

PROCEEDINGS OF SPIE

8th International Symposium on Advanced Optical Manufacturing and Testing Technology

Optical Test, Measurement Technology, and Equipment

Yudong Zhang
Fan Wu
Ming Xu
Sandy To
Editors

26–29 April 2016
Suzhou, China

Sponsored by
COS—The Chinese Optical Society (China)
IOE—Institute of Optics and Electronics, Chinese Academy of Sciences (China)

Technical Co-sponsor
SPIE

Supporting Organizations
Ministry of Science and Technology of China (China)
Chinese Academy of Sciences (China)
National Natural Science Foundation of China (China)

Published by
SPIE

Volume 9684
Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 9684

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

AOMATT 2016: Optical Test, Measurement Technology, and Equipment, edited by
Yudong Zhang, Fan Wu, Ming Xu, Sandy To, Proc. of SPIE Vol. 9684, 968401
© 2016 SPIE CCC code: 0277-786X/16/\$18 · doi: 10.1117/12.2256682

Proc. of SPIE Vol. 9684 968401-1

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 *8th International Symposium on Advanced Optical Manufacturing and Testing Technologies: Optical Test, Measurement Technology, and Equipment*, edited by Yudong Zhang, Fan Wu, Ming Xu, Sandy To, Proceedings of SPIE Vol. 9684 (SPIE, Bellingham, WA, 2016) Six-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781628419191

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2016, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 0277-786X/16/\$18.00.

Printed in China.

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

**SPIE. DIGITAL
LIBRARY**

SPIDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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 six-digit CID article numbering system structured as follows:

- The first four 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

xi	<i>Authors</i>
xvii	<i>Symposium Committee</i>
xix	<i>Introduction</i>
xxi	<i>Sponsors</i>

Part One

ORAL SESSION

9684 02	Mount-induced transmitted wavefront distortion measurement of large slab matrix module [9684-31]
9684 03	Research on the photoelectric measuring method of warhead fragment velocity [9684-57]
9684 04	The influence of relative humidity on the scattered light signal of aerosol concentration measurement system [9684-129]
9684 05	Near infrared reflective shearing point diffraction interferometer for dynamic wavefront measurement [9684-14]
9684 06	Research on adjusting and testing of off-axis paraboloid mirror with large aperture [9684-10]
9684 07	High precision calibration of line structured light sensors based on linear transformation over triangular domain [9684-72]
9684 08	Annular sub-aperture stitching interferometry testing for large-caliber aspheric [9684-32]
9684 09	Synchronous two-wavelength temporal interferometry [9684-1]
9684 0A	Design of a photoelectron/ion imaging spectrometer with high temporal resolution [9684-116]
9684 0B	Manufacture, alignment and measurement for a reflective triplet optics in imaging spectrometer [9684-176]
9684 0C	Sub-aperture stitching test of a cylindrical mirror with large aperture [9684-67]
9684 0D	A novel way of squareness measurement on ultra-precision motion stage basing on the error separation [9684-111]

- 9684 OE **Stochastic dual-plane on-axis digital holography based on Mach-Zehnder interferometer** [9684-155]
- 9684 OF **Design of a compound eye system with planar microlens array and curved folded mirrors** [9684-145]
- 9684 OG **Mounting of reference surface for a transmission sphere** [9684-45]
- 9684 OH **Sub-nanometer asphere fabrication and testing** [9684-167]
- 9684 OI **3D shape reconstruction of rail and surface defect detection based on PMP** [9684-159]
- 9684 OJ **Phase measurement profilometry based on a virtual reference plane method** [9684-161]
- 9684 OK **Rapid matching of stereo vision based on fringe projection profilometry** [9684-142]
- 9684 OL **Gaussian process based intelligent sampling for measuring nano-structure surfaces** [9684-36]
- 9684 OM **A review of relationship between optical performance and geometrical errors of freeform optics** [9684-160]
- 9684 ON **Monitoring PMD in two-dimensional phase diagram for NRZ-DPSK systems using 0.25 bit period delay-tap sampling technique** [9684-2]
- 9684 OO **Study on the metrological performance of self-calibration angle encoder** [9684-171]
- 9684 OP **An improved self-calibration algorithm for multilateration coordinates measuring system** [9684-117]
- 9684 OQ **High resolution aspheric surface measurement technology based on laser interferometer** [9684-147]
- 9684 OR **Distributed pavement subgrade shape monitoring based on FBG sensing technique** [9684-40]
- 9684 OS **Study on high-precision measurement of long radius of curvature** [9684-158]
- 9684 OT **Ultra-high accuracy point diffraction interferometer: development, accuracy evaluation and application** [9684-174]

POSTER SESSION

- 9684 OU **Dynamics of spiral patterns in gas discharge detected by optical method** [9684-7]
- 9684 OV **Research on testing system for optical surface based on polarizing coherent technology** [9684-13]
- 9684 OW **A phase retrieval algorithm based on color-frequency encoding for fringe reflection technique** [9684-55]

