

PROCEEDINGS OF SPIE

Complex Light and Optical Forces IX

**Enrique J. Galvez
Jesper Glückstad
David L. Andrews**
Editors

**11–12 February 2015
San Francisco, California, United States**

Sponsored and Published by
SPIE

Volume 9379

Proceedings of SPIE 0277-786X, V. 9379

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

Complex Light and Optical Forces IX, edited by Enrique J. Galvez, Jesper Glückstad,
David L. Andrews, Proc. of SPIE Vol. 9379, 937901 · © 2015 SPIE
CCC code: 0277-786X/15/\$18 · doi: 10.1117/12.2191441

Proc. of SPIE Vol. 9379 937901-1

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Author(s), "Title of Paper," in *Complex Light and Optical Forces IX*, edited by Enrique J. Galvez, Jesper Glückstad, David L. Andrews, Proceedings of SPIE Vol. 9379 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 0277-786X

ISBN: 9781628414691

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

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Printed in the United States of America.

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Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique citation identifier (CID) number is assigned to each article at the time of the first 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, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

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Introduction

Complex Light and Optical Forces had its ninth meeting 11–12 February 2015, in San Francisco, California, United States. It was particularly auspicious timing to have a conference on fundamental and applied aspects of light in 2015, designated the International Year of Light. The conference was held in the backdrop of a beautiful city, which enjoyed exceptionally good weather in the days of the conference.

The conference had 33 presentations that included 3 posters. Session titles were “Optical Beam Sculpturing,” “Polarization in Complex Light,” “Quantum Effects,” “Quantum Complex Light,” “Optical Tweezers,” “Optical Flows,” and “Optical Forces.” An additional session on “Structured Light in Photonics Instrumentation” was held jointly with the conference on Photonics Instrumentation Engineering II.

Cementing its unofficial role as the yearly outlet for research on the fundamentals of complex light and optical manipulation, the conference presentations and the papers in this volume reflect the state of the art research in the field. They included new in-depth understanding of complex light fields, in problems such as optical healing and revival, or in the unraveling of the exquisite complexity that is present in space-variant polarization fields. The modes of light also continue to further our understanding of quantum mechanics, and unravel the role of complex light in encoding quantum information for communication and computation. The conference included healthy debates on the classical-quantum boundary. It also highlighted new technological devices that advance the manipulation of phase and polarization of designer beams to yet higher levels of sophistication. This control of light has enabled new ways of facilitating the interaction between light and matter, such as the use of optically manipulated conduits to channel the light and deliver radiation pressure or the spectral content to matter in new ways and from directions not previously accessible. Such unraveling of light complexity has also led to proposals for new forces and interactions between light and matter, which are the seeds for future research.

The contributions in this volume are representative of the latest research in the field, and as presented at the meeting, underscore the vitality of an exciting topic of research and technology that studies and uses light in all of its complexity.

Enrique J. Galvez
David L. Andrews
Jesper Glückstad

