

Committee on Atomic, Molecular, and Optical Sciences

Committee

Mette Gaarde

Co-Chair

Mette Gaarde is the Les and Dot Broussard Alumni Professor of Physics at Louisiana State University. Gaarde is an expert on the theory of ultrafast laser-matter interactions in atomic, molecular, and condensed-phase systems and studies a wide range of ultrafast dynamics. This includes both the production of attosecond light pulses, and the dynamics initiated by application of such pulses, which has implications in across atomic, molecular, and optical (AMO) science, as well as chemistry and condensed-matter physics. Previously, Gaarde worked as a Research Assistant Professor at Lund University before she joined the faculty at LSU in 2003. Gaarde has received multiple awards at LSU, most recently the 2023 Distinguished Research Master Award. She is a Fellow of the American Physical Society (APS) and of Optica, and she recently served as Chair of the APS Division of Atomic, Molecular, and Optical Physics. Gaarde also served as a member of the AMO2020 decadal study and a term as a member on the previous Academies CAMOS committee from 2013-2015. Gaarde earned a Ph.D. in physics from Copenhagen University, Denmark.

Prem Kumar

Co-Chair

Prem Kumar is a professor in the Department of Electrical and Computer Engineering at Northwestern University with a courtesy appointment in the Department of Physics and Astronomy. Kumar's primary research focus is on photonic devices and their applications utilizing the principles of nonlinear and quantum optics. Kumar's recent projects have included: generation, distribution, and ultrafast processing of photonic entanglement for applications in quantum information networks; novel quantum light states for precision measurements, imaging, and sensing; and novel optical amplifiers and devices for networked classical optical communications. Kumar is a fellow of Optica (formerly the Optical Society of America), American Physical Society, Institute of Electrical and Electronics Engineers, Institute of Physics (U.K.), American Association for the Advancement of Science, and SPIE (formerly the Society of Photo-Optical Instrumentation Engineers). Kumar has been a Distinguished Lecturer for the IEEE Photonics Society, Hermann A. Haus Lecturer at MIT, recipient of the Quantum Communication Award from Tamagawa University in Tokyo, Japan, and the Walder Research Excellence Award from the Provost's office at Northwestern University. While on leave from Northwestern, Kumar served as a program manager in the Defense Sciences Office at DARPA, where Kumar was selected Program Manager of the Year in 2015 and awarded the Secretary of Defense Medal for Outstanding Public Service in 2016. Prior to joining DARPA, Kumar served on the National Academies committee that issued the 2012 report Optics and Photonics: Essential Technologies for Our Nation, which spawned the National Photonics Initiative (NPI). Kumar serves on the NPI Steering Committee, lending expertise to issues pertaining to the National Quantum Initiative. Kumar is the editor-in-chief of Optica, the flagship journal of The Optica Publishing Group for high-impact research. Kumar earned a Ph.D. in Physics from the State University of New York at Buffalo.

Samuel Achilefu

Member

Samuel Achilefu is professor and chair of the Department of Biomedical Engineering at the University of Texas Southwestern (UTSW) Medical Center in Dallas. Achilefu holds the Lyda Hill Distinguished University Chair and other faculty appointments as a professor of radiology. Achilefu is an expert in the optical imaging of tissue using nanophotonics and light-harvesting materials. Achilefu is a fellow of many professional societies, including the SPIE (formerly the Society of Photo-Optical Instrumentation Engineers), Optica (formerly the Optical Society of America), American Institute for Medical and Biological Engineering, and American Association for the Advancement of Science. Before joining UTSW in February 2022, Achilefu spent over 20 years at Washington University in St. Louis, MO. Achilefu is also a fellow of the National Academy of Inventors, and member of the National Advisory Council for Biomedical Imaging and Bioengineering at the National Institutes of Health. Achilefu earned a Ph.D. in molecular physical and materials chemistry at the University of Nancy, France.

Wesley C. Campbell

Member

Wesley Campbell is a professor of physics at University of California Los Angeles after starting as a postdoc in Chris Monroe's group at the Joint Quantum Institute. Campbell's focus is experimental atomic physics with applications in quantum information and precision measurement and has projects in both trapped ion and neutral molecular quantum information processing. Campbell is an APS fellow and is currently vice chair of APS DAMOP. Campbell earned his PhD from Harvard University.

