



**SPIE. PHOTONICS  
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**25 - 30 January 2025**  
The Moscone Center  
San Francisco, CA, USA

**CALL FOR PAPERS**

Submit abstracts by  
**17 July 2024**

## Quantitative Phase Imaging XI (BO506)

*Conference Chairs:* **Yang Liu**, Univ. of Illinois Urbana-Champaign (United States); **YongKeun Park**, KAIST (Republic of Korea)

*Program Committee:* **Tatiana Alieva**, Univ. Complutense de Madrid (Spain); **George Barbastathis**, Massachusetts Institute of Technology (United States); **Liangcai Cao**, Tsinghua Univ. (China); **Shwetadwip Chowdhury**, The Univ. of Texas at Austin (United States); **Pietro Ferraro**, Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello" (Italy); **Björn Kemper**, Universitätsklinikum Münster (Germany); **Jerome Mertz**, Boston Univ. (United States); **Aydogan Ozcan**, Univ. of California, Los Angeles (United States); **Demetri Psaltis**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Monika Ritsch-Marte**, Medizinische Univ. Innsbruck (Austria); **Francisco E. Robles**, Wallace H. Coulter Dept. of Biomedical Engineering at Georgia Institute of Technology (United States); **Balpreet Singh Ahluwalia**, UiT The Arctic Univ. of Norway (Norway); **Peter T. C. So**, Massachusetts Institute of Technology (United States); **Laura Waller**, Univ. of California, Berkeley (United States); **Renjie Zhou**, The Chinese Univ. of Hong Kong (Hong Kong, China); **Thomas A. Zangle**, The Univ. of Utah (United States)

### SPECIAL ABSTRACT REQUIREMENTS

Submissions to this conference include the following:

- 100-word text abstract (for online program) (REQUIRED)
- 250-word text abstract (for abstract digest) (REQUIRED)
- OPTIONAL: one figure and caption with preliminary results. This must be submitted as a separate PDF document.

All submissions will be reviewed by the Program Committee to determine acceptance. Abstracts and figures will be used only for the purpose of review, and will not be published.

Quantitative phase imaging (QPI) refers to measuring 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

- new QPI methods
- 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 phase conjugation 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
- Image segmentation
- Cell/tissue type classification

#### DEEP LEARNING AND AI TECHNIQUES FOR QPI

- AI methods to retrieve chemical specificity from QPI data
- AI methods for translating QPI in other forms of contrast
- Deep learning approaches for classification
- Deep learning methods for diagnosis
- AI approaches for improved image formation

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**QPI OF CELL & TISSUES**

- 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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# Present your research at SPIE Photonics West

Follow the instructions below to develop a successful abstract for submission to a conference and review policies for publication in the Proceedings of SPIE in the SPIE Digital Library. Submissions subject to chair approval.

## Important dates

Abstracts due	17 July 2024
Registration opens	October 2024
Authors notified and program posts online	7 October 2024
Submission system opens for manuscripts and poster PDFs*	25 November 2024
Poster PDFs due for spie.org preview and publication	2 January 2025
Manuscripts due	8 January 2025
Advance upload deadline for oral presentation slides**	23 January 2025

\*Contact author or speaker must register prior to uploading

\*\*After this date slides must be uploaded onsite at Speaker Check-in

## What you will need to submit

- Presentation title
- Author(s) information
- Speaker biography (1000-character max including spaces)
- Abstract for technical review (200-300 words; text only)
- Summary of abstract for display in the program (50-150 words; text only)
- Keywords used in search for your paper (optional)
- Check the individual conference call for papers for additional requirements (i.e., special abstract requirements or instructions for award competitions)

Note: Only original material should be submitted. Commercial papers, papers with no new research/development content, and papers with proprietary restrictions will not be accepted for presentation.

## How to submit your abstract

- Visit the conference page: [www.spie.org/bo506call](http://www.spie.org/bo506call)
- Choose one conference that most closely matches the topics of your abstract. You may submit more than one abstract, but submit each abstract only once
- Click the title of the conference to view the full description and submit by clicking the "Submit an Abstract" button on that page
- Sign in to your SPIE account, or create an account if you do not already have one
- Follow the steps in the submission wizard until the submission process is completed
- If your submission is related to an application track below, indicate the appropriate track when prompted during the submission process

## Application track

Listed below are the application tracks available for this meeting. Application tracks aggregate presentations and focus on emerging technical and societal needs that require a multidisciplinary approach.

- **AI/ML:** Papers that highlight the use of artificial intelligence, machine learning, and deep learning to create and implement intelligent systems across multiple sectors, technologies, and applications
- **Sustainability:** Papers that highlight the use of optics and photonics for renewable energy, natural resource management, sustainable manufacturing, and greenhouse gas mitigation in support of the UN Sustainable Development Goals
- **Brain function:** Papers that highlight the development of innovative optics and photonics technologies that increase our understanding of brain physiology and function
- **Translational research:** Papers that highlight the transition from bench to bedside using the latest photonics technologies, tools, and techniques for healthcare
- **3D printing:** Papers that highlight the innovative use of optics and photonics in multidisciplinary applications for multidimensional manufacturing
- **Photonic chips:** Papers that highlight advances in materials, design, fabrication, integration, testing and packaging of photonic components at the chip level

## Submission agreement

All presenting authors, including keynote, invited, oral, and poster presenters, agree to the following conditions by submitting an abstract:

- Register and pay the conference registration fee
- Agree to receive email messaging for the conference series
- Oral presenters: recording and publication of your onsite presentation (slides synched with voice) for publication in the Proceedings of SPIE in the SPIE Digital Library
- Poster presenters: one person may not present more than two posters in a poster session; poster presenters may submit an optional poster PDF available for preview in the online program (web and app) and for publication in the Proceedings of SPIE in the SPIE Digital Library
- Submit a manuscript by the advertised due date for publication in the Proceedings of SPIE in the SPIE Digital Library
- Obtain funding for registration fees, travel, and accommodations
- Attend the meeting
- Present at the scheduled time

## Review and program placement

- To ensure a high-quality conference, all submissions will be assessed by the conference chair/editor for technical merit and suitability of content
- Conference chairs/editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations
- Final placement in an oral or poster session is subject to chair discretion

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- More publication information available on the [SPIE Digital Library](http://SPIEDigitalLibrary)

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