

Lab-on-a-Fiber Incubator: Technologies, Applications, and Opportunities

10 – 12 November 2023
Optica Headquarters
Washington, DC, USA



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Welcome

Hello and welcome to Washington, DC, and the **Lab-on-a-Fiber Incubator: Technologies, Applications, and Opportunities**. This program has been developed by Conor L. Evans, Wellman Center for Photomedicine/Massachusetts General Hospital, and Walter Margulis, Centro de Telecomunicações PUC-Rio.

The incubator begins on the evening of 10 November with a welcome dinner at 18:00 at The Admiral Restaurant, located at 1 Dupont Circle NW. The following morning, Thursday, 09 November, there will be breakfast at 8:00, with the program beginning at 8:30 at Optica Headquarters. We have enclosed a map for your reference.

Incubator Meetings are designed to provide a unique and focused experience, allowing colleagues working in a niche field to meet and engage in discussions of related advances, challenges and opportunities. If you have feedback on the format of the [Incubator program](#) or suggestions for future Incubators, please share your thoughts with Hannah Walter-Pilon, Optica Director of Technical Community Engagement at incubators@optica.org.

Sincerely,



Elizabeth A. Rogan

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Share Your Experience

Share your photos and post about your incubator experience across social media! Make sure to use the hashtag [#OpticalIncubator](#).

Join Optica

As an incubator attendee, you can receive 50% off your first year of Optica membership. Visit optica.org/join and use the code [IM-JOIN50](#).

Lab-on-a-Fiber Incubator: Technologies, Applications, and Opportunities

10 - 12 November 2023

Hosted by:

Conor L. Evans, Wellman Center for Photomedicine/Massachusetts General Hospital, United States
Walter Margulis, Centro de Telecomunicações PUC-Rio, Brazil

Friday, 10 November 2023

Afternoon **Attendees arrive in DC and check into the hotel**
The Royal Sonesta, 2121 P St NW

18:00 EST **Welcome Dinner**
The Admiral, 1 Dupont Cir NW

Saturday, 11 November 2023

08:00 EST **Breakfast at Optica Headquarters**
2010 Massachusetts Ave NW

08:30 EST **Welcome**
Ryan Strowger, Chief Events and Corporate Engagement Officer, Optica

08:45 EST **Program Overview & Goals**
Conor Evans and Walter Margulis

09:00 EST **Keynote Talk**
Lab on fiber Technology: Perspectives, potentials and challenges
Andrea Cusano, University of Sannio

09:45 EST **Challenges and Opportunities**
The Things That Keep You Up At Night
Terry Rauch, U.S. Department of Defense

Challenges in Medicine and Surgery
Samuel Lin, Beth Israel Deaconess Medical Center

*Seeing the unseen in patients: Advancing disease prevention and treatment
through microimaging*
Guillermo J. Tearney, Wellman Center for
Photomedicine/Massachusetts General Hospital

- 11:45 EST Panel Discussion**
Moderated by Conor Evans
- 12:30 EST Lunch at Optica Headquarters**
- 13:30 EST Fiber Optic Technologies**
Novel couplers, circulators, and lantern designs for improved sensitivity
Caroline Boudoux, Castor Optics
- Optical Fibres for biomedical applications: an overview of some activities @ Southampton*
Gilberto Brambilla, University of Southampton
- Talk Title to be Announced*
Mérédéc Loyez, University of Mons
- Unsupervised Learning-Based Optical Fiber Bio-Imaging*
Jian Zhao, MIT
- 15:00 EST Coffee Break**
- 15:30 EST Fiber Optic Technologies (Continued)**
Functional fibers for optofluidic and medical applications
Fredrik Laurell, Royal Institute of Technology, KTH
- Lincoln Technologies for Lab on a Chip*
William Herzog, MIT Lincoln Labs
- Talk Title to be Announced*
Åsa Claesson, Research Institutes of Sweden RISE
- 16:30 EST Panel Discussion**
Moderated by Walter Margulis
- 18:00 EST Networking Dinner**
Firefly Restaurant, 1310 Connecticut Ave NW

Sunday, 12 November 2023

- 08:00 EST Breakfast at Optica Headquarters**
2010 Massachusetts Ave NW
- 08:30 EST Applications**
Research and Development at Thorlabs: From Optical Fiber to Nanophotonic Devices
Matthew Singer, Thorlabs

