium Niobate

Authors: Yu Xue, Xiaoxuan Wu, Junjia Wang and Liu Liu

Abstract: High-performance photodetector is significant for thin film lithium niobate. In this work, we demonstrate a high-performance black phosphorus photodetector based on a thin film lithium niobate platform. Due to the hybrid waveguide of lithium niobate and BP, the photodetector obtains a high absorption coefficient of 1.58 dB/ μm and high responsivity of 7.5 A/W (@optical power of 7.9 μW).

16:15-16:30 # ID 9217

High energy Efficiency Soliton Microcomb Generation in ultra-high-Q micro-cavity

Authors: Wenwen Cui, Yong Geng, Zheng Yi, Xinjie Han, Yanlan Xiao, Boqing Zhang, Jing Xu and Heng Zhou and Kun Qiu

Abstract: We demonstrated that dissipative Kerr soliton microcomb with energy conversion efficiency as high as 25% @ 21.5 GHz comb spacing can be generated in ultra-high-Q micro-cavity with optimized operating parameters.

16:30-16:45 # ID 7728

Wireless-Optical Interconnection for Data Center based on Passive Metasurface

Authors: Weijie Qiu, Weigang Hou, Xiangyu He, Lei Guo and Pengxing Guo

Abstract: We propose the wireless-optical interconnection scheme for data center based on passive metasurface, guaranteeing the zero-wiring among racks, performing the parallel phase control, and has >2 times communication coverage area of the beam.

Session 115-T6: LEDs, Photovoltaics, and Optoelectronics in Energy

Presider: Aung Ko Ko Kyaw, Southern University of Science and Technology, China

Time: 15:15-16:45 | Online Room 8, ID: 831 1366 0011

15:15-15:45

Invited Speaker Martin D. Dawson, University of Strathclyde

Deep Ultraviolet Optical Wireless Communications Using Micro-LEDs

Abstract: Micro-LED technology is emerging very rapidly for new forms of electronic visual displays, but it is also of great interest for optical communications. Individual visible-wavelength micro-LEDs show bandwidths up to ~1GHz and can be modulated in various formats for multi-Gb/s data communications. Here we summarise our recent work extending this capability into the deep ultraviolet region of the spectrum, useful in both line-of-sight and non-line-of-sight optical wireless links in a region of very low solar background radiation. We report on 10Gb/s wavelength division multiplexing and record data rate and distance demonstrations with deep ultraviolet micro-LEDs.

15:45-16:15

Invited Speaker Kai Wang, Southern University of Science and Technology

High-Efficiency Quantum Dot Light-Emitting Diodes and Manipulation of Light Field

Abstract: Directional emission and micro-sized light source are essential for VR/AR and 3D displays. Herein, high efficiency large angle deflection ($> 85\%$ at 75°) has been achieved by metagrating, and full color micro-QLED with narrow linewidth ($\sim 1\text{nm}$) and high Purcell factor (46.0) is designed via meta-cavity.

16:15-16:45

Invited Speaker Aldo Di Carlo, University of Rome Tor Vergata

Session 116-T1: Optical Fibers and Fiber-based Devices

Presider: Sulaiman Wadi Harun, University of Malaya

Time: 17:00-18:30 | Online Room 1, ID: 863 2270 8565

17:00-17:15 # ID 6733

Amplifying of Orbital-Angular-Momentum Modes in a Helically Twisted Few-Mode Erbium-Doped Fiber

Authors: Yan Wu, Jianxiang Wen, Mengdi Zhang, Fufei Pang and Tingyun Wang

Abstract: We realize the direct generation of vortex modes by twisting a few-mode erbium-doped fiber, based on which vortex beam amplification is achieved among the C-band. Our findings could be applied in long-haul space division multiplexing.

17:15-17:30 # ID 3950

Simulation Analysis on Vortex Modes Characteristics in Twisted Two-Mode Polarization Maintaining Fiber

Authors: Ying Cao, Yan Wu, Jianxiang Wen and Mengdi Zhang

Abstract: We investigate a two-mode polarization maintaining fiber (TM-PMF) imposed by torsion. It has been demonstrated that the eigenmodes of twisted TM-PMF will convert to vortex modes with gradually increasing twist rate.

17:30-17:45 # ID 377

Wavelength Selective Mode Conversion in Few-mode Fiber with Cascaded Long-Period Fiber Gratings

Authors: Shiqi Chen, Yunhe Zhao, Mengxue Tang, Ziyang Hua, Huiqin Peng, Yuehui Ma and Yunqi Liu

Abstract: We demonstrate a wavelength selective mode converter based on cascaded long-period gratings in few-mode

fiber. The mode conversion efficiency of $> 90\%$ at each resonant wavelength could be obtained with separation distance of 2.5 cm.

17:45-18:00 # ID 7937

Study on Dissipative Soliton Dynamics with High-Order Dispersion Engineering

Authors: Hairun Guo and Jincan Lin

Abstract: We demonstrate dispersion-engineered dissipative soliton mode-locked lasers by spatial light modulation. Transitions of dispersive waves from Kelly sidebands and quartic solitons have been observed. Overall cavity dispersion profile is retrieved to confirm the dispersion engineering

Session 117-T2: Optical Transmission Systems, Sub-systems and Technologies

President: Gordon Ning Liu

Time: 17:00-18:30 | Online Room 2, ID: 836 5238 9479

17:00-17:15 # ID 7779

Analysis of EEPN-Induced Phase and Amplitude Distortions in Coherent Optical QPSK Systems

Authors: Huaiyin Wang, Xingwen Yi and Wei Sun

Abstract: We analyze the intra-symbol and inter-symbol EEPN in detail and derive the variances of EEPN-induced phase, amplitude noise and their ratio for coherent QPSK signals. We also give the phase-compensated EEPN after blind phase search (BPS). All theoretical derivations are verified in simulation.

17:15-17:30 # ID 3310

124.8-Gbit/s Net Data Rate Capacity for IM/DD Optical Intra-Data Center Interconnections By Utilizing Probabilistically Shaped PAM-8 and Digital Linear Feed-Forward Equalizers

Authors: Dr. Ahmed Galib Reza, Marcos Troncoso Costas, Colm Browning and Liam Barry

Abstract: We demonstrate 50-Gbaud probabilistically shaped PAM-8 signal transmissions for semiconductor optical amplifier (SOA)-based intra-data center interconnects. Considering the 7% HD-FEC overhead, we achieve a net data rate of 124.8-Gbit/s after transmissions over 1-km SMF.

17:30-17:45 # ID 5417

Multi-labeled Random-forest Enabled Softwarized Management for Photonics Switching Systems

Authors: Ihtesham Khan, Noor UI Huda Ajmal, Hafsa Tariq, Lorenzo Tunesi, Muhammad Umar Masood, Enrico Ghillino, Paolo Bardella, Andrea Carena, Arsalan Ahmad and Vittorio Curri

Abstract: We propose topologically and technologically agnostic data-driven abstracting of any NxN optical switching system for calculating quality-of-transmission penalties using a direct machine learning design and the definition of its control states using an inverse approach.

17:45-18:00 # ID 9375

Deep Learning for QoT Estimation in SMF and FMF Links

Authors: Mohammad Ali Amirabadi, Mohammad Hossein Kahaei, S. Alireza Nezamalhoseini and Andrea Carena

Abstract: We investigate deep learning-based regression and classification methods for quality of transmission estimation in single-mode and few-mode fiber links. Results show efficiency and low complexity in both approaches.

18:00-18:15 # ID 2564

End-to-end Learning for Fiber Nonlinearity Mitigation Geometric Shaping via RNN-based Autoencoder

Authors: Zhiyang Liu, Cao Chen, Shilin Xiao and Weisheng Hu

Abstract: We propose a novel scheme for fiber nonlinearity mitigation with geometric constellation shaping using RNN-based autoencoder structure. Simulations show a Q-factor gain of 0.65 dB compared to the unshaped constellation at the optimum launch power.

18:15-18:30 # ID 1056

GS-16QAM OFDM with ANN Scheme for W-band RoF System

Authors: Jiacong Liang, Jing He, Ran Song, Jing He and Yaoqiang Xiao

Abstract: In the paper, a geometrically shaped (GS) 16 QAM based OFDM with artificial neural network scheme is proposed in W-band RoF system. The receiver sensitivity of GS-16QAM OFDM outperforms that of OFDM with uniform 16QAM.

18:30-18:45 # ID 4280

Accurate In-Service Crosstalk Monitoring in SDM systems Based on Convolutional Neural Network

Authors: Chen Cheng, Maoqi Zhang, Junda Chen, Yizhao Chen, Zihe Hu, Zheng Yang, Kangjie Li and Ming Tang

Abstract: We propose a baud-rate insensitive, accurate and in-service crosstalk monitoring scheme for space division multiplexing systems based on 1-dimensional convolutional neural network. The mean absolute error of experimental result performs below 0.19dB.

Session 118-T8: Micro-, Nano-, and Quantum Science and Applications

President: Xiao Xiong, Beijing University

Time: 17:00-18:30 | Online Room 3, ID: 842 7075 7440

17:00-17:30

Invited Speaker Young-Ik Sohn, Korea Advanced Institute of Science and Technology Practical Photonic Quantum Memory Based on Integrated Photonics

Abstract: "Optical quantum memory is an essential building block for universal quantum computing based on linear optics. In spite of limited lifetime of photon, on-chip delay lines are considered a very practical solution compared to other matter-based ones because the insertion loss can be engineered to a tolerable level.

17:30-18:00

Invited Speaker Simon Groeblacher, Delft University of Technology

Session 119-T5: Microwave Photonics and Optical Signal Processing

President: Houxiao Wang

Time: 17:00-18:30 | Online Room 4, ID: 846 1762 4368

17:00-17:30

Invited Speaker Ruoming Li, Aerospace Information Research Institute, Chinese Academy of Sciences

PFDIR-a wideband Deramp-on-receive SAR System Based on Photonic-Assisted RF Front-End

Abstract: A wideband photonic-assisted SAR system, PFDIR (Photonic Front-end Deramp-on-receive Imaging Radar), is envisaged to obtain SAR imaging at very high resolution. The configuration of the system are described and imaging results are presented.

17:30-17:45 # ID 5257

High Energy Efficiency Soliton Microcomb Generation in Ultra-high-Q micro-cavity

Authors: Wenwen Cui, Yong Geng, Zheng Yi, Xinjie Han, Yanlan Xiao, Boqing Zhang, Jing Xu and Heng Zhou

Abstract: We conduct detailed experimental investigation on the phase coherence between two on-chip Kerr-soliton-microcombs, and achieve the best phase noise down to -50 dBc/Hz@ 1 Hz, -90 dBc/Hz@ 1kHz, and -120 dBc/Hz@1 MHz offset, respectively.

17:45-18:00 # ID 2279

Research on the Influence of Antenna Number and Step Frequency of Optical-controlled UCFDA on Radar Imaging

Authors: Jiazhen Cai, Jingcan Ma, Chunyu Che, Lu Liu, Xinlu Gao, Zhennan Zheng and Shanguo Huang

Abstract: This paper proposes using optical-controlled uniform circular frequency diverse array (UCFDA) to generate orbital angular momentum (OAM) beams. Simulation experiments are conducted, and the impact of key parameters of UCFDA on results is also discussed.

18:00-18:15 # ID 8329

Microwave-photonics-based Vortex Electromagnetic Wave Generation For High Resolution Radar Imaging

Authors: Zhajji Wang, Guanqun Sun, Fangzheng Zhang and Shilong Pan

Abstract: We propose a photonic microwave vortex electromagnetic waves generation method. Vortex electromagnetic signals having a bandwidth of 1 GHz with orbital angular momentum (OAM) mode numbers from -16 to 16 are generated for high-resolution imaging.

18:15-18:30 # ID 9026

Optical sub-Nyquist Sampling of S and C-band Signals with 1 GHz Clock Source and Its Performance

Authors: Karamdeep Singh, Siva Subramaniam C N, Sreeraj S J, Balaji Srinivasan and Deepa Venkitesh

Abstract: We demonstrate sub-sampled photonic down conversion with 500 MHz digitization bandwidth using home assembled 1 GHz AHMLL as clock source. We have evaluated SNR, SINAD performance of photonic downconverter for S-band and C-band signals.

Session 120-T7: Biophotonics and Optical Sensors

President: Yang Hui

Time: 17:00-18:30 | Online Room 5, ID: 836 8564 2371

17:00-17:30

Invited Speaker Qiaoqiang Gan, KAUST

Miniaturized Spectroscopic Sensing Over a Surface 'Rainbow'

Abstract: This talk will overview our effort in "rainbow" trapping effect on plasmonic gratings and its new applications in spectroscopic sensing.

17:30-17:45 # ID 5710

Shape Monitoring of Carbon Fiber Reinforced Polymer by Embedded Fiber Bragg Grating Array

Authors: Dian Chen, Wenjing Mo, Zhengda Zhao and Jian Chen

Abstract: Fiber Bragg Grating array with high temperature resistance and high strength is embedded in a Carbon Fiber Reinforced Polymer plate, of which the strain distribution is measured and the shape is reconstructed via strain-curvature-displacement algorithm.

18:00-18:15 # ID 8475

Multispectral Filters for MIR Spectral Imaging Applications

Authors: Xin He

Abstract: This paper presents novel multispectral filters (MF) for spectral imaging applications with mid-IR (MIR) wavelengths. The metasurface-based filters are fabricated with conventional micro-nano fabrication facilities and exhibit bandwidths less than 250 nm and maximum transmission efficiencies of around 60%. The filters show promise for applications in precision agriculture, medical imaging, gas sensing, and other areas.

Session 121-T3: Networks Architectures, Management and Applications

President: Vittorio Curri, Politecnico di Torino

Time: 17:00-18:30 | Online Room 6, ID: 827 1560 8818

17:00-17:30

Invited Speaker Rudi Bratovich, SM-OPTICS

Environmental Sensing using Deployed Optical Network Infrastructures

Abstract: We propose an optical network architecture aimed at exploiting the telecommunication infrastructure also as a sensing network to detect the mechanical stresses induced by anthropic activities monitoring the SOP of the propagating optical IMDD signals.

17:30-17:45 # ID 2942

Query Based Iterative Learning Approach for Lightpath Deployment in Optical Networks

Authors: Fehmida Usmani, Ihtesham Khan, Hafsa Tariq, Dr. Muhammad Shahzad, Arsalan Ahmad and Vittorio Curri

Abstract: We proposed a novel unsupervised Iterative learning (IL) framework developed on top of the Random forest (RF) classifier to obtain higher QoT estimation accuracy of LP before deployment with a reduced number of training samples.

17:45-18:00 # ID 2929

Contention Under Heavy Traffic Load in a 224x224 Wavelength-routing OXC Made of Smaller Clustered Sub-OXCs

Authors: Thierry Zami

Abstract: By assessing the internal blocking ratio under very high traffic load in a 224x224 wavelength-routing OXC, this study draws less favorable conclusion than prior art, in terms of contention and of physical impairments.

18:00-18:15 # ID 8795

Latency and Jitter Optimization of Industrial PON System by Frame-Based Dense Burst Allocation

Authors: Jialiang Jin, Dezhi Zhang, Qizheng Li, Heng Yue, Yue Zuo, Dan Shu and Rui Li

Abstract: We improve the upstream latency and jitter of the PON system by introducing frame-based dense burst allocation, test results show significant improvements. It can be used in industrial scenarios and better supporting various industrial applications.

18:15-18:30 # ID 716

A Deep Reinforcement Learning Policy for Joint Antenna Selection and Radio Resource Block Allocation in a TWDM-PON Based Front-haul with Massive MIMO

Authors: Yunwu Wang, Min Zhu, Jiahua Gu, Xiang Liu, Weidong Tong and Jiao Zhang

Abstract: We propose a deep reinforcement learning-based policy for massive multiple input multiple output (MIMO) enabled beamforming in a front-haul network. The simulation results show the proposed algorithm can achieve better performance than heuristics.

