Track 1: Optical Fibers and Fiber-based Devices
Grand Ballroom I, 3F

13:30-15:30 • November 05, 2023 • Sunday
Fiber lasers
Presider: Ryszard Buczynski, University of Warsaw, Poland

13:30-14:15 • ACPPOEM-0813-2 *Tutorial*
Dynamics of soliton fiber lasers
Dingyuan Tang
Shenzhen Technology University, China
It is well-known that solitons formed in a fiber laser are in nature dissipative solitons, and under certain appropriate conditions, the formed solitons could also mimic properties of the nonlinear Schrodinger equation (NLSE) solitons. Light circulating in a laser cavity is obviously also subjected to the action of the cavity boundary condition. How would the cavity effects influence the operation of a fiber laser? In this tutorial we will answer the question and show the various features of soliton fiber lasers, especially, we will explain in detail when fiber laser operation could be described by the extended Ginzburg-Landau equation (GLE), and under which conditions the GLE can be reduced to the NLSE.

14:15-14:30 • ACPPOEM-0731-126
Robust All-polarization-maintaining Linear-cavity Mode-Locked Tm-Doped Fiber Laser
Siwei Peng[1], Xuanyi Liu[2], H. Y. Fu[2], Qian Li[1]
1.School of Electronic and Computer Engineering, Peking University, China; 2.Tsinghua Shenzhen International Graduate School, Tsinghua University, China
A robust all-polarization-maintaining linea-cavity Tm-doped fiber laser mode-locked with the Kerr effect was demonstrated. Solitons centering at ~1890 nm and ~1905 nm were obtained with pulse durations of 448 fs and 567 fs, respectively.

14:30-14:45 • ACPPOEM-0710-2
"Invisible" Pulsation of Harmonic Mode-locking in a Bidirectional Fiber Laser
Qingbo Wang, Pan Wang, Zhi Wang, Yan-ge Liu
Nankai University, China
Using a bidirectional passively mode-locked fiber laser as research platform, we report the harmonic mode-locking "invisible" pulsation for the first time, and conduct research on this phenomenon by the dispersive Fourier transform technology.

14:45-15:00 • ACPPOEM-0731-71
Q-switched Harmonic Mode-locked Noise-like Pulses with a Repetition Rate of 26.79 MHz in an Erbium-Doped Fiber Laser
Chuangkai Li[1], Xiaoqiang Ban[1], Minghe Zhao[1], Feng Ye[1], Hongyan Fu[2], Qian Li[1]
1.School of Electronic and Computer Engineering, Peking University, China; 2.Tsinghua Shenzhen International Graduate School, Tsinghua University, China
We have demonstrated a Q-switched harmonic noise-like pulses (QHMLNLPs) in an erbium-doped fiber laser using nonlinear polarization evolution with a repetition of 26.79 MHz, representing the highest repetition rate achieved in QHMLNLPs.

15:00-15:15 • ACPPOEM-0814-31 *Industry Innovation Nomination*
Triple-cladding Ytterbium doped fiber for 12 kW single module
Yue Meng[1], Zuying Xu[2], Xudong Shi[2], Yu Li[2], Tianying Liu[2], Can Li[2], Xiao Yan[2], Wei Zheng[2], Heng Wang[2], Jiangang Yu[2], Zhiyong Zhao[1], Ming Tang[1]
1.Huazhong University of Science and Technology, China; 2.Everfoton Technologies Corporation Limited, China
High-power fiber lasers had encountered numerous technology challenges in double-cladding fibers. In this paper, we designed and fabricated a fiber triple-cladding ytterbium doped fiber with large core diameter by using Modified Chemical Vapor Deposition (MCVD) combined with all-gas-phase doping method. An excellent laser performance could be obtained under 12kW .

15:15-15:30 • ACPPOEM-0814-42
Cavity Stabilization of a Brillouin Fiber Laser Based on Homodyne Phase Locking
Rui Wang, Wei Wei, Weilin Xie, Yi Dong
Beijing Institute of Technology, China
We stabilize the resonant cavity of a Brillouin fiber laser adopting a probe-based homodyne phase-locking technique. Laser Frequency and power variation are controlled to within 5 MHz and below 0.03 dB respectively in 600 seconds.