Optical fiber sensing at Brussels Photonics: from microstructured optical fibers to fiber tip sensors
Tigran Baghdasaryan, Vrije Universiteit Brussel

Lab-in-a-fiber Sensors: Hurdles and Prospects
Stavros Pissadakis, FORTH-IESL

Getting light in and out of optical fibers with 2-Photon Polymerization
Jona Engel, Nanoscribe GmbH

10:15 EST Coffee Break

10:30 EST Applications (Continued)

Development and In-Vivo Validation of a Portable Phosphorescence-Based Fiber-Optic Oxygen Sensor
Lilian Witthauer, University of Bern

Innovating for Impact: Smart Lab-on-Fiber Solutions to Tackle Health Outbreaks & Hunger
Joana Paiva, Porto University

11:15 EST Panel Discussion
Moderated by Andrea Cusano

12:00 EST Lunch at Optica Headquarters

13:00 EST Wrap-up/Discuss Next Steps

14:00 EST Adjourn

Hosts



Conor Evans

*Associate Professor, Wellman Center for
Photomedicine/Massachusetts General Hospital
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Dr. Conor L. Evans is an Associate Professor at the Harvard Medical School, an Affiliated Faculty member of the Harvard University Biophysics Program, a Faculty member of the Laser Biomedical Research Center, and leads his lab at the Wellman Center for Photomedicine at Massachusetts General Hospital. Dr.

Evans lab's research is focused on the development and clinical translation of optical microscopy and spectroscopy tools. A recipient of the NIH Director's New Innovator Award, his efforts have resulted in the creation of new technologies currently in multiple clinical trials. He is a Royce Fellow of Brown University, a Fellow of the SPIE, and has been honored with several awards, including the Goldwater Scholarship, NASA Space Grants, and the ASP New Investigator Award. Dr. Evans is an editor for Scientific Reports, academic editor for PLOS One, and has written more than 100 peer-reviewed publications. He holds 14 patents and patent applications and works to translate his technologies to the clinic. He additionally serves the Wellman Center as Faculty Liaison to the Department of Defense.



Walter Margulis

Senior Scientist, FiberActivity/Centro de Telecomunicações
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Walter Margulis has a PhD degree in Laser Physics from Imperial College concluded in 1981 under the supervision of Prof. Dan Bradley. His dissertation focused on picosecond semiconductor devices and pulse generation. Previously, he graduated at the Catholic University of Rio de Janeiro (PUC-Rio) in Physics and in Electrical Engineering and did a

master's degree on Atomic Physics. He spent most of his professional life in Sweden, as a senior scientist at RISE, the Research Institutes of Sweden (formerly Acreo). During this time, he was a guest professor at the Department of Applied Physics of the Royal Institute of Technologies KTH in Stockholm. In the mid-eighties, he co-discovered the effect of frequency doubling in fibers. His present research interests are on the design, fabrication, characterization and use of specialty fibers and fiber components, electrically controlled fiber devices and poling, fiber sensors, photosensitivity, and optofluidics for nonlinear optics and life-sciences in fibers. He supervised several PhD students and post-docs on these research lines. In optofluidics, he developed techniques and components to guide light seamlessly from fiber into liquids and vice-versa. In recent years, he and his colleagues demonstrated several lab-on-a-fiber functions, such as flow cytometry, filtering, in-situ trapping and analysis, particle collection and quantitative viral detection in microbubbles. He is a Fellow of Optica (2010) and an Outstanding Optica Reviewer (2012). In 2021 he returned to Brazil and is again doing research at PUC-Rio.

Attendees



Tigran Baghdasaryan

Professor, Vrije Universiteit Brussel
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Tigran Baghdasaryan received his PhD in Engineering Sciences at Vrije Universiteit Brussel (VUB), Belgium in 2015. From 2016 to 2022 he was Postdoctoral Research Fellow of the Research Foundation Flanders (FWO) and became Research Professor in 2022 at VUB, where he is affiliated with the Brussels Photonics (B-PHOT) research group. He has extensive expertise in design, modelling, fabrication, characterization and prototyping of advanced optical sensors in standard and specialty fibers. His research focuses on fiber Bragg gratings, photonic crystal fiber sensors and femtosecond laser micromachining of gratings and waveguides in specialty fibers. His most recent works involve 2-photon polymerization-based direct laser writing of waveguide components and resonant structures for optical interconnect and sensing applications. He has authored and co-authored 22 peer-reviewed journal publications and more than 30 conference contributions. He is an Optica Senior Member.



