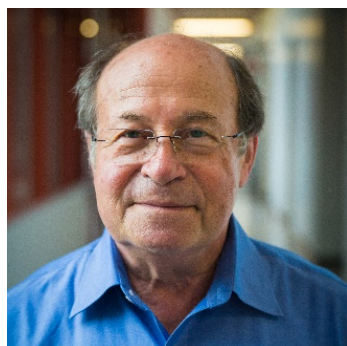


155th meeting of The Lyncean Group of San Diego

Date: Wednesday, 29 July 2026

Location: Southwestern Yacht Club, 2702 Qualtrough Street, San Diego, CA 92106

Speaker: Dr. Yeshaiahu (Shaya) Fainman,
ASML/Cymer Chair and Distinguished Professor of Advanced Optical Technologies,
Department of Electrical and Computer Engineering (ECE),
Jacobs School of Engineering, University of California San Diego (UCSD)



Dr. Fainman. Source: Jacobs School of Engineering

Title: Foundry enabled chip-scale photonics technology and applications.

Abstract: Dense photonic integration requires miniaturization of materials, devices, circuits and systems, including passive components (e.g., engineered composite metamaterials, filters, etc.), active components (e.g., modulators and nonlinear wave mixers) and integrated circuits (Fourier transform spectrometer, programmable phase modulator of free space modes, linear algebra processors, etc.). In this talk we will discuss recent progress in developing CMOS (Complementary Metal-Oxide-Semiconductor) compatible nonlinear optical materials such as silicon rich nitride (SRN) as well as examples of foundry enabled silicon photonic circuits and systems. Specifically, we will review silicon photonics-based Fourier transform spectrometers. Moreover, taking advantage of nanofabrication we will discuss on-chip spectrometers using stratified waveguide filters and machine learning. Moving forward, we will discuss chip-scale integrated circuit/system that will allow to realize linear algebra accelerators with superior performance in speed, energy consumption and size compared to its electronic counterpart. Such system can be manufactured using monolithic CMOS process and impact such applications as 5G/6G and beyond wireless MIMO (Multiple-Input and Multiple-Output) systems as well as deep learning and artificial intelligence.

Speaker biography: Dr. Shaya Fainman received the M.Sc and Ph.D degrees from Technion, the Israel Institute of Technology, in 1979 and 1983, respectively.

Since 1990, he has been directing research of the Ultrafast and Nanoscale Optics group at UCSD and has helped to make pioneering contributions to utilizing near-field optical

phenomena in inhomogeneous and meta-materials, nanophotonics and plasmonics, nonlinear optics of femtosecond pulses and non-conventional imaging.

His current research interests are in near-field optical science and technology with applications targeting information technologies that are compatible with CMOS manufacturing. He has contributed over 360 manuscripts in peer review journals and is a recipient of numerous awards and distinctions.

He is a Fellow of the Optical Society of America, a Fellow of the Institute of Electrical and Electronics Engineers and a Fellow of the Society of Photo-Optical Instrumentation Engineers. In addition, he is the recipient of the Miriam and Aharon Gutvirt Prize, Technion, Haifa, Israel (1982), Lady Davis Fellowship (2006), and Brown award (2006).

For more information on Dr. Fainman's work at UCSD, see the 19 March 2025 article by Phoebe Skok on the UC San Diego Today website [here](#).

Some Lyncean members may remember that Dr. Fainman spoke to the Group once before, on 6 September 2013. You'll find his presentation, "Nanophotonics Technology and Applications," [here](#).

Dr. Fainman's presentation today provided insights into the substantial progress made in chip-scale photonic device development, their relatively near-term applications in advanced wireless communications systems and their longer-term applications in advanced computing systems. His presentation slides is available [here](#).



Dr. Fainman started his presentation with a short historical overview of the evolution of the photonics research organization at UCSD.



Dr. Fainman concluded with a discussion of the Integrated Photonics Education Kit, (IPEK) which was developed in 2019 in collaboration with Tyndall National Institute in Cork, Ireland, as a hands-on tool to bring integrated photonics into the undergraduate college engineering and science curriculum. Read more on IPEK [here](#).



Pete Lobner presented Dr. Fainman with a Lyncean coin

After the meeting adjourned, Dr. Fainman kindly stayed to continue conversations with several interested Lyncean members.

Pete Lobner's meeting slides are available [here](#).