18:30-18:45 # ID 846

Survivability against Amplifier Failures in Multi-Band Elastic Optical Networks

Authors: Soheil Hosseini, Ignacio de Miguel, Noemí Merayo, Óscar González de Dios and Ramón J. Durán Barroso

Abstract: We propose different techniques to provide protection against, at least, amplifier failures in C+L optical networks, demonstrating that the use of the proposed hybrid protection technique leads to a significant decrease on blocking ratio.

Session 122-T8: Micro-, Nano-, and Quantum Science and Applications

Presider: Lei Shi

Time: 17:00-18:30 | Online Room 7, ID: 881 1220 7791

17:00-17:30

Invited Speaker Gustavo Wiederhecker, University of Campinas

New Tones from Light & Sound Interaction in Microresonators

Abstract: In this talk I will review our recent progress on Kerr nonlinearities in microresonators and discuss our recent demonstration of four wave-mixing in a triple state silicon nitride photonic molecule using a dual-tone pump scheme

17:30-18:00

Invited Speaker Luqi Yuan, Shanghai Jiao Tong University

Novel Photonics in Synthetic Frequency and Time Dimensions

Abstract: Synthetic dimensions in photonics have been under rapid development and attract great interests in past few years. Different degrees of freedom of light can be utilized to construct the synthetic dimension. Here I will discuss the recent opportunities of constructing the synthetic frequency and time dimensions towards further manipulating the light, where a variety of connections between sites in artificial lattice structures can be designed in the synthetic space.

18:00-18:30

Invited Speaker Guancong Ma, Hong Kong Baptist University

Non-Abelian Braiding of Sound and Light

Abstract: Non-Abelian-based theories are one of the foundations of modern physics. For example, non-Abelian braiding realized by the dynamic winding of anyons is widely considered an important candidate of quantum computers.

Poster Session 1

Time: 14:00-15:30 | Hallway, 4F

ID 681

Dual Wavelength Spectrum-Shaped Mid-Infrared Pulses Based on Optical Parametric Amplifier with LiGaS₂ Crystal

Authors: Kan Tian, Linzhen He and Houkun Liang

Abstract: We report a simple and compact method to generate mid-infrared dual-wavelength few-cycle pulses, spanning from 5.6 to 11.4 μm with outstanding spectral and temporal shaping and tuning freedom.

ID 3970

Broadband uni-traveling-carrier Photodiode for Terahertz Communication System

Authors: Yun Wang, JianGuo Yu

Abstract: A modified uni-traveling-carrier photodiodes with responsivity of 0.07A/W and wide electric bandwidth over 280 GHz are designed. The absorption layer and the bandsmooth layer are optimized for high responsivity and wide optical bandwidth.

ID 408

Simultaneous Terahertz Generation And Manipulation Using Epsilon-Near-Zero-Enhanced Hybrid Nonlinear Metasurface

Authors: Xi Feng, Yongchang Lu, Qingwei Wang, Xueqian Zhang, Quan Xu, Li Niu, Xieyu Chen, Chunmei Ouyang, Jianguang Han and Weili Zhang

Abstract: A terahertz nonlinear metasurface method based on epsilon-near-zero effect and nonlinear Pancharatnam-Berry phase is experimentally demonstrated, which can simultaneously emit and manipulate the output terahertz waves in an efficiency manner.

ID 3526

A Heterogeneous Integration of GaAs Schottky Barrier Diode To Quartz Substrate Using Micro Transfer-Printing

Authors: Yuxuan Wang, Kunpeng Dai, Bin Niu, Yuechan Kong and Tangsheng Chen

Abstract: We demonstrate transferring of GaAs SBD active layers with electrodes to a quartz wafer using micro-transfer printing method. This allows as a versatile approach for future THz mixers and multipliers.

ID 9840

140 Gbps Photonics-Aided THz Wireless Communication Around 400 GHz Band Based on Artificial Neural Network Equalizer

Authors: Yuancheng Cai, Liyao Zhang, Jiao Zhang, Bingchang Hua, Mingzheng Lei, Yucong Zou, Guo Zhao, Jianjun Yu and Min Zhu

Abstract: We propose and experimentally verify a 400-GHz photonic-aided THz wireless communication system enabled by an artificial neural network (ANN) equalizer. The results show that the piecewise learning rate enabled ANN equalizer can achieve a net rate of 140 Gbps.

ID 9845

Micro-hole Side-polish Plastic Optical Fiber Based Surface Plasmon Resonance Sensor For Temperature Sensing

Authors: Chuanxin Teng, Youwei Wang, Maosen Li and Peng Shao

Abstract: A micro-hole side-polished POF based surface plasmon resonance sensor was proposed for temperature sensing. A temperature sensitivity of $-1.43 \text{ nm}/^\circ\text{C}$ was obtained in the temperature range from 20°C - 60°C . The sensor was compact in size.

ID 9775

High Precision Spectral Measurement Based on Heterodyne Mixing

Authors: Chen Zhang, Qinghua Tian, Xiangjun Xin, Fu Wang, Zhipei Li and Yongjun Wang,

Abstract: A high precision spectral measurement system based on heterodyne mixing is proposed, which can reduce the influence of environmental factors on stimulated Brillouin scattering effect and improve the wavelength accuracy of the measuring spectrum.

ID 7511

2D Shape Reconstruction Based on Ring-Core Few-Mode Fiber and DPP-BOTDA

Authors: Pengbai Xu, Huapeng Guo, Kunhua Wen, Xinyong Dong, Jun Yang and Yuwen Qin

Abstract: In this study, distributed shape reconstruction is demonstrated based on a ring-core few-mode fiber and differential pulse-pair Brillouin optical time-domain analysis. An asymmetric hump shape is successfully reconstructed via the Frenet-Serret-frames algorithm.

ID 4689

Optical Frequency Comb Generation from a Bismuth-Based Mode-Locked Fiber Laser

Authors: Yutaka Fukuchi and Ryoichi Miyauchi

Abstract: Optical frequency comb generation from an active mode-locked laser employing a bismuth-based nonlinear erbium-doped fiber is demonstrated. A 10GHz-spaced comb with a bandwidth of 240GHz is produced.

ID 6328

Theoretical Derivation of Mode Coupling Coefficient for The Crosstalk of Super-Modes in Few-Mode Multicore Fiber

Authors: Haoyu Rui, Wencheng Li, Shulin Jin, Hongfeng Pan and Lian Xiang

Abstract: We have derived a universal expression of the mode coupling coefficient between super-modes in few-mode multicore fiber (FM-MCF). Results show that the inter-super-mode crosstalk (ISMXT) in our theory is consistent with former theories.

ID 9815

The Influence of Refractive Index Disturbance of Ring-Core Fiber With Central Air Hole On Modes Separating

Authors: Yuzhen Zhao, Youchao Jiang, Zixiao Wang, Shiyong Xiao

Abstract: In this paper, the influences of the ring thickness, the maximum refractive index of the ring and curve steepness on the mode separation are analyzed, and we manufacture the ring-core fiber with central air hole.

ID 4339

Effect of Twisted Side Cores on OAM Modes in Chirally-Coupled-Ring Fiber

Authors: Shuo Liu, Xiongfeng Rao, Li Yang

Abstract: The variations of effective refractive indices of OAM modes with the parameters of the twisted side cores in chirally-coupled-ring fiber are simulated, which shows the fiber has great potential on the OAM generation and transmission.

ID 458

Time-efficient Data Reduction Solution For Coherent Phase-Sensitive OTDR with Twice Undersampling Method

Authors: Feihong Yu, Liyang Shao, Shuaiqi Liu, Weihao Lin, Xingwei Chen and Huabei Liu

Abstract: A time-efficient data reduction solution based on the twice undersampling technique was proposed, which has a 95% data reduction ratio while being able to improve the data processing speed by 72.89%.

ID 3193

Ultrafast Temperature Interrogation using an In-Line Mach Zehnder Interferometer based on Optical Time-Stretching

Authors: Weihao Lin;Yibin Liu;Siming Sun;Shangru Li ;Jie Hu;Fang Zhao;Feihong Yu;Shuaiqi Liu;Perry Ping Shum;Perry Ping Shum

Abstract: An ultrafast temperature interrogating system based on the optical time-stretch method is proposed and experimentally demonstrated. The wavelength shift is converted into time domain pulse drift by employing a dispersive element.

ID 1601

A Compact Sagnac Loop for Temperature Sensing Based on Time-Stretch Method

Authors: Weihao Lin;Siming Sun;Xingwei Chen;Huabei Liu;Junhui Sun;Jinghang Zhao;Jingming Zhang;Perry Ping Shum;Liyang Shao

Abstract: we present a new method to detect temperature based on polarization maintaining fiber to construct a Sagnac interferometer in time domain, an ultrafast temperature sensor with a sensitivity of 0.482 ns/ °C is realized.

ID 7075

Temperature Monitoring of Data Center based on Temperature Sensitive Laser

Authors: Xuwei Wang, Desheng Li, Ying Qiu, Xuesheng Tang, Jin Tao, Ming Luo, Zichen Liu, Xiang Li, Li Liu, Tianye Huang and Perry Ping Shum

Abstract: Two schemes of temperature-sensitive laser for intra-datacenter communication link are proposed. Results show that the temperature of the data center can be monitored in real time by measuring the wavelength shift of the transmitter laser.

ID 9088

Rectangular Noise-Like Pulses In An Er-doped Figure-Nine Fiber Laser

Authors: Haozhe Lyu, Junwen Li, Zhuang Wang, Heping Li, Zhiyao Zhang, and Yong Liu

Abstract: We report on the generation of rectangular noise-like pulses (NLPs) in an Er-doped figure-nine fiber laser. Massive subpulses inside the rectangular NLP are directly identified by utilizing a high-speed real-time oscilloscope.

ID 8870

All-fiber Surface Plasmon Resonance sensor based on D-shape fiber in V-slot Array

Authors: Wancong Zhao, Xiaoning Shi, Anbo Guo, Jiangtao Xu, Xianglong Zeng*

Abstract: We designed and customized a V-slot array to produce D-shape fiber efficiently and fabricated the sensor based on surface plasmon resonance principle by using a multimode optical fiber.

ID 9957

Novel Optical Fibers Assisting Electric Telecommunication Network Construction

Authors: Guangzhe Wu, Bozhong Li, Li Deng, Xiaomeng Xia, He Lu, Wei Jin, Qian Wang, Ying Wang, Can Li, Fuwen Bai, Hanlin Lei, Xinyan Zhou, Liwei Huang, Chao Hu, Liyan Zhang, Biao Shui, Hongyan Zhou and Jun Wu

Abstract: As the essential part of electric communication system, the technical development of optical fiber is a direction worthy of in-depth research. Compared with common-used G.652 fiber, G.654.E fiber with lower attenuation and larger effective area, can eventually realize longer span transmission, and provide a new solution for ultra-long distance transmission for power backbone communication network. 200µm G.657.A1 optical fiber can effectively increase the fiber number of OPGW in power communication access network.

ID 5687

Apodized Fiber Bragg Grating Array Enabled Flexible Multi-Wavelength Random Fiber Laser

Authors: Ming Shen, Yanxin Li, Jiancheng Deng and Xuwen Shu

Abstract: A compact apodized fiber Bragg grating array is fabricated by femtosecond point-by-point tilted parallel

inscription method. Up to six wavelengths emission is achieved with an erbium-Raman random fiber laser employing this device.

ID 4716

High Gain, Low DMG Cladding-Pumped Few-Mode Er/Yb/P Co-Doped Fiber Amplifier for C-band Operation

Authors: Qiang Qiu, Zhimu Gu, Le He, Yingbo Chu, Nengli Dai, Jinyan Li

Abstract: We demonstrate an FM-EYDFA operating in the C-band. With a large-signal power of 4.1 dBm, the DMG of <1 dB and the maximum gain of 28 dB was achieved, with the PCE of 23.9%.

ID 6069

Pedestal 4-core Erbium Doped Fiber For High-Efficiency Cladding-Pumped Amplifier

Authors: Zhimu Gu, Qiang Qiu, Le He, Yingbo Chu, Nengli Dai and Jinyan Li

Abstract:

ID 776

Genetic Algorithm Based O-band multi-step-index OAM Fiber Design

Authors: Mingjuan Zhuang, Jiajing Tu, Quanchao Lu, Shecheng Gao, Zhaohui Li

Abstract: We use genetic algorithms to design a multi-step-index OAM fiber that can support six radial first-order OAM modes mostly can achieve 99.9% purity mainly for O-band data center MIMO-less transmission scene.

ID 9481

A Polarimetric Fiber Sensor For Detecting Current And Vibration Simultaneously

Authors: Aodi Yu, Yuhao Huang, Li Xia

Abstract: A polarimetric fiber sensor is proposed and experimentally demonstrated for simultaneous electric current sensing and real-time vibration monitoring. The two signals can be effectively separated through frequency domain filter due to the difference in frequency.

ID 4406

A Fiber Sensor System for Axle Counting in Railway Application

Authors: Sheng Wang; Tianfu Zhang; Lu Zhang; Yang Li

Abstract: A novel axle counting system based on fiber Bragg grating is proposed. Combined with the highly sensitive axle counting sensor, edge filter demodulation technique and axle counting algorithm, the accuracy of wheel detection is demonstrated.

ID 4831

Highly Sensitive Temperature and Salinity Fiber Sensor based on Vernier Effect by Tapered-PMF in Sagnac-Interferometer

Authors: Fang Zhao, Weihao Lin, Jie Hu, Shuaiqi Liu, Feihong Yu, Perry Ping Shum, Liyang Shao

Abstract: A kind of highly sensitive salinity solution and temperature sensing system based upon Vernier effect in a single tapered-Sagnac interferometer structure is demonstrated. It has great potential in the ocean environmental monitoring.

ID 7966

Near-Nyquist Optical Pulse Generation By Parametric Process In Highly Nonlinear Fiber

Authors: Yusheng Yao, Jiakang Li, Dongfang Jia*, Chunfeng Ge*, Zhaoying Wang, and Tianxin Yang

Abstract: We propose a novel scheme to generate near-Nyquist pulse with a flexible and adjustable duty cycle based on optical parametric process in high nonlinear fiber. Near-Nyquist pulses with different duty cycles are obtained.

ID 6884

Compressed-domain Data Classification for Distributed Acoustic Sensing System

Authors: Xingliang SHEN, Jialong LI, Zhengting WU, Hong DANG, Jinna CHEN, Liyang SHAO, Huanhuan LIU, and Perry Ping SHUM

Abstract: A novel method to compress the distributed acoustic sensing signal while sampling, and directly detect and classify the vibration events with compressed data.

ID 6456

Enhancement Transverse Anderson Localization Effect in Glass-air Disordered Optical Fiber by Tuning the Diameter and Number of Air-holes

Authors: Jiajia Zhao, Yali Zhao, Changbang He, Jinshuai Zhang, Ming Tang

Abstract: We demonstrate a method to enhance the transverse Anderson localization effect and structural stability of glass-air disordered optical fiber by simply adjusting the number and diameter of air-holes.

ID 225

Fiber-Tip Refractive Index Sensor Based on Bragg Grating Written in an Exposed-Core Side-Hole Fiber

Authors: Yun-Qing Meng, Xian Dong, You-Hang Xie, Chuang Wu, Jie Li, and Bai-Ou Guan

Abstract: Fiber tip refractive index sensors based on exposed-core side-hole fiber Bragg gratings with X-shaped fiber cross sections are proposed and demonstrated. Maximum sensitivity of 15.1 nm/RIU is achieved for the refractive index range of 1.33~1.34.

ID 6169

Review of Sensitivity-Enhanced Optical Fiber And Cable Used In Distributed Acoustic Fiber Sensing

Authors: Chun Xiao, Junqiu Long, Lang Jiang, Guofeng Yan, Yunjiang Rao

Abstract: Principle of distributed acoustic fiber sensing and acoustic sensitivity of optical fiber and cable is introduced. Structure and material of sensitivity-enhanced fiber and cable are also presented, including performance improving methods.

