

Coherent Single-Photon Transduction with SRF Cavities for Distributed Quantum Sensing

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A key frontier in Quantum Information Science is the distribution of single microwave photons between superconducting radio-frequency (SRF) quantum devices over fiber-optic links, enabling networked quantum sensors with sensitivities beyond what any standalone node can achieve. High-efficiency microwave-optical transduction at the single-photon level is the critical enabling capability. This presentation examines single-photon transduction based on coupling SRF cavities to electro-optic resonators, with emphasis on preserving photon coherence and minimizing added noise. Our results show that this architecture can coherently transfer single photons among superconducting devices across quantum networks.