

PROCEEDINGS OF SPIE

Sixth Conference on Frontiers in Optical Imaging and Technology: Novel Technologies in Optical Systems

Donglin Xue
Peng Wang
Editors

22–24 October 2023
Nanjing, China

Organized by
Imaging and Detection Technology Committee, CSOE (China)
Nanjing University of Science and Technology (China)
Nanjing University (China)
Xi'an Technological University (China)
Beihang University (China)
Science and Technology on Low-Light-Level Night Vision Laboratory (China)

Sponsored by
The Chinese Society for Optical Engineering (China)

Published by
SPIE

Volume 13153

Proceedings of SPIE 0277-786X, V. 13153

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

Sixth Conference on Frontiers in Optical Imaging and Technology: Novel Technologies in Optical Systems,
edited by Donglin Xue, Peng Wang, Proc. of SPIE Vol. 13153, 1315301
© 2024 SPIE · 0277-786X · doi: 10.1117/12.3032291

Proc. of SPIE Vol. 13153 1315301-1

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 *Sixth Conference on Frontiers in Optical Imaging and Technology: Novel Technologies in Optical Systems*, edited by Donglin Xue, Peng Wang, Proc. of SPIE 13153, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510679665
ISBN: 9781510679672 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2024 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 *Conference Committee*

NOVEL TECHNOLOGIES IN OPTICAL SYSTEMS

13153 02	The properties of $\text{SiO}_2\text{-B}_2\text{O}_3\text{-BaO-TiO}_2$ glass [13153-2]
13153 03	A 360° continuous detection system based on visual elimination of image rotation [13153-3]
13153 04	Manipulation of photonic orbital-angular-momentum phase spectrum for high-accuracy rotating velocimetry of a posture-varied target [13153-4]
13153 05	Design of a large-range dispersive objective for line-sweep spectral confocal displacement sensors [13153-5]
13153 06	High conductivity multi-channel AlGaN/AlN/GaN heterostructure for underwater blue light detection [13153-6]
13153 07	Snapshot high dynamic range imaging based on adjustable attenuation microarray mask [13153-7]
13153 08	Spectral shifts and spectral switches of partially coherent electromagnetic vortex beam propagating through turbulent atmosphere [13153-8]
13153 09	Research on the performance of rapid rotating scanning scheme for the off-axis 45° parallel two-mirror system [13153-9]
13153 0A	Tunable polarimetric sensitive terahertz absorber [13153-10]
13153 0B	A phase retrieval algorithm combines deep learning for testing optical surface [13153-12]
13153 0C	Optical system design with wide temperature range and long focal length based on linear thermal expansion opto-mechanical model [13153-13]
13153 0D	Design and verification of a silicon carbide special-shaped mirror set based on 3D printing [13153-14]
13153 0E	Whole and local phase modulation measurement of SLM with common-path phase-shifting interferometry [13153-15]
13153 0F	Multi-camera array bionic compound eye target recognition and ranging system [13153-17]
13153 0G	Scaling law for incoherently combined laser array propagating in the atmosphere [13153-18]

13153 OH	Effects of vertical spatial resolution of sounding data on meteorological parameters [13153-20]
13153 OI	Study of a standardizer suitable for on-site verification of laser scanners [13153-21]
13153 OJ	An improved deconvolution algorithm based on Richardson-Lucy method with the adaptive gain coefficient applied in the plasma laser-induced fluorescence diagnosing [13153-23]
13153 OK	Laser active imaging deblurring technique based on random coding [13153-25]
13153 OL	Study on the effect of aperture on laser scintillation characteristics [13153-27]
13153 OM	Convolutional neural network-based crack identification and detection in underwater buildings [13153-28]
13153 ON	Monte Carlo simulation of turbulence induced by temperature and salinity changes on underwater light transmission performance [13153-29]
13153 OO	Implementation of a large aperture hyperspectral imaging optical system [13153-31]
13153 OP	Underwater optical wireless communication using a green laser [13153-33]
13153 OQ	Study on characteristics of low-level jets in planetary boundary layer based on wind profiling radar [13153-34]
13153 OR	The transport properties of vortex pair with opposite sign and application to optical field focusing [13153-35]
13153 OS	Research on spatial carrier phase-shifting algorithm and its application in quadri-wave lateral shearing interferometer [13153-36]
13153 OT	A servo control method for continuous zoom optical system based on improved model predictive control [13153-38]
13153 OU	Pixel super resolution imaging technology based on phase wavefront modulation [13153-39]
13153 OV	Performance analysis of hybrid RF-UWOC dual-hop link for satellite-underwater communication [13153-40]
13153 OW	Polarization-independent metalens for broadband chromatic correction in the mid-wave infrared range [13153-41]
13153 OX	High-power antimonide semiconductor laser diodes emitting at 2μm [13153-42]
13153 OY	Study of large solar telescope mirror seeing [13153-43]
13153 OZ	Multi-channel high-precision data acquisition system for optoelectronic platform [13153-45]
13153 IO	Optimization of random illumination pattern in computational ghost imaging [13153-46]