15:30-16:00 Coffee Break

16:00-18:15 • November 05, 2023 • Sunday
Structured fibers /devices
Presider: Dingyuan Tang, Shenzhen Technology University, China

16:00-16:30 • ACPPOEM-0731-149 *Invited*
Optical Properies of Active Fibers with Nanostructured Cores
Ryszard Buczynski[1,2], Jan Aubrecht[3], Dariusz Pysz[1], Ivo Barton[3], Marcin Franczyk[1], Michal Kamrádek[3], Adam Filipkowski[1], Ivan Kasik[3], Pavel Peterka[3]
1.Lukasiewicz Research Network - Institute of Microelectronics and Photonics, Poland; 2.University of Warsaw, Poland; 3.Institute of Photonics and Electronics of the Czech Academy of Sciences, Czech Republic
Nanostructured optical fibers are a new class of fibers with a core composed of various glass nanorods ordered in arbitrary structures. We study an influence of their internal structure on fiber active and passive properties. A proof-of-concept active fibers doped with ytterbium, erbium and thulium are presented and analyzed.

16:30-17:00 • ACPPOEM-1009-5 *Invited*
Coupled-Core Multicore Fibers and Devices for Long-haul Transmission Application
Lin Ma
Shanghai Jiao Tong University, China
We demonstrate the design, fabrication, and evaluation of coupled-core multicore fibers with low spatial mode dispersion and compatible fan-in/fan-out devices with low loss. Transmission experiments based on coupled-core multicore fibers are also experimentally demonstrated.

17:00-17:15 • ACPPOEM-0731-112
High Sensitivity Surrounding Refractive Index Sensor Based on Helical Long-Period Fiber Gratings Inscribed in Tapered Double-Cladding Fiber
Yanping He[1], Yuehui Ma[1], Chen Jiang[2], Peng Wei[1], Yunqi Liu[1]
1.Shanghai University, China; 2.Nanjing University of Posts and Telecommunications, China
We demonstrate a surrounding refractive index (SRI) sensor based on helical long-period fiber grating inscribed in the tapered double-cladding fiber. The maximum SRI sensitivity is 5483.33 nm/RIU

17:15-17:30 • ACPPOEM-0731-163
Ultralow-loss arc-discharge fusion splicing between antiresonant hollow-core fibers
Cong Zhang[1], Peng Li[2], Yue Wang[1], Di Lin[1], Lei Zhang[2], Jie Luo[2], Meng Xiang[1], Songnian Fu[1], Yuwen Qin[1]
1.Guangdong University of Technology, China; 2.Yangtze Optical Fiber and Cable Joint Stock Limited Company, China
We demonstrate a fusion splicing loss record of 0.03 dB between two anti-resonant hollow core fibers (AR-HCFs), using a traditional arc-discharge fusion splicer. After optimization of arc-discharge parameters, a deployment-friendly AR-HCF interconnection is reported.

17:30-17:45 • ACPPOEM-0731-43
Net 8×250 Gbit/s/λ PAM6/8 Optical Interconnect over High-Density Eight-Core Fiber and Low-Crosstalk Laser Direct Writing FI/FO Devices
Yu Yang[1], Zhaopeng Xu[1], Honglin Ji[1], Gang Qiao[1], Lulu Liu[1], Shangcheng Wang[1], Ruiting Cheng[2], Jinyi Yu[2], Chuanchuan Yang[2], Zhixue He[1], Yongqi He[2], Zhangyuan Chen[2], Weisheng Hu[1], Juhao Li[2]
1.Peng Cheng Laboratory, China; 2.Peking University, China
We experimentally demonstrate a net 8×250 Gbit/s/λ PAM6 and PAM8 transmission over 200-m standard-125μm-cladding high-density eight-core fiber and low-crosstalk femtosecond laser direct writing fan-in/fan-out devices. The proposed prototype system is promising for high-speed optical interconnection applications.

17:45-18:00 • ACPPOEM-0801-111
Wavelength and polarization state synchronization measurement based on MMF scattering pattern
Yuxuan Xiong, Ting Jiang, Zheng Gao, Hao Wu, Shaojun Zhou, Ming Tang
Huazhong University of Science and Technology, China
We presented a system for the measurement of wavelength and polarization state synchronization based on multimode fiber speckle. By employing convolutional neural network, we successfully established the mapping relationship between speckle patterns and wavelengths, as well as between speckle patterns and Stokes parameters. Consequently, the system accomplishes synchronized measurement of both wavelengths and polarization states. The system achieves a wavelength resolution of 0.5 nm and can distinguish two SOPs on the Poincaré sphere with a Euclidean distance of 0.365.