Maria Carreon

Member

Maria L. Carreon, is an associate professor at the University of Arkansas, Ralph E. Martin Department of Chemical Engineering. Carreon has served as assistant professor in several higher education institutions including the University of Tulsa, South Dakota School of Mines & Technology, and the University of Massachusetts, Lowell. Carreon's research interests center on the rational design of nanomaterials (including nanowires, thin films, ordered porous oxides, zeolites, and Metal Organic Frameworks) for diverse functional applications. Carreon recently focused on the development of plasma catalysis as an alternative for the electrification and decentralization of chemical processes. Carreon is an active member of the Mexican National Science Council and editor of Institute of Physics SciNotes. Carreon's was the first recipient of the Conn Center Fellowship at University of Louisville and also received two National Kokes awards (given by the North American Catalysis Society) and the 2023 NSF Career Award. Carreon earned a Ph.D. in chemical engineering at the University of Louisville.

Cheng Chin

Member

Cheng Chin is a professor in the Department of Physics and at the James Franck Institute and Enrico Fermi Institute at the University of Chicago. Chin leads a research group on experimental atomic, molecular and optical physics. Chin's expertise includes laser cooling and trapping of atoms and molecules, Bose-Einstein condensation and degenerate Fermi gas, quantum simulation, quantum chemistry, and quantum information. Chin received the APS I.I. Rabi Prize (2011), Bose-Einstein condensation Award (2017) and is an Academician of Academic Sinica in Taiwan (2024). Chin earned a Ph.D. in physics (2001) from Stanford University under the advisory of Steven Chu and conducted postdoc research at Stanford University and Innsbruck University in Austria.

Stephen D. Fantone

Member

Fantone is the president and chief executive officer of Optikos Corporation. Fantone is an expert in optical engineering and optical product development, has served on numerous program review panels and has been awarded over 70 patents covering a broad range of optical technologies. Fantone is a senior lecturer in the Mechanical Engineering Department at MIT and serves on the boards of the Pioneer Institute for Public Policy Research, the Hertz Foundation and the Optica Foundation. Fantone has been an Optica (formerly the Optical Society of America) member for over 40 years and has served in several volunteer capacities, including as treasurer from 1996 to 2013 and president in 2020; in 2007, he was awarded their Distinguished Service Award. Fantone received the University of Rochester Distinguished Scholar Award. Fantone earned a Ph.D. in optics from the Institute of Optics at the University of Rochester.

Oliver Gessner

Member

Oliver Gessner is a senior scientist in the Chemical Sciences Division of Lawrence Berkeley National Laboratory (LBNL) and the leader of the LBNL Atomic, Molecular, and Optical Sciences (AMOS) Program. Gessner's research focuses on electronic and nuclear dynamics underlying fundamental photochemical and light harvesting mechanisms in molecules, clusters, and interfacial systems. Gessner's group studies these dynamics by means of ultrafast x-ray spectroscopy and imaging techniques, as well as ultrafast electron diffraction. Gessner received an Early Career Research Program Award of the DOE Office of Science in 2012, an LBNL Director's Award for Exceptional Scientific Achievement in 2014 and became a fellow of the American Physical Society (APS) in 2015. Gessner was elected vice chair of the APS Division of Chemical Physics in 2023. Gessner earned a Ph.D. in physics from the Technical University Berlin.

Zakya H. Kafafi

Member

Zakya Kafafi is a Distinguished Research Fellow at Lehigh University. Kafafi's research considers printed electronics and photonics. Previously, Kafafi was director of the Division of Materials Research at the National Science Foundation. Kafafi also worked at the Naval Research Laboratory (NRL) in Washington, D.C. leading an interdisciplinary research team, and establishing a section on Organic Optoelectronics. Kafafi was president of Spectroscopic Associates, Inc. winning a Research & Development IR 100 Award for the design of a cryogenic link that rotates and translates in a vacuum. Kafafi received an NRL Edison Patent Award for inventing a simple two-step, cost-effective method to pattern conducting polymers for flexible optoelectronic devices. Kafafi serves on the advisory boards of the Institute of Electrical and Electronics Engineers Photonics Journal and the Conference on Spin in Organic Semiconductors; a member of Sigma Xi and American Chemical Society (ACS); and a fellow of the American Association for the Advancement of Science, Materials Research Society, Optica (formerly the Optical Society of America), and SPIE (formerly the Society of Photo-Optical Instrumentation Engineers). Kafafi is a recipient of the Hillebrand Prize, the ACS Chemical Society of Washington's highest honor, and the Kuwait Prize in Applied Sciences in the field of Renewable and Sustainable Energy. Kafafi earned a Ph.D. in chemistry from Rice University.

