

PROCEEDINGS OF SPIE

Quantum and Nonlinear Optics X

Qiongyi He
Dai-Sik Kim
Chuan-Feng Li
Editors

14–16 October 2023
Beijing, China

Sponsored by
SPIE
COS—Chinese Optical Society

Cooperating Organizations

Tsinghua University (China) • Peking University (China) • University of Science and Technology of China (China) • Zhejiang University (China) • Tianjin University (China) • Beijing Institute of Technology (China) • Beijing University of Posts and Telecommunications (China) • Nankai University (China) • Changchun University of Science and Technology (China) • University of Shanghai for Science and Technology (China) • Capital Normal University (China) • Huazhong University of Science and Technology (China) • Beijing Jiaotong University (China) • China Jiliang University (China) • Shanghai Institute of Optics and Fine Mechanics, CAS (China) • Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China) • Institute of Semiconductors, CAS (China) • Institute of Optics and Electronics, CAS (China) • Institute of Physics, CAS (China) • Shanghai Institute of Technical Physics, CAS (China) • China Instrument and Control Society (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Republic of Korea) • Australian and New Zealand Optical Society • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

Supporting Organizations

China Association for Science and Technology (CAST) (China)
Department of Information of National Nature Science Foundation, China (NSFC) (China)

Published by
SPIE

Volume 12775

Proceedings of SPIE 0277-786X, V. 12775

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Quantum and Nonlinear Optics X, edited by Qiongyi He, Dai-Sik Kim,
Chuan-Feng Li, Proc. of SPIE Vol. 12775, 1277501 · © 2023 SPIE
0277-786X · doi: 10.1117/12.3021645

Proc. of SPIE Vol. 12775 1277501-1

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Quantum and Nonlinear Optics X*, edited by Qiongyi He, Dai-Sik Kim, Chuan-Feng Li, Proc. of SPIE 12775, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510667990

ISBN: 9781510668003 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2023 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.org

Paper Numbering: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

vii	<i>Symposium Committees</i>
xi	<i>Conference Committee</i>

QUANTUM AND NONLINEAR OPTICS II

12775 07	The formation of high-Q polygon modes in weakly perturbed microdisks on thin-film lithium niobate and its applications (Invited Paper) [12775-5]
----------	---

QUANTUM AND NONLINEAR OPTICS VI

12775 0M	Nonlinear threshold in cylindrical microresonators with small radius variations in the presence of a disturbing coupler [12775-19]
12775 0N	Manipulating the harmonic mode-locked regimes inside a fiber cavity by a reinforcement learning algorithm [12775-20]

QUANTUM AND NONLINEAR OPTICS VIII

12775 0T	Telecom-band photon-pair source based on high-index doped silica glass spiral waveguide [12775-26]
12775 0U	Nonlinear dynamics of coherently driven cavities with synchronous intracavity phase modulation [12775-27]

QUANTUM AND NONLINEAR OPTICS IX

12775 0W	Nonlinear pulse dynamic in a weak coupled normal dispersion multicore fiber (Invited Paper) [12775-30]
12775 0Y	Tunable spontaneous-parametric down-conversion in III-V semiconductor waveguides heterogeneously integrated in the silicon platform [12775-38]

QUANTUM AND NONLINEAR OPTICS X

12775 10	Tailored dispersive wave generation in quasi-phase-matched liquid core fibers [12775-32]
----------	---

- 12775 12 **Investigation of multiphoton photocurrent in SiC using phase-modulated femtosecond laser pulses** [12775-35]
- 12775 13 **Self-similar light beams at the second harmonic generation in a PT-symmetry structure with strong Bragg coupling at both frequencies** [12775-36]

