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

**CALL FOR PAPERS**

Submit abstracts by  
**17 July 2024**

## **Optical Tomography and Spectroscopy of Tissue XVI (BO309)**

*Conference Chairs:* **Sergio Fantini**, Tufts Univ. (United States); **Paola Taroni**, Politecnico di Milano (Italy)

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### **SPECIAL ABSTRACT REQUIREMENTS**

Submissions to this conference must include:

- 100-word text abstract (for online program)
- 250-word text abstract (for technical review)
- 2-page extended abstract (for committee review only). The extended abstract must be submitted as a separate PDF document limited to two pages, including tables and figures. Include author names and affiliations; text; any figures, tables, or images; and sufficient data to permit committee review.

Medical imaging based on near infrared (NIR) illumination is a powerful and cost-effective approach for characterizing thick tissues non-invasively. Technological developments using principles of Diffuse Optical Spectroscopy (DOS), Diffuse Optical Imaging (DOI), Diffuse Optical Tomography (DOT), and Diffuse Correlation Spectroscopy (DCS) have helped drive significant advances in quantitative, model-based NIR methods. Diffuse optical technologies account for the effects of multiple light scattering in tissue and have been applied to a broad variety of problems in biology and medicine spanning from cancer and wound healing to muscle function and brain imaging.

Many of these methods are designed to provide functional diagnostic information about tissue physiology in real or near-real time. Endogenous hemoglobin absorption and tissue scattering provides a particularly powerful and unique capability of diffuse optical methods in their ability to measure tissue oxygen utilization and blood perfusion. Quantification of other tissue constituents can also effectively contribute to physiological studies as well as diagnostic applications. The temporal analysis of intensity fluctuations in diffuse correlation spectroscopy provides measurements of blood flow in tissue. Exogenous optical contrast agents that introduce absorption, fluorescence, or scattering biomarkers that are predictive of disease and clinical outcome are a topic of major interest and activity. The combination of intrinsic and extrinsic contrast elements into multi-modality DOI platforms provides functional, dynamic images with capabilities that rival, and in some cases exceed, conventional radiologic imaging approaches. Similarly, the combination of diffuse optical methods with established anatomic imaging technologies such as MRI, ultrasound, and x-ray imaging is a powerful strategy that can significantly enhance information content. As a result, diffuse optical methods provide cost-effective solutions for diagnostic imaging and therapeutic guidance as either "stand-alone" or integrated "multi-modality" platforms.

This conference emphasizes all aspects of diffuse optical methods in tissues, including theoretical, modeling, and data analysis approaches, novel hardware and instrumentation, and applications in human subjects and pre-clinical models.

Suggested topics include the following:

### **THEORY, MODELING, AND DATA ANALYSIS**

- Advances in the formulation of forward and inverse problems, methods that account for tissue heterogeneity, and understanding limits of image resolution, contrast, and signal-to-noise ratio;
- Transport theory, diffusion theory, Monte Carlo simulations, numerical methods;
- Fundamental properties of photon density waves (PDW) and methods for control and measurement of PDWs;
- Theory, models, and methods for DCS measurements;
- Deep learning, machine learning, and artificial intelligence for diffuse optics.

### **INSTRUMENTATION AND METHODS**

- Novel hardware, probe, and imaging designs including improved signal processing, advances in sources and detectors, novel imaging geometries to enhance speed, signal-to-noise ratio, and information content;
- Tissue phantoms and protocols for performance assessment;
- Multi-modality platforms, image co-registration and data visualization;
- Methods to elucidate the physiological meaning of endogenous optical contrast, including dynamic signals, vascular reactivity, and effects of dynamic perturbations;
- Specialized technologies for small animal model imaging;
- Exogenous absorption, scattering, and fluorescence contrast agents for enhanced cellular and molecular specificity;
- Cost-effectiveness, reducing barriers to access, and miniaturization of instrumentation;
- Design and applications of wearable devices;

### **APPLICATIONS**

- Non-invasive cerebral spectroscopy and imaging: normal brain function, neuro-degeneration, brain trauma, and neuro-pathologies;
- Non-invasive spectroscopy and imaging of skeletal-muscular systems, including joints, bones, and muscle;
- Non-invasive spectroscopy and imaging of normal breast function, hormonal stimulation, disease risk, breast pathologies, and monitoring of response to cancer therapy;
- Spectroscopy and imaging of tissues for diagnostic evaluations or physiological monitoring;
- Spectroscopy and imaging of tissue for monitoring therapeutic interventions such as response to chemo-, radiation-, preventative, and hormonal therapies;
- Image-guided diagnosis, treatment, therapy, and surgical planning;
- Correlation of optical imaging biomarkers with gold standard methods, clinical endpoints, and validation in multi-center settings;
- Preventive and screening applications;
- Minimally-invasive, intra-operative settings.

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#PhotonicsWest

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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/bo309call](http://www.spie.org/bo309call)
- 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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