ID 6355

A Mode Field Adapter for Single Mode Fibre to Multimode Fibre Based on Fibre Core Thermal Diffusion

Authors: Yaping Liu, Liyan Zhang, Jun Chu, Lei Shen, Zhuang Xiong, Xin Mao, Lei Zhang and Liangming Xiong

Abstract: We propose a mode field adapter based on fibre core thermal diffusion of a single mode fibre. The cutoff wavelength of this single mode fibre is lower than 1100 nm, and the mode field diameter of fundamental mode in this fibre is about 15 μm after thermal diffusion, which is consistent with that of LP₀₁ in multimode fibre. We measured the insertion loss, multi-path interference and bit error rate of the mode field adapter and multimode fibre link. The results provide that multimode fibre can transmit single mode optical signals error free through mode field adapter. Therefore it can improve the transmission rate and capacity of traditional data centers based on multimode fibre.

ID 4720

Two-Dimension Vector Bending Sensor Based on Helical Long-Period Gratings in Four-core Fiber

Authors: Huiqin Peng, Yunhe Zhao, Yuehui Ma, Yongsheng Yang, Yunqi Liu and Zuyuan He

Abstract: We propose a vector bending sensor based on helical long-period gratings in four-core fiber, whose sensitivities at bending directions of 0° and 180° are 7.27 nm/m-1 and -11.39 dB/m-1, 21.37 nm/m-1 and -3.87 dB/m-1, respectively.

ID 7335

FND-glass Fiber Interfaces And Their Optically Detectable Magnetic Resonance Studies

Authors: Mona Jani, Paulina Czarnecka, Adam Filipkowski, Saravanan Sengottuvel, Mariusz Mrózek, Paweł Dąbczyński, Ireneusz Kujawa, Dariusz Pysz, Wojciech Gawlik, Adam M. Wojciechowski

Abstract:

ID 7490

Real-time Detection of Heavy Metal Pb²⁺ by Combining Electrochemical and Microfiber Surface Plasmon Resonance Sensors

Authors: Xiaoling Peng, Jianqing Li, Kaiwei Li, Zhiyong Yang, Zhicong Ren, Daotong You, Tuan Guo

Abstract: A dual-mode approach for simultaneous detection of Pb²⁺ by combining electrochemical and surface plasmon resonance (SPR) microfiber sensors is proposed. Microfiber sensor is attached to indium tin oxide electrode for real-time feedback the electrochemical process.

ID 6948

Low Noise OPGW Gallop Monitoring Based on FBG-FP System with Reference Signal

Authors: Feng Li, Jianye Zhang, Weiwei Huo, Qingrui Guo, and Qianzi Zhang

Abstract: To solve this problem of low SNR for OPGW sensing system based on FBGs, we propose a noise reduction method based on adaptive reference signal processing.

ID 2988

A Novel Few-Mode Multi-Core Fiber With Large Effective Mode Area And Low Inter-Core Crosstalk

Authors: Zhixiang Yang; Yifei Zhao; Yifan Zhang; Guiyao Zhou

Abstract: This Paper proposes a novel 7-core 5-mode fiber. The proposed optical fiber, by adopting a combination of air-trench structure and high-index ring, realizes large mode area and low inter-core crosstalk(XT).

ID 4675

Fast Phase Demodulation Method for Heterodyne Phase-Sensitive OTDR

Authors: Shuaiqi Liu, Feihong Yu, Liyang Shao, Mang I Vai

Abstract: A fast and effective phase demodulation method based on spatial phase shifting is proposed for heterodyne phase-sensitive OTDR. Compared to conventional methods, the proposed method experimentally demonstrated >30% calculation speed improvement with no performance deterioration.

ID 1967

Reflective resonator with angled fiber coupled double microspheres

Authors: Heng Yu, Xiaochen Liu, Yan Xie, Yong Yang, Qi Zhang, Xiaobei Zhang*, Tingyun Wang

Abstract: We propose a reflective resonator device with angled fiber coupled double microspheres. Optical path is studied, and mode splitting phenomenon is introduced by coupled double microspheres.

ID 3669

Demonstration of 112Gb/s PAM-4/6 Transmission Using Low-Complexity Volterra-DFE

Authors: Peili He, Min Sun, Wei Li, Na Li, Zhongshuai Feng, Hua Zhang, Chaonan Yao, Liping Sun, Zongtao He, Hu Zhu, Zhenfeng Xue

Abstract: We propose a low-complexity decision feedback equalizer by simplifying Volterra structure. Based on this equalizer, experiments show that PAM-4 and PAM-6 signals can respectively transmit over 10km and 2km in a standard single-mode fiber.

ID 5532

A Simple Synchronization Method of FPGA-based Parallel Channels for Transmitter

Authors: Jiaxin Yan, Xiaotian Sun, Xiaoxiao Dai, Weiqi Lu, Qi Yang, Jing Zhang, Yuanxiang Wang and Kun Qiu

Abstract: This paper proposes a synchronization method for transmitter parallel channels based on FPGA by measuring BER. In the experiment, we can realize the synchronization of 2-parallel channels with a bit rate of 25 Gbps.

ID 7544

The Pulse Response of Multi-Mode Fibers in Mode-Division Multiplexing Systems

Authors: Mengjiang Jiang, Xingwen Yi, Fan Li

Abstract: We study the pulse response of MMF basing on the matrix propagation model. The results show that in strong coupling regime, the pulse response of MMF follows the Gaussian distribution from the central limit theorem.

ID 3694

FPGA-Based Quasi-Cyclic LDPC Encoding Algorithm

Authors: Zhuo Ding, Liqian Wang, Shanyong Cai, Miao Zhu, Yunfan Chang, Zhiguo Zhang

Abstract: In this paper, an algorithm for quasi-cyclic low-density parity-check code(QC-LDPC) encoding is proposed. Experimental results show that the proposed algorithm not only reduces the encoding delay, but also reduces the complexity of hardware implementation.

ID 8973

End-to-end Learning based on Autoencoder for Fronthaul

Authors: Junyuan Nie, Wenshan Jiang, Xiaoxiao Dai, Qi Yang, Jing Zhang and Kun Qiu

Abstract: In order to improve the performance of the mm-Wave fronthaul in the time-varying wireless environment, we introduce autoencoder based end-to-end learning to optimize the system performance. We conduct experiments in several mm-Wave channel environments, such as line-of-sight, obstacle blocking and multipath channel. The constellation mapping/de-mapping of transceiver is optimized by end-to-end learning method. The simulation and experimental results indicate that the method can realize adaptive mapping with slight shaping gain and achieve robustness under different channel conditions.

ID 9060

Temperature Interrogation Based Peanut Shaped MZI Demodulated by 1D CNN Incorporated Time-stretch

Authors: Yibin Liu, Weihao Lin, Gina Chen, Huanhuan Liu and Perry Shum

Abstract: The dual peanut shaped fiber MZI and disperse fiber which transform the sensor data from spectrum to time domain are constructed to ultrafast temperature detection based on 1D CNN demodulation.

ID 4443

Signal-to-noise Ratio Estimation In Weakly Coupled Multi-Core Fiber Transmission Systems

Authors: Wencheng Li, Haoyu Rui, Lian Xiang

Abstract: We investigated the signal-to-noise ratio (SNR) in weakly coupled multi-core fiber (MCF) transmission systems by taking into account intra-core nonlinear interference noise (NLIN) and nonlinear inter-core crosstalk (NICXT). Then we assess corresponding transmission performance.

ID 9276

A Low Complexity Windowed Decoding based on Extended Min-Sum Algorithm for Non-Binary Spatially-Coupled LDPC Codes

Authors: Yatong Zhao, Liqian Wang, Miao Zhu, Weiming Wang, Kai Tao, Yinlong Shi and Xue Chen

Abstract: Windowed decoding based on the EMS algorithm is proposed in this paper, which can reduce the complexity by more than 30%. Furthermore, 0.3 dB gain is obtained without complexity cost in the improved EMS-WD scheme.

ID 979

An Efficient Multi-Wavelength Group-Based Fault Detection Scheme in PON System

Authors: Zheyi Jin, Meihua Bi*, Miao Hu, Jiao Zhang, Jun Li

Abstract: We present a fault detection scheme with the multi-wavelength grouping coding (MWGC) technology to achieve the signal detection problem in large-capacity PON system. By constructing the simulation, this scheme is verified.

ID 9486

Energy Efficiency with Distance-Adaptive Traffic Grooming in IP over Elastic Optical Data Center Networks

Authors: Zhipeng Hao, Jingwen Hu, Hong Chen, Weidong Shao, Bowen Chen, Jinbing Wu

Abstract: We investigate the energy efficiency with the distance-adaptive traffic grooming approach in IP over elastic optical data center networks. Simulation results show that the proposed approach significantly reduce the energy consumption and realize resource optimization.

ID 5503

Improvement of SPGD by Gradient Descent Optimization Algorithm in Deep Learning

Authors: Zhao Qingsong, Hao Shiqi, Wang Yong, Wang Lei, Zhi Lin

Abstract: To accelerate the convergence speed of SPGD algorithm in wavefront correction, an iterative correction algorithm combined with the Adam optimization is presented, and the simulation verifies that the algorithm is more robust in turbulent environment.

ID 4472

Analytical Solution of All-Optical Format Conversion Based on XPM Effect

Authors: Qiankun Li, Hai Lin, Qi Xu

Abstract: The XPM effect has been used to convert the amplitude-modulated signal to the phase-modulated signal in all-optical signal processing. This paper mainly introduce the exact analytical solution of the converted phase-modulated signal based on the XPM effect.

ID 4988

Higher Order Asymmetrical Split-Step Fourier Method for Nonlinear Schrodinger Equations

Authors: Qingsong Hu, Junhe Zhou

Abstract: A higher order asymmetrical SSFM is introduced, which brings significant accuracy improvement for the NLSE solution. A nonlinear Fourier Transform(NFT) based fiber communication system is simulated, demonstrating the step size is increased by 40 times with the computational cost increased only by 2 times.

ID 8398

Nonlinear Impairment Compensation Using Self-Attention Mechanism in OAM Mode Division Multiplexing Transmission

Authors: Yujia Mu, Ran Gao, Qi Zhang, Yi Cui, Fei Wang

Abstract: A shift autocorrelation self-attention equalizer has been proposed for nonlinear compensation in orbital angular momentum mode division multiplexing optical fiber communication system. The experimental results show that the algorithm has 2 dB and 1 dB sensitivity gain compared with conventional Volterra and CNN nonlinear equalization.

ID 910

Improved Post-compensation SSBI Mitigation Method for Single-sideband Signals

Authors: Zhonghan Su, Zhennan Zheng, Xinlu Gao, Jingcan Ma, Jiasi Yang and Shanguo Huang

Abstract: We improved the post-compensation SSBI mitigation method by analyse the possible value of SSBI and reduced the iterations required.

ID 1276

Self-sustained Optical Frequency Combs Generation with a Tunable Line Spacing based on Coupled Optoelectronic Oscillators

Authors: Haiyan Dong, Hanlei Zeng, Juanjuan Yan

Abstract: A coupled optoelectronic oscillator based OFC generator is demonstrated. It consists of a mode-locked ring laser and an optoelectronic feedback loop. Two OFCs with an 8-GHz and 10-GHz spacing are experimentally produced.

ID 8419

Design of Polar Turbo Product Codes for Optical Fiber Communications Based on FPGA

Authors: Xinda Chen, Yinghao Wang, Weifeng Qian, Kai Tao, Yongben Wang and Weiming Wang

Abstract: We propose a dynamic parameter decoding algorithm for polar-TPC, with 0.1 dB gain. In addition, we construct a 16.7% concatenated polar-TPC and Reed-Solomon (RS) code with a pre-forward-error-correction BER of 2.05×10^{-2} .

ID 6290

Frequency Modulated Continuous Wave Linearization of LiDAR Using Reinforcement Learning

Authors: Haohao Zhao, Guohui Yuan and Zhuoran Wang

Abstract: The frequency-swept laser (FSL) acts an important part in frequency modulated continuous wave (FMCW) light detection and ranging (LiDAR), while its inherent nonlinearity is always deemed as one of the most important issues. To address this weakness, we import deep reinforcement learning (RL) to control the modulation signal of the FSL to guarantee the linear FMCW generation. The experimental result shows that the distance resolution raises more than one order of magnitude with the RL control, indicating that our novel routine is excellent for the feedback control to realize the purpose of the FMCW linearization.

ID 1053

A Modified Permutation Algorithm for Low Complexity Encoding in NB-QC-LDPC codes

Authors: Miao Zhu, Liqian Wang, Yatong Zhao, Weiming Wang, Kai Tao, Yinlong Shi and Xue Chen

Abstract: A modified permutation algorithm that optimizes the preprocessing step of the efficient encoding algorithm is proposed for Non-Binary quasi-cyclic low-density parity-check codes. Linear complexity encoding is implemented and at least 0.15dB performance loss is avoided.

ID 823

Capacity of Normal and probability shaping APSK/QAM in Visible Light Communication System

Authors: Guojin Qin, Xianhao Lin, Jifan Cai, Ruizhe Jin, Jianyang Shi, Nan Chi

Abstract: The capacity of MAPSK/QAM is comprehensively investigated in linear and fitting non-linear VLC channel under two kinds of power limitation. 8,16,64,256-APSK performs well under peak-power limitation, while 8-QAM 32,64-APSK have more robustness in non-linear channel.

ID 721

A Semi-closed Form Formula to Evaluate the NLI in the Presence of Bidirectional Raman Amplifier

Authors: Chengcheng Wu, Min Sun, You Wang, Wei Li, Liping Sun, Zongtao He, Hu Zhu, Zhenfeng Xue

Abstract: A semi-closed form formula to evaluate the nonlinear interference in bidirectional Raman WDM links is proposed. The accuracy of the formula is almost identical to the GN-Model, while the computational efficiency is obviously improved.

Poster Session 2

Time: 10:00-11:30 | Hallway, 4F

ID 4918

Fiber nonlinear compensation using Bi-directional Recurrent Neural Network Model Based on Attention Mechanism

Authors: Xinzhi Yang, Zili Fang, Wenbo Zhang, Lixia Xi, Xiaoguang Zhang and Nan Cui

Abstract: A bi-directional recurrent-neural-network-based algorithm with attention mechanism for nonlinear effects compensating in optical fibers is proposed. Comparing with digital back propagation method, 0.6 dB ~ 1.0 dB improvements had been achieved.

ID 8591

Experimental Investigation On The Security Vulnerability of Electro-Optic Self-Feedback Phase Encryption Loop For Secure Optical Communication

Authors: Lihong Zhang, Wenkun Huang, Wenfu Gu, Zhensen Gao, Yuncai Wang, Yuwen Qin

Abstract: We propose an experimental setup for cracking the TDS of electro-optic self-feedback phase loop, and demonstrate the feasibility of the scheme for modulating different rates NRZ signals by combining statistical analysis techniques with hardware devices.

ID 9876

One time Pad Scheme based on CSI and Polar Code for OFDM-PON

Authors: Bingshuai Wang, Yaoqiang Xiao, Zhiyi Wang

Abstract: A one-time pad scheme based on channel state information (CSI) and polar code is proposed. Simulation results show that proposed scheme has great potential in enhancing data security and improving transmission performance.

ID 3804

Demonstration of 50 Gb/s PAM4 Secure Optical Communication Based On Electro-Optic Self-Feedback Temporal Phase Encryption

Authors: Ying Luo, Biao Su, Bin Tang, Zhensen Gao, Yuncai Wang, Yuwen Qin

Abstract: We propose a 50 Gb/s PAM4 physical-layer secure optical communication system by employing an electro-optic self-feedback hardware module for temporal self-phase encryption and decryption without consuming any additional encryption channel.