18:00-18:15 • ACPPOEM-0801-13
High Gain Bi-Doped Fiber Amplifier Operating in the O-band with a Broad Bandwidth
Yuanyuan Yang, Weiqi Wang, Jianxiang Wen, Yanhua Dong, Yana Shang, Yanhua Luo, Xiaobei Zhang, Fufei Pang, Tingyun Wang
Shanghai University, China
In a single 1240 nm pumped dual pass amplification system, when the signal power was -30 dBm, the Bi-doped fiber reached 41.1 dB at 1325 nm. The bandwidth range of gain above 20 dB was 1290-1365 nm.

17:30-20:00 Welcome Reception

08:30-10:00 • November 06, 2023 • Monday
Spectrum manipulation
Presider: Yuan Gong, University of Electronic Science and Technology of China, China

08:30-09:00 • ACPPOEM-0801-23 *Invited*
Mid-infrared supercontinuum laser source based on fluorotellurite fibers
Guanshi Qin
Jilin University, China
We demonstrated 50-W-level mid-infrared supercontinuum laser source, ultrabroadband supercontinuum generation from 600 to 5400 nm, and tunable Raman soliton generation from 2 to 4 μm in newly-developed all-solid fluorotellurite fibers.

09:00-09:15 • ACPPOEM-0815-60
Supercontinuum generation in silicon-germanium core silica cladding fiber pumped around the 1550 nm telecommunication wavelength
Congxiao Xu, Na Chen, Susu Zhang, Zhenyi Chen, Yana Shang, Yong Liu, Shupeng Liu, Fufei Pang, Tingyun Wang
Shanghai University, China
Femtosecond pulse evolution along $Si_{0.6}Ge_{0.4}$ core silica cladding fiber was simulated by solving the generalized nonlinear Schrödinger equation utilizing the fourth-order Runge-Kutta algorithm. Supercontinuum generation covers from 3.5μm to 11.1μm with 1550nm pump.

09:15-09:30 • ACPPOEM-0801-2
Splicing large-diameter hollow core fibers with SMF with low insertion loss
Bo Shi[1], Francesco Poletti[1], Ailing Zhong[2], Matěj Komanec[2], Radan Slavik[1]
1.Univeristy of Southampton, United Kingdom; 2.Czech Technical University in Prague, Czech Republic
We present a approach that allows to insert a short piece of coreless fiber in front of a large diameter HCF, which is experimentally shown to be low insertion loss (0.25 dB) and robust splices.

09:30-09:45 • ACPPOEM-0815-27
An Optical Arbitrary Spectral Synthesizer
Patrick Blown[1,2], Ian Clarke[2], Joseph Zagari[2], Andrei Valdez[2], Harald Rosenfeldt[2]
1.Institute of Photonics and Optical Science (IPOS), Australia; 2.Finisar Australia, Australia
We present a system for creating arbitrary frequency spectra with the ability to fold in other spectral sources. The device has output power 17dBm, contrast 60dB and accuracy 0.6dB over the C-band.

09:45-10:00 • ACPPOEM-0815-47
An extended L-band gain equliazation with a few mode erbium dopd fiber
Jianshuai Wang[1], Li Pei[1], Kaihua Hu[1], Jingjing Zheng[1], Wenxuan Xu[1], Jing Li[1], Tigang Ning[1], Li Zhong[2]
1.Beijing Jiaotong University, China; 2.Yangtze Optical Fibre and Cable joint stock limited company, China
An extend L-band FM-EDFA is demonstrated. At 1600 nm, a minimal differential modal gain of the first three order modes is obtained by 0.54 dB and the gains are higher than 20 dB.

10:00-10:30 Coffee Break

10:30-12:00 • November 06, 2023 • Monday
Sensors/micro-devices
Presider: Guanshi Qin, Jilin University, China

10:30-11:00 • ACPPOEM-0821-2 *Invited*
Fiber microlaser biosensor for sensitive optofluidic immunoassay
Yuan Gong
University of Electronic Science and Technology of China, China
High performance microlaser biosensors will be introduced. Optical fiber microlasers are developed for sensitive disposable biosensing, as well as the fast and high-throughput immunoassays.

11:00-11:15 • ACPPOEM-0731-136
Efficiency Tunnable All-Optical Controlled Coupled-Mode Induced Transparency in a Microsphere Resonator
Weichen Yuan, Hongyan Fu
Tsinghua University, China
In this work, based on a dual-laser pumping scheme, an all-optical controlled coupled-mode induced transparency in a silica microsphere resonatorhas been demonstrated, experimentally and theoretically. This proposed scheme is stable, simple and power efficient.

