USC Viterbi
School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Seminar

Building Quantum Networks with Quantum Electrooptics

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Date: Monday, March 4, 2024
Time: 2:00pm – 3:30pm PST
Location: EEB 248
https://usc.zoom.us/j/97370470279?pwd=NGZ4aWdGUHRjUUtrQllkemVIV3lxQT09

Meeting ID: 973 7047 0279
Passcode: 790169

Abstract: In the last few decades, a myriad of physical systems such as photons, atoms, ions and spins have been explored for various different quantum technologies such as computation, communication and meteorology. Until now, no single physical system has been suitable for all the different quantum applications and, therefore, different systems are utilized in different spheres usually without any intercompatibility between them. A solution to this emerging chaos in the quantum landscape is to build hybrid quantum networks where various quantum systems with their unique advantages can be connected together to build a combined system able to perform better than the sum of its aggregates. The nodes in such a network would be connected using flying qubits - telecom wavelength optical photons - which would also allow these nodes to be separated by long distances. There has been some progress in this direction, particularly attempts to make trapped ions and solid state qubits compatible with optical photons. However, making microwave technologies such as superconducting qubits compatible with high energy optics is more challenging due to the large energy gap between the two. In this talk, I will present how quantum electro optics can be used to establish a quantum bridge between microwave and optical frequencies. Such a bridge would not only allow connection of superconducting quits over a long distance but also would be a key step in making future hybrid quantum networks a reality.

Biography: Rishabh completed his bachelor's and master's degree in Physics at the Indian Institute of Technology, Kanpur. His research mainly involved studying orbital angular momentum of light, in particular, sorting photons in this basis to get a multidimensional basis for photons. His master's thesis involved simulating Maxwell's equation using Finite Difference Time Domain (FDTD) method. Rishabh started graduate school at ISTA in fall of 2018 and joined the Fink group in 2019. He graduated in 2023 and works now as a postdoc on new cavity electrooptics experiments.

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