Caroline Boudoux

Professor, Polytechnique Montréal/Co-President, Castor Optics, Inc.
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Caroline Boudoux is a Professor of Engineering Physics at Polytechnique Montréal and co-founder and co-president at Castor Optics. She is on the Board of Meetings for OPTICA, a SPIE Fellow, and a Fulbright scholar. Boudoux has authored three textbooks in optics and engineering and contributed to several edited books, publications, and patents.



Gilberto Brambilla

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Gilberto Brambilla is a Professor in Photonics at the Optoelectronics Research Centre (University of Southampton, U.K.) and General Manager and Deputy Director of the Future Photonics Hub since 2016. He leads the group working on "optical Fibre Sensors and devices" and he is Associate Dean (International) in the Faculty of engineering and Physical Sciences. He has been the Director of the EPSRC Centre for Innovative Manufacturing in Photonics until 2015. He obtained his MSc (Material Engineering) with honours from Politecnico di Milano (Italy) and his PhD degree in Optoelectronics from the ORC in 2002. In 2007 he was awarded a Research Fellowship from the Royal Society. His research interests include: point fibre sensors; distributed fibre sensors; design and fabrication of rare earth doped scintillating fibres; material structuring using fs lasers; UV fibre lasers; optical fibre nanowires, fibre tapers and couplers; fabrication of delivery fibres and systems. He has published > 500 papers in international scientific journals/conferences, authored 11 patents and gave more than 40 invited/keynote/plenary talks over the 5 continents.



Asa Claesson

Senior Scientist, RISE Innventia AB
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Åsa is an experienced technical and business expert with particular focus on Specialty Optical Fibers, Optical Fiber Sensors, and Fiber Optics in general. She has a M.Sc. in Materials Science from Uppsala University and joined RISE (formerly Acreo and Institute of Optical Research) in 1997. With former roles as unit and department manager, leading fiber optics at RISE and the laboratory Fiberlab in Hudiksvall, she now focuses on research, innovations and sales in fiber optics and photonics. She is also chairing the board at the national photonics platform, PhotonicSweden.



Andrea Cusano

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Andrea Cusano is full Professor of Electronics, Optoelectronics and Photonics at the University of Sannio. His research interests are focused on the suitable merging of optical fibers and nanotechnologies and was the pioneer of the “Lab on fiber Technology” concept, nowadays recognized as a hot topic in nanophotonics. He published over 500 papers on prestigious international journals and communications in well-known international conferences worldwide; he has close to 20 national and international patents currently in charge of prestigious industrial companies. He is co-author of more than 100 invited chapters published in international books, invited papers, key note and plenary lectures in prestigious scientific international journals as well as international conferences. He has been past Editor in Chief of Journal of Optics and Laser Technology (Elsevier) for ten years and now is Editor in Chief Results in Optics (Elsevier). He was also cofounder of several spin-off companies focused on the development of fiber optic sensing systems for industrial and life science applications: “OptoSmart S.r.l.” in 2005, “MDTech” in 2007, “OptoAdvance” in 2011, Mantid S.r.l. in 2017, Often Medical in 2019 and Biotag in 2022. In 2020, he was appointed as Technical Director of the Research Infrastructure (C-NOS: Optoelectronics and Photonics Technologies for Life Science Applications).



Jona Engel

*Sales Manager Americas, Nanoscribe
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Jona Engel has broad background in materials science and advanced manufacturing methods. His work focuses on multi-scalar problems with industrial relevance. His broad background allows him to take a step back and view a larger section of the process chain. In his current function he supports

the 2-Photon polymerization company Nanoscribe in the American market.



William Herzog

Assistant Group Leader, Massachusetts Institute of Technology Lincoln Lab
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Dr. Herzog is the Associate Leader of the Advanced Materials and Microsystems Group in the Advanced Technology Division at MIT, Lincoln Laboratory, a Department of Defense Federally Funded Research & Development Center. Bill's background is in materials, optics, photonics, and light-matter interactions.