11:15-11:30 • ACPPOEM-0731-49
Ultra-sensitive Fiber Fabry-Perot Temperature Sensor Based on 3D Nano-Printed Air Cavity and Vernier Effect
Zhen Li[1], Wei Xu[2,3], Enqing Chen[4], Mian Wu[1], Ying Qiu[1], Jingjing Zheng[5], Chunmin Sheng[2], Jin Tao[1]
1.National Key Laboratory of Optical Communication Technology and Network China Information and Communication Technology Group Co., Ltd., China; 2.Zhejiang Dongtong Optical Network IoT Technology Co., Ltd, China; 3.School of Electronic and Information Engineering, Changshu Institute of Technology, China; 4.Xi'an High Technology Institute, China; 5.Wuhan Fiberhome Technical Services Co., Ltd, China;
In this paper, an ultra-high sensitive fiber Fabry-Perot temperature sensor based on direct 3D Nano-printed air cavity with two-photon polymerization and parallel Vernier effect is proposed and the sensitivity reaches up to -26nm/℃ .

11:30-11:45 • ACPPOEM-0731-77
3D printed microlens probe for optical coherence tomography
Yalong Tai[1], Zhuorong Li[1], Liu Dejun[1], Bozhe Li[1], Rui Zhu[2], Jianan Li[2], Qiang Li[2], Haiping Liu[2], Changrui Liao[1], Yiping Wang[1]
1.Shenzhen University, China; 2.Shenzhen Vivolight Medical Device & Technology Co., Ltd., China
In this paper, we propose a 3D printed side-viewing microlens on fiber tip by using the femtosecond laser two-photon polymerization (TPP) method for optical coherence tomography (OCT) imaging applications.

11:45-12:00 • ACPPOEM-0731-79
Magneto-refractive effect and sensing characteristics of erbium-doped silica fiber
Caihong Huang, Wanyue Wang, Qiufan Wu, Mei Chen, Yanhua Dong, Yi Huang, Tingyun Wang
Shanghai University, China
The magneto-refractive sensing characteristicsof EDF are investigated. The magnetic field sensing sensitivity is 4.914×10^{-5}rad/μT and the magnetic field resolution is 0.37 μT/√Hz under the AC magnetic field at 500 Hz.

12:00-13:30 Lunch Break

13:30-16:00 • November 06, 2023 • Monday
Distributed effects
Presider: Chengbo Mou, Shanghai University, China

13:30-14:00 • ACPPOEM-0831-3 *Invited*
Fiber based high power random Raman laser with flexible spectral manipulation property
Jiangming Xu
National University of Defense Technology, China
The history and status of high-power random Raman fiber laser (RRFL) will be reviewed. Especially, spectral manipulation of high-power RRFL, including purity scalability, wavelength number-interval-amplitude and linewidth tuning, and low-quantum-defect achieving, will be discussed.

14:00-14:15 • ACPPOEM-0731-107
Real-time FPGA Implementation of CNN-based Distributed Fiber Optic Vibration Event Recognition Method
LuoZhongyao[1,2,3], GeZhao[1,2,3], WuHao[1,2,3], TangMing[1,2,3]
1.Huazhong University of Science and Technology, China; 2.National Laboratory for Optoelectronics (WNLO), China; 3.National Engineering Laboratory for Next Generation Internet Access System, China
A scheme is proposed to create pipelined FPGA impelementation of CNN. It is used to demonstate the possibility of implementing a CNN-based DVS algorithm in embedded system for real-time edge computing.

14:15-14:30 • ACPPOEM-0731-85
Transfer Learning Based Programmable Raman Amplifier for Flexible Multi-band Optical Network
Liu Yuejiao, Gu Rentao, Gao Xiaoxuan, Bai Lin
Beijing University of Posts and Telecommunications, China
We deploy neural network and transfer learning, develop an integrated programmable Raman amplifier using commercial components to realize arbitrary target gain profiles, and achieve 0.126dB average RMSE in gain generation and ~67% prediction improvement when component parameters deviation.

14:30-14:45 • ACPPOEM-0801-130
Experimental study on the time-domain statistical properties of Er-doped random fiber laser
Xingyu Bao, Jiaojiao Zhang, Yifei Qi, Pan Wang, Longqun Ni, Zinan Wang
Key Laboratory of Optical Fiber Sensing and Communications University of Electronic Science and Technology of China, China
For understanding Er-doped random fiber laser (ERFL) intrinsic physical mechanisms, we investigate the ERFL time-domain statistical properties under full-bandwidth condition, and study the effects of the transmission and Raman amplification process on ERFL output characteristics.