- 9684 0X **Spectrum synthesis for a spectrally tunable light source based on a DMD-convex grating Offner configuration** [9684-58]
- 9684 0Y **Test technology on divergence angle of laser range finder based on CCD imaging fusion** [9684-77]
- 9684 0Z **Test method on infrared system range based on space compression** [9684-124]
- 9684 10 **Test technology on CCD anti-sunlight jamming based on complex circumstance** [9684-125]
- 9684 11 **Longitudinal electron bunch diagnostics using coherent transition radiation at the IRFEL** [9684-20]
- 9684 12 **Calibration of transition matrix of coordinate system for the aurora imager** [9684-66]
- 9684 13 **Optimal visual simulation of the self-tracking combustion of the infrared decoy based on the particle system** [9684-51]
- 9684 14 **Design of near-infrared single photon detector at 1550nm wavelength** [9684-146]
- 9684 15 **Experimental research of improved subaperture stitching method able to eliminate high-order defocus error** [9684-23]
- 9684 16 **Design of an ultraviolet fluorescence lidar for biological aerosol detection** [9684-6]
- 9684 17 **Dual-wavelength retinal image registration based on vessel segmentation and optic disc detection** [9684-132]
- 9684 18 **Research of errors and fabrication method for cylindrical hologram phase grating as standard in interferometric stylus profiler** [9684-120]
- 9684 19 **Improved coded exposure for enhancing imaging quality and detection accuracy of moving targets** [9684-34]
- 9684 1A **Three-dimensional profile reconstruction based on infrared multi-view vision** [9684-9]
- 9684 1B **Research on measurement of center thickness of the lens with a hole** [9684-44]
- 9684 1C **Research on effects of baffle position in an integrating sphere on the luminous flux measurement** [9684-163]
- 9684 1D **A robust color image fusion for low light level and infrared images** [9684-80]
- 9684 1E **The influence of low light level ICCD image on low light level and infrared image fusion** [9684-78]
- 9684 1F **Online evaluation system for the photo-physical properties of organic photoelectric materials and device integrated with the device fabrication instrument** [9684-69]
- 9684 1G **Alignment and measurement for back-end optical system of quantum communication** [9684-38]

- 9684 1H **Performance test and image correction of CMOS image sensor in radiation environment** [9684-114]
- 9684 1I **The analysis of measurement accuracy of the parallel binocular stereo vision system** [9684-84]
- 9684 1J **Fresnel incoherent correlation holography and its imaging properties** [9684-82]
- 9684 1K **A new multi-probe scanning method for measuring optical surface** [9684-141]
- 9684 1L **Different environmental conditions from the effects of repetitive fixed focus lens of long focal distance** [9684-162]
- 9684 1M **Accuracy decline of the Brillouin optical time-domain analysis system induced by self-phase modulation** [9684-144]
- 9684 1N **Research on auto-centering device in surface defects evaluation system of large spherical optics** [9684-105]
- 9684 1O **Design on electromagnetic actuator of aerostatic bearing stylus displacement sensor** [9684-83]
- 9684 1P **A method based on reflection theory to test the attenuation performance of an absorption coat to 8mm waves** [9684-63]
- 9684 1Q **A cylinder based calibration method for integrating a line structured light sensor with a rotation-translation platform** [9684-70]
- 9684 1R **Three-dimensional measurement of multilayer thin films based on scanning white light interferometer** [9684-149]
- 9684 1S **Analysis and modeling of atmospheric turbulence on the high-resolution space optical systems** [9684-133]
- 9684 1T **Research on manufacturing method of CGH** [9684-148]
- 9684 1U **A new method of head attitude tracking based on CCD/MIMU** [9684-64]
- 9684 1V **A testing method of optical axes parallelism of shipboard photoelectrical theodolite** [9684-505]
- 9684 1W **Detection for flatness of large surface based on structured light** [9684-113]
- 9684 1X **Study on paper's basis weight measurement method by double monochromatic light sources** [9684-42]
- 9684 1Y **Specular gloss scales comparison between the SIMT and the NIST** [9684-169]
- 9684 1Z **Application of image stitching in rail abrasion 3D online detection** [9684-165]

Part Two

POSTER SESSION (CONT.)

- 9684 20 **Defect detection for end surface of ferrite magnetic tile** [9684-21]
- 9684 21 **The estimation method on diffusion spot energy concentration of the detection system** [9684-65]
- 9684 22 **Influencing factors and error analysis for specular gloss measurement** [9684-170]
- 9684 23 **Evaluating system for SRAM-based FPGA single event upset rate** [9684-115]
- 9684 24 **The method to reduce the spinal error in the aspheric mirror testing with the CGH** [9684-143]
- 9684 25 **Research on measurement of total luminous flux of single LED in direct comparison method** [9684-166]
- 9684 26 **A novel long-wave infrared high resolution continuous zoom lens with uncooled thermal detector** [9684-19]
- 9684 27 **A fast algorithm for image defogging** [9684-127]
- 9684 28 **Measurement of deformation and frequency response characteristic of PZT tube in tunable fiber laser with short period based on coherent laser beam** [9684-52]
- 9684 29 **Consistency check method for sighting axis and laser detection axis based on field testing** [9684-41]
- 9684 2A **Color hologram reconstruction based on single DMD** [9684-15]
- 9684 2B **General model for the pointing error analysis of Risley-prism system based on ray direction deviation in light refraction** [9684-24]
- 9684 2C **Computer-generated holograms for precision optical testing** [9684-85]
- 9684 2D **Adaboost multi-view face detection based on YCgCr skin color model** [9684-93]
- 9684 2E **Application research of the balance detector on coherent detection techniques** [9684-131]
- 9684 2F **A standard test method based on point spread function for three-dimensional imaging system** [9684-101]
- 9684 2G **Development of glucose measurement system based on pulsed laser-induced ultrasonic method** [9684-30]
- 9684 2H **Performance evaluation and verification of infrared imaging system based on TTP metric** [9684-48]
- 9684 2I **Research on testing method for combined aspheric surface with non-rotational symmetric** [9684-68]

