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*Electrical & Computer Engineering*  
**S E M I N A R**  
Louisiana State University

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**Emerging Optical and Quantum Sensing in Silicon**

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**Abstract**—Silicon is the most scalable optoelectronic material but has suffered from its inability to generate directly and efficiently classical or quantum light on chips. Silicon is also an inherently weak absorbing material in near-infrared (NIR) wavelengths, which is highly important for emerging applications in the existing CMOS foundry framework. First, I will talk about a nanophotonic engineering design and CMOS-compatible fabrication technique that help attain 20-fold prodigious light absorption enhancement in 1.0  $\mu\text{m}$  thin silicon ultrafast optical sensors, leading to surpassing the inherent absorption efficiency of gallium arsenide (mainstream detection material) for a broad spectrum in the NIR. Next, I will present the first all-silicon quantum light source based on a single atomic emissive center embedded in a silicon-based nanophotonic cavity. We observe a more than 30-fold enhancement of luminescence, a near unity atom-cavity coupling efficiency, and an 8-fold acceleration of the emission from the quantum center. This talk will explore avenues for emerging applications in classical and quantum communication, sensing, imaging, and computing.

**Bio**—Dr. Wayesh Qarony is a postdoctoral scholar at the University of California Berkeley in the EECS department, jointly with the Molecular Foundry of Lawrence Berkeley National Lab. He focuses on nanophotonic design, fabrication, and characterization of optoelectronic, photonics, and quantum semiconductor devices for ubiquitous energy and sensing applications. He has notable scientific contributions by publishing over 40 high-quality research articles, including Nature and Advanced Science, with more than 1500 google citations. Dr. Qarony was awarded and honored many times, including summa-cum-laude gold medal in B.Sc., German Hempel & HKPFS fellowships, UC Davis PSA grant, outstanding PolyU Ph.D. graduate shining in academia honor, UC Berkeley NSF I-Corps grant award, and 2022 NSF I-Corps stipend award. Dr. Qarony received his Ph.D. in Applied Physics and M.Sc. in Electrical Engineering from Hong Kong Polytechnic University and Jacobs University Bremen, Germany, respectively. Before joining UC Berkeley & LBNL, he was a postdoctoral scholar at ECE UC Davis.

**When:** Wednesday, 1 March 2023, 11:30 - 12:30

**Where:** Room 3316E Patrick F. Taylor Hall

**Info:** <https://www.lsu.edu/eng/ece/seminar>

