

Abstract Submitted
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RF SQUID-Mediated Coherent Tunable Coupling Between a Superconducting Phase Qubit and Lumped Element Resonator¹ MICHAEL ALLMAN, University of Colorado at Boulder, FABIO ALTOMARE, NIST, JED WHITTAKER