Jeremy Levy

Member

Jeremy Levy is a Distinguished Professor of Physics in the Department of Physics and Astronomy at the University of Pittsburgh. Levy's research interests center around the emerging field of oxide nanoelectronics, experimental and theoretical realizations for quantum computation, semiconductor and oxide spintronics, quantum transport and nanoscale optics, and dynamical phenomena in oxide materials and films. Levy is a Class of 2015 Vannevar Bush Faculty Fellow, a fellow of the American Physical Society and American Association for the Advancement of Science, a recipient of the 2008 Nano50 Innovator Award, and the NSF Career Award. For ten years Levy served as founding director of the Pittsburgh Quantum Institute (2012-2022). Levy has received the University of Pittsburgh's Chancellor's Distinguished awards for research (2004, 2011) and teaching (2007), and the Provost Award for Excellence in Doctoral Mentoring (2022). Levy earned a Ph.D. in physics from the University of California, Santa Barbara.

Robert A. Lieberman

Member

Robert Lieberman is president of Lumoptix LLC, a scientific and engineering research and policy consulting firm. Lieberman is educated in solid-state physics and molecular biophysics. Previously, Lieberman was at Intelligent Optical Systems (IOS), formerly part of the Physical Optics Corporation where he was vice president of R&D. At IOS, Lieberman helped found several other companies while maintaining an active research career in optics and photonics. Prior to that, Lieberman worked for ten years at AT&T Bell Labs in the Semiconductor Development, Physics Research, and Materials Research Laboratories. Lieberman served as a reviewer for the 2020 Academies decadal report, *Manipulating Quantum Systems: An Assessment of Atomic, Molecular, and Optical Physics in the United States*. Lieberman holds 34 U.S. patents, and currently serves as an advisor and/or Board member to several for-profit and nonprofit organizations. Lieberman is a life member of Institute of Electrical and Electronics Engineers, a fellow of SPIE (formerly the Society of Photo-Optical Instrumentation Engineers) and was SPIE's 2016 president. Lieberman earned a Ph.D. in physics from the University of Michigan.

Natalia M. Litchinitser

Member

Natalia Litchinitser is a professor of electrical and computer engineering and a professor of physics at Duke University. Litchinitser's research focuses on linear and nonlinear optics in engineered nanostructures, metamaterials, topological photonics, as well as the engineering of the light beams themselves. Litchinitser was previously a professor of electrical engineering at the University at Buffalo, The State University of New York, a member of technical staff at Bell Laboratories, Lucent Technologies, and a senior member of technical staff at Tyco Submarine Systems. Litchinitser authored 7 invited book chapters and over 250 journal and conference research papers. Litchinitser is a fellow of the American Physical Society, Optica (formerly the Optical Society of America), and SPIE (formerly the Society of Photo-Optical Instrumentation Engineers); a senior member of the Institute of Electrical and Electronics Engineers; and co-chair of CLEO Fundamental Science and SPIE Nanoscience and Engineering Applications conferences in 2021-2022. Litchinitser earned a Ph.D. in electrical engineering from the Illinois Institute of Technology.

Holger Mueller

Member

Holger Mueller is the Eugene Commins Presidential Chair in Experimental Physics and Professor of Physics at UC Berkeley, holding a concurrent appointment as a Faculty Scientist at the Lawrence Berkeley National Laboratory in the Molecular Biophysics and Integrated Bioimaging division. Mueller is a recipient of the 2023 Brown Investigator Award, the 2022 Nasa Group Achievement Award as part of BECCAL Science Definition Team. Mueller is an APS Fellow and was honored to receive the Francis M. Pipkin Award from APS in 2015. Mueller earned his PhD in Physics summa cum laude from Humboldt-Universität zu Berlin.