- 13153 11 **Demonstration of a blue light transmitter with 100Mbps rate, 80° divergence angle, and 18mW optical power for underwater wireless optical communication based on laser diode and engineered diffuser [13153-47]**
- 13153 12 **Experimental demonstration of measuring angle of incidence for light into receiver in underwater laser communication system based on four-quadrant detector [13153-48]**
- 13153 13 **A measurement method for straightness of two-dimensional long guide rails [13153-49]**
- 13153 14 **The current state of development in underwater lidar detection [13153-51]**
- 13153 15 **Mid-infrared dual-band imaging metalens [13153-52]**
- 13153 16 **Atomic absorption spectroscopy detection system based on wavelength modulation and wavelet denoising [13153-53]**
- 13153 17 **Estimation of atmospheric optical turbulence profile using support vector machine based on whale optimization algorithm [13153-54]**
- 13153 18 **Illumination pattern and path control through laser beam steering using a calibrated two-dimensional galvo scanner [13153-55]**
- 13153 19 **Point source wavefront reconstruction using Swin-UNet in sensorless adaptive optics systems with CCD light intensity images [13153-57]**
- 13153 1A **Development of the Sc/Si multilayer mirrors with high spectral selectivity for the Solar Upper Transition Region Imager [13153-58]**
- 13153 1B **Review on intelligent wavefront reconstruction approaches for pyramid wavefront sensors [13153-59]**
- 13153 1C **Research on the typical parameters of aerosol optical properties in China's maritime areas [13153-60]**
- 13153 1D **Optimized wavefront fitting with voltage saturation constraint in adaptive optics system [13153-61]**
- 13153 1E **A simulation on hierarchical wavefront control for large aperture lightweight polymer mirrors [13153-62]**
- 13153 1F **Effect of diamond crystal structure on anode heat transfer rate of x-ray source [13153-66]**
- 13153 1G **Parameter estimation algorithm based on the combination of cross-correlation and principal component analysis for structured illumination microscopy [13153-69]**
- 13153 1H **Analysis of atmospheric optical turbulence to plateau atmosphere using HAP model [13153-72]**
- 13153 1I **Common mode noise suppression of fiber optic hydrophones based on symmetrical structure [13153-73]**

- 13153 1J **Effect of light wavelength on underwater in-situ darkfield microscopy at different water optical attenuation coefficients [13153-74]**
- 13153 1K **Investigation of spectral responsivity of imaging sensor and systems with a differential approach [13153-75]**
- 13153 1L **High-precision spectral imaging based on PZT linear optimization [13153-79]**
- 13153 1M **Analysis of stress distribution characteristics in optical fibers of submarine cables with different structures [13153-84]**

Conference Committee

Conference Chair

Junhao Chu, Shanghai Institute of Technical Physics (China)

Conference Co-chairs

Qian Chen, North University of China (China)

Antoni Rogalski, Military University of Technology (Poland)

Xiaofeng Li, Soochow University (China)

Weiguo Liu, Xi'an Technological University (China)

Yanqing Lu, Nanjing University (China)

Huijie Zhao, Beihang University (China)

Conference Executive Chair

Qian Chen, North University of China (China)

Technical Program Committee

Ming Gao, Xi'an Technological University (China)

Shensheng Han, Shanghai Institute of Optics and Fine Mechanics
(China)

Weiqi Jin, Beijing Institute of Technology (China)

Ye Li, Changchun University of Technology (China)

Bo Liu, Institute of Optics and Electronics (China)

Jin Lu, Tianjin Jinhang Institute of Technical Physics (China)

Yanqiu Lv, AVIC CAMA (Shanghai) Infrared Technology Company,
Ltd. (China)

Zhichuan Niu, Institute of Semiconductors (China)

Feng Shi, Science and Technology on Low-Light-Level Night Vision
Laboratory (China)

Yanli Shi, Yunnan University (China)

Haizhi Song, Southwest Institute of Technical Physics (China)

Jun Wang, University of Electronic Science and Technology of China
(China)

Nanjian Wu, Institute of Semiconductors (China)

Jiangtao Xu, Tianjin University (China)

Donglin Xue, Changchun Institute of Optics, Fine Mechanics, and
Physics (China)

Xing Yang, National University of Defense Technology (China)

Qiang Zhang, University of Science and Technology of China (China)

Yan Zhou, Institute of Semiconductors (China)

Chao Zuo, Nanjing University of Science and Technology (China)