- 9684 2J **Design and fabrication of CGH for 600mm diameter SiC primary mirror surface figure testing** [9684-123]
- 9684 2K **A new method for COD analysis with full-spectrum based on Artificial Neural Network** [9684-53]
- 9684 2L **Generation of parallel transmission sub-pulses of spatial distribution based on polarizing splitting prism** [9684-33]
- 9684 2M **Evaluating surface repeatability for interferometric measurement: a comparative study** [9684-106]
- 9684 2N **New reconstruction algorithm for absolute shape calibration in two-flat test** [9684-60]
- 9684 2O **Object tracking algorithm based on contextual visual saliency** [9684-87]
- 9684 2P **Object detection based on deformable part model** [9684-89]
- 9684 2Q **Studies on spectral scene reproduction systems based on multispectral LED fitting** [9684-59]
- 9684 2R **Method used to test the imaging consistency of binocular camera's left-right optical system** [9684-43]
- 9684 2S **Development of high power UV irradiance meter calibration device** [9684-168]
- 9684 2T **Design of measuring system for wire diameter based on sub-pixel edge detection algorithm** [9684-86]
- 9684 2U **Measurement of z-axis deviation angle of electro-optic crystal by conoscopic interference** [9684-39]
- 9684 2V **Stray light measurement for point source transmittance of space optical systems** [9684-110]
- 9684 2W **Simulation study on simultaneous phase-shifting lateral-shearing interferometer** [9684-112]
- 9684 2X **Axis consistency testing method based on image processing technology for non-cooperative target** [9684-99]
- 9684 2Y **Study and analysis of catadioptric null compensating test** [9684-47]
- 9684 2Z **Development and experiments of lateral shearing interferometer for parabolic surface measurement** [9684-46]
- 9684 30 **Research of maneuvering target prediction and tracking technology based on IMM algorithm** [9684-97]
- 9684 31 **A surface irregularity compensation alignment method for all-reflective optical system** [9684-152]
- 9684 32 **Online damage inspection of optics for ATP system** [9684-104]
- 9684 33 **A visual tracking method based on improved online multiple instance learning** [9684-88]

- 9684 34 **Defects detection for rough magnetic tiles surface based on light sectioning** [9684-56]
- 9684 35 **A new measurement method for color discrimination thresholds of human eyes based on PWM light-mixing technology** [9684-103]
- 9684 36 **Compact optical system for cesium atomic fountain clock** [9684-54]
- 9684 37 **Fizeau simultaneous phase-shifting interferometry based on extended source** [9684-178]
- 9684 38 **Analysis of absolute flatness testing in sub-stitching interferometer** [9684-128]
- 9684 39 **A review of RGB-LED based mixed-color illumination system for machine vision and microscopy** [9684-76]
- 9684 3A **Surface roughness measurement with laser triangulation** [9684-75]
- 9684 3B **Experimental study of resonance fiber optic gyroscope employing a dual-ring resonator** [9684-100]
- 9684 3C **The effect analysis of conic coefficient error based on data measured from Talysurf and simulation of Zernike coefficients** [9684-74]
- 9684 3D **Research of mine water source identification based on LIF technology** [9684-5]
- 9684 3E **The application of tapered multi-mode fiber in laser signal simulation** [9684-73]
- 9684 3F **Design of short-range terahertz wave passive detecting system** [9684-138]
- 9684 3G **Non-null compensator design method in digital Moiré interferometry for freeform surface measurement** [9684-156]
- 9684 3H **The aberration characteristics in a misaligned three-mirror anastigmatic (TMA) system** [9684-157]
- 9684 3I **An adaptive block-based fusion method with LUE-SSIM for multi-focus images** [9684-28]
- 9684 3J **Interferometry measurement of parallel optical plate wavefront** [9684-172]
- 9684 3K **Performance evaluation of laser line scanner for in-process inspection of 3D geometries** [9684-26]
- 9684 3L **Large-scale absolute surface reconstruction** [9684-137]
- 9684 3M **TRIZ theory in NEA photocathode preparation system** [9684-151]
- 9684 3N **New design of electronic display system for spectrometer** [9684-109]
- 9684 3O **The effects of Ga incorporation on the crystalline quality of AlInAs metamorphic buffer using x-ray characterization** [9684-50]
- 9684 3P **The design and implementation of the full-Stokes imaging spectropolarimeter** [9684-71]

