SPIE. PHOTONICS WEST BIOS

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

Quantitative Phase Imaging V

This conference has an open **call for papers:**

SUBMIT AN ABSTRACT
(SIGN IN REQUIRED)

Submission guidelines for Authors and Presenters

Important Dates

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Abstract Due:
25 July 2018

Author Notification:
1 October 2018

Manuscript Due Date:
11 January 2019

Conference Cosponsors

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OPTICS from image to knowledge

Conference Committee

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Additional Conference Information

The Conference Committee will consider submissions received through an extended deadline of **10 August**.

Call for Papers

Quantitative phase imaging (QPI) refers to quantifying at each point in the field of view the optical path length shift introduced by a specimen. This measurement allows for label-free and quantitative assessment of cells and tissues. The quantitative phase images of specimens are related to their refractive index distribution, an intrinsic optical property, which plays an important role in the study of pathophysiology of many diseases. This rapidly emerging field enables the investigation of cells and tissues in terms of morphology and dynamics with nanoscale sensitivity over temporal scales from milliseconds to days. Accurate determination of intrinsic properties, optical, chemical, and mechanical, is likely to help with both basic understanding of cell function and interpretation of pathological states. Employing the principles of interferometry and holography, QPI provides unique capabilities not only for imaging, but for propagation of optical fields as well. As a result, QPI can be used to improve image quality of instruments affected by aberrations, i.e., QPI provides opportunities for non-iterative adaptive optics. With reliable phase information, an imaging instrument becomes also a powerful device for measuring light scattering. Thus, quantitative phase imaging has recently bridged the gap between the imaging and scattering disciplines. This approach is called Fourier transform light scattering, as it represents the spatial analog to Fourier transform spectroscopy. Using QPI, one can easily measure angular scattering from a single cell, which offers opportunities for label-free cell sorting.

This conference is a forum for disseminating the development of methodologies of QPI and their applications to studying specimens. The multidisciplinary nature of QPI will see this conference bring together technology and application experts in electrical and bioengineering, physics and biophysics, cell biology, analytical chemistry, clinical sciences, medical imaging, optics and photonics, and tissue engineering. We will contribute to the development of interdisciplinary bonds in supporting scientists, engineers, biologists and physicians interested in the broad field of label-free quantitative phase imaging.

Papers are solicited on biomedical optics, biophotonics methodologies and applications in the broad area of QPI. Technology development activities are expected to advance the current state of the art in, for example: spatial phase sensitivity, temporal phase sensitivity, acquisition rate, resolution, tomographic reconstruction, spectroscopic content, throughput, phase reconstruction, phase unwrapping, image processing algorithms, user friendliness, etc. Application activities are expected to target specific biological questions, including: quantifying, monitoring, and functionally assessing the normal and pathological states in live cells and tissues from subcellular to organ scales.

Relevant topics include, but are not limited to:

QPI methodologies

- methods for QPI in general
- digital holography for QPI applications
- off-axis interferometric methods
- phase shifting interferometric methods
- common path interferometry for QPI
- QPI using transport of intensity equation or ptychography
- low-coherence interferometry for QPI
- phase-sensitive optical coherence tomography and microscopy
- multimodal techniques: QPI plus other methods (e.g., fluorescence)
- using QPI to retrieve scattering information from cells and tissues
- Fourier-transform light scattering
- use QPI for adaptive optics or wavefront shaping techniques
- numerical field propagation and time-reversal applications
- optical manipulation and QPI
- probes for QPI, such as nanoparticles

Algorithms and Imaging Processing in QPI

- coherence effects in QPI
- image processing methods for QPI
- field and phase retrieval algorithms
- phase unwrapping algorithms
- machine learning algorithms for QPI

QPI of Cell & Tissue studies

- quantitative phase imaging of cells
- quantitative phase imaging of tissues
- cell physiology using QPI
- biomechanics of cells and tissue using QPI
- quantitative phase imaging in neuroscience
- quantitative phase imaging in biophysics
- rheology measurements using QPI techniques
- single cell mechanics, motility, and adhesion study using QPI

Clinical applications of QPI

- quantitative phase imaging in tissue pathology
- quantitative phase imaging in hematology
- medical diagnosis using refractive index values or QPI in general

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