

PROCEEDINGS OF SPIE

Environmental Effects on Light Propagation and Adaptive Systems III

Karin Stein
Szymon Gladysz
Editors

21—25 September 2020
Online Only, United Kingdom

Sponsored by
SPIE

Cooperating Organisations
European Optical Society
KTN—Knowledge Transfer Network (United Kingdom)
Technology Scotland (United Kingdom)
Visit Scotland (United Kingdom)
BARSC—British Association of Remote Sensing (United Kingdom)
EARSeL—European Association of Remote Sensing Laboratories (Germany)
ISPRS—International Society for Photogrammetry and Remote Sensing

Published by
SPIE

Volume 11532

Proceedings of SPIE 0277-786X, V. 11532

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

Environmental Effects on Light Propagation and Adaptive Systems III, edited by Karin Stein,
Szymon Gladysz, Proc. of SPIE Vol. 11532, 1153201 · © 2020 SPIE
CCC code: 0277-786X/20/\$21 · doi: 10.1117/12.2584616

Proc. of SPIE Vol. 11532 1153201-1

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 *Environmental Effects on Light Propagation and Adaptive Systems III*, edited by Karin Stein, Szymon Gladysz, Proceedings of SPIE Vol. 11532 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510638778
ISBN: 9781510638785 (electronic)

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 © 2020, 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 \$21.00 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/20/\$21.00.

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: *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 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

CHARACTERISATION OF THE PROPAGATION ENVIRONMENT

- 11532 04 **Turbulence magnitude of West Africa: a virtual measuring campaign** [11532-2]
- 11532 05 **Investigation of optical turbulence over an urban area: comparison between experimental results and simulation** [11532-3]
- 11532 06 **Portable Raman dual-laser spectrometer for oil and gas** [11532-4]

EXOTIC BEAMS

- 11532 0A **Propagation of Gaussian and Hermite-Gaussian non-paraxial beams in a homogeneous and inhomogeneous atmosphere (Invited Paper)** [11532-6]
- 11532 0D **Classification of beams carrying orbital angular momentum propagating through underwater turbulence (Invited Paper)** [11532-9]

QUANTUM COMMUNICATION

- 11532 0E **Photonic orbital angular momentum in turbulence: vortex splitting and adaptive optics (Invited Paper)** [11532-10]
- 11532 0G **Spatial eigenmodes of light in atmospheric turbulence** [11532-12]
- 11532 0H **The QEYSSAT mission: on-orbit demonstration of secure optical communications network technologies (Invited Paper)** [11532-13]

LASER "COMMUNICATION"

- 11532 0I **Performance of a coherent free-space optical communications link with wavefront sensorless adaptive optics** [11532-14]
- 11532 0J **Implementation of variable data rates in transceiver for free-space optical LEO to ground link** [11532-15]
- 11532 0K **Propagation of coherently combined beams in turbulent atmosphere: analytical approach** [11532-16]

POSTER SESSION

- 11532 0N **Complex transfer characteristics of long-path optical systems** [11532-19]
- 11532 0O **Spatial differential analysis of the collimated wave beam intensity profile** [11532-20]