ID 6425

A Temperature Compensation Method For APD Requiring High Voltage Power Supply

Authors: Hao Wang; Minglun Zhang; Hongyu Zhou; Xiao Zhu

Abstract: This paper presents a temperature compensation method for APD working under high voltage. By using temperature sensor and low output impedance characteristic of the amplifier circuit, the temperature compensation is achieved to a certain extent.

ID 8233

Joint Modulation Format Identification and OSNR Monitoring based on LSTM

Authors: Xingle Chang, Zhipei Li, Qi Zhang, Chenchen Wang, Yongjun Wang, Qinghua Tian, Feng Tian, Xiangjun Xin

Abstract: A joint modulation format identification and OSNR monitoring scheme based on LSTM is proposed for the accurate performance monitoring of coherent optical communication systems.

ID 1941

Design of Codebook for Long-reach Sparse Code Multiple Access Passive Optical Networks**Authors:** Pengcheng Deng, Hui Yang, Xianzhuo Zhang, Anlin Yi, Lianshan Yan

Abstract: A novel design of Sparse code multiple access codebooks over fiber channel is proposed. The simulation results show the proposed codebook design exhibits good transmission performance, especially in the low optical signal to-noise ratio regions.

ID 9030

Performance analysis of relaying FSO communication system based on optical CDMA**Authors:** Jiahe Zhang, Jianhua Ji, Ke Wang, Ming Xu and Yufeng Song

Abstract: By establishing system models of amplify-and-forward (AF) and decode-and-forward (DF) relaying FSO-CDMA, expressions of bit error rate (BER) are analyzed and derived theoretically.

ID 2103

Linear Neural Network Enabled Optical Performance Monitoring From Directly Detected PDM-QAM Signals**Authors:** Yijun Cheng, Songnian Fu, Zhiyun Yan, Yuwen Qin

Abstract: We experimentally demonstrate a linear neural network enabled optical performance monitoring for directly detected PDM-QAM signals. For 10Gbaud PDM-QAM16/64 signals, the accuracy of MFI reaches 100% and the RMSE of OSNR monitoring is 1.13dB.

ID 3653

All-optical Clock Recovery Based on Ultrahigh-Order Mode Locking with NPR in SOA**Authors:** Shangchun Wang, Haiyang Wang, and Zhengyong Li

Abstract: We propose a scheme of all-optical clock recovery (AOCR) based on ultrahigh-order mode locking by a semiconductor optical amplifier, and realize the AOCR up to 40 Gbits/s with PRBS NRZ optical signals.

ID 6493

Experimental Investigation on All-fiber Few-mode Recirculating Loop System (AF-FMRLS)**Authors:** Tianfeng Zhao, Shenglong Tang, Feng Wen, Baojian Wu, Bo Xu and Kun Qiu

Abstract: We experimentally demonstrate an all-fiber few-mode recirculating loop system (AF-FMRLS) with the transmission performance investigation. The operable area slowly squeezed with the round trip significantly helps reduce the multi-input multi-output (MIMO) complexity.

ID 7477

Vector Soliton Distillation of Laser Pulses Based on Nonlinear Fourier Transform**Authors:** Yutian Wang, Songnian Fu, Ming Tang, Jian Kong, Xiahui Tang, Luming Zhao

Abstract: We propose and demonstrate the application of the soliton distillation signal processing based on the nonlinear Fourier transform to the vector soliton purification in an ultrafast fiber laser.

ID 4999

A Data-effective Black-box EDFA Gain Model with Singular Value Decomposition**Authors:** Yuqi Li, Mingming Zhang, Ming Tang

Abstract: We propose an accurate prediction method of gain spectra of EDFA, under different conditions of signal-pump power, utilizing singular value decomposition. The RMSE of the spectral gain prediction is 0.1319 dB with experimental validation.

ID 7350

Joint Modulation Format Identification and Mode Coupling Estimation Scheme Based on ADTP and MT-CNN for Mode Division Multiplexed Systems**Authors:** Fan Yang, Chenglin Bai, Hongbing Gao, Xinyu Chi, Ruohui Zhang, Qi Qi, Hengying Xu, Lingguo Cao, Peng Qin

Abstract: We propose a scheme based on ADTP and MT-CNN, which realizes joint monitoring of MFs and MCs at intermediate nodes for MDM systems. The monitoring accuracies of MFs and MCs exceed 98.5% and 98.8%, respectively.

ID 6920

DWDM Optical Network Monitoring Based on PAM4 Digital Label with QC-LDPC Coding

Authors: Xue Wang, Tao Yang, Jiao Wang, Kaixuan Li, Sheping Shi

Abstract: A DWDM monitoring scheme based on PAM4 digital label with QC-LDPC coding is proposed. The monitoring efficiency can be significantly improved, as more monitoring information can be obtained correctly and simultaneously with low cost.

ID 6098

SnF with Balanced Storage Use in Optical Circuit Switched (OCS) Networks

Authors: Tasabbir Rakibul Hoque, Weiqiang Sun, Weisheng Hu

Abstract: Balanced resources are crucial for improving network stability and we propose storage-balanced routing based on a time-shifted multilayer graph. Simulation results show that balanced storage use improved storage and link utilization, therefore, enhancing network performance.

ID 8981

Investigation of Low-PAPR Coherent-Optical OFDM System Based on DFT-Spread

Authors: Lei Li, Yupeng Li

Abstract: Coherent optical orthogonal frequency division multiplexing (CO-OFDM) systems have high peak to average power ratio (PAPR). An interpolated subcarrier selective mapping method for PAPR reduction based on discrete Fourier transform spread (DFT-Spread) is proposed.

ID 3547

High Security SCMA Encryption Scheme Based On Codebook And Frequency Masking In Seven Core Fiber

Authors: Shuaidong Chen, Jianxin Ren, Yaya Mao, Xiumin Song, Bo Liu, Xiangyu Wu, Yu Bai, Yibin Wan

Abstract: A high security SCMA encryption scheme based on codebook and frequency masking in seven core fiber was proposed. The 7D cellular neural network (CNN) is used for codebook encryption and carrier frequency encryption.

ID 4533

Middle Equalization Scheme for Visible Light Communication Utilizing Phosphor-coated LED

Authors: Yufeng Wang, Yiwu Xu and Xiongbin Chen

Abstract: A 1.9 Gbps visible light communication (VLC) system based on a commercial phosphor-coated LED is achieved using a novel middle equalization scheme. A VLC Gigabit Ethernet system with a distance of 7 m is demonstrated.

ID 7417

Complexity Comparisons Between Complex- And Real-Valued Neural Network Equalizers For Short Reach Optical Interconnects

Authors: Caoyang Liu, Lin Sun, Jiawang Xiao and Gordon Ning Liu

Abstract: A complex-valued recurrent neural network equalizer (RNNE) is proposed for optical IMDD communication systems. Complexity comparisons to the real-valued RNNE is performed.

ID 3062

High-Dynamic Transmission Modeling for Laser Inter-Satellite Links (LISLs)

Authors: Juan Yong, Feng Wen, Zhiwei Hu, Feng Fan and Kun Qiu

Abstract: In this paper, we establish a highly dynamic theoretical model for the laser inter-satellite links (LISLs), taking

the sun outage, the Doppler frequency shift and the platform vibration as the major noise sources of the free-space laser communication system.

ID 1986

Modulation Format Classification of Probabilistically Shaped M-QAM Signals Based on Nonlinear Power Transformation

Authors: Junling Huang, Anlin Yi

Abstract: In this paper, we proposed a modulation format classification scheme for probabilistically shaped quadrature amplitude modulation (PS-QAM) by extracting the amplitude information and nonlinear power spectrum after high-order Fast Fourier Transform (FFT).

ID 2597

Amplitude-adaptive 3-D Stokes Space Algorithm for Polarization Demultiplexing

Authors: Pengfei Wang, Mingyi Gao, Xinbang Han, Xin Shi, Xiaodi You and Gangxiang Shen

Abstract: A polarization demultiplexing algorithm based on Stokes space for an eternal time-varying SOP signal is proposed. The simulated results verify that the algorithm has a higher convergence speed and is more accurate for 16-QAM.

ID 5818

Channel-Aware Subcarrier Allocation for Hybrid NOMA/OFDMA-Based Bandlimited Multi-User VLC Systems

Authors: Chen chen

Abstract: We propose a channel-aware subcarrier allocation scheme for hybrid NOMA/OFDMA-based bandlimited multi-user VLC systems. Simulation results show that a 3.3-dB SNR gain over the benchmark scheme can be obtained in a four-user VLC system.

ID 606

Rectangular Constellation Coding for Probabilistically Shaped High-order QAM Signals

Authors: Fengchu Cao, Mingyi Gao, Xinbang Han, Xin Shi, Xiaodi You and Gangxiang Shen

Abstract: We proposed a rectangular constellation coding to extend the Euclidean distance of probabilistically shaped high-order quadrature amplitude modulated signals. The improved BER performance for PS 1024-QAM and PS Room 4-96-QAM has been achieved in simulation.

ID 8250

Balanced Coding Schemes for Optical Multipath Interference Supression in PAM4-IMDD Systems

Authors: Kunjian Lian, Dawei Wang, Huixiao Ma and Zhaohui Li

Abstract: We develop two balanced coding schemes with low complexity for multipath interference (MPI) noise suppression in optical PAM4-IMDD systems. Simulation results confirm that the two schemes effectively mitigate the MPI induced carrier-carrier beat noise and improve the system BER performance with reduced power penalty for large laser linewidth.

ID 8035

Joint Equalization of RSOP and PMD Impairments Based on Square-root Cubature Kalman Filter for PDM-16QAM System

Authors: Zukai Sun, Hengying Xu, Chenglin Bai, Yining Zhang, Lingguo Cao, Fan Yang, Hongbing Gao, Yanfeng Bi, Nan Cui

Abstract: We propose a polarization demultiplexing scheme using Square-root cubature Kalman filter for 28 GBaud PDM-16QAM system. It can jointly compensate 90 ps DGD under 15 Mrad/s RSOP with time complexity of $O(N \log N)$.

ID 5120

Demonstration of Ultra-Low Cost Wavelength Labelling System Supporting Bidirectional 240-lanes-DWDM Optical Networks**Authors:** Keji Zhou, Yong Xiao, Tianming Li, Chenjie Rao, Yancai Luan, Yaqin Wang and Sheng Cui, Ming Wei

Abstract: A novel design of an ultra-low-cost bidirectional 240-lanes-DWDM wavelength labelling system based on Xilinx FPGA(XC7A200T). The monitoring error is less than 0.5dB when the optical power is in the range of -23 ~ -13 dBm.

ID 3855

Tunable Multi-wavelength Nyquist Pulses Generation**Authors:** Jiakang Li, Yusheng Yao, Dongfang Jia*, Chunfeng Ge*, Zhaoying Wang, and Tianxin Yang

Abstract: We propose a novel scheme for Nyquist wavelength division multiplexing (WDM) without guard band based on recirculating frequency shifting (RFS), which can generate tunable multi-wavelength Nyquist pulses with only one laser.

ID 3995

Fiber Nonlinearity Mitigation for mQAM Coherent Optical Communication System Utilizing Random Forest Algorithm**Authors:** Guanqun Zhan&Anlin Yi

Abstract: A fiber nonlinearity mitigation for m-level quadrature amplitude modulation (mQAM) system utilizing random forest algorithm is proposed. The feasibility is verified in both uniformly distributed mQAM and probabilistically-shaped (PS-mQAM) long-haul coherent optical communication system.

ID 5719

Modified Dual-depletion Region Photodetector**Authors:** Weifang Yuan, Xiaofeng Duan, RenRen, Ke Li, Yu Li, Kai Liu, Yongqing Huang, and Xiaomin Ren

Abstract: A modified dual-depletion region photodetector is proposed based on a triangulated distributed electric field. The results show a significant improvement in the bandwidth of MDDR-PD compared with that of UTC-PD and DDR-PD.

ID 7452

A Novel Photodiode Equivalent Circuit Model Considering Electrode Skin Effect**Authors:** Tonghui Li, Xiaofeng Duan, Gongqing Li, Ke Li, Kai Liu, Yongqing Huang

Abstract: Novel equivalent circuit model for photodiodes is proposed by considering the skin effect of the electrode at high frequency. The fitting results are in good agreement with measured results.

ID 988

Study on Characteristics of Optoelectronic Frequency Down-Conversion In Uni-traveling Carrier Photodetector**Authors:** Zicheng Wang, Yongqing Huang, Shaoyu Wang, Xuejie Wang, Jiawei Du, Xiaofeng Duan, Kai Liu, Yisu Yang, Xiaomin Ren

Abstract: The output characteristics of optoelectronic frequency down-conversion of RF signal in uni-traveling carrier photodetector are studied. The main mechanism of photoelectric frequency down-conversion is the regulation of RF signal on transport velocity of electrons.

ID 5827

Single-Carrier 400-Gb/s DP-16QAM Self-Homodyne Coherent Transmission Using an Integrated Thin-Film Lithium Niobate Polarization Controller

Authors: Haiqing Wei, Kaiqin Lai, Ranfeng Gan, Sen Zhang, Qun Zhang, Qian Xiang, Lu Qi, Mingzhen Huang, Kaixuan Chen, Dawei Wang, Liu Liu, and Changjian Guo

Abstract: We demonstrate 400-Gb/s SHC transmission over 20-km SSMF using an integrated TFLN polarization controller with a novel APC algorithm. A polarization scrambling speed of up to 210-krad/s is successfully tracked without performance penalty.

ID 4611

Phase Noise Mitigation in Continuous Chirp Phase-Sensitive OTDR With Digital Filtering

Authors: Haijun He, Zhengyu Pu, Yin Zhou, Lin Jiang, Xihua Zou, Wei Pan, Lianshan Yan

Abstract: This work theoretically analyzes the effect of phase noise on the sensing accuracy in CC Φ -OTDR and uses a Lorentz filter to mitigate the effect of phase noise, achieving about 9-dB sensing accuracy improvement.

ID 181

Research on High-Precision Frequency Transfer Based on Space Laser

Authors: Lei Zhang, Xiaodong Liang, Dongjie Wang, and Shaobo Li, MingYang Lv

Abstract: We establish an optical carrier RF phase stable transport system in free space. The free space frequency transmission experiment realizes the 100m spatial link transmission, and the second stability reaches 5.15×10^{-14} .

ID 564

Interaction of Probabilistic Shaping and the LDPC Code Rate

Authors: Zhongliang Sun, Han Cui, Du Tang, Zhen Wu, Yueming Lu, and Yaojun Qiao

Abstract: In this paper, we evaluated the interaction of probabilistic shaping pulse amplitude modulation (PS-PAM) and forward error correction (FEC) using the low-density parity check (LDPC) in intensity modulation / direct detection (IM/DD) system with transmitter peak-power constraint (PPC). The simulation results show that the combination of shaping and FEC code rate jointly influence the post bit error ratio (BER) performance at the same net rate. The results indicate that the shaping and the LDPC code rate should be simultaneously taken into consideration in PS transmission system.

ID 5594

Investigation of Filtering Penalty Estimation Considering WSS Statistical Characteristics And Link Noise Distribution

Authors: Wenbo Yu, Hu Shi, Yiqi Li, Huan Chen, Wendong Shang, Yuting Du, and Zhenhua Feng

Abstract: We propose a fast but accurate filtering penalty estimation method for practical optical transmission system with commercial coherent transponders and WSSs. Experimental and simulation results show estimated OSNR penalty can be achieved within 0.3-dB errors.

ID 2848

OAM Mode Division Multiplexed Optical Fiber Communication System with CNN-dropout Equalizer

Authors: Ziyun Jiang, Sitong Zhou*, Ran Gao*, Xinyu Liu, Jiahao Bi, Huan Chang

Abstract: This paper proposes an equalizer based on CNN-dropout technique. Its improvement in BER and robust performances are proved when demonstrated in OAM MDM optical fiber communication system with 180Gbit/s PAM8 signal through 10.2km RCF transmission.

