Tuesday, January 18th, 2022, 2:30pm

Speaker: Alp Sipahigil

Institution: UC Berkeley

Title: Optical Interconnects for Superconducting Quantum Processors

Abstract:
The ability to store, transfer, and process quantum information promises to transform how we calculate, communicate, and measure. In the past two decades, superconducting microwave circuits based on Josephson junctions emerged as a powerful platform for quantum computation. However, these systems operate at low temperatures and microwave frequencies, and require coherent optical interconnects to transfer quantum information across long distances. In this talk, I will present our recent experiments demonstrating the transduction of a superconducting qubit excitation to an optical photon. I will present an integrated device platform combining superconducting qubits, piezoelectric transducers, and optomechanical transducers for converting quantum states between superconducting circuits, single phonons, and single optical photons. I will discuss how we use nanomechanical oscillators in their quantum ground states to convert single photons from microwave frequencies to the optical domain. I will conclude by discussing the prospects of this approach for realizing future quantum communication networks based on superconducting quantum processors.