14:45-15:00 • ACPPOEM-0815-112
Temperature-insensitivity PDMS coated silica microsphere
Guo Geng, Jin Xiaoling, Zhang Zuxing, **Bing Sun**
Nanjing University of Posts and Telecommunications, China
This study introduces a temperature-insensitive high-Q resonator employing the Whispering Gallery Mode (WGM) configuration. Leveraging the distinctive thermal-optic properties of PDMS characterized by a notably superior negative coefficient compared to silica microspheres, a controlled deposition of PDMS onto the silica microsphere surface is conducted. Experimental findings validate a highQ-factor within the resonant cavity, accompanied by a minimal temperature-induced crosstalk of merely 3 pm/°C.

15:00-15:15 • ACPPOEM-0815-39
High Spatial Density weakly coupled 7-core-6mode fiber and its (De)Multiplexer
Lei Shen[1,2,3], Jun Chu[1,2], Shuo Xu[1,2], Xianchao Gong[1,2], Liubo Yang[1,2], Ying Li[1,2], Lei Zhang[1,2,3], Jie Luo[1,2,3]
1.State Key Laboratory of Optical Fiber and Cable Manufacture Technology, China; 2.Yangtze Optical Fibre and Cable Joint Stock Limited Company, China; 3.Optical valley labs, China
We report the design, fabrication and measurement of a high spatial density weakly-coupled 7-core-6-mode fiber and its (de)Multiplexer. The attenuations of all channels are no more than 0.225dB/km. The IL of the FIFO part is less than 0.5dB, and the IL of the mode (de)MUX part is less than 2dB. This FM-MCF and its (de)Multiplexer can be used in weakly-coupled SDM systems that allows to multiply the capacity.

15:15-15:30 • ACPPOEM-0815-78
Characteristics optimization of tuning fork-fiber probes in shear force scanning near-field optical microscope
Hongjie Ma, Na Chen, Zhenmin Liu, Shaoying Li, Yong Liu, Yana Shang, Yangyi Zheng, Shupeng Liu, Tingyun Wang
Shanghai University, China
We demonstrate periodic variation of tuning fork fiber probe's resonant frequency and quality factor with its probe length and vibration modes through simulations and experiments, to optimize its character in shear force mode of SNOM.

15:30-16:00 • ACPPOEM-1008-3 *Invited*
Advanced fiber laser sources for 3D LIDAR imaging
Sze Set[1], Zheyuan Zhang[1], Takuma Shirahata[1], Chao Zhang[2], Naoki Yamaguchi[1], Shinji Yamashita[1]
1.The University of Tokyo, Japan; 2.Shimane University, Japan
We introduce advanced fiber laser sources for 3D LIDAR imaging, deployed in two fundamentally distinct and innovative laser-based distance ranging, the Chirped Amplitude-Modulated Phase-Shift (CAMPS) method and the Picosecond-Optical-Sampling Time-Of-Flight (POS-TOF) method.

15:30-18:00 Coffee Break & Poster Session

18:30-21:00 Banquet and Awards Ceremony

08:30-9:45 • November 07, 2023 • Tuesday
Dynamics and micro-nano devices
Presider: Minglie Hu, Tianjin University, China

08:30-09:00 • ACPPOEM-1009-1 *Invited*
High-repetition-rate, few-cycle pulse compression and wavelength-tunable UV dispersive-wave generation in hollow-capillary fiber
Meng Pang
Shanghai Institute of Optics and Fine Mechanics, CAS, China
Hollow-core fiber is a good platform to study nonlinear gas-light interactions, especially important for generating high-quality laser pulses with ultrashort pulse durations and broad wavelength-tuning range. In this talk, we demonstrate our recent work in this field, including a pulse-compression set-up that can deliver few-cycle, hundreds-of-uJ pulses at 10~100 kHz repetition rate and the a dispersive-wave-emission set-up that can generate ultraviolet ultrshort pulses with tunable central wavelengths from ~200 to ~400 nm.

9:00-9:15 • ACPPOEM-0801-125
High Sensitivity Nanoparticle Detection Enabled by Microresonators Operating at Exceptional Points
Zong Cao, Zijie Wang, Yong Yang, Qi Zhang, Xiaobei Zhang
Shanghai University, China
We demonstrate a theoretical investigation of a nanoparticle sensor using coupled whispering gallery mode resonators, and the sensitivity can be improved by more than 10 times when the sensor operates at exceptional points(EPs).