ID 1756

Adaptive Bias Entropy-loading for Capacity Approaching in Indoor Multipath Visible Light Communication Systems

Authors: Jiaqi Chen, Yize Zhang, Yi Sun, Fan Yang, Bo Bai, Shuang Jin, Yuhan Dong

Abstract: We propose an adaptive bias entropy-loading scheme to further approach the multipath channel capacity. It outperforms traditional entropy-loading in terms of achievable information rate and forward error correction overhead with only 11.1%.

ID 1481

RLS-Adam Algorithm for Time-Domain Equalizers in IM/DD Systems

Authors: Zhe Cao, Yuwei Liu, Tianwai Bo, Zhongwei Tan, and Yi Dong

Abstract: We propose and experimentally demonstrate a recursive least square based adaptive moment estimation (RLS-Adam) algorithm for updating the coefficients of time-domain equalizers with faster convergence speed and reduced complexity.

ID 3382

An Improved Frequency Offset Estimation Algorithm Based on Eigenvalue Shift and Grid Search for Discrete Spectrum Modulated NFDM System

Authors: Jianqing He, Jianping Li, Xinkuo Yu, Yonghua He, Yuwen Qin, Songnian Fu

Abstract: We propose an improved frequency offset (FO) estimation algorithm based on training symbols (TS) with eigenvalue-shift and grid-search for discrete spectrum modulated nonlinear-frequency-division-multiplexing (NFDM) system, which can eliminate the baud-rate influence with high estimation accuracy.

ID 4969

Gated Recurrent Unit Aided Nonlinear Dynamics Analysis in Fiber Optics

Authors: Lu Han, Yongjun Wang, Chao Li, Xingyuan Huang, Haifeng Yang, Jingwen Liu

Abstract: In this paper, a data-driven GRU network is proposed to recognize initial pulse mode. The network is trained and tested on pulse evolution in HNLF. Well stability performance and high accuracy of 100% are obtained.

ID 2476

Bending Fault Detection Of Few Mode Fiber Link Based On Multi-Mode Transmission Reflection Analysis

Authors: Liu Feng, Ding Gao Yiyang

Abstract: A bending fault detection method for FMF based on MM-TRA is proposed. The localization errors of 40km FMF bending are less than 5.8 m when the mode combination of LP01 and LP11 is used.

ID 3287

Optimizing the Statistical Properties for an Optically Injected Semiconductor Laser in Chaos

Authors: Xiaoqing Zhou, Bo Li, Xiao-Zhou Li, Yiyang Gu, Xiuyou Han, and Mingshan Zhao

Abstract: Chaotic dynamics of optically injected lasers are investigated for optimizing the statistical properties. The practical limitations on the analogue detection bandwidth are found to be beneficial to the generation of chaotic waveforms with Gaussian distributions.

ID 868

Abnormal Loss Monitoring for Digital Subcarrier-Multiplexing Systems Based on Learned Digital Backpropagation

Authors: Yingjie Jiang, Du Tang, Zhen Wu, Zhongliang Sun and Yaojun Qiao*

Abstract: We propose an abnormal loss monitoring method for digital subcarrier-multiplexing systems based on learned digital backpropagation. The proposed method can simultaneously give the positions of multiple abnormal loss points in the subcarrier-multiplexing systems.

ID 9020

Automatic Trajectory Planning for UAV Aided Visible Light Communication Systems

Authors: Jiawei Hu, Kai Zhang, Zhide Li, Xinke Tang, Yuhan Dong

Abstract: We propose a trajectory planning strategy for UAV-aided visible light communication systems based on deep Q-network (DQN) to maximize the system capacity. We further modify it to balance the ground user fairness and system capacity.

ID 8775

Photonics-aided multi-subcarrier phase-insensitive/sensitive PAM-4 multiplexing wireless transmission system at 100 GHz

Authors: Weidong Tong, Jiao Zhang, Min Zhu, Weiliang Xu, Yingxin Wei, Shuang Gao, Qinru Li, Xiang Liu, Bingchang Hua, Mingzheng Lei, Yuancheng Cai, Liang Tian, Yucong Zou

Abstract: We demonstrate 46 Gb/s 4-subcarrier PAM-4 signals generation and THz wave wireless transmission at 100-GHz, enabled by intensity modulation and heterodyne coherent detection. A comprehensive comparison of phase-insensitive scheme and phase-sensitive scheme is investigated. The simulation results show that the phase-sensitive scheme has a 5.5 dB received optical power sensitivity improvement and 1.8 dB input optical power into photodiode (PD) sensitivity improvement compared with phase-insensitive scheme.

ID 830

Core Selection for Capacity on Demand in Multi-Core Fiber Transmission System

Authors: Akram Abouseif, Ghaya Rekaya-Ben Othman and Yves Jaouen

Abstract: We propose and validate a core selection method on coupled-based MCF transmission system. This method allows to answer the question of capacity on demand of future application, without sacrificing the performance.

ID 5764

On Channel Estimation based on Compressed Sensing for OFDM UWOC Systems

Authors: Xiaoqian Liu, Jiawei Hu, Kai Zhang, Xinke Tang, Yuhan Dong

Abstract: We propose a compressed sensing (CS)-based channel estimation algorithm using equispaced pilots and setting a noise threshold to remove the useless channel taps. It can achieve high estimation accuracy under low pilot allocation complexity.

ID 8703

Cost-Effective Service Function Chain Mapping Approaches in Edge-Cloud Elastic Optical Networks

Authors: Jun Yu, Wenwen Zheng, Hong Chen, Weidong Shao, Danyang Zheng, Bowen Chen, Jinbing Wu

Abstract: In this paper, we develop a virtual network function priority mapping (VNFPM) approach and a virtual link priority mapping (VLPM) approach to improve service function chain (SFC) deployment success and reduce SFC mapping cost.

ID 4164

Maximum Tolerable-Delay Redistribution Approaches with Network Resource Scheduling in Edge-Cloud Elastic Optical Networks

Authors: Jinrui Wu, Jinwen Hu, Weidong Shao, Hong Chen, Mingyi Gao, Bowen Chen and Jinbing Wu

Abstract: According to the needs of different connection requests for the urgency of the allocation, we proposed the maximum tolerable-delay redistribution approaches in edge-cloud elastic optical network. Simulation results show the effectiveness of the proposed approaches.

ID 6219

A Timeslot-Aware Shared Path Protection Scheme in QKD-based Optical Networks

Authors: Bin He, WeiKe Ma, Hong Chen, Weidong Shao, Mingyi Gao, Bowen Chen and Jinbing Wu

Abstract: A timeslot-aware shared path protection scheme is proposed to improve the timeslot utilization in the quantum key distribution (QKD) optical network. Simulation results show that the proposed scheme performs well.

ID 8793

Resource Optimization Approaches with Multi-Line-Rate Traffic Grooming in Cloud-Edge Elastic Optical Networks

Authors: Ruixin Liang, Bowen Chen*, Shoucui Wang, Hong Chen, Mingyi Gao, Weidong Shao

Abstract: In this paper, we proposed resource optimization approaches with multi-line-rate traffic grooming to reduce blocking probability and improve spectrum efficiency in cloud edge elastic optical networks. Simulation results show the effectiveness of the proposed approaches.

ID 1982

Dynamic Resource Allocation Algorithm Based on Periodic Alternation of Bands in C+L+S-bands EONs

Authors: Wenchao Zhang, Shan Yin, Lihao Liu, Yutong Chai, Shanguo Huang

Abstract: We propose a novel dynamic algorithm in the C+L+S-bands network, with flexible resource scheduling by considering the time behavior of traffic and the accumulation of nonlinear interference, which significantly improves the network performance.

ID 460

Dynamic Resource Scheduling in Delay-Sensitive Passive Optical Networks

Authors: Weijing Sang, Hengjun Wang, Rentao Gu, Yun Lu, Yuefeng Ji

Abstract: A novel DBA mechanism is proposed to decrease latency of delay-sensitive services in multi-service scenarios using pre-allocation and reordering algorithm. It achieves a reduction in latency and an improvement in fairness compared with traditional algorithms.

ID 1693

Deep Reinforcement Learning-based RSA of EONs with Elastic Weight Consolidation

Authors: Yan Zhan, Liufei Xu and Yue-Cai Huang

Abstract: We study the deep reinforcement learning-based RSA of EONs. We propose an elastic weight consolidation method, where the agent can remember the learnt policies for previous task during transfer learning, which will reduce catastrophic forgetting.

ID 1817

Entropy-based Reward Design for Deep Reinforcement Learning-enabled Routing, Modulation and Spectrum Assignment of Elastic Optical Networks

Authors: Yuqi TU, Bixia Tang, Yue-Cai Huang

Abstract: We present a new reward design for the deep reinforcement learning (DRL)-based routing, modulation and spectrum assignment in the elastic optical networks (EONs), which can be perceived to facilitate the learning of the agent.

ID 1875

High Baud Rate On-Chip Spatial Mode Signaling Based On Tapered Asymmetric Directional Coupler

Authors: Jun Qin, Ming Jin, Haowen Shu, Qingzhong Deng, Yueqin Li, Jian Sun and Xingjun Wang

Abstract: In this paper, on chip signaling of 400Gbps (2*200Gbps) 16-QAM and 600Gbps (6*100Gbps) QPSK signals are successfully achieved via 2*2 and 6*6 mode (De)MUX which supports TE0-TE1, TE0-TE2, TM0-TM1, TM0-TM2 modes.

ID 396

Adaptive Service Scheduling for Satellite-Ground Downlink Capacity in Optical Satellite Networks

Authors: Kunpeng Zheng, Jia Liu, Yongli Zhao, Huibin Zhang, Wei Wang, Sabidur Rahman, Jie Zhang

Abstract: we propose an adaptive service scheduling method for the time-varying SGDL capacity in OSNs. Results show that proposed method can effectively reduce blocking probability by 39.72% than baseline

Poster Session 3

Time: 14:00-15:30 | Hallway, 4F

ID 3885

Shared Path Protection Based on Time Window Matching in Optical Satellite Networks

Authors: Xuechen Yan, Yongli Zhao, Hua Wang, Wei Wang, and Jie Zhang

Abstract: Targeting the inter-satellite link failure issues in the optical satellite networks, we design a shared path protection algorithm based on time window matching. It improves network redundant degree by 35.68% compared to the benchmark algorithm.

ID 660

Costeffective Delay-bounded Topology Construction of Time-Sensitive Networking for Industrial Internet Applications

Authors: Hao Ma, Guochu Shou, Junli Xue, Yaqiong Liu, Yihong Hu

Abstract: We propose a cost-effective delay-bounded topology construction method that expands local network via preferential attachment with delay constraint. The experiments show that the method is effective, and the node degree is regulated with fitness parameter.

ID 9969

Reconfigurable Optical-electrical Network Architecture for Disaggregated Data Centers

Authors: Wenzhe Li, Guojun Yuan, Pingping Huang

Abstract: We propose a reconfigurable optical-electrical network for disaggregated data centers to fulfill the requirement of different applications. The architecture minimizes the communication hops within one VM with optical reconfiguration. We propose a corresponding reconfiguration scheme to achieve better latency performance. Simulation results show the architecture achieves better latency uniformity, and reduce latency by up to 33%.

ID 2113

Dynamic and Low-Cost TWDM-PON Resource Allocation for NG-RAN Fronthaul with Multi-cell Traffic Predictions

Authors: Pengfei Zhu, Shaohui Li, Zishan Liu, Qiang Cheng and Jiawei Zhang

Abstract: This work proposed an N-steps ahead max First-Fit algorithm with multi-cell traffic predictions to achieve adaptive resource allocation with low resource consumption and reconfiguration cost. Simulation results indicate that the traffic prediction precision can reach 95%, and the proposed algorithm can reduce the reconfiguration cost about fourfold with additional 0.75 wavelengths utilization in average, compared to the baseline.

ID 9279

High Performance Dual Polarization and Dual Wavelength Band Waveguide Grating Coupler

Authors: Xuetong Zhou, Hon Ki Tsang

Abstract: We describe a novel and high performance dual polarization and dual wavelength band waveguide grating coupler which can be fabricated by deep UV photolithography.

ID 2722

Reconfigurable Sb₂Se₃-Silicon Waveguide Based Mode-Order Converter for On-Chip Multimode Silicon Photonics

Authors: Yedeng Fei, Yin Xu, Dongmei Huang, Yue Dong, Bo Zhang and Yi Ni

Abstract: We propose a reconfigurable Sb₂Se₃-silicon waveguide-based mode-order converter, which can achieve the reconfigurable mode conversion function between TE₀-TE₁ and TE₀-TE₀. The total device length is only 2.3 μm with excellent mode conversion performance.

ID 7550

A 67 GHz Silicon Slow Light Modulator Using Slow Wave Electrode For Velocity Matching

Authors: Penghui Xia, Hui Yu, Qiang Zhang, Zhilei, Fu, Qikai Huang, Nannan Ning, Zhujun Wei, Xiaoqing Jiang, Jianyi Yang

Abstract: We demonstrate a silicon slow light modulator using slow wave coplanar waveguide (SW-CPW) electrode for velocity matching. Measured microwave index of the SW-CPW electrode is ~ 7 , which leads to a bandwidth of 67 GHz.

ID 4944

Narrow Linewidth DFB Semiconductor Laser Based on Distributed Phase Compensation

Authors: Yangyang Gong, Jizhou Liu, Zhenxing Sun, Gen Lv, Shijian Guan, Yunshan Zhang, Rulei Xiao, Xiangfei Chen

Abstract: We proposed a HR-AR coated narrow linewidth DFB laser based on the distributed phase compensation. The single-mode properties can be guaranteed through the phase compensation. A typical spectral linewidth of below 200kHz is obtained.

ID 511

Uncooled Tunable Laser Via Multi-Wavelength Laser Array Based On Reconstruction-Equivalent-Chirp Technique

Authors: Jizhou Liu, Yaqiang Fan, Yangyang Gong, Zhenxing Sun, Rulei Xiao and Xiangfei Chen

Abstract: We demonstrated an uncooled tunable laser via the monolithically integrated multi-wavelength laser array based on the reconstruction-equivalent-chirp technique. A tuning range of 33.8 nm is realized at the whole commercial temperature.

ID 7416

X-ray Tube Characteristics Facing X-ray Fluorescence Spectrometer

Authors: Zeyuan Chang, Ran Gao, Qi Zhang, Yun Teng, Lan Rao, Zhewei Cao

Abstract: Through the discussion of theoretical analysis and experimental data of correlation experiments, We propose a method to improve the X-ray diffraction intensity by reasonably designing the parameters of the X-ray tube.

ID 2157

Research on High Diffraction Efficiency X-ray Fluorescence Spot Generation Technology for X-ray Fluorescence Spectrometer

Authors: Cao Zhewei, Zhang Qi, Gao Ran, Teng Yun, Rao Lan, Chang Zeyuan

Abstract: To improve the performance of WDXRF, proposed a method to improve the diffraction X-ray fluorescence spot efficiency. Through the experiment, the light spot is reduced by 50%, and the diffraction efficiency is increased by 3.6%.

ID 4809

Three-dimensional Tunable Orientation Of Silver Nanowires In Nematic Liquid Crystals Via Photo-Alignment

Authors: Ziqi Xia, Jingxin Sang, Jiatong Sun

Abstract: In this work, we explored the orientation, re-orientation and vertical orientation by the combination of the photo-alignment technology, electric field and applied electric field, which realizes Three-dimensional tunable orientation of AgNWs in nematic liquid crystals photo-alignment.