Nathalie Picqué

Member

Nathalie Picqué is a director at the Max-Born Institute for Nonlinear Optics and Short Pulse Spectroscopy (Berlin, Germany) and a professor of physics at the Humboldt University of Berlin. Picqué was a research group leader at the Max-Planck Institute of Quantum Optics (Garching, Germany) and a research scientist with the Centre National de la Recherche Scientifique at Orsay, France. Picqué's research interests are in the areas of optics and molecular physics, more particularly in interferometry, precision spectroscopy, and laser technology. Picqué's research focuses on exploring new ideas that involve laser frequency combs and on applying these novel concepts to metrology, molecular spectroscopy, holography and chip-scale sensing. Picqué has received several awards, including the 2021 Gentner-Kastler Prize in Physics, a 2021 European Research Council Advanced Grant, the 2022 Breakthrough in Physical Sciences of the Falling-Walls Foundation and the 2023 Cécile DeWitt-Morette Prize of the French Academy of Sciences. Picqué earned a Ph.D. in physics from Université Paris-Saclay (France).

Eleanor Rieffel

Member

Eleanor G. Rieffel is the senior researcher for advanced computing and data analytics and leads the Quantum Artificial Intelligence Laboratory (QuAIL) at NASA Ames Research Center. Rieffel also serves as the chief computational scientist for the Superconducting Quantum Materials and Systems Center, of which the QuAIL group is a part. Rieffel joined NASA Ames Research Center in 2012 to work on their expanding quantum computing effort and was one of two 2020 NASA Ames Associate Fellows. Rieffel's research focuses on quantum algorithms, evaluation and utilization of near-term quantum hardware, fundamental resources for quantum computation, quantum error characterization and mitigation, distributed quantum computing, and applications of quantum computing. Rieffel is the co-author, with Wolfgang Polak, of the 2011 book *Quantum Computing: A Gentle Introduction*. Previously, Rieffel performed research in diverse fields at the Fuji-Xerox Palo Alto Laboratory, including quantum computation, applied cryptography, image-based geometric reconstruction of 3D scenes, bioinformatics, video surveillance, and automated control code generation for modular robotics. Rieffel earned a Ph.D. in mathematics from the University of California, Los Angeles.

Francis Robicheaux

Member

Francis Robicheaux is a professor in the Department of Physics and Astronomy at Purdue University in West Lafayette, Indiana. Prior to that, Robicheaux was a professor in the Department of Physics at Auburn University. Robicheaux is a theoretical and computational physicist in atomic, molecular, and optical physics. Robicheaux's most recent interests are in the collective interaction between atoms facilitated by the absorption and emission of photons and in the physics of antimatter atoms trapped by strong magnetic fields in the ALPHA experiment at CERN. Robicheaux is a fellow of the American Physical Society; was named an Alumni Professor (2004), and received the Dean's Faculty Research Award (2011) at Auburn University; and received the John Dawson Award for Excellence in Plasma Physics Research from the American Physical Society in 2011. Robicheaux earned a Ph.D. in physics from the University of Chicago.

Monika Schleier-Smith

Member

Monika Schleier-Smith is an associate professor in the Physics Department at Stanford University. Schleier-Smith's current research is on advancing optical control of interactions among laser-cooled atoms, with an eye towards applications in quantum simulation, metrology, and computation. Schleier-Smith has pioneered techniques and ideas for simulating phenomena of condensed-matter physics and quantum gravity using tools of atomic physics and developed protocols in quantum control for entanglement-enhanced sensing. Schleier-Smith's honors and awards include the National Science Foundation Career Award, Presidential Early Career Award for Scientists and Engineers (PECASE), a MacArthur Foundation Fellowship, the I. I. Rabi Prize of the American Physical Society (APS), an APS Fellowship, and the Benjamin Franklin NextGen Award. Schleier-Smith earned a Ph.D. from the Massachusetts Institute of Technology.

Endre Takacs

Member

Endre Takacs is an atomic physicist and a professor in the Department of Physics and Astronomy at Clemson University. Takacs' research interests include the atomic physics of highly charged ions, atomic processes in high-temperature plasma, laboratory astrophysics, and the medical physics application of radiation. Takacs has engaged in various academic and research activities globally, including positions at the University of Debrecen, Massachusetts Institute of Technology, Harvard-Smithsonian Astrophysical Observatory, National Institute of Standards and Technology, Vanderbilt University, and Queens University in Belfast. In addition to academic pursuits, Takacs has contributed to various medical and radiation physics consulting projects. Takacs is a member of the American Physical Society, Roland Eotvos Hungarian Physical Society, and the European Physical Society. Takacs earned a Ph.D. in atomic physics from the University of Debrecen, Hungary.