09:15-09:30• ACPPOEM-0801-127
Subnanometer Resolution Displacement Sensor Based on Vernier Effect
Dechun Dan, Yong Yang, Yang Wang, Qi Zhang, Xiaobei Zhang
Shanghai University, China
In this paper, the Vernier effect is realized for subnanometer resolution displacement sensing based on the structure of a hollow microsphere with a hole.

09:30-9:45 • ACPPOEM-0801-6
Distributed fiber vibration event recognition using Fractional Fourier Transform and Denoising Diffusion Probabilistic Models
Zhao Ge, Can Zhao, Hao Wu, Ming Tang
Huazhong University of Science and Technology, China
We propose a vibration event recognition method using fractional fourier transform (FrFT) and denoising diffusion probabilistic models (DDPM). The experimental results show that the model effectively identifies real vibration events by training on synthesized dataset, and it exhibits a high level of generalization ability.

10:00-10:30 Coffee Break

10:30-12:00 • November 07, 2023 • Tuesday
Fiber-based devices
Presider: Meng Pang, Shanghai Institute of Optics and Fine Mechanics, CAS, China

10:30-11:00 • ACPPOEM-1009-2 *Invited*
Attosecond soliton molecule dynamics and modulations in fiber laser
Minglie Hu
Tianjin University, China
The interactions of optical solitons in passively mode-locked fiber lasers result in abundant bound states that reflect intriguing nonlinear attractor behaviors in complex dissipative systems. By adopting a balanced optical cross-correlation method with a 5zs/√Hz temporal resolution, we derive an upper estimate of 60 as intramolecular timing jitter, which is integrated from 100 Hz to the Nyquist frequency (60 MHz). Furthermore, we experimentally demonstrate the synchronization of the internal vibrations of soliton molecules through the optical injection of a master oscillator signal. Direct observation of the synchronization process is enabled by balanced optical cross-correlation detection, a technique allowing real-time detection of intramolecular separation with sub-femtosecond temporal resolution. By retrieving these universal synchronization features, the role of the soliton molecule as a nonlinear dynamical system of chief importance is further highlighted.

11:00-11:15 • ACPPOEM-0731-188
Femtosecond laser plane-by-plane inscription of high-quality fiber Bragg gratings
Jiafeng Wu[1,2], Jun He[1,2], Xizhen Xu[1,2], Shen Liu[1,2], Changrui Liao[1,2], Yiping Wang[1,2]
1.Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education/Guangdong Province, College of Physics and Optoelectronic Engineering, Shenzhen University, China; 2.Shenzhen Key Laboratory of Photonic Devices and Sensing Systems for Internet of Things, Guangdong and Hong Kong Joint Research Centre for Optical Fibre Sensors, Shenzhen University, China
We have demonstrated two novel plane-by-plane (Pl-b-Pl) methods for inscription of FBG in optical fiber using femtosecond laser.These Pl-b-Pl methods simplify the direct grating inscription process and improve the performance of the FBGs component.

11:15-11:30 • ACPPOEM-0731-80
High-temperature pressure sensor based on a highly birefringent fiber Bragg grating created in a dual side-hole fiber
Baijie Xu[1,2], Jun He[1,2], Xizhen Xu[1,2], Bin Du[1,2], Shen Liu[1,2], Changrui Liao[1,2], Yiping Wang[1,2]
1.Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education/Guangdong Province, College of Physics and Optoelectronic Engineering, Shenzhen University, China; 2.Shenzhen Key Laboratory of Photonic Devices and Sensing Systems for Internet of Things, Guangdong and Hong Kong Joint Research Centre for Optical Fibre Sensors, Shenzhen University, China
We have demonstrated a novel high-temperature pressure sensor based on a highly birefringent FBG consisting of saw-tooth stressors inscribed in the cladding of dual side-hole fiber by using a femtosecond laser direct writing technology.

11:30-11:45 • ACPPOEM-0731-99
Mode Converters Based on the Long-Period Gratings Inscribed in Tapered Few Mode Fiber
Peng Wei, Yuehui Ma, Long Chen, Yunqi Liu
Shanghai University, China
We proposed the fabrication of mode converters based on long-period gratings after tapered few-mode fiber, and successfully realized fundamental mode coupled with high order core mode and cladding mode in a spectral range.

11:45-12:00 • ACPPOEM-0801-144
Sensing Demodulation from Degraded Spectra of Chiral Fiber Grating Based on Convolutional Neural Network
Hongliang Xie[1,2], Xiongfeng Rao[1,2], Zihan Li[1,2], Li Yang[1,2]
1.University of Science and Technology of China, China; 2.Key Laboratory of Electromagnetic Space Information, China
Taking C-LPFG-based torsion sensing as an example, we propose a detection method based on convolutional neural network, which maps the entire transmission spectrum to the corresponding environmental variables, enabling the torsion sensing in adverse cases.