ID 2301

Direct Modulation Bandwidth Improvement in Two-section DFB Lasers Based on the Detuned Loading Effect

Authors: Yifan Xu, Hongming Gu, Tao Fang, Lianyan Li, Yongming Nie, Yunshan Zhang

Abstract: A directly modulated two-section distributed feedback laser is investigated. The reconstruction-equivalent-chirp technique is used to realize the detuning of the gratings. The modulation bandwidth is improved by the detuned loading effect.

ID 6805

Wide-band Fast-Sweeping Tunable Laser Based On Mutliwavelength DFB Semiconductor Laser Array

Authors: Yaqiang Fan, Rulei Xiao, Pan Dai, Jizhou Liu, Zhuo Chen, Zhen Li, Feng Wang and Xiangfei Chen

Abstract: A wide-band fast-sweeping tunable laser array has been designed and fabricated. The continuous wavelength tuning range of the laser array can be greater than 38 nm with a sweeping period of 10.7 ms.

ID 2086

Cascade Photodetector Array with Balanced Detection Function for Terahertz Applications

Authors: Jiawei Du, Xuejie Wang, Yongqing Huang*, Shaoyu Wang, Xiaofeng Duan, Kai Liu, Yisu Yang, Xiaomin Ren

Abstract: A uni-traveling-carrier photodetector (UTC-PD) cascade array for terahertz applications is proposed and the 3dB bandwidth can be improved from 203 GHz to 267 GHz. The cascade array can also obtain a balanced detection function.

ID 8768

Design Method of High-speed MUTC Photodiodes for Terahertz Applications

Authors: Xuejie Wang, Jiawei Du, Yongqing Huang, Ren Ren, Mingxi Yang, Shaoyu Wang, Kai Liu, Xiaofeng Duan, Xiaomin Ren

Abstract: A novel design method of modified uni-traveling- carrier photodiodes for terahertz wave generation is proposed. Both hole and electron transport in photodiodes are considered in the design method to realize high-speed and high-power performance.

ID 3915

Efficient Silicon-Based Graphene Waveguide Photodetector Based On Dual-Polarization Multiplexing

Authors: Ziyi Wei, Ming Jin, Qingzhong Deng, Haowen Shu and Xingjun Wang

Abstract: A compact silicon-based graphene waveguide photodetector integrated with a polarization multiplexing (fundamental TE and TM) optical circuit is proposed for efficient light absorption. The graphene absorption rate is 3.5 times higher than that of a single TE₀-polarized waveguide photodetector, which will greatly reduce the length of the active region and thus improve the performance of bandwidth, dark current, and SNR.

ID 5813

Low Divergence Angle 1.3 μm InGaAlAs/InP Laser Integrated With SSC Having Reverse Mesa Waveguide

Authors: Li Zhenyu, GuoJing, Zhu Xuyuan and Liang Song

Abstract: We report 1.3 μm InGaAlAs/InP lasers integrated with a tapered surface SSC having a reverse mesa waveguide. The far field angles in the vertical and lateral directions are 6.8 and 4.3 degree, respectively.

ID 4812

Analytical Theory For Parametric Gain And Conversion Efficiency Of Four Wave Mixing In Dissipative Micro-Ring Resonator

Authors: Shiqi He, Nuo Chen, Hanghang Li, Zihao Yang, Zhuang Fan, Xinliang Zhang and Jing Xu*

Abstract: We propose an analytical formula for parametric gain and conversion efficiency of four-wave mixing effect in micro-ring resonator with high injected pump power. It is of great importance for integrated parametric devices.

ID 4190

Amorphous Silicon Metasurface-based Polarizer Near 770 nm Wavelength Regime

Authors: Wenlin Luan, Qingcheng Song, and Xia Yu

Abstract: A quarter wave plate operating at 770 nm based on a-Si metasurface is designed and fabricated.

Experiment has been carried out. Some regularity found during simulation may provide valuable ideas for the design of metasurface-polarizers.

ID 6679**Ultra-compact Fiber-to-chip Metasurface-based Edge Coupler**

Authors: Sumei Xu, Yuan Dong, Shaonan Zheng, Qize Zhong, Ting Hu

Abstract: We propose an ultra-compact metasurface-based fiber-to-chip edge coupler for aluminum nitride photonics. The coupling loss is ~ 1.54 dB/facet through a commercially cleaved fiber with an $8 \mu\text{m}$ mode diameter working at $2 \mu\text{m}$.

ID 8129**Rapid Configuration of Optical Processor Based On Reconfigurable Multiport Interferometer**

Authors: Wanyu Zhao, Yihang Dan, Zeyang Fan, Tian Zhang, Kun Xu

Abstract: We demonstrate an optimization method for universal multiport interferometers to perform rapid configuration reconstruction. This method uses deep learning to model the relationship between transmission characteristics and configuration parameters of reconfigurable multiport interferometers.

ID 1267**Performance Analysis of Silicon Optical Phased Array With Nonuniform Antenna**

Authors: Yang Chen, Mengyuan Ye, Duwei Zeng

Abstract: We analyze the performance of OPAs with 6 nonuniform antenna designs and propose an algorithm optimization method for nonuniform antenna design. It is simulated with a steering range of $\pm 50^\circ$ and SMSR of 11.3dB.

ID 6111**Parallel Arrayed Waveguide Grating For Multi-Plane Light Conversion Mode Multiplexer**

Authors: Zepeng Wei, Aru Kong, Ting Lei, Xiaocong Yuan

Abstract: We design and fabricate a 2×8 parallel AWG for an MPLC LP-mode multiplexer which can multiplex 4 wavelengths generated by 8 light sources into 2 parallel output ports with a single AWG structure.

ID 6476**A Low-Fabrication-Temperature Erbium-Based Waveguide Amplifier**

Authors: Bo Wang and Xingjun Wang

Abstract: We report a low-fabrication-temperature erbium-based waveguide amplifier with Er-Yb silicate and Bi_2O_3 mixed material as gain medium. Finally, 2 dB signal enhancement has been observed at 1550nm.

ID 6935**High Speed Directly Modulated $1.3 \mu\text{m}$ InGaAlAs/InP MQW DFB Laser**

Authors: Zhu Xvyuan, Guo Jing, Li Zhenyv and Liang Song,

Abstract: High speed directly modulated $1.3 \mu\text{m}$ InGaAlAs/InP DFB laser has been fabricated. For a $200 \mu\text{m}$ cavity length, the modulation bandwidth is larger than 29 and 21 GHz at 20 and 80°C , respectively.

ID 871**Fabrication and Characterization of Silicon-Organic Hybrid Electro-Optic Modulator**

Authors: Zihan Zhou, Meng Chao, Xinxin Su, Xindi Yang, Zhuo Chen, Shuhui Bo, Ruonan Liu, Zhihua Li, Zhenlin Wu, Mingshan Zhao and Xiuyou Han

Abstract: Electro-optic modulator (EOM) is the key device of high-speed fiber communication and ultra-wideband microwave photonic system. A silicon-organic hybrid integrated EOM is fabricated with 3dB-bandwidth over 50 GHz and half-wave voltage length product $0.26 \text{ V}\cdot\text{cm}$.

ID 5199

Programmable All-Optical Nonlinear Activation Functions Based On A Micro-Ring Resonator With Phase-Change Materials**Authors:** Ziling Fu, Rui Jiang, Xin Ding, Zhi Wang, Jian Wang and Chongqing Wu

Abstract: We demonstrate a programmable all-optical activation function device based on silicon micro-ring resonator loaded with phase change materials. Four different nonlinear activation functions of Relu, ELU, Softplus and RBF are implemented for incident signal light.

ID 6789

An X-interleaved Silicon Modulator For High-Speed Application**Authors:** Zijian Zhu; Yingxuan Zhao

Abstract: This work proposes a modulator based on two inversely oblique junctions by Monte-Carlo simulation. The results demonstrate high modulation efficiency and low loss, showing great potential of 3D design for high-speed datacom.

ID 2167

All-optical Spatial Mode-selective Switch Based on Graphene-embedded Vertical Directional Couplers**Authors:** Lixi Zhong, Quandong Huang, Ou Xu and Yuwen Qin

Abstract: We proposed an all-optical mode-selective switch based on graphene-embedded directional couplers, which can switch the TM₂₀, TM₀₂, TM₁₁, TM₀₁, and TM₁₀ modes with extinction ratios higher than 14.5 dB and control-light powers lower than 1.79 mW.

ID 5843

Low-temperature in Situ Growth of High-Quality Continuous Graphene By Chemical Vapor Deposition**Authors:** Liangchen Hu, Fengsong Qian, Yiyang Xie and Chen Xu

Abstract: We report a method for in situ growth of high-quality graphene at low temperature. By controlling the temperature of two independent temperature zones in the tubular furnace, the graphene growth was realized at 600 oC. Raman measurement results show that the graphene grown is very uniform and continuous, with the intensity ratios ID/IG=0.1 and I2D/IG=1.6.

ID 251

Demonstration of Single-Mode Surface-Emitting Laser With High-Order Mode**Authors:** Xiang Ma, Hefei Qi, Wenqi Yu, Shaobo Li, Qiaoyin Lu and Weihua Guo

Abstract: Single mode surface emitting microcylinder laser with high-order mode is experimentally demonstrated at O-band. Continuous wave working with side-mode suppression-ratio > 40dB has been realized. The output emission can be different high-order mode varying from period number to period number of the top grating.

ID 5653

An Instantaneous-Wavelength-Variation Monitoring System Based on Mach-Zehnder Interferometer For The Wavelength-Swept DFB Laser**Authors:** Zhuo Chen , Pan Dai, Qian Hao , Zhen Li , Yaqiang Fan , Rongrong Dou, Feng Wang, and Xiangfei Chen

Abstract: An instantaneous-wavelength-variation monitoring system based on Mach-Zehnder interferometer for the wavelength-swept DFB laser

ID 2448

An Ultrafast Wavelength-Swept REC-DFB Laser Based On The Instantaneous Injection Current**Authors:** Zhen Li, Pan Dai, Lingxin Meng, Zhuo Chen, Kaichuan Xu¹, Yaqiang Fan¹, Rongrong Dou,

Feng Wang, and Xiangfei Chen

Abstract: An ultrafast wavelength-swept DFB semiconductor laser based on the REC technique via instantaneous injection current modulation is demonstrated. By using FPGA based driving circuit, a wavelength-swept range of 9.27 nm within 5 μ s is achieved.

ID 9358

Ce1Dy2Fe5O12 Magneto-Optical Thin Films for Temperature Stable Silicon Integrated Optical Isolators

Authors: Zixuan Wei, Wei Yan, Yucong Yang, Jun Qin, Longjiang Deng and Lei Bi*

Abstract: We report the Faraday rotation angle of Ce:YIG, Dy:CeIG and Ce:TbIG thin films in different temperature grown in GGG substrate. The results demonstrate that Dy:CeIG has low temperature coefficient of Faraday rotation which is suitable for wide temperature range integrated optical isolators.

ID 5575

Ultra-Broadband Integrated Magneto-Optical Isolators on Silicon Nitride Platforms

Authors: Wei Yan, Di Wu, Yucong Yang, Zixuan Wei, Jun Qin, Longjiang Deng and Lei Bi

Abstract: We report ultra-broadband integrated magneto-optical isolators on silicon nitride platforms based on the dispersion compensation method. The device achieved 2.7 dB insertion loss with 30 nm (3.48 THz) 20-dB isolation bandwidth.

ID 3808

Self-calibrating Microring Resonator By Monitoring Wavelengths

Authors: Zhenming He, Junwei Cheng, Hailong Zhou, Jianji Dong, Xinliang Zhang

Abstract: We demonstrate a self-calibrating microring resonator with 7-bit high-precision configuration and resistance to temperature fluctuations by monitoring wavelengths. This work provides stable and accurate control of microring resonators for optical computing applications.

ID 1285

Slow-Light Waveguide Structure Using Coupled Bragg Grating Resonators on Thin-Film Lithium Niobate

Authors: Gengxin Chen, Liu Liu

Abstract: We demonstrate a slow-light waveguide structure using coupled Bragg grating resonators on thin-film lithium niobate platform, exhibiting small footprint of $\sim 100\mu\text{m}^2$, large 1dB bandwidth of 4.3nm, and large optical group index of 6.5.

ID 8663

Wavelength and Bandwidth Tunable Silicon Photonic Filter Over O+C+L Band

Authors: Pei Zhang, Zhenyu Zhao, Yujia Zhang, Xuhan Guo and Yikai Su

Abstract: We propose and demonstrate a wavelength and bandwidth tunable silicon photonic filter over the O+C+L band using novel Mach-Zehnder interferometers and vernier microring resonators. All bands show ultra-high out-of-band extinction ratios over -35 dB.

ID 7185

Frequency-doubled Microwave Photonic Phase Shifter with Frequency Up-/Down Conversion Without Optically Filtering

Authors: Yingyan ; Jianxin Ma

Abstract: A filterless frequency-doubled microwave photonic phase shifter with frequency up-/down-conversion is proposed and verified by simulations. The electrical spurious suppression ratio for the generated signals is more than 40dB and the conversion efficiency is -18dB .

ID 3286

A Standard Broadband Vector Signal Generation Method Based On Microwave Photonics Technology**Authors:** Liuliu Zhang, He jiang, Zhengyang Xie, Wen Xie, Zheng Zheng

Abstract: We propose a method to generate high-quality broadband vector signal based on the combination of microwave photonics technology and predistortion algorithm.

ID 4714

Wideband Microwave Channelized Receiver Based on Dual Optical Frequency Comb and Photonics-Assisted Image-Reject Mixer**Authors:** Ximin Wang, Jialiang Chen, Yingxi Miao, Caili Gong, Yongfeng Wei, Yuqing Yang

Abstract: A microwave photonics image rejection channelized receiver scheme based on dual optical frequency comb (OFC) is proposed. The image rejection ratio is greater than 25dB. This scheme is reconfigurable.

ID 8988

Generation of Optical Pulses with a Tunable Repetition Rate Using an Electro-optic Frequency-Shifting Loop**Authors:** Yu Wang, Juanjuan Yan

Abstract: A scheme of generating optical pulses with a tunable repetition is demonstrated using temporal Talbot effects in an EOFSL. Optical pulses with a 3-GHz, 6-GHz and 9-GHz repetition rate are experimentally produced.

ID 5283

Impacts of Modulation Instability in a Fiber Recirculation Loop Used for Photonics-Assisted Microwave Pulse Replication**Authors:** Yifan Pu, Xiuyuan Sun, Zhongyang Xu, Shilong Pan

Abstract: The impacts of modulation instability (MI) on photonics-assisted microwave pulse replication are analyzed. The MI in a fiber replication-loop can amplify the signals. Periodic power transfer between the optical carrier and optical sidebands is observed.

ID 6186

WDM Optical Fiber Communication With Reduced DSP Complexity Using Highly-Coherent Laser Array And Joint Post-Processing**Authors:** Shanzhuo Chen, Hao Guo and Yihan Li

Abstract: We report a WDM optical communication structure in which the complexity of post-processing is significantly reduced by using a novel high-coherence Brillouin laser array (BLA) and inter-channel exchange of compensation parameters.

ID 8716

High resolution optical ranging using highly - linear stepped-frequency signals**Authors:** Yujie Lyu, Jiarong Zhang and Yihan Li

Abstract: We present a high resolution optical ranging demonstration using a continuous optical carrier whose instantons frequency is modulated step-wisely with extreme linearity based on a recirculating frequency shifting fiber loop.

ID 5562

A Time-to-Digital Converter Based On Looping And Averaging Logic For Accuracy Improvement**Authors:** Zhiwei Huang, Zidong Chen, Chongzhuo Zhao, Chuanxin Teng, Shijie Deng

Abstract: A time-to-digital conversion (TDC) circuit for accuracy improvement is proposed. By using the loop measurement, the trigger pulse signals are cycled and averaged to reduce the clock jitter and improve the TDC measurement accuracy.