POSTER SESSION

- 12775 14 **Space-time optical vortices in planar coupled waveguides with quadratic nonlinearity** [12775-39]
- 12775 17 **A high-throughput and FPGA-based LDPC decoder for continuous-variable quantum key distribution system** [12775-43]
- 12775 18 **High-speed implementation of privacy amplification for continuous-variable quantum-key distribution with Toeplitz matrix based on FPGA** [12775-44]
- 12775 19 **Monitoring the source noise of a plug-and-play continuous variable quantum key distribution system** [12775-45]
- 12775 1A **A new scheme for orthogonal dual-polarization continuous-variable quantum key distribution** [12775-46]
- 12775 1B **A refractive index sensor based on FWM effect of tellurite photonic crystal fiber** [12775-47]
- 12775 1C **Modulation noise model for multi-carrier Gaussian modulated continuous-variable quantum key distribution based on OFDM technology** [12775-48]
- 12775 1D **Dual-comb pulses constituting soliton rain trains in a wavelength multiplexed fiber laser based on single-walled carbon nanotube** [12775-49]
- 12775 1E **Generating Gaussian error in lattice cryptography with quantum random number generator** [12775-50]
- 12775 1F **Evolution of inter-pulse non-frequency shift components in multi-pulse pumped supercontinuum generation with normal dispersion** [12775-51]
- 12775 1G **Atomic clock on the basis of the CPT effect in counter-propagating circularly polarised waves** [12775-52]
- 12775 1H **Non-Hermitian unidirectional routing of photonic qubits** [12775-53]
- 12775 1I **Numerical modelling of ultra-narrow generation in a Raman fiber laser with random distributed feedback** [12775-54]
- 12775 1J **Localized spectral modes generated in the random Raman laser based on multimode fiber** [12775-55]
- 12775 1K **Multi-topological charges vortex beam generator based on nonlinear bound states in the continuum with improvement of nonlinear conversion efficiency** [12775-56]

- 12775 1L **5-bit all free space optical quantum random number generator** [12775-57]
- 12775 1N **Generation of entangled coherent states in cavity QED and its nonclassicality** [12775-59]
- 12775 1P **A method to enhance the detection capability of optical sensing based on the quantum characteristics of vortex beam** [12775-61]

Symposium Committees

Symposium Chairs

Bernard Kress, *President*, SPIE (United States) and Google
(United States)

Qihuang Gong, *Honorary President*, Chinese Optical Society (China)
and Peking University (China)

General Chairs

Ying Gu, *President*, Chinese Optical Society (China) and Chinese
People's Liberation Army General Hospital (China)

Wenqing Liu, *Vice President*, Chinese Optical Society (China) and
Anhui Institute of Optics and Fine Mechanics (China)

Technical Program Chairs

Zejin Liu, *Vice President*, Chinese Optical Society (China) and
National University of Defense Technology (China)

Xiangang Luo, Institute of Optics and Electronics (China)

Xingde Li, Johns Hopkins University (United States)

Technical Program Co-chairs

Wei Huang, Northwestern Polytechnical University (China)

Guobin Fan, China Academy of Engineering Physics (China)

Qingming Luo, Hainan University (China)

Ninghua Zhu, Institute of Semiconductors (China)

Fengyi Jiang, Nanjing University (China)

Organizing Committee

Suotang Jia, *Vice President*, Chinese Optical Society (China) and
Shanxi University (China)

Xiaomin Ren, *Vice President*, Chinese Optical Society (China) and
Beijing University of Posts and Telecommunications (China)

Wenjie Wang, *Vice President*, Chinese Optical Society (China) and
Sunny Optical Technology (Group) Company, Ltd. (China)

Jianda Shao, *Vice President*, Chinese Optical Society (China) and
Shanghai Institute of Optics and Fine Mechanics (China)

Hong Jin, *Vice President*, Chinese Optical Society (China) and
Changchun Institute of Optics, Fine Mechanics and Physics (China)

Yunquan Liu, *Vice President*, Chinese Optical Society (China) and Peking University (China)
Xinliang Zhang, Xidian University (China)
Yanqing Lu, Nanjing University (China)
Chuanfeng Li, University of Science and Technology of China (China)
Wei Hao, Xi'an Institute of Optics and Precision Mechanics (China)
Qun Hao, Changchun University of Science and Technology (China)
Yidong Huang, Tsinghua University (China)
Yongtian Wang, Beijing Institute of Technology (China)
Xiaocong Yuan, Shenzhen University (China)
Limin Tong, Zhejiang University (China)
Xiaoying Li, Tianjin University (China)
Yan Li, Peking University (China)
Jianxin Chen, Fujian Normal University (China)
Weimei Liu, Nankai University (China)
Jian Wang, Huazhong University of Science and Technology (China)

Secretaries-General

Xu Liu, *Secretary General*, Chinese Optical Society (China) and Zhejiang University (China)
Bo Gu, *Deputy Secretary General*, Chinese Optical Society (China)
Hong Yang, *Deputy Secretary General*, Chinese Optical Society (China) and Peking University (China)
Tianrui Zhai, *Deputy Secretary General*, Chinese Optical Society (China) and Beijing University of Technology (China)

Local Organizing Committee Chair

Xu Liu, *Secretary General*, Chinese Optical Society (China) and Zhejiang University (China)

Local Organizing Committee Co-chairs

Hong Yang, *Deputy Secretary General*, Chinese Optical Society (China) and Peking University (China)
Yuhong Wan, Beijing University of Technology (China)
Liquan Dong, Beijing Institute of Technology (China)