12:00-13:30 Lunch Break

13:30-14:45 • November 07, 2023 • Tuesday
Mode locking and mode manipulation
Presider: Yingying Wang, Jinan University, China

13:30-13:45 • ACPPOEM-0801-1
Intelligent mode-locking enabled by real-time reinforcement learning
Jiajin Wang, Guoqing Pu, Zhiwei Fang, Chao Luo, Yong Wu, Lilin Yi
Shanghai Jiao Tong University, China
A real-time embedded approach to realize intelligent mode-locked fiber lasers based on reinforcement learning is proposed. The reinforcement learning is deployed in a Field programmable gate array (FPGA) to complete the inference process and real-time control. Benefited from the dedicated quantization and deployment strategy, the FPGA finishes a single forward inference in 6.4 us, which is about 32-times faster than an Nvidia RTX-3050 GPU, and the proposed solution manifests ultrahigh power efficiency.

13:45-14:00 ACPPOEM-0801-126
High All-Optical Tuning Efficiency in Magnetic Nanoparticles Coated Hollow Microbubble Resonator
Junlong Ma, Yiqi Chen, Yang Yu, Yong Yang, Qi Zhang, Xiaobei Zhang
Shanghai University, China
We conducted studies on the all-optical tuning characteristics of hollow microbubble resonators coated with magnetic nanoparticles and found that resonators with relatively larger wall thicknesses lead to a significant improvement in all-optical tuning efficiency.

14:00-14:15 • ACPPOEM-0801-40
High Sensitivity Refractive Index Sensor Based on the Cladding Mode of Long-Period Grating Inscribed in Few-Mode Fiber
Yuehui Ma, Yunqi Liu, Chengbo Mou
Shanghai University, China
The surrounding refractive index (SRI) sensing characteristics of cladding mode in a few-mode fiber are investigated. In the range of 1.33~1.43, the SRI sensitivity of LP_{05} mode is 5.30 times that of single-mode fiber.

14:15-14:30 • ACPPOEM-0801-43
Regulation of Radial Higher-order Orbital Angular Momentum Mode Based on Helically-Twisted Elliptic Fiber
Chuangrong Huang[1], Jiajing Tu[1], Shecheng Gao[1], Weiping Liu[1], Zhaohui Li[2]
1.Jinan University, China; 2.Sun Yat-sen University, China
Based on mode coupling theory and angular momentum matching principle, the generation process and mechanism of radial higher-order orbital angular momentum (OAM) based on helically-twisted elliptic fiber (HTEF) is analyzed. High-precision HTEFs are successfully fabricated using the arc discharge technology of a fusion splicer. By changing the twisted rate of the HTEF, $OAM_{\pm 2n}$ withradial order n of 2, 3, 4 and 5 are successfully generated at 1550 nm. Subsequently, we compare the differences in twisted rates between simulations and experiments.

14:30-14:45 • ACPPOEM-0814-53
Impact of Small Signal Gain and Saturation Engergy on the Mode-Locking States in an Yb-doped Fiber Laser
Xinxu Duan, Yuantong Liu, Qigui Huang, Zhengxin Gao, Lei Jin
Harbin Engineering University, China
Impact of small signal gain g_0 and saturation energy E_{sat} on the mode-locking states in an Yb-doped fiber was investigated. We discovered the transition states between the two stable mode-locking states by tuning them.

15:30-16:00 Coffee Break

16:00-18:00 • November 07, 2023 • Tuesday
Novel fibers
Presider: Gang Xu, Huazhong University of Science and Technology, China

16:00-16:30 • ACPPOEM-1009-3 *Invited*
Design, fabrication and characterization of high performance hollow-core anti-resonant fiber
Yingying Wang, Shoufei Gao, Yifeng Hong, Wei Ding
Institute of Photonics Technology, Jinan University, China
We review our recent works on design, fabrication and characterization of high performance anti-resonant hollow core fiber (AR-HCF). An in-house fabricated arc-shaped multi-layered AR-HCF structure shows a minimum loss of 0.2 dB/km @ 1550 nm. The polarization maintaining AR-HCF shows a birefringence of 1.8×10-5 and low loss of 4.8 dB/km @ 1522 nm. These two fibers could fulfill a range of applications in optical communication, precise metrologies, gyroscopes, and ultrafast/high-power laser deliveries.