ID 7772

An Element Sharing Based Dynamic Range Adjustable Time-to-Digital Converter**Authors:** Chongzhuo Zhao, Zidong Chen, Zhiwei Huang, Chuanxin Teng, Shijie Deng

Abstract: A dynamic range adjustable time-to-digital converter is proposed. The circuit is based on an element sharing control logic which allows the easy adjustment of the measuring range of the TDC with saved chip layout.

ID 8536

A Reconfigurable Comb-Based Microwave Photonic Filter With Large Bandwidth**Authors:** Zikai Yin, Jingwen Wang, Feifei Yin, Guchang Chen, Yitang Dai and Kun Xu

Abstract: A reconfigurable microwave photonic filter with large bandwidth is proposed. Reconfigurable responses are realized through flexible tap coefficients, and a large bandwidth of 7.1 GHz is achieved by the image interference suppression.

ID 9035

Modeling Device Nonlinearity in Millimeter-wave Photonics Systems**Authors:** Junting Shi, Wen Zhou, Li Zhao

Abstract: The Photonics-aided millimeter-wave (MMW) scheme to complement Beyond 5G (B5G) and 6G mobile networks is hampered by transceiver nonlinearity-induced signal degradation. To better comprehend the impact of each nonlinear device on the signal fidelity of the transmitter, the driver electrical amplifier, Mach-Zehnder modulator (MZM), and photodetector (PD) of the MMW systems are characterized by the VPI software. Their actual working range and optimal operating conditions are investigated by referring to the parameters of commercially available devices.

ID 9927

Performance Comparison of Different Nonlinear Compensation Schemes in E-band Millimeter-Wave Communication Systems**Authors:** Junting Shi, Wen Zhou, Li Zhao

Abstract: An E-band 70-m wireless demonstration has been successfully performed in 256 quadrature amplitude modulation (QAM) formats. Traditional Volterra nonlinear equalizer (VNE) and multiple-input multiple-out (MIMO) VNE, as well as deep neural network (DNN) and long-short-term memory (LSTM) nonlinear compensators, are introduced to retrieve the distorted signals in E-band MMW transmission. The robust NN-based equalization techniques enable a net throughput of 66.67 Gbps over a 70-m wireless delivery.

ID 6248

Effect of Slave Laser Characteristics on Phase Noise of Optical Injection Locking at Weak Powers**Authors:** Dajian Cai, Xiaojie Guo, Zhaohui Li

Abstract: The phase noise of optical injection locking (OIL) at weak injected powers is investigated experimentally. We find that the ratio of linewidth to the cavity structure-dependent lower-limit coefficient determines the phase noise of OIL.

ID 2627

Photonics-assisted Frequency and DOA estimation via Frequency-Spatial Compressed Sensing**Authors:** Tieliang Zhang, Yang Li, Xihua Zou, Wei Pan, Lianshan Yan, Bo Yang, Hao Chi

Abstract: A photonics-assisted antenna array based joint-frequency-and-DOA estimation system is proposed, in which each antenna is mixed with the same PRBS in the optical domain. The incident signals are resolved within 100MHz and 10°.

ID 9501

Hybrid Integrated Microdisk Resonator Temperature Sensing System based on Differential Interrogation and Microwave Photonics

Authors: Nishan Wu, Li Xia, Shiyu Li and Zhuoying Wang

Abstract: A hybrid integrated micro-disk resonator (MDR) temperature sensing system based on differential interrogation and microwave photonics is demonstrated. High-speed demodulation with good linearity and high sensitivity of $-0.3362 \text{ dB}/^\circ\text{C}$ can be realized experimentally.

ID 8837

A Highly Adaptive Compilation Method to Break the Limitation of SNR on Calculation Precision in Photonic Neuromorphic System

Authors: Yuepeng Wu, Cen Wang, Hongxiang Guo, Yi Guo and Jian Wu

Abstract: We propose a compilation method in photonic neuromorphic systems to improve calculation precision and provide high adaptability. Simulations show that our method significantly reduces the SNR requirement for given precision and outperforms physics-aware training methods.

ID 6308

Single-tone Extraction From Multi-Tone Microwave Signal Based On Injection-Locked Optoelectronic Oscillator

Authors: Yaowen Chen, Zhenwei Fu, Lingjie Zhang, Zhen Zeng, Zhiyao Zhang, Yong Liu

Abstract: The optoelectronic oscillator under multi-tone microwave signal injection is investigated. A single-tone signal with a frequency close to dominate oscillation mode of free-running optoelectronic oscillator can be recovered with an optimized far-from-carrier phase noise.

ID 4808

Large-scale Matrix-Vector Multiplication Based on Simplified Circular Optical Computing via Matrix Factorization

Authors: Yi Guo, Hongxiang Guo, Yuepeng Wu, Jian Wu

Abstract: We propose and experimentally demonstrate a circular optical computing model based on limited number of delay lines capable of efficient large-scale matrix-vector multiplication via band constrained nonnegative matrix factorization.

ID 2690

Microwave-photonic Interferometer For Simultaneous Sensing Of Loss And Temperature With Fiber Ring Resonator

Authors: Zhuoying Wang, Shiyu Li, Nishan Wu and Li Xia

Abstract: The optical carrier microwave interferometry of fiber ring resonator for loss and temperature sensing is proposed. Utilizing phase-shift amplification technique, the sensitivity of loss is improved and the special characters of insensitive points are noticed.

ID 6076

A Novel Fabry-Perot Microcavity Based on Nonperiodic High-Index-Contrast Subwavelength Gratings

Authors: Yushang Chen, Yongqing Huang, Kai Liu, Yisu Yang, Xiaofeng Duan, and Xiaomin Ren

Abstract: We report a novel Fabry-Perot microcavity based on nonperiodic high-index-contrast subwavelength gratings, which has outstanding advantages such as high quality factor, narrow spectrum, and small effective mode volume.

Poster Session 4

Time: 10:00-11:30| Hallway, 4F

ID 2423

An All-Optical Analog-to-digital Converter with Enhanced ENOB Based on Modulo Operation and Fourier-Prony Recovery

Authors: Qiuyan Li, Jifang Qiu, Bowen Zhang, Yan Li, Xiaobin Hong and Jian Wu

Abstract: An ENOB-enhanced scheme is proposed by combining an all-optical analog-to-digital converter with modulo operation and Fourier-Prony recovery. Simulation results show that this scheme improves the quantization levels without increasing any hardware cost.

ID 9175

Experimental Demonstration of Optical Quantizers based on General MMI and CSS-MMI

Authors: Bowen Zhang, Jifang Qiu, Chang Liu, Yan Li, Xiaobin Hong and Jian Wu

Abstract: The experimental results show that optical quantizers based on cascaded step-size MMI (CSS-MMI) and general MMI can achieve optimal effective number of bit (ENOB) values of 4.07 bits and 3.83 bits, respectively..

ID 8655

An Efficient Optical Sparse Matrix Multiplication Accelerator for Graph Neural Networks

Authors: Ying Jia, Hongxiang Guo, Yi Guo and Jian Wu

Abstract: We propose an optical graph neural network (OGNN) that can accelerate sparse multiplication of GNN. The proposed OGNN architecture achieves competitive performance with the electronic counterpart and provides efficient computing unit utilization for sparse multiplication.

ID 4587

Highresolution Microwave Photonic Filtering Interrogation Technology Based On Time-Domain Refined Analysis

Authors: Di Zheng*, Xiuwen Zhang, Xihua Zou, Wei Pan

Abstract: The time-domain analysis has been widely used in microwave photonic filtering based interrogation for fiber Bragg grating (FBG) array. In order to solve the problem that the interrogation resolution is limited by RF detection bandwidth in traditional time-domain analysis methods, a novel time-domain analysis with refinement capability has been developed. The proposed time-domain analysis algorithm was theoretically deduced and the feasibility of the proposed method was validated by simulation. Compared to traditional time-domain analysis methods, the proposed time-domain refinement algorithm can greatly improve the interrogation resolution and the demodulation speed at the same system parameters.

ID 5669

A Flexibly Frequency Switchable Optoelectronic Oscillator Based on a Multi-passband Microwave Photonic Filter

Authors: Pan Pan, Weiyu Dai, Sijie Chen, Honyan Fu

Abstract: In this paper, a frequency switchable optoelectronic oscillator (OEO) is proposed, which can be switched with the central frequency of 2.37 GHz and 2.87 GHz in this experiment.

ID 8331

Optical Vector Quadrature De-multiplexer for m-QAM De-aggregations based on Orthogonal-polarization-pumped Phase-sensitive Amplifiers

Authors: Jiabin Cui, Guo-Wei Lu, Yuefeng Ji

Abstract: An orthogonal-polarization-pumped PSA-based optical quadrature de-multiplexer (QD) is proposed and analyzed. The proposed QD can de-aggregate input optical vectors into in-phase and quadrature components. Error-free de-aggregations are achieved for 10G Baud 16/32 QAM signals.

ID 5430

Generation of Phase-Coded Linearly-Chirped Waveforms Based On Spectral Shaping And Frequency-To-Time Mapping

Authors: Xuan Li, Shanghong Zhao, Yixiao Zhou and Guodong Wang

Abstract: A linearly chirped microwave pulse is generated based on all-fiber spectral shaping followed by frequency-to-time mapping, and the phase coding is realized by incorporating polarization modulation in the system.

ID 3971

Switchable Multi-Format Linearly Frequency-Modulated Signal Generator Based on a Sagnac loop

Authors: Guodong Wang; Shanghong Zhao; Xuan Li; Yixiao Zhou

Abstract: A compact method to generate switchable multi-format linearly frequency-modulated (LFM) signal is proposed and investigated. The core components are two phase modulators inside a Sagnac loop, which respectively driven by a linearly chirped waveform and a coding signal. By controlling the amplitudes of the coding signal, we can obtain the LFM signals with different formats, including frequency shift keying (FSK), phase shift keying (PSK), dual-band PSK and FSK/PSK modulation formats. A theoretical analysis and a simulation work are performed to demonstrate the system feasibility. The scheme exhibits switchable formats, high tunability, compact structure, and no DC bias drifts, which may find applications in modern multifunctional system.

ID 7436

Triangular Waveforms Generation Based on an Dual-loop Optoelectronic Oscillator

Authors: Jiali Zhang, Yingying Gu, Bingyi Niu, Qianxue Liu, Fuduo Ji, Xiaozhou Li, Xiuyou Han, Mingshan Zhao, Jingjing Hu

Abstract: A new scheme based on dual-loop optoelectronic oscillator (OEO) to generate triangular wave is proposed. The "vernier effect" is realized by using chirped fiber gratings, which can effectively improve the side mode suppression ratio.

ID 9838

An Ultrafast-Response Perovskite Photodetector Based On A Small Molecule As A Dopant-Free Hole Transporting Layer

Authors: Chengwei Shan, Aung Ko Ko Kyaw

Abstract: The high-performance OIHP photodetector with the Triazine-ThOMeTAD HTL exhibited a low dark current of 1.09 nA/cm², a fast response of 18 ns, and a high detectivity of over 8.2×10^{12} Jones at zero bias.

ID 8788

Organic Solar Cell with Efficiency over 20% and VOC Exceeding 2.1 V Enabled by Tandem with All-Inorganic Perovskite and Thermal Annealing-Free Process

Authors: Xiaoyu Gu, Aung Ko Ko Kyaw

Abstract: A 2-terminal monolithic perovskite/organic tandem solar cell (TSC) incorporating wide bandgap CsPbI₂Br as front cell absorber and organic PM6:Y6 blend as rear cell absorber has been demonstrated with power conversion efficiency (PCE) over 20%.

ID 496

Simultaneous Measurement of Axial Strain and Temperature Based on Twin-core Single-hole Fiber with Vernier Effect

Authors: Yujian Li, Yifan Liu, Weihao Yuan and Changyuan Yu

Abstract: An ultrasensitive optical fiber cascaded MZIs sensor based on the Twin-core Single-hole fiber and None core fiber is proposed for simultaneous axial strain and temperature measurement with the Optical Vernier effect.

ID 1469

Phase Noise Sensitivity of Coherent FMCW LiDAR Measured by Variable linewidth Laser with Low-Frequency Compensation and Mirror Method

Authors: Yu Zhou, Zu-Kai Weng, Keizo Inagaki, Atsushi Kanno and Tetsuya Kawanishi

Abstract: A variable linewidth light source using the mirror method and low-frequency compensation is applied to investigate the impact of laser phase noise on FMCW LiDAR

ID 7707

Simultaneous Temperature and Strain Sensing Based on Single-mode Photonic Crystal Fiber

Authors: Peng Zhou, Chenxi Wang, and Huiping Tian

Abstract: We propose a single-mode photonic crystal fiber (PCF) sensor based on stimulated Brillouin scattering, and it can ensure simultaneous temperature and strain sensing. The proposed PCF sensor can achieve high sensitivity and low measurement error.

ID 5496

Long-distance OPGW Optical Cable Monitoring System Based on ϕ -OTDR Technology

Authors: Ying Wang, Yanyang Lei, Xing Liu, Can Li, Xiaomeng Xia, Tong Chen, Yue Deng, Jing Zhang, Xiaohui Tang*

Abstract: In this paper, a long-range phase-sensitive optical time-domain reflectometer (ϕ -OTDR) system is proposed, which is based on the direct detection type ϕ -OTDR system, combined with the first-order forward Raman distributed amplification technology and remote pump amplification technology, to achieve 130km vibration monitoring range and 20m spatial resolution. Compared with relay EDFA amplification technology and bidirectional distributed amplification technology, the system eliminates the necessity of a remote power supply, which is of great significance in the monitoring application of long-distance OPGW optical cable.

ID 6469

Detection of the AKT Protein Using Supermode Interference Microfiber Sensor

Authors: Zhen Tian, Shengyu Hao, Jinhui Yuan, Liqiang Zhang, Yicun Yao, Zhichao Zhang, Nankuang Chen, Minghong Wang, Qiang Wu

Abstract: A tapered seven core fiber sensor is experimentally demonstrated to detect the AKT in cells. The results show that the TSCF has sensitivity of 6780.7 nm/RIU at 1.42, and the detection limit is 0.5 ng/ml.

ID 6236

A Novel Binary Descriptor for 3D Registration of Point Clouds from Low-cost Sensors

Authors: Zhihua Du, Yong Zuo, Xiaohan Song, Yuhao Wang, Xiaobin Hong, Jian Wu

Abstract: Binary weighted projection-point distance (BWPD) feature descriptor is proposed. Experimental results and rigorous comparisons with the state-of-the-arts validate that our approach achieves the superior performance and the feasibility across contexts and 3D sensors.

ID 6296

A Compact Design And Fabrication Of Optical Force Sensors Based On Integrated GaN Devices

Authors: Yumeng Luo, Gaofei Lu, Jiahao Yin, and Kwai Hei Li

Abstract: In this work, we have designed and fabricated a miniature optical force sensor based on integrated GaN devices. The novel integration of patterned flexible film and 3D printing micropost endows the device with force-sensing capabilities.

ID 4031

Study on distributed OPGW lightning strike location monitoring system based on BOTDR

Authors: Yuan Ji, Jianming Shao, Shuanglong Li, Chen Ye

Abstract: The OPGW lightning strike process is simulated, and the experimental results show that the BFS has an instantaneous rise of at least 8MHz when the quantity of electric discharging is 125C.

ID 3883

Optical Design and Simulation of Interrogator for Fiber Bragg Grating Sensors Based on

Linear Variable Filter

Authors: Zhaoyi Liu, Yi Liu and Anyi Huang,

Abstract: this paper proposes a new interrogator scheme based on linear variable filter (LVF). According to the LVF principle, an optical theoretical model of interrogator was build and stmlated by Zemax.