Local Organizing Committee

Wei Xiong, Chinese Optical Society (China)
Yu Xiang, Peking University (China)
Yong Zeng, Beijing University of Technology (China)

Nan Zhang, Beijing Institute of Technology (China)
Ruiqing Jia, Chinese Optical Society (China)
Xiao Li, Chinese Optical Society (China)
Jianxin Sun, Chinese Optical Society (China)

Technical Organizing Committee

Hossein Asghari, Loyola Marymount University (United States)
Liangcai Cao, Tsinghua University (China)
P. Scott Carney, The Institute of Optics, University of Rochester
(United States)
Benyong Chen, Zhejiang Sci-Tech University (China)
Qionghai Dai, Tsinghua University (China)
Gerd Ehret, Physikalisch-Technische Bundesanstalt (Germany)
Xinyu Fan, Shanghai Jiao Tong University (China)
Zheyu Fang, Peking University (China) and Rice University
(United States)
Ying Gu, Chinese People's Liberation Army General Hospital (China)
Sen Han, University of Shanghai for Science and Technology (China)
and Suzhou H&L Instruments LLC (China)
Ingmar Hartl, Deutsches Elektronen-Synchrotron (Germany)
Qiongyi He, Peking University (China)
Werner Hofmann, Deutsches Patent- und Markenamt (Germany)
Minghui Hong, Xiamen University (China)
Shibin Jiang, AdValue Photonics, Inc. (United States)
Tina Kidger, Kidger Optics Associates (United Kingdom)
Chang-Seok Kim, Pusan National University (Korea, Republic of)
Dai-Sik Kim, Ulsan National Institute of Science and Technology
(Korea, Republic of)
Chuan-Feng Li, University of Science and Technology of China
(China)
Xingde Li, Johns Hopkins University (United States)
Ming Li, Institute of Semiconductors (China)
Baojun Li, Jinan University (China)
Wei Li, Institute of Semiconductors (China)
Jun Liu, Shanghai Institute of Optics and Fine Mechanics (China)
Qingming Luo, Hainan University (China)
Ting-Chung Poon, Virginia Polytechnic Institute and State University
(United States)
Yuji Sano, Institute for Molecular Science (Japan) and Osaka
University (Japan)
Kebin Shi, Peking University (China)
Nuannuan Shi, Institute of Semiconductors (China)
Tsutomu Shimura, The University of Tokyo (Japan)
Samuel Stranks, University of Cambridge (United Kingdom)
Takuo Tanaka, RIKEN (Japan)

Masahiko Tani, University of Fukui (Japan)
Limin Tong, Zhejiang University (China)
Kazumi Wada, Massachusetts Institute of Technology (United States)
Yongtian Wang, Beijing Institute of Technology (China)
Jianpu Wang, Nanjing University of Technology (China)
Ting Wang, Institute of Physics (China)
Rengmao Wu, Zhejiang University (China)
Rongshi Xiao, Beijing University of Technology (China)
Minghong Yang, Wuhan University of Technology (China)
Jianhua Yao, Zhejiang University of Technology (China)
Hiroshi Yoshikawa, Nihon University (Japan)
Changyuan Yu, The Hong Kong Polytechnic University
(Hong Kong, China)
Xiao-Cong Yuan, Shenzhen University (China)
Jianzhong Zhang, Harbin Engineering University (China)
Xuping Zhang, Nanjing University (China)
Xinliang Zhang, Wuhan National Research Centre for Optoelectronics
(China)
Cunlin Zhang, Capital Normal University (China)
Xi-Cheng Zhang, The Institute of Optics, University of Rochester
(United States)
Zhenrong Zheng, Zhejiang University (China)
Haizheng Zhong, Beijing Institute of Technology (China)
Changhe Zhou, Jinan University (China)
Zhiping Zhou, Peking University (China)
Rui Zhu, Peking University (China)
Dan Zhu, Huazhong University of Science and Technology (China)

Conference Committee

Conference Chairs

Qiongyi He, Peking University (China)

Dai-Sik Kim, Ulsan National Institute of Science and Technology
(Korea, Republic of)

Chuan-Feng Li, University of Science and Technology of China
(China)

Conference Program Committee

Fang Bo, Nankai University (China)

Chunhua Dong, University of Science and Technology of China
(China)

Osamu Hirota, Tamagawa University (Japan)

Kebin Shi, Peking University (China)

Xiaolong Su, Shanxi University (China)

Jianwei Wang, Peking University (China)