16:30-16:45 • ACPPOEM-0726-16
Design of Heterogeneous 4LP-Mode Multicore Fiber with Two-Ring Layout
ZHEYU ZHAO, TAKANORI SATO, TAKESHI FUJISAWA, KUNIMASA SAITOH
Grad. Sch. of Info. Sci. and Tech., Hokkaido University Sapporo, Japan
Heterogeneous 4LP-mode 4- and 6-core fibers with two-ring layout and 125-um cladding diameter are investigated.Numerical results show that extending the modes number to 4LP-mode increases the spatial channel count keeping a feasible XT value.

16:45-17:00 • ACPPOEM-0728-10
Active Mode Multicasting without Parasitic Wavelength Conversion arising in Few-Mode Fiber
Xiaoshan Huang, Songnian Fu, Cong Zhang, Gai Zhou, Meng Xiang, Yuwen Qin
Institute of Advanced Photonics Technology, School of Information Engineering, Guangdong University of Technology, China
We theoretically propose the active mode multicasting without parasitic wavelength conversion, based on the inter-modal four-wave mixing arising in a dispersion engineered few-mode fiber. A proof-of concept experiment is demonstrated for LP_{01} and LP_{11} modes.

17:00-17:15 • ACPPOEM-0728-13 *Industry Innovation Nomination*
Fused Tapered Fan-in/Fan-out Device of 6-Mode 7-Core Fiber Based On OM3 Multimode Fiber
Chen Yang[1], **Haoze Du**[2], Yuanhui Shao[2], Fengming Zhang[2], Zhuyixiao Liu[2], Senyu Zhang[2], Zhiyong Zhao[2], Ming Tang[2]
1.Yangtze Optical Fiber and Cable Joint Stock Limited Company (YOFC) R&D Center, China; 2.National Engineering Laboratory for Next Generation Internet Access System, School of Optical and Electronic Information, Huazhong University of Science and Technology, China
Fused tapered Fan-in/Fan-out devices of few-mode multi-core fiber have received attentions in recent ten years. Most devices are based on special designed fibers which are called "bridge fiber". A low insertion loss and low-cost Fan-in/Fan-out device using OM3 fiber as the bridge fiber is fabricated and demonstrated in this paper. The insertion losses of LP01, LP11a, LP11b, and LP21a are less than 1dB, and the insertion loss of LP21b and LP02 are 2.02dB and 2.2dB.

17:15-17:30 • ACPPOEM-0728-18
A Data-efficient Erbium-doped Fiber Amplifier Model under Partial Channel Loadings
Yuqi Li[1], Mingming Zhang[1], Zihe Hu[1], Zhuoxuan Song[1], Siqi Yan[2], Ming Tang[1]
1.School of Optical and Electronic Information and Wuhan National Laboratory for Optoelectronics, Optics Valley Laboratory, Huazhong University of Science and Technology, China; 2.School of Optical and Electronic Information and National Engineering Laboratory for Next Generation Internet Access System, Huazhong University of Science and Technology, China
We proposed a modified spectral gain model for the Erbium-doped fiber amplifier based on singular value decomposition. More than 93% of predicted loading channel gain errors are less than 0.2 dB under partial channel loadings.

17:30-17:45 • ACPPOEM-0731-10
Coupling light into a hollow-core fiber with mitigated excitation of higher-order modes
Ailing Zhong[1], Eric Numkam Fokoua[2], Stanislav Zvanovec[1], Francesco Poletti[3], Radan Slavik[3], Matej Komanec[1]
1.Czech Technical University in Prague, Czech Republic; 2.Microsoft, UK, United Kingdom; 3.University of Southampton, United Kingdom
We show experimentally that unwanted cross-coupling into higher-order modes of a hollow-core fiber can be reduced to values close to -40dB when optimizing the input beam size for their suppression rather thanminimum insertion loss.

17:45-18:00 • ACPPOEM-0731-176

Optical Power Ring Model for Coupling Efficiency Estimation in VCSEL-MMF Links

Yuzhong Ma[1], Gordon Ning Liu[1], Xin Chen[2], Jason E. Hurley[2], Hao Dong[2], Hao Chen[2], Ming-Jun Li[2]
1.Soochow University, China; 2.Corning Incorporated, American Samoa

An optical power ring model for calculating fiber coupling efficiency is proposed. This model can reflect the complex mode field distribution at the end face of a launch fiber. Experimental results show that the model has higher accuracy than the model based on the uniform and Gaussian distribution. In addition, a further simulation analysis using the new model has proven that the large core multimode fiber has higher tolerance to the radial coupling offset and dust contamination.