NEURAL ENGINEERING SEMINAR SERIES

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Micro mechanical devices for high-speed manipulation of light

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ABSTRACT: The ability to shape and control the wavefront of propagating light beams is of fundamental importance in science and technology. A large variety of optical elements, such as lenses, metasurfaces, and spatial light modulators, achieve this by introducing local changes in the phase or amplitude of a propagating signal. In recent years, thanks to the advance of novel fabrication techniques, there have been significant improvements in the use of these devices for neurobiology, neural engineering, and the implementation of new tools for brain research. In this presentation, I will describe the advantages of MEMS devices to manipulate light and review the unique applications that these optical elements would enable for brain research and biomedical applications.

Jan. 25, 2023

12:15 -1:15 p.m. (E.T.)
W306 Millennium Science

Daniel Lopez
Liang Professor of Electrical Engineering at Penn State University and the Director of the Nanofabrication Lab at the Materials Research Institute.

BIOGRAPHY: Daniel Lopez is the Liang Professor of Electrical Engineering at Penn State University and the Director of the Nanofabrication Lab at the Materials Research Institute. He received his Ph.D. in Physics in 1995 from the Centro Atomico Bariloche in Argentina. Immediately after, he joined IBM T. J. Watson Research Center as a Postdoctoral Fellow, and in 1998, Bell Laboratories (Murray Hill, NJ) as a Research Staff member. At Bell Laboratories, he worked in developing, fabricating, and applying micro and nano electro-mechanical systems (MEMS and NEMS) for optical communications, imaging, and ultra-sensitive force detectors. At Bell Labs, he was part of the team responsible for creating the world's first all-optical, high-speed data switch (LambdaRouter). In 2008, he moved to Argonne National Laboratory to lead the Nanofabrication and Devices group at the Center for Nanoscale Materials. During the time he served as group leader, he developed new strategic research directions in materials science, built a milli-kelvin cryogenic facility for research in quantum materials, created an active international community of users from academia and industry, and enhanced the group's nanofabrication capabilities by adding new space and state-of-the-art processing, characterization, and synthesis tools. In 2020, after spending a year at NIST (Gaithersburg) working on quantum packaging for atomic sensors, Dr. Lopez joined Penn State University as a named Professor of EE and Director of their Nanofabrication Lab. During the year 2022, he assembled the Mid-Atlantic Semiconductor Hub (MASH), a consortium of 10 universities across six states that combines resources to meet the need of the semiconductor industry in the U.S. by strengthening and aligning research, manufacturing, and workforce development. He is affiliated with the Microsystems and Nanotechnology Division in the Physical Measurement Lab at the National Institute for Standards and Technologies (NIST) in Gaithersburg, MD.

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