

PROCEEDINGS OF SPIE

Optical Modeling and Performance Predictions XIV

**Mark A. Kahan
Catherine Merrill**
Editors

**19–20 August 2024
San Diego, California, United States**

Sponsored by
SPIE

Published by
SPIE

Volume 13129

Proceedings of SPIE 0277-786X, V. 13129

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

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 *Optical Modeling and Performance Predictions XIV*, edited by Mark A. Kahan, Catherine Merrill, Proc. of SPIE 13129, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510679184

ISBN: 9781510679191 (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

v *Conference Committee*

OPTICAL MODELING

- 13129 02 **Leveraging artificial intelligence and machine learning for lens design** [13129-2]
- 13129 04 **Correlations between wavefront data and image quality metrics in toleranced high-performance imaging systems** [13129-3]
- 13129 05 **GMT adaptive optics test camera: conceptual optical design** [13129-38]
- 13129 06 **Mirror surface contamination specification derived from coronagraphy scatter error budget allocation** [13129-4]
- 13129 08 **Single-shot spectropolarimetry with stress-engineered optics** [13129-40]

SOURCES AND DETECTORS

- 13129 0A **Homogeneity and angular distribution of the radiance of an integrating sphere and a parabolic reflector in middle- and long-wavelength infrared** [13129-6]
- 13129 0B **Radiometry for stray light from extended sources** [13129-7]
- 13129 0C **Thermal characterization of modified uni-traveling carrier photodetectors: insights into temperature-dependent performance metrics** [13129-8]

MICROSCOPY, COMMUNICATIONS, AND X-RAY OPTICS

- 13129 0D **SOLID principles of object-oriented programming in optical simulation of a high-NA microscope system** [13129-9]

MATERIALS, O-M, AND CONTAMINATION I

- 13129 0F **Overcoming contamination obstacles in additive manufacturing a monolithic propulsion structure for the SunRISE mission** [13129-12]
- 13129 0H **Performance test results of Twin-TQCM under cryogenic temperature** [13129-17]

MATERIALS, O-M, AND CONTAMINATION II

- 13129 OI **Design of aspheric singlet with tuned aberration content for use in the visible spectrum**
[13129-20]
- 13129 OK **Habitable world observatory modeling optical and metrology models, and performance predictions** [13129-22]
- 13129 OL **Analytical and numerical modeling framework for nanomaterial-enhanced fiber-optic CO₂ sensors** [13129-23]
- 13129 OM **Fast simulations with high accuracy for photonic crystals and quantum nanostructures enabled by a projection-based learning methodology** [13129-24]

POSTER SESSION

- 13129 OO **A comprehensive approach to diffractive waveguide optimization in mixed reality near-eye displays** [13129-25]
- 13129 OP **Modeling of waveguiding interconnect for coupling to silicon photonics** [13129-26]
- 13129 OQ **2D trapezoidal waveguide design for near one terahertz quantum cascade lasers**
[13129-28]
- 13129 OS **Design of all-pass optical microring resonators based on silicon-on-insulator waveguides**
[13129-30]
- 13129 OT **Interaction analysis: coherent vs. legacy transmission data systems for ITU grid spacing**
[13129-31]
- 13129 OU **Efficient and versatile four direction LED-based automotive lighting systems advances in optical modeling and performance predictions** [13129-32]
- 13129 OV **Superior homogeneity and efficient five-face emitting DLED module optimized optical design and practical application for automotive signal lighting** [13129-33]
- 13129 OW **Presenting a rapid, dry method for measuring particulate contamination on surfaces**
[13129-35]
- 13129 OX **Unveiling habitable planets: toy coronagraph tackles the exozodiacal dust challenge**
[13129-36]
- 13129 OZ **MANIFEST filter box: a conceptual optical and opto-mechanical design** [13129-39]