Fredrik Laurell

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Fredrik Laurell is a professor of physics at KTH, the Royal Institute of Technology. He is a Fellow of Optica and member of the Royal Swedish Academy of Engineering Sciences. He has been the chairman of the Swedish Optical Society, and the National committee for optics (ICO). He cofounded PhotonicSweden, the national platform in Photonics, and chaired the Optics section at the Royal Swedish Academy of Sciences. He has authored or co-authored more than 300 journal papers, 500 conference papers and holds 17 patents. He has co-founded 5 companies and received the Göran Gustafsson Prize in Physics. Laurell's research spans studies of optical materials, fiber optics, nonlinear optics, and laser physics. He is particularly interested in pushing photonics into real world applications and works extensively with outreach activities.



Samuel Lin

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I have recently completed my PhD under the supervision of Prof. Daniele Faccio, exploring the limits of imaging in the highly diffusive regime. My research interests include numerical and experimental exploration of diffuse optical imaging using ultrafast lasers and single-photon sensitive detectors. During my PhD, I published a numerical study using information theory to establish potential practical limits of imaging through highly diffusive materials and a separate study that analyses the contribution of diffuse photons to enhance image reconstruction. My ongoing work includes utilizing a machine learning framework featuring variational autoencoding to tackle the highly ill-posed inverse problem of imaging beyond 100 transport meanfree paths, numerical and experimental analysis of photon propagation through anentire adult human head, and exploring computational imaging paradigms using functional near-infrared spectroscopy measurements of brain activity from the visual cortex.



Médéric Loyez

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Médéric Loyez is postdoctoral researcher who has studied and developed plasmonic optical fiber biosensors during his PhD thesis. He has a background in biochemistry. After learning new techniques in biological, chemical and photonics teams in Canada (Prof. Jacques Albert) and the USA (Prof. Lan Yang) for a postdoctoral fellowship, he is currently working as a research fellow of the F.R.S-FNRS in the laboratory of Prof. Ruddy Wattiez and the Advanced Photonic Sensors Unit of Prof. Caucheteur.



Joana Paiva

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Joana Paiva is a PhD holder in Physics and a MSc in Biomedical Engineering. She is recognized as the inventor of six PCT patents and holds the position of a senior researcher, with a notable record of being an author and co-author of more than 30 peer-reviewed papers. Joana has also established herself as a second-time founder, an auxiliary professor at the University of Porto, and an evaluator of funding proposals and European Projects. She is distinguished for her entrepreneurial spirit and unwavering passion for science, biotechnology, photonics, and their societal impact. Her professional portfolio includes involvement in diverse projects, encompassing areas such as sustainability, disease prediction, medical devices, food quality, and robotics. Joana is renowned for her collaboration in multidisciplinary teams within academic circles.

Throughout her career, Joana has been the recipient of numerous international scientific and entrepreneurship recognitions and awards. Notably, she was honored to be part of the prestigious Forbes 30 Under 30 Europe list in the Science & Healthcare category in 2020. Her achievements also include nine national scientific and innovation awards, among them the "Women in Science, 2021" distinction by FCT and Ciência Viva, the "2019 Born From Knowledge" award from ANI, and the "2021 Women Entrepreneurship Award" from the Católica Business School of Economics. Her primary focus lies in the digitalization of the human body through the analysis of physiological signals using the principles of Physics, Light, Mathematics, and Artificial Intelligence, spanning from the intricacies of the brain to the intricacies of blood. Her ultimate aspiration is to revolutionize the field by converting noisy physiological data into valuable clinical insights, with a special emphasis on aiding early disease detection through the integration of cutting-edge sensor technology and AI. In light of the

emergence of Lab on Chip approaches for point-of-care and biotechnology applications, Joana has been actively engaged in the development of innovative solutions based on optical fiber sensors for the realms of biomedical engineering, food technology, and clean energy. She skillfully leverages the advantages of Artificial Intelligence and Advanced Analytics in conjunction with Lab-on-Fiber Approaches, a journey she embarked on in 2015 to advance these fields further.