ID 796

100km Optical Chirp Chain BOTDA with Spatial Resolution of 4m

Authors: Guangzhe Wu, Bozhong Li, Ying Wang, Can Li, Xinyan Zhou, Hanlin Lei, Chao Hu, Li Deng, Xiaomeng Xia, Liwei Huang, He Lu, Wei Jin, Qian Wang, Fuwen Bai, Chao Ma, Liyan Zhang, Biao Shui, Hongyan Zhou and Jun Wu

Abstract: The optical chirp chain Brillouin optical time-domain analysis (OCC-BOTDA) is considered the best performing fast measuring technology based on Brillouin scattering, and we proposed OCC-BOTDA by using pattern recognition algorithm and differential pulse-width pair technique, which can improve the spatial resolution and sensing range effectively. In the experiment, a spatial resolution of 4m is achieved over a single-mode fiber with a length of 100km.

ID 2897

Grating Assisted Hybrid Plasmonic Grating Slot Waveguide for On-chip Surface-enhanced Raman Scattering Sensor

Authors: Shiyu Li, Zhuoying Wang, Nishan Wu, Shengsheng Yu, Li Xia

Abstract: A hybrid plasmonic grating slot waveguide utilized for on-chip SERS sensor integrates dielectric slot Bragg grating as a notch filter, which reflects the pump light for secondary coupling to further enhance the electric field simultaneously.

ID 4705

Simulation of an In-Line Optofluidic Refractive Index Sensor Based on a Seven-Liquid-Core Teflon-Cladding Fiber

Authors: Jiang-Tao Dong, You-Hang Xie, Chuang Wu, Jie Li, and Bai-Ou Guan

Abstract: We propose and theoretically demonstrate a highly sensitive optofluidic refractive index sensor based on a modal interferometer formed by a segment of liquid-filled seven-hole Teflon-cladding fiber sandwiched by two standard single mode fibers.

ID 9575

Droplet Microsensors Based on GaN Diode Optopairs

Authors: Gaofei Lu, Xiaoshuai An, Yumeng Luo, Yang Chai and Kwai Hei Li

Abstract: A compact GaN-based microsensor consisting of GaN diode optopairs is developed for droplet sensing by taking advantage of the refractive index difference between liquid and air, which provides a rapid and stable response.

ID 6749

Design of Miniaturized And Highly Sensitive Fluorescence Detection Module For The Integrated Equipment Of Nucleic Acid Rapid Detection

Authors: Guozhen Liu, Shiqi Zhou, Ya Zhang and Guanghui Wang

Abstract: This paper designed a kind of fluorescence detection module with high sensitivity and integration, which was successfully integrated in the equipment of nucleic acid rapid detection.

ID 5178

An Adaptive Feedback Strategy For Enlarging The Frequency Dynamic Range of DMZI Sensors

Authors: Simeng Jin, Zhisheng Yang, Qian Zhang, Xiaobin Hong, Ziping Zhang, Yun Liang

Abstract: A vibration-state-dependent feedback strategy is proposed to enlarge the frequency dynamic range of feedback-based Dual Mach-Zehnder Interferometer sensors. A 10-fold lowering of the minimum measurable frequency with respect to conventional methods is experimentally demonstrated.

ID 9900

A Theoretical Investigation into On-chip Mid-Infrared Multianalyte Slot Waveguide-based Sensor on Germanium on Insulator Platform

Authors: Arpita Mishra, Krishna Kant Rana, Talabattula Srinivas

Abstract: We theoretically investigated a Germanium slot waveguide for multianalyte wideband sensing based on evanescent field absorption. The result indicates that a simple slot could procure performance essential for on-chip sensing for industrial and agricultural usages.

ID 2974

Subwavelength Nano-imaging with a Microbottle Lens

Authors: Guoqiang Gu, Lu Ma, Pengcheng Zhang, Yuye Wang, Lin Zeng, Hui Yang*

Abstract: A microbottle lens constituted by glass microcylinder and polymer covering layer is fabricated and used to image the grating structures with subwavelength pitch of 260 nm or 360 nm in one or two imaging modes.

ID 1606

Remote Monitoring System Construction and Optimization Using Optical Heterodyne Method

Authors: Shilin Chen, Li Wang, Menghan Liu, Kai Chen, Jilin Zheng, Tao Pu

Abstract: A novel type of remote optical monitoring system is proposed and optimized. The performance of the monitoring system is successfully improved through the optimization of networking mode and power ratio of laser emission array.

ID 5502

Bidirectional Magnetic Field Sensing Based on Hollow Micro-Bottle Resonators

Authors: Jinhao Fei, Shuaichang Zhao, Zijie Wang, Yong Yang, Qi Zhang, Xiaobei Zhang* and Tingyun Wang

Abstract: We demonstrate a highly sensitive bidirectional magnetic field sensor, which is prepared by thin-walled hollow micro-bottle cavity filled with magnetic fluid. And bidirectional sensing of vertical and horizontal magnetic fields has been achieved.

ID 8017

A Simulation Study of Photonic Nanojet Generated By A Combination of A Dielectric Microsphere and A Hemisphere Lens

Authors: Lu Ma, Guoqiang Gu, Yi Zhang and Hui Yang

Abstract: Photonic nanojet (PNJ) is a highly focused light beam. Here, we report the numerical simulation of PNJ generated by using a combination of a dielectric microsphere lens and a hemisphere lens.

ID 6235

All-Optical Nonlinear Activators Using Silicon-Based Waveguides and Microring Resonators for Photonic Neural Networks

Authors: Bei Chen, Xiaozhi Liu, Zichao Zhao, Zeyu Yu, Yuehai Wang and Jianyi Yang

Abstract: Silicon-based waveguides and all-pass microring resonators used as all-optical nonlinear activators for photonic neural networks are demonstrated. The recognition accuracies of the proposed devices all can reach more than 90% for MNIST handwritten digits.

ID 683

Self-consistent Photon Number Resolving Detector System To Optimize Photon Statistics Distribution

Authors: Yansheng Bao, Bochen Wang and Zhengyong Li

Abstract: We establish a photon number resolving detection (PNRD) model and propose a method to optimize photon statistics distribution without any calibration of standard detector.

ID 2814

21 Gbps Source-Independent Quantum Random Number Generator Based On Vacuum Fluctuations

Authors: Yibo Zhu, Yiming Bian, Jie Yang, Jie Yang and Song Yu

Abstract: We report an ultra-fast quantum random number generator based on detecting vacuum fluctuations without assuming input states. To eliminate the effect of classical noise, Toeplitz hash extractor is employed to extract randomness. The final random number generation rate up to 21.28 Gbps is experimentally achieved.

ID 7512

End-to-end Inverse Design of Diffractive-optics for Multi-channel Computational Imaging

Authors: Dasen Zhang, Zhenzhen Liu and Junjun Xiao

Abstract: We apply an end-to-end scheme to inverse design an image system by optimizing the optical frontend and the image reconstruction algorithm of electronic backend, and demonstrate multi-spectral image reconstruction covering both the visible and infrared.

ID 7986

Parallelized Optical Logic Operations And Multiplexed Light-Field Projection Enabled By Few-Layer Diffractive Optical Neural Network

Authors: Xianjin Liu, Zhenzhen Liu and Junjun Xiao

Abstract: We show a parallel logic operation scheme based on 2-hidden layer diffractive optical neural network (DONN) and provide design for up to 9-bit optical logic operations, and 3D holographic image projections with such DONN.

ID 4638

Modal q-plates based on Dielectric Metasurfaces

Authors: Mingke Jin, Xuan Liu, Yutao Tang, Zixian Hu, Kingfai Li, Guixin Li and Etienne Brasselet

Abstract: We report on the design, fabrication and characterization of modal optical vortex beam shaping where both the azimuthal and radial degrees of freedom are univocally shaped via optical spin-orbit interaction mediated by dielectric metasurfaces.

ID 3560

Plasmonic Nonlinear Metasurfaces For Building An Optical Spiking Neuron

Authors: Fengbin Lin, Lili Gui, Yi Wei and Kun Xu

Abstract: Resonant periodic gold nanorod array is utilized as a saturable absorber to achieve a novel excitable fiber laser, which shows properties of a leaky integrated-and-fire neuron, including spike generation, pulse encoding, and nonlinear response.

ID 8004

Robustness of Ultrahigh-Q Microcavity General Packaged Devices

Authors: Shengnan Huangfu, Fangxing Zhang and Jialve Sun

Abstract: To promote the process of large-scale application of optical microcavity devices. We experimentally demonstrate that our packaged WGM cavity can maintain a Q factor of up to 10^9 under controlled temperature and humidity conditions and ambient conditions.

ID 4724

Topological Polaritonic Interface State Induced By Exciton-Photon Coupling

Authors: Rui Jiang and Wenjing Liu

Abstract: We propose a general and experimentally feasible scheme inducing topological polaritonic interface states in strongly coupled photonic crystals. These interface polaritons possess intriguing properties with spatially separated components, ultra-confined profiles, and distinct Hopfield coefficients.

ID 6433

Actively Tunable Chirality Induced by an Asymmetrically Coupled Third Level

Authors: Junda Wang, Wenjing Liu

Abstract: We implemented an actively tunable on-chip chiral light source with an asymmetrically coupled third mode.

ID 9479

Numerical Characterization Of Soliton Microcomb In An Athermal Hybrid Si₃N₄-TiO₂ Microring

Authors: Zheng-Yu Wang, Pi-Yu Wang, Ming Li, Shuai Wan, Chang-Ling Zou, Guang-Can Guo, and Chun-Hua Dong

Abstract: The athermal optical microresonator constructions is designed to cancel the thermorefractive effect of hybrid Si₃N₄-TiO₂ microring. The numerical results predict that athermal constructions could prolong the soliton existence range and reduce the thermorefractive noise.

ID 2971

All-Optical Synchronization of Remote Optomechanical Systems

Authors: Jin Li, Zhong-Hao Zhou, Shuai Wan, Yan-Lei Zhang, Zhen Shen, Ming Li, Chang-Ling Zou, Guang-Can Guo, and Chun-Hua Dong

Abstract: By utilizing the thermal-optic and optical spring effect, we demonstrate the all-optical synchronization between a microdisk and a microsphere separated 5 km apart with a single coherent laser.

ID 5132

Enhancing Coherence Time In Plasmon-Emitter Strong Coupling Systems With Cavity Spectral-Hole-Burning

Authors: Wenjie Zhou, Jiabin You, Xiao Xiong, Yuwei Lu, Lay Kee Ang, Jingfeng Liu and Lin Wu

Abstract: With a strategy of simultaneously introducing two cavity modes of opposite detuning to a plasmon-emitter strong-coupling system, we achieve an enhanced coherence time for the emitter by 4.5-orders of magnitude, opening potential applications in quantum technology.

ID 1074

Illumination and Transmit Speed Investigation of Lighting Infrastructure with Diffuser Plates for Practical Indoor Visible Light Communication Systems based on Monte Carlo Simulation

Authors: Dan Wu, Linxiao Lyu, Linlin Chen, Zhaowen Lin, Junmin Liu, Jing Liu, Mingxia Qiu, Guangyue Chai, Zhongliang Yu and Kai Wang

Abstract: In recent years, visible light communication (VLC) system has gained tremendous attention due to its advantages over radio frequency communications, such as high transmit speed of up to gigabit per second, the ability to ensure data security, and ease of system integration. The VLC system can be used for both indoor lighting and communication, so there is a great potential to provide a thorough analysis for both the quality of illumination and the indoor transmit speed.

ID 4020

Bright Semiconductor Single-Photon Sources Pumped by Heterogeneously Integrated Micropillar lasers with Electrical Injections

Authors: Xueshi Li, Shunfa Liu, Yuming Wei, Jiantao Ma, Changkun Song, Ying Yu, Rongbin Su, Wei Geng, Youling Chen, Haiqiao Ni, Hanqing Liu, Xiangbin Su, Zhichuan Niu, and Jin Liu

Abstract: We present realizations of bright semiconductor single-photon sources heterogeneously integrated with on-chip electrically-injected microlasers. Our work provides a powerful tool for advancing hybrid integrated quantum photonics.

ID 3519

Dimensional Transition of GaAs from Three to Two Dimension

Authors: Ren Ren, Xiaomin Ren*, Hao liu, Rongmin Xiu, Weifang Yuan, Shiwei Cai

Abstract: An interesting method to study the dimensional transition point has been proposed. It is found that electrons transportation is dominated by dimension effect (DE) in low-dimensional systems and the thickness effect (TE) in bulk materials.

ID 344

Temperature-insensitive nanobore fiber Bragg Grating

Authors: Cong Xiong, Wei Jiang, Caoyuan Wang, Ruwei Yu, Jun He, Xuan Li, Kang Ying, Haiwen Cai, Aiqun Liu, and Limin Xiao

Abstract: A fiber Bragg grating based on a novel nanobore fiber is proposed. The nanobore fiber Bragg grating is temperature-insensitive and has a nanochannel embedded in the fiber core, which can be used for nanofluidic applications.

ID 1914

All-solid Polymer Waveguide for Fiber Interconnection

Authors: Yuxing Chen, Cong Xiong, Jie Zhu, Caoyuan Wang, Ruwei Yu, Hanbing Yue, Zhende Zhai, Yuzhi Shi, Aiqun Liu and Limin Xiao

Abstract: The all-solid light-induced self-writing waveguide using the photopolymer material to interconnect two fibers was first demonstrated. The waveguide provides a new scheme for interconnecting of optical fibers.

ID 4380

Ultralow-loss Fusion Splicing Between Antiresonant Hollow-Core Fibers

Authors: Caoyuan Wang, Jie Zhu, Ruwei Yu, Zhende Zhai and Limin Xiao

Abstract: An ultralow loss (0.08 dB) fusion splice between antiresonant hollow-core fibers (AR-HCFs) is demonstrated, where the transmission property of AR-HCF does not change within a wide working wavelength range.

ID 4014

Ultralow-loss and Polarization-Maintained Fusion Splicing for Asymmetric Antiresonant Hollow-Core Fibers

Authors: Ruwei Yu, Jie Zhu, Caoyuan Wang, Cong Xiong, and Limin Xiao

Abstract: An ultralow fusion splicing loss of 0.41 dB and a maintained polarization extinction ratio of 28 dB were demonstrated between a PANDA fiber and an asymmetric antiresonant hollow-core fiber, with no additional intermediate component.

ID 5513

Low-loss Fusion Splicing Between Antiresonant-HCFs and AR-coated SMFs with Low Return Loss

Authors: Caoyuan Wang, Ruwei Yu and Limin Xiao

Abstract: We have demonstrated a unique fiber splicing technique for low-loss fusion splicing between antiresonant hollow core fibers and standard single-mode fibers with AR coating, achieving an insertion loss of 0.3 dB per connection and return loss below -28 dB over a wide spectral range.

ID 1263

Antiresonant Hollow-Core Fiber with Ultralow Bending Loss

Authors: Jie Zhu, Caoyuan Wang, Ruwei Yu, Ye Wang, Zhende Zhai, and Limin Xiao

Abstract: We have fabricated a 0.8-km long high performance antiresonant hollow-core fiber with an attenuation of ~ 12 dB/km, and an ultralow bending loss @ 1612nm ≤ 10 dB/km at a bend radius of 1.6 cm.

ID 7156

A High-efficiency Silicon Nitride Edge Coupler for the Monolithically Integrated III-V-on-Si Laser

Authors: Huaibing Liu, Yisu Yang, Xiaomin Ren and Yongqing Huang

Abstract: We demonstrate a bi-layer 5-tip SiN edge coupler on SOI for the monolithic III-V laser. The measured fiber-to-chip coupling efficiency is 76 % with a vertical/horizontal 1-dB alignment tolerance of $\pm 0.6/0.9 \mu\text{m}$ at 1550nm.

ID 5084

Volumetric-enhanced Raman spectroscopy using microstructured optical fibers

Authors: Yihan Miao, Xujia Zhang, Xia Yu

Abstract: This article studied volumetric-enhanced Raman signal propagation with a high refractive index liquid infiltrated into the air core of two fibers. By detecting food oil with two microstructures, the existing theoretical models were supplemented.

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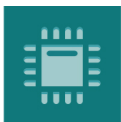
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