- 9684 3Q **A novel method using simplified PCNN for near infrared eye detection** [9684-27]
- 9684 3R **A simple method for focal length measurement** [9684-153]
- 9684 3S **Laser range profile of spheres** [9684-150]
- 9684 3T **Modeling and simulation of atmosphere interference signal based on FTIR spectroscopy technique** [9684-61]
- 9684 3U **Analysis of spectral mismatch error influences on short-circuit current measurement of reference solar cell** [9684-134]
- 9684 3V **Solving surface parameters of conic asphere mirror based on computer simulation** [9684-177]
- 9684 3W **Analysis and design of energy monitoring platform for smart city** [9684-22]
- 9684 3X **Iterative surface construction for blind deflectometry** [9684-102]
- 9684 3Y **Automatic estimation of the focusing reconstruction distance of recorded object in digital holography** [9684-37]
- 9684 3Z **Experimental investigation of laser transmission at 1.06 μ m in horizontal atmosphere under fine and haze-fog conditions of summer** [9684-139]
- 9684 40 **Computer-aided alignment method of optical lens with high accuracy** [9684-154]
- 9684 41 **Rigid geometric-optics autocollimation model and its theoretical analysis based on ray-tracing method** [9684-62]
- 9684 42 **Dual-wavelength method for measuring the thickness of HSQ photoresist** [9684-173]
- 9684 43 **Analysis of adjustment error in aspheric null testing with CGH** [9684-90]
- 9684 44 **Noise suppression performance of typical phase shifting algorithms** [9684-92]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Ao, Kuang, 0A
Bai, Fuzhong, 3A
Bai, Jian, 1N
Bai, Qing, 2B
Bao, Bin, 23
Bao, Jiaqi, 26
Cai, Chuan, 3U
Cai, Zong-qj, 2K
Cao, Jian, 0K
Cao, Pin, 1N
Cao, Tingfen, 02
Cao, Xuedong, 1W
Cao, Zheng, 30, 37
Cao, Zhenggang, 2F
Chai, Huiting, 1N
Chai, Liqun, 2C, 2N
Chang, Suping, 1O
Chen, Bo, 3Y
Chen, Haiping, 02
Chen, Jiang, 36
Chen, Jing, 30, 32
Chen, Lei, 05, 06, 15
Chen, Li, 19
Chen, Qiang, 43
Chen, Qinfang, 2V
Chen, Shanyong, 0C, 1K
Chen, Wei, 1M
Chen, Xiangcheng, 34
Chen, Xiaomei, 1S
Chen, Xinhua, 3P
Chen, Xinrong, 18
Chen, Yong-kang, 1D
Chen, Yudong, 2T
Chen, Yuheng, 3P
Chen, Yunyun, 04
Chen, Zhen-xing, 0Y, 0Z, 10
Chen, Zhiguo, 0R
Chen, Zhu, 3Y
Cheng, Weihai, 1Y, 25
Cui, Fengpin, 04
Dai, Wei-kun, 3N
Dai, Yun, 17
Dan, Lijun, 21
Deng, Chao, 30
Deng, Huaxia, 0F
Diao, Xiaofei, 0Q
Ding, Quanxin, 1U
Ding, Zhendong, 2H
Dong, J. R., 3O
Dong, Jinxin, 2F, 35
Du, Rui, 17
Du, Yunfei, 21
Duan, Fan, 0I
Duan, Jin, 13
Duan, Xueting, 1T
Fan, Bin, 1G, 24, 3V
Fan, Chengyu, 3Z
Fan, Xuewu, 2J
Fan, Yue, 3B
Fan, Zhaojin, 28
Fan, Zhigang, 41
Feng, Chang, 1H
Feng, Wei-wei, 2K
Feng, Xiaoxing, 3Z
Feng, Xiao-xuan, 1L
Feng, Ziang, 09
Fu, Bao, 2O
Gan, Xun, 32
Gao, Bo, 2C
Gao, Chun-ming, 17, 1H
Gao, Jiali, 14
Gao, Jianqiang, 2S
Gao, Qiong, 2H
Gao, Songtao, 0H, 0S
Gao, Wei, 21
Gao, Xiaorong, 0I, 0J, 1Z
Gao, Xicheng, 0F
Gao, Youtang, 3M
Gao, Zhan, 09
Gong, Lei, 3S
Gong, Yanjun, 3S
Graves, Logan R., 3X
Gu, Fang, 04, 0A
Gu, Ji-hua, 2A
Guan, Yue, 0A
Guo, Hao, 29, 3E
Guo, Hongwei, 0K
Guo, Meng, 0D
Guo, Shuai, 27
Guo, Quanfeng, 12
Guo, Yongcai, 3I, 3Q
Han, Fu-li, 0Z, 10
Han, Lin, 19
Han, Rui, 3N
Han, Zhigang, 15
Hao, Fu-guo, 2K
Hao, Peiming, 2Y
Hao, Qun, 3G