Stavros Pissadakis

Principal Researcher, FORTH-IESL

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Stavros Pissadakis is Director of Research at the Foundation for Research and Technology-Hellas (FORTH), Institute of Electronic Structure and Laser (IESL). He obtained his Ptychion degree from the Physics Department of University of Crete, Greece and his Ph.D. degree from Optoelectronics Research Centre (ORC), University of Southampton, UK. He has been employed in several academic positions in Greece and UK; also, he was visiting professor at the University of Parma, Italy. While joined FORTH-IESL, he established the Photonic Materials and Devices Laboratory (PMDL). He has coordinated-participated in several European and National research and industrial projects; also, he is a member of the Board of Stakeholders of the European Technological Platform Photonics21. His current scientific interests include development of microstructured and photonic crystal fiber actuating and sensing devices, optofluidics, whispering gallery mode devices, and study of photosensitivity in optical fibers and materials using laser radiation. Dr Pissadakis is an author/co-author of 82 publications in refereed journals and of 150 publications in international conferences, including 48 invited contributions. He is a Topical Editor of Applied Optics, an Associate Editor of IEEE/Optica JLT, and a Senior Member of both OSA and IEEE.



Terry Rauch

*Executive Director, Health Readiness Policy & Oversight
Director of R&D for Health Readiness Policy and Oversight
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Dr. Terry M. Rauch currently serves the Department of Defense within Health Affairs, Health Readiness Policy and Oversight (HRP&O) as the Director of Medical Research and Development (R&D). Dr. Rauch represents the DoD R&D community in international health agreements and domestic federal agency and non-government partnership in an effort to better serve missions, and medical readiness for 2.3 million service members through cross collaborations. Dr. Rauch has more than 40 years of experience in many facets of the Military Health System and has held numerous senior level positions in the Army and the Office of the Secretary of Defense. As a senior military officer he served as the Chief of Staff to the Assistant Secretary of Defense for Health Affairs, and principal advisor to four Assistant Secretaries of Defense for Health Affairs on matters pertaining to biomedical research, development and acquisition as well as medical products and devices needed to protect U.S. military forces against Chemical, Biological, Radiological & Nuclear (CBRN) threats. He commanded the U.S. Army Public Health Command-Europe, a scientific and technical organization that provided comprehensive preventive medicine services to garrisoned U.S. Army forces in Europe. Dr. Rauch served as the Chairman of the North Atlantic Treaty Organization (NATO) Working Group on Preventive Medicine advising Stabilization Forces-Bosnia and Stabilization Forces-Kosovo on preventive medicine matters. As Deputy Commander, and then later as Chief of Staff, of the U.S. Army Medical Research and Materiel Command he supported the daily management and integration of a medical research, development, and acquisition program encompassing 11 subordinate laboratories in six countries, 3,000 personnel, and over \$1 billion in funding. Dr. Rauch received his Bachelor of Science degree in psychology from the University of Cincinnati, where he also earned his Ph.D. in biology and psychology.



Matt Singer

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Matt Singer is a Physical Optics Engineer at Thorlabs specializing in the R&D of metasurfaces, plasmonics, and nanophotonic devices. He obtained his BS and MS at the University of Buffalo SUNY in Electrical Engineering.



Guillermo J. Tearney

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Guillermo (Gary) Tearney MD, PhD, FACC, FCAP, FNAI is the Remondi Family Endowed MGH Research Institute Chair, Professor of Pathology at Harvard Medical School, an Affiliated Faculty member of the Harvard-MIT Division of Health Sciences and Technology (HST), and maintains his lab at the Wellman Center for Photomedicine at the Massachusetts General Hospital. Prof. Tearney received his MD magna cum laude from Harvard Medical School and received his PhD in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology. Prof. Tearney's research interests are focused on the development and clinical validation of non-invasive, high-resolution optical imaging methods for human disease diagnosis. Prof. Tearney's lab was the first to perform human imaging in the coronary arteries and gastrointestinal tract in vivo with Optical Coherence Tomography (OCT), which provides cross-sectional images of tissue architectural microstructure at a resolution of 10 μ m. He has also conducted many of the seminal studies validating OCT and is considered an expert on OCT image interpretation. Recently, Prof. Tearney's lab has invented a next generation OCT technology, termed μ OCT, which has a resolution of 1 μ m and is capable of imaging cells and subcellular structures in the body.



