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

Seminar

Building quantum networks: from solid-state defects and Rydberg atoms in cavities to a new scientific frontier with hybrid quantum systems

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Date: Tuesday, February 27, 2024
Time: 2:00pm – 3:30pm
Location: ZOOM Only

https://usc.zoom.us/j/96689616375?pwd=bGJ0dXZZUEdxTjN3bHFlL3ZnVWdVUT09

Meeting ID: 966 8961 6375
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Abstract: The experimental development of quantum networks marks a significant scientific milestone, poised to enable secure quantum communication, distributed quantum computing, and entanglement-enhanced nonlocal sensing. In this talk, I will discuss the recent advancements in the field along with the outstanding challenges through my work on two different platforms: Silicon Vacancy defects in diamond nanophotonic cavities and Rydberg atoms coupled to hybrid cavities. First, I will present our recent results on distributing entanglement across a two-node network with on-chip solid-state defects in cavities which we built at Harvard. We demonstrated high-fidelity entanglement between communication and memory qubits and showed long-distance entanglement over the 35 km of deployed fiber in the Cambridge/Boston area. Second, I will describe our work at the University of Chicago on using Rydberg atoms as transducers of quantum information between optical and microwave photons, with the goal of integrating Rydberg platforms with superconducting circuits and paving the way for advanced quantum network architectures. The talk will conclude with a perspective on the potential of this hybrid platform approach in constructing quantum networks, highlighting the uncharted scientific and technological opportunities it could unlock.

Biography: Aziza is a postdoc at Harvard in the group of Mikhail Lukin. She did her PhD at the University of Chicago in groups of Jon Simon and David Schuster, working on the transduction of single optical to millimeter wave photons using Rydberg atoms in cavities. Aziza got a Bachelor's degree from Harvard University and an MPhil from the University of Cambridge, where she built an experiment for generating potassium-39 BEC in a uniform box potential.