SPIE. PHOTONICS WEST OPTO

The Moscone Center
San Francisco, California, United States
2 - 7 February 2019

Complex Light and Optical Forces XIII

This conference is no longer accepting submissions.
Late submissions may be considered subject to chair approval. For more information, please contact Matt Novak.

Important Dates

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Abstract Due:
25 July 2018

Author Notification:
1 October 2018

Manuscript Due Date:
9 January 2019

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Call for Papers

Complex light – light with structured wavefronts, amplitudes, phase and polarization – is the common theme in a rapidly expanding number of areas in optics. Fundamental topics in this field include: classical and quantum aspects of the spin and orbital angular momentum of light; spin-orbit effects; optical beams with a structured wavefront; high-order modes and their generation methods; optical waves that have singularities of phase and non-uniform polarization; monochromatic and multichromatic optical vortices; chiral interactions; vortex loops and knots; novel propagation dynamics; the interaction between singularities; new topological effects of multidimensional mode spaces; the interactions of complex light with rotating optical elements and within laser cavities; the encoding of spatial modes onto light for communication, and the extent of that capacity. These studies also link significantly into other fields including optical trapping, lab-on-a-chip fluidics, microrheology, and cold atoms. Increasing interest in quantum information has also led to developments in the multimode encoding of quantum information, quantum communication, quantum imaging, the use of orbital angular momentum quantum eigenstates for quantum computing, and new fundamental tests of quantum mechanics.

The complex light fields that can now be routinely produced also offer an unprecedented level of control for probing and exerting forces on matter at the microscale and nanoscale level. The applied topics of this conference include novel ways to manipulate matter with optical fields, and to organize, rotate, bind, channel or sort microscale or nanoscale objects. The applications of optical forces on matter generally engage light fields with boundaries and gradients: through the exchange of linear or angular momentum between light and matter, optical force fields and torques can be produced with no conventional counterpart. Optical tweezers offer exquisite control over microscale objects based on intensity and phase differentials, exploiting beams with vortices, singularities and other kinds of phase structure: hollow beams; tailor-made three-dimensional optical traps; sheets of light; curved focus beams and evanescent waves. The optical elements associated with the production and detection of such beam structures themselves have significant imaging applications. These methods offer new opportunities for implementation in ultrahigh resolution imaging, nanoscale probes, optical tools for biotechnology, nanofabrication and photonics, laser cooling, atom trapping, atom chips, and particle sorting.

Together, these topics represent a highly active interdisciplinary field with a rich scope for new developments, notably spanning and linking fundamental and applied aspects. This conference provides a well-established annual forum for advancing the development and application of new forms and methods of generating complex optical structures. The world-wide interest in these topics brings together an international community to discuss new fundamentals, methods, techniques, and devices. Papers are solicited, focusing on any of the following or related topics:

- singular optics with phase or polarization discontinuities
- optical vortices, propagation, loops, knots and interactions
- optical angular momentum
- geometric phases
- spiral phase contrast and vortex filters

- structured optical modes
- Laguerre-Gauss, Hermite-Gauss, Bessel, Mathieu, Airy, helico-conical beams
- vector, Poincare' and space-variant polarized beams
- pulsed- and time-structured beams, Bessel-X pulses
- optical tweezers and fiber tweezers
- holographic optical trapping and manipulation
- nanoscale and deep imaging and trapping
- optical binding
- optical manipulation using generalized phase contrast (GPC)
- imaging with structured light
- light robotics
- laser cooling, atom trapping and atom chips
- single-molecule and liquid-crystal-molecule interactions with light
- communication, encoding and cryptography with spatial modes
- quantum multimode and vector spaces
- quantum information processing and imaging with complex light
- entanglement and hyper-entanglement with spatial modes
- micro- and nanofabrication with structured light
- nano-optics and nanostructure devices
- optofluidics, optical sorting, optical fractionation
- chirality in optical fields
- chirality in particles and film nanophotonics
- near-field and evanescent wave interactions
- ultrahigh-resolution imaging
- electron vortices
- multimode propagation in fibers
- spin-orbit effects.

Travel Support Award

We are pleased to announce an Early Career Professional Travel Award for this conference of $400 USD. To be eligible for the Travel Award, you must:

- be a junior scientist (Masters or PhD student, or post doc with less than three years experience)
- be listed as an author on an accepted paper within this conference
- have conducted the majority of the work to be presented
- submit your manuscript online before 9 January 2019
- present your paper as scheduled
- submit a 250-word statement of need
- submit a 1-page describing your research and bio (please include your SPIE Paper Number).

Applicants must email a short statement confirming eligibility, intent to apply, plus additional required materials, to Prof. Enrique Galvez at egalvez@colgate.edu by Monday **7 January 2019**.