

Abstract Submitted
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Superconducting Single Electron Transistor Coupled to a DC-Biased High-Q Microwave Cavity¹ FEI CHEN, WEIWEI XUE, IAN HAYES, M.P. BLENCOWE, A.J. RIMBERG, Dartmouth College — DC biased high-Q microwave cavities based on the circuit quantum electrodynamics (QED) architecture [1] have been developed, allowing simultaneous particle and photon exchange with nanostructures placed in a 1-D transmission line resonator. Here we embed superconducting single electron transistors (S-SETs) in such a cavity. The interplay between the S-SET and the microwave cavity offers an interesting system for studying nonlinear quantum dynamics and the quantum-to-classical transition. We fabricate the S-SET using cryogenic ultra-thin film evaporation techniques. The S-SET is directly coupled to the center conductor of the transmission line resonator, allowing application of a DC bias across the S-SET. The highly tunable nonlinearity can be accessed by using a small DC bias such that the S-SET remains in the supercurrent regime. Recent experimental results will be discussed. [1] A. Wallraff et al, Nature, 431, 162 (2004).

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