He, Fei, 12
 He, Mingzhao, 0P
 He, Tingyao, 16
 He, Wenyan, 1W
 He, Xianhui, 33
 He, Y., 3O
 He, Yingwei, 3U
 He, Yiwei, 43
 He, Yuhang, 2C
 He, Yuhang, 2N
 He, Zhiping, 0B
 Ho, Cheng-Fang, 0G
 Hou, Jun-jian, 2A
 Hou, Lexin, 39
 Hou, Xiao-hua, 40
 Hou, Yinlong, 37
 Hsu, Wei-Yao, 0G
 Hu, Chunbing, 1O
 Hu, Qi, 13
 Hu, Qing-ping, 1D, 1E
 Hu, Song, 1H
 Hu, Wenqi, 2Y
 Hu, Yao, 3G
 Hu, Zhixiong, 2F
 Hua, Dengxin, 16
 Huan, Shuai, 1X
 Huang, Biyong, 1Y, 25
 Huang, Chuan-ke, 3V
 Huang, Chien-Yao, 0G
 Huang, Dayong, 3M
 Huang, De-wei, 0V
 Huang, Fengshan, 07
 Huang, Fengzhen, 2B
 Huang, Ji-peng, 3N
 Huang, Run, 3X
 Huang, Yao, 0O
 Huang, Yongmei, 2E
 Huang, Yukun, 3I
 Huang, Zhao-wei, 3N
 Ji, Bin-dong, 40
 Ji, Tonghui, 0N
 Ji, Yiqun, 3P
 Ji, Zijuan, 26
 Jia, Xin, 1I, 38
 Jiang, Hongzhen, 2U, 3Y
 Jiang, Lili, 1S
 Jiang, Yu, 32
 Jiang, Zhuangde, 08
 Jin, Chunshui, 0T
 Jin, Jingcheng, 42
 Kai, Jiang, 3C
 Kang, Yanhui, 0Q
 Kang, Yao, 0P
 Kim, DaeWook, 3X
 Kong, Lingbao, 0M
 Kuo, Ching-Hsiang, 0G
 Lai, Lei, 1C, 22, 25
 Lai, Tao, 0D
 Lai, Zhi, 28
 Lan, Qi, 2D

Le, Jing, 16
 Lee, Jinlong, 0I, 0J, 1Z
 Lei, Bai-ping, 24, 3V
 Lei, Xinzhuo, 2Q
 Li, Bo, 0W
 Li, Chaoming, 18
 Li, Chaoqiang, 43
 Li, Chun, 42
 Li, Dan, 2K
 Li, Dong, 2U, 3Y
 Li, Gang, 3C
 Li, Guangyu, 09
 Li, Haozhao, 1B
 Li, Hui, 3E
 Li, Jianshuan, 0P
 Li, Jing, 0M
 Li, Jin-huan, 3N
 Li, Lian, 3I
 Li, Qiang, 2C, 2N
 Li, Qiang, 3T
 Li, Tiecheng, 1C, 1Y, 22, 25
 Li, Ting, 3F
 Li, Xiangjiang, 3M
 Li, Xiaoyang, 18
 Li, Xin, 2X
 Li, Xinyao, 2V
 Li, Xu, 12
 Li, Yang, 1N
 Li, Yuehua, 07, 1Q
 Li, Zhaohui, 2V
 Liang, Weiwei, 3E
 Lin, Fangsheng, 1C, 1Y, 22, 25
 Liu, Bingcai, 2Z
 Liu, Changchun, 02
 Liu, Chao, 1D, 1E
 Liu, Dong, 1N
 Liu, Feng, 2I
 Liu, Fengwei, 44
 Liu, Guixin, 0O
 Liu, Guodong, 2G
 Liu, Haitao, 24
 Liu, Ji, 03
 Liu, Jie, 2R
 Liu, Jun, 2L
 Liu, Junfeng, 0D
 Liu, Kai, 3C
 Liu, Lijian, 1Q
 Liu, Meiyang, 2R
 Liu, Qiong, 30, 32
 Liu, Shuhua, 0U
 Liu, Wanqiu, 0R
 Liu, Weimin, 1F
 Liu, Wenli, 2F
 Liu, Xiaojun, 1O
 Liu, Xiaoyan, 03
 Liu, X. Y., 11
 Liu, Xu, 2U, 3J, 3Y
 Liu, Yanfang, 29
 Liu, Yang, 12
 Liu, Yi, 04

Liu, Yong, 2U, 3J, 3Y
Liu, Yumin, 0N
Liu, Yuzhu, 0A
Liu, Zhengmin, 3T
Long, Kuang, 1W
Lou, Guowei, 3F
Lu, Jinfeng, 0C
Lu, P., 11
Lu, Wenlong, 1O
Lu, Zengxiong, 0T
Luo, Lin, 0I, 1Z
Lv, Gang, 0B
Lv, Jia, 1X
Lv, Yao, 0Y
Ma, Dongmei, 0T
Ma, Dongxi, 2X
Ma, Haotong, 1J
Ma, Hua, 1L, 1R, 3R
Ma, Kai, 1U
Ma, Ke, 1L
Ma, Mengchao, 0F
Ma, Na, 2H
Ma, Suodong, 0W, 0X, 3P
Ma, TianMeng, 3I
Ma, Yu-rong, 1L
Ma, Zhen, 2J, 2V
Mao, Baoqi, 19
Mao, Yao, 30, 32
Meng, Haifeng, 3U
Meng, Lingqiang, 1F
Meng, Zhou, 1M
Miao, Dongjing, 0P
Miao, Erling, 0H
Mo, Changtao, 1X
Ni, Guoqiang, 1S
Pan, Er-ting, 3N
Pan, Qiao, 0X
Pang, Zhihai, 2J, 2V
Pei, Shixin, 0A
Peng, Qiu, 3C
Peng, Shijun, 0S
Peng, Wang, 3C
Peng, Wei-Jei, 0G
Peng, XianRong, 2O
Peng, Xiaoqiang, 0D
Peng, Yunfeng, 0N
Peng, Zhang, 1W
Qian, Songsong, 3F
Qiao, Chunhong, 3Z
Qiao, Dan, 0O
Qiao, Jianliang, 3M
Qin, Jie, 09
Qin, Yusheng, 12
Quan, Hai-yang, 2M, 3L
Rao, Zhimin, 16
Ren, Ge, 1J
Ren, Hongbing, 0J
Ren, Huan, 1L, 1R, 3J, 3R
Ren, M. J., 0L
Ren, Zhong, 2G

Rong, Lu, 0E
Ruan, Jun, 36
Shen, Li, 04
Shen, Weimin, 0X, 19, 3P
Shen, Yibing, 1N
Shi, Feng, 0C
Shi, Junru, 36
Shi, Leibing, 22
Shi, Sheng-bing, 0Y, 0Z, 10
Shi, Zheng-dong, 1L, 1R, 3J, 3R
Song, Chong, 3C
Song, Le, 15
Song, Wei-hong, 3L, 3X, 43
Song, Y., 3O
Song, Zongxi, 21
Su, Dongqi, 0H
Su, Haibing, 27
Su, Hailin, 1X
Su, Jing, 0A
Su, Lijuan, 2B
Sun, B. G., 11
Sun, Hongxiao, 1B
Sun, L. J., 0L
Sun, Lin, 08
Sun, Xuna, 2L
Sun, Y. R., 3O
Sun, Yanling, 1O
Sun, Zhonghan, 21
Tan, Jiubin, 41
Tan, Xinran, 41
Tang, Cheng-chang, 3N
Tang, L. L., 11
Tao, Jiayuan, 20, 34
Tao, Lei, 3K
Tian, Ailing, 2Z
Tian, Chaoping, 3A
Tian, Fujing, 1K
Tie, Guipeng, 0D
Wan, Bin, 2G
Wan, Daoming, 2N
Wan, Xiong, 1A
Wang, Bin, 3H
Wang, Boshi, 0R
Wang, Congzheng, 1H
Wang, Dayong, 0E
Wang, Fen, 0V
Wang, Fengpeng, 0E
Wang, Gaixia, 2E
Wang, Guangming, 1X
Wang, Guolei, 0P
Wang, Hexin, 39
Wang, Hongjun, 2Z
Wang, Hong-xia, 3W
Wang, Hu, 2R
Wang, Hui, 0T
Wang, Hui, 27
Wang, Jianghua, 1U
Wang, Jianlin, 2F
Wang, Junwei, 1O
Wang, Keyi, 20, 34

Wang, Lei, 2Q
 Wang, LiNing, 13
 Wang, Min, 0V
 Wang, Ming, 1X
 Wang, Mingjun, 3S
 Wang, Mingyi, 0U
 Wang, Pengfei, 1F
 Wang, Shanshan, 37
 Wang, Shaopu, 3G
 Wang, Shengjia, 09
 Wang, Wei, 3B
 Wang, Xingyu, 27
 Wang, Xinliang, 36
 Wang, Xuanyu, 1P
 Wang, Yan, 0O
 Wang, Yongsheng, 1U
 Wang, Yueming, 0B
 Wang, Yunlong, 23
 Wang, Yunxin, 0E
 Wang, Yuwei, 20, 34
 Wang, Zeyong, 1Z
 Wang, Zhichao, 0O
 Wang, Zhipeng, 1J
 Wei, Lei, 2P
 Wei, Xiaohong, 2C
 Wei, Xiaoxiao, 2I
 Wei, Yuanyuan, 04
 Wei, Yuxing, 33
 Wei, Zhigang, 0R
 Wen, Jingji, 1X
 Wen, Tao, 2F
 Wu, Dan, 2A
 Wu, Dongcheng, 0S
 Wu, F. F., 11
 Wu, Fan, 1N
 Wu, Fan, 24, 2M, 3H, 3L, 43
 Wu, Gao-feng, 3L
 Wu, Hong-bing, 1V
 Wu, Limin, 22
 Wu, Pengfei, 08
 Wu, Xiaoming, 1B
 Wu, Xiaoyan, 3Q
 Wu, XuHua, 2W
 Wu, Yong-qian, 3L, 3V, 44
 Xi, Hou, 24, 2M, 44
 Xia, Ming, 1C, 22, 2S
 Xian, Yong-li, 17
 Xiao, Yi, 0K
 Xie, Weimin, 38
 Xie, Zongliang, 1J
 Xing, Jiang, 2A
 Xing, Song, 40
 Xing, Tingwen, 1I, 38
 Xiong, Limin, 3U
 Xiong, Zhao, 02
 Xiong, Zhihua, 2G
 Xu, Feng, 2I
 Xu, Fuchao, 38
 Xu, Jian, 3K
 Xu, Kaiyuan, 2C
 Xu, Liang, 2V
 Xu, Linhua, 0A
 Xu, Min, 0M, 39
 Xu, Qi-rui, 1G
 Xu, Zhichen, 28
 Xu, Zhidan, 1X
 Xu, Zhiyong, 2D
 Xu, Zhiyong, 2P
 Xue, Shuai, 0C
 Xue, Yaoke, 2R
 Xue, Zi, 0O, 0Q
 Yan, Fengtao, 24
 Yan, Kai, 1N
 Yan, Pengcheng, 3D
 Yan, Yu, 3K
 Yang, Fan, 0U
 Yang, Haifeng, 2L
 Yang, Shaodong, 2R
 Yang, Shuming, 08
 Yang, Xiaoping, 2L
 Yang, Xiaoyu, 3J, 3Y
 Yang, Y. L., 11
 Yang, Yi, 1L, 1R, 3J, 3R
 Yang, Yong, 2L
 Yang, Yongying, 1N
 Yao, Shun, 42
 Ye, Haixian, 02
 Ye, Yutang, 3H
 Yin, Dejin, 1C, 1Y, 22, 25, 2S
 Yin, Kaixin, 3Z
 Yin, Ruiguang, 29, 3E
 Yin, Y. H., 0L
 Yin, Ziqiang, 1K
 Yu, Bo, 42
 Yu, Fengxiang, 36
 Yu, Huan, 1I, 1J
 Yu, Kan, 26
 Yu, Jian, 18
 Yu, Jie, 0T
 Yu, Lixia, 03
 Yu, S. Z., 3O
 Yu, Zhengyang, 3T
 Yu, Zong-Ru, 0G
 Yuan, Liyin, 0B
 Yuan, Quan, 1L, 1R, 3J, 3R
 Yuan, Yan, 2B
 Yue, Chunran, 0O
 Zeng, Xiaodong, 28
 Zha, Hang, 18
 Zhai, Dede, 1K
 Zhang, Bifeng, 3U
 Zhang, Bin, 03
 Zhang, Chao, 3F
 Zhang, Di, 13
 Zhang, Haitao, 0T
 Zhang, Hao, 2B
 Zhang, Hongyan, 1F
 Zhang, Hui, 36
 Zhang, Jiahong, 04
 Zhang, Jian, 0H

Zhang, Jin, 0F
Zhang, Jiyan, 35
Zhang, Junchao, 3U
Zhang, Kejia, 3U
Zhang, Lili, 1X
Zhang, Lin, 1L, 1R, 3J, 3R
Zhang, Linchao, 1B
Zhang, Long, 2Y
Zhang, Ming, 3I
Zhang, Pengfei, 3Z, 40
Zhang, Qiuzhi, 1U
Zhang, Ruihua, 0K
Zhang, Shougang, 36
Zhang, Wenpan, 3E
Zhang, Xiao-hui, 1D, 1E
Zhang, Xiaoqiong, 09
Zhang, Xiaoyan, 3A
Zhang, Xichan, 0N
Zhang, Xue-min, 40
Zhang, Yanxiu, 2H
Zhang, Yihui, 1N
Zhang, Yong, 2X
Zhang, Yugui, 3T
Zhang, Zhimin, 1A
Zhao, Hongshen, 24
Zhao, Hui, 2R
Zhao, Jie, 0E
Zhao, Linfeng, 29
Zhao, Pu, 08
Zhao, Quanke, 1Z
Zhao, Shuqi, 1A
Zhao, Wenchuan, 3X
Zhao, Y. M., 3O
Zheng, Donghui, 05, 06
Zheng, Fanglan, 2U, 3Y
Zheng, Jianing, 3I
Zheng, Liehua, 2Y
Zheng, Quan, 15
Zhou, Hao, 2A
Zhou, Jiankang, 3P
Zhou, Jingbo, 07, 1Q
Zhou, Lin, 1N
Zhou, Lu-jun, 1V
Zhou, Mengran, 3D
Zhou, Panyu, 0M
Zhou, Sen, 3K
Zhou, T. Y., 1I
Zhou, Taogeng, 3U
Zhou, Wang, 2Q, 2T
Zhou, Wencai, 2I
Zhou, Yuqing, 1M
Zhou, Z. R., 1I
Zhu, Fan, 4I
Zhu, Li, 3F
Zhu, Qiudong, 37
Zhu, Wenhua, 05, 06
Zhu, Xiaoqiang, 43, 44
Zou, Gangyi, 2J
Zou, Hui-hui, 1V

Symposium Committee

Honorary Chair

Guangcan Guo, Chinese Optical Society (China) and Chinese Academy of Sciences (China)

Symposium General Chair

Liwei Zhou, Beijing Optical Society (China) and Beijing Institute of Technology (China)

Symposium General Co-chairs

Jianlin Cao, Ministry of Science and Technology of China
David R. Silva, National Optical Astronomy Observatory (United States)
Eric Mazur, Harvard University (United States)
H. Philip Stahl, NASA Marshall Space Flight Center (United States)
Yinnan Yuan, Soochow University (China)
Yudong Zhang, Chengdu Branch, Chinese Academy of Sciences (China)

International Advisory Committee

Wenhan Jiang, Institute of Optics and Electronics (China)
Junhua Pan, Soochow University (China)
Marc Cayrel, European Southern Observatory (Germany)
Liangchi Zhang, University of New South Wales (Australia)
Ralf D. Geckeler, Physikalisch-Technische Bundesanstalt (Germany)
Oltmann Riemer, Universität Bremen (Germany)

Organizing Committee

Enhui Liu, *Chair*, Institute of Optics and Electronics (China)
Jinghua Cao, *Co-chair*, Chinese Academy of Sciences Bureau of International Cooperation (China)
Libin Xiang, *Co-chair*, Shanghai Engineering Center for Microsatellites (China)
Yadong Jiang, *Co-chair*, University of Electronic Science and Technology of China (China)
Chinhua Wang, *Co-chair*, Soochow University (China)
Shinan Qian, Brookhaven National Laboratory (United States)
Myung K. Cho, National Optical Astronomy Observatory (United States)

Program Committee

Xiangang Luo, *Chair*, Institute of Optics and Electronics (China)

Yuwen Qin, *Co-chair*, National Natural Science Foundation of China
(China)

Jingchi Yu, *Co-chair*, Soochow University (China)

Symposium General Secretary

Li Yang, Committee of Optical Manufacturing Technology COS (China)

Introduction

The 8th International Symposium on Advanced Optical Manufacturing and Testing Technology (AOMATT 2016) was held 26–29 April 2016 at the Suzhou International Conference Center, Suzhou, China. The symposium was opened in the morning of 26th April with a formal opening ceremony. The ceremony started with the introduction of VIP guests, symposium chairs, conference chairs, and plenary speakers. Professor Liwei Zhou AOMATT 2016 Symposium Chairman, Professor Bin Xu Vice President of Institute of Optics and Electronics (China), one of the sponsors of AOMATT 2016, and Professor Yuan Yinnan, Vice President of Soochow University (China) gave opening speeches to a packed auditorium.

Plenary sessions followed immediately after the conclusion of the opening ceremony. There were a total of eight plenary presentations: "Less is more: extreme optics with zero refractive index physics", by Dr. Eric Mazur, Balkanski Professor of Physics and Dean of Applied Physics at Harvard University (United States); "Large optical telescopes in the era of large wide-field survey", by Dr. David R. Silva, Director of United States National Optical Astronomy Observatory (United States); "The European Extremely Large Telescope (E-ELT) revolution is under construction", by Dr. Marc Cayrel, European Southern Observatory (ESO) Project Manager, E-ELT Optomechanics (Germany); "Ultra-precision lens fabrication via molding: advances and challenges", by Dr. Liangchi Zhang, Professorial Fellow of Australian, Head of the Laboratory for Precision and Nano Processing Technologies, The University of New South Wales (Australia); "Advancing ultra-precision machining to high performance", by Dr. Ing. Oltmann Riemer, Head of the Laboratory for Precision Machining, Universität of Bremen (Germany); "Micro/nano-optics for flexible functional devices: today and future", by Dr. Linsen Chen, Chief of National United Engineering Research Center of Digital Optical Imaging and Display, Soochow University (China); "New angles on angle metrology: approaching fundamental limits", by Dr. Ralf D. Geckeler, Head of Length and Angle Graduations Group, Physikalisch-Technische Bundesanstalt (Germany); and "Functional photonic nanostructures: from thin films and slits to catenaries", by Dr. Xiangang Luo, Director of State Key Laboratory of Optical Technologies for Nano-Fabrication and Micro-Engineering, Chinese Academy of Sciences (China).

More than 800 people attended the opening ceremony and full-day plenary sessions. More than 1,000 abstracts were submitted to AOMATT 2016. About 500 submissions were selected for oral and poster presentations after careful reviews by conference chairs and committee members. Oral papers were presented in eight parallel conference sessions 27 and 28 April. An all-symposium poster session was held in the afternoon of 28 April. Many papers highlighted cutting edge research and development in optical design, manufacturing, and testing. Authors and attendees had very productive discussions and exchanged ideas throughout the symposium.

The AOMATT 2016 organizing committee would like to express their sincere appreciation for the strong support of SPIE, technical co-sponsor and long-term partner of AOMATT. Dr. Andrew Brown, Senior Director of SPIE, sent a letter of congratulations to the symposium. In his letter, Dr. Brown thanked all symposium chairs, conference chairs, and committee members for their leadership, and all authors and attendee for their contributions to make AOMATT 2016 a success. Dr. Brown also stated: "The vision of AOMATT is closely aligned with SPIE's mission to promote optics and photonics around the world. SPIE sponsors and co-sponsors technical conferences around the world and contribute millions of dollars every year in support of education and outreach programs, such as scholarships, travel grants, and other educational programs."

Finally, we would like to express our sincere appreciation to COS—The Chinese Optical Society (China), and IOE—Institute of Optics and Electronics, Chinese Academy of Sciences (China), for sponsoring and supporting AOMATT 2016. We want to thank all authors and participants as well volunteers for their contributions to the symposium and sharing their research with colleagues around the world.

We look forward to seeing everyone at AOMATT 2018.

Li Yang
Secretary General, AOMATT 2016
Committee of Optical Manufacturing Technology (COMT), COS

Sponsors

Sponsored by

COS—The Chinese Optical Society (China)
IOE—Institute of Optics and Electronics, Chinese Academy of
Sciences (China)

Technical Co-sponsor

SPIE

Local Supporting Organization

Soochow University (China)

Supporting Organizations

Ministry of Science and Technology of China (China)
Chinese Academy of Sciences (China)
National Natural Science Foundation of China (China)

Cooperating Organizations

National University of Defense Technology (China)
University of Electronic Science and Technology of China (China)
Sichuan University (China)
State Key Laboratory of Optical Technologies for Nano-Fabrication
and Micro-Engineering (China)
Key Laboratory of Adaptive Optics, Chinese Academy of Sciences
(China)
Changchun Institute of Optics, Fine Mechanics and Physics (China)
University of Shanghai for Science and Technology (China)
Beijing Institute of Technology (China)
Changchun University of Science and Technology (China)
Nanjing University of Science and Technology (China)
The Hong Kong Polytechnic University (Hong Kong, China)
Zhejiang Quartz Crystal Optoelectronic Technology Company, Ltd.
(China)
Suzhou Association for Sciences and Technology (China)
Optical Society of Sichuan Province (China)

Managed by

COS—The Chinese Optical Society (China)

