PROCEEDINGS OF SPIE

Complex Light and Optical Forces XIII

Jesper Glückstad David L. Andrews Enrique J. Galvez Editors

5–7 February 2019 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 10935

Proceedings of SPIE 0277-786X, V. 10935

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 SPIEDigitalLibrary.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 Complex Light and Optical Forces XIII, edited by Jesper Glückstad, David L. Andrews, Enrique J. Galvez, Proceedings of SPIE Vol. 10935 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

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

ISBN: 9781510625129 ISBN: 9781510625136 (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 © 2019, 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/19/\$18.00.

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.



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

Authors v vii Conference Committee **OPTICAL MODES I** Shaping the longitudinal electric field component of light (Invited Paper) [10935-1] 10935 02 **OPTICAL MODES II** 10935 09 Pendulum beams: a window into the quantum pendulum [10935-8] **PROPAGATION IN MEDIA** Angular momentum dynamics of light-driven mass density waves in thin film structures 10935 OB [10935-10] 10935 OD Dielectric loss induced excess momentum and anomalous spin of light [10935-12] **PROPAGATION IN PHOTONIC MEDIA** 10935 OF SLM phase mask optimization for fiber OAM mode excitation (Invited Paper) [10935-14] **COMPLEX LIGHT GENERATION** Retrieving the OAM spectrum and the spatial distribution of the structured optical fields 10935 OJ (Invited Paper) [10935-18] FREE SPACE PROPAGATION 10935 OS Dynamics of vortex propagation in wave fields: from order to disorder and beyond (Invited Paper) [10935-27]

10935 01 Spectral self-imaging and Gouy rotation echos of propagating vortex pulse arrays [10935-28]

10935 0U Optical spin-orbit interactions in molecular scattering of twisted light [10935-29]

COMPLEX LIGHT DETECTION

1093512 Laguerre-Gaussian mode sorter (Invited Paper) [10935-35]

OPTICAL TRAPPING

1093516 Deformation of single cells - optical two-beam traps and more (Invited Paper) [10935-39]

OPTICAL FORCES

- 109351A Optical control of strongly absorbing nanoparticles and their potential for photothermal treatment (Invited Paper) [10935-43]
- 10935 1B Optical eigenmode description of single-photon light-matter interactions [10935-44]

OPTICAL MANIPULATION

- 10935 1F Multi-site optical recording of neuronal activity with complex light patterns (Invited Paper) [10935-48]
- 109351H Plasmonic annular aperture arrays for nanoparticle manipulation [10935-50]

POSTER SESSION

- 109351K Nonlinear optical eigenmodes: perturbative approach [10935-52]
- 1093510 Spin torque on birefringent "o" and "e" axes in regular rhombohedral calcite crystals [10935-56]
- 10935 1P Twisted light transfers OAM and SAM to electrons in a GaAs photocathode [10935-57]