João Varela

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Cancer diagnosis, in the absence of specific biomarkers, relies on expensive, time-consuming and invasive methods. These resource intensive procedures may not be suitable for early diagnosis, which is of paramount importance for increasing survival chances of cancer patients. Lab-in-a-Fiber (LiF) technologies are a small yet promising solution to tackle this problem, as their dimensions allows them to reach remote body regions for precise detection and capturing of samples for diagnostic purposes, with the added advantage of integration with other advanced therapeutic and diagnostic procedures. In our work, we present a simple and versatile LiF device capable of selectively detecting and collecting cancer cells, with potential for clinical applications. As a proof-of-concept, we were able to rapidly detect suspension cancer cells and capture them for downstream analysis. Our device demonstrates potential for use in clinical settings, where patient samples can be collected for in-vitro diagnostics even in remote and sensitive regions, where biopsy is harder to perform. We envisage that this system can be combined with advanced molecular point-of-care diagnostic technologies, paving the way to personalized therapy.



Lilian Witthauer

Postdoctoral Associate, Universitat Bern
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Lilian Witthauer currently holds the position of Assistant Professor with Tenure Track in Diabetes Technology at the University of Bern and serves as the leader of the Sensing and Monitoring Lab. She completed her PhD in Experimental Physics from the University of Basel, a Master's degree in Physics from the same university, and a Master of Advanced Studies in Medical Physics from ETH Zuerich. Her current research at the University of Bern is focused

on new optical glucose sensing technologies and the application of non-invasive sensing to improve the management of diabetes. Before joining the University of Bern, Lilian Witthauer worked as a research fellow at Harvard Medical School and Massachusetts General Hospital. During this time, she focused on developing phosphorescence-based oxygen sensors to enhance the assessment of compartment syndrome in collaboration with Professor Conor Evans at the Wellman Center for Photomedicine. Throughout her academic career, Lilian Witthauer has concentrated on advancing optical sensors and technologies for medical applications. Her contributions include work on optical navigation sensors based on shadow imaging and Fiber Bragg Gratings, as well as a planning system for virtual reality surgery. Her experience also extends to the analysis of large datasets and the construction of electronic and optical experimental setups, gained during her time as a particle physicist at electron acceleration facilities. In addition to her research, Lilian Witthauer is involved in mentoring students at various academic levels within the Graduate School for Cellular and Biomedical Sciences at the University of Bern. She also serves as a lecturer in the Master Biomedical Engineering program at the same university. Lilian Witthauer is a member of the Working Group on Continuous Glucose Monitoring within the IFCC Scientific Division.



Jian Zhao

Postdoctoral Associate, Massachusetts Institute of Technology

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Dr. Jian Zhao is a postdoctoral researcher at the Picower Institute for Learning and Memory at the Massachusetts Institute of Technology (MIT). Before joining the Picower Institute, he served as a postdoctoral associate in the Department of Electrical and Computer Engineering at Boston University. Dr. Zhao earned his Ph.D. in optics and photonics from CREOL, the College of Optics and Photonics, at the

University of Central Florida. He also received a B.S. degree in optics from the School of Physics and Engineering at Sun Yat-sen University in China. His research interests encompass vibrational and multiphoton microscopy with their associated biomedical applications, computational imaging, the integration of artificial intelligence in microscopy imaging, micro-structured fiber optics, and ultrafast optics. Dr. Zhao is an active member of Optica, SPIE, and BMES.

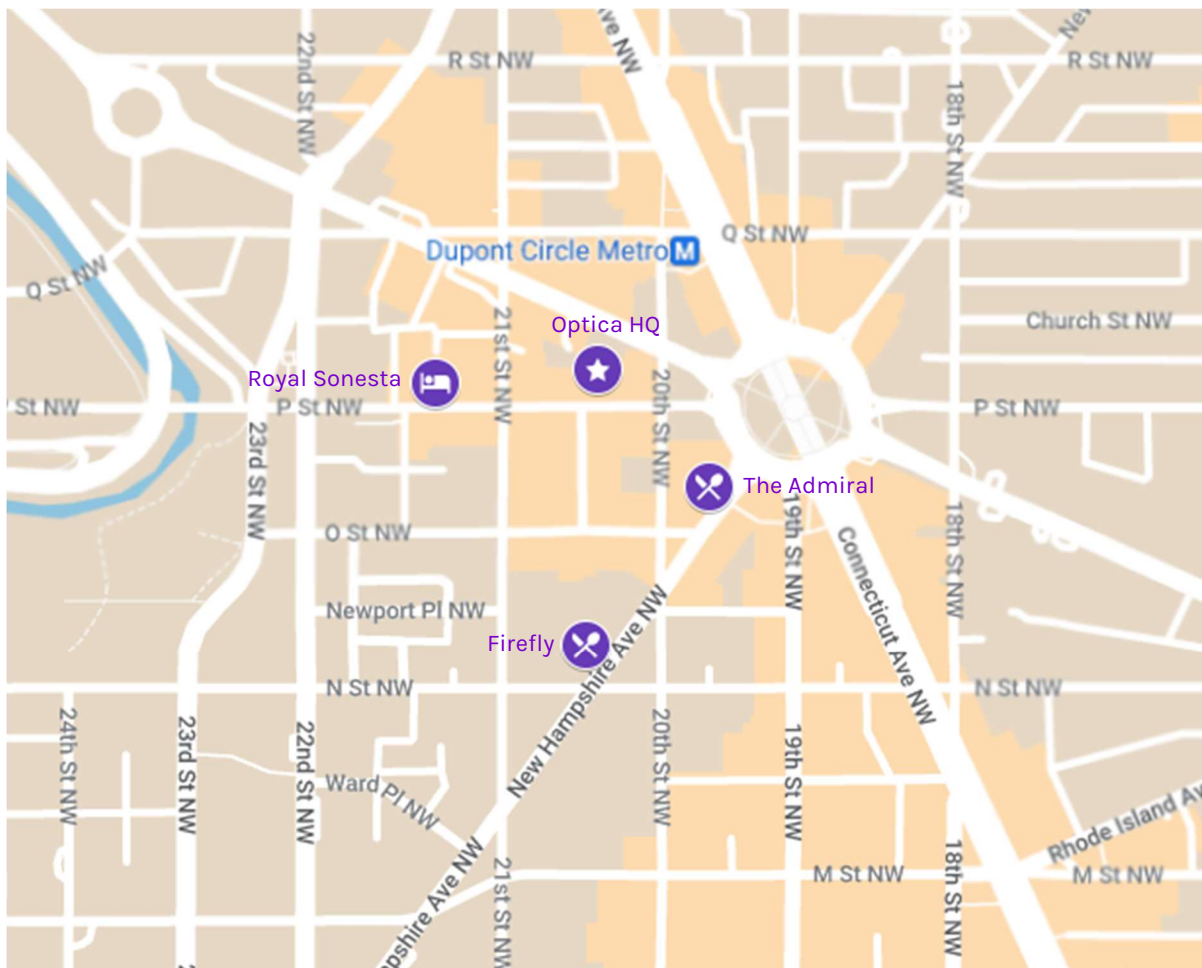
Map

Optica Headquarters: 2010 Massachusetts Ave NW

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Networking Dinner: Firefly Restaurant, 1310 Connecticut Ave NW



Anti-Harassment Policy and Code of Conduct

Optica is committed to providing an environment that is conducive to the free and robust exchange of scientific ideas. This environment requires that all participants be treated with equal consideration and respect. While Optica encourages vigorous debate of ideas, personal attacks create an environment in which people feel threatened or intimidated. This is not productive and does not advance the cause of science. All participants in Optica and Optica-managed events and activities are therefore expected to conduct themselves professionally and respectfully.

It is the policy of Optica that all forms of bullying, discrimination and harassment, sexual or otherwise, are prohibited in any Optica or Optica-managed events or activities. This policy applies to every individual at the event, whether attendee, speaker, exhibitor, award recipient, staff, contractor or other. It is also a violation of this policy to retaliate against an individual for reporting bullying, discrimination or harassment or to intentionally file a false report of bullying, discrimination or harassment.

Bullying, discrimination and harassment of any sort by someone in a position of power, prestige or authority is particularly harmful since those of lower status or rank may be hesitant to express their objections or discomfort out of fear of retaliation.

Optica may take any disciplinary action it deems appropriate if, after thorough investigation, it finds a violation occurred.

For complete policy information visit optica.org/codeofconduct.

If you wish to report bullying, discrimination, or harassment you have witnessed or experienced, you may do so through the following methods:

- Use the online portal optica.org/incidentreport
- Email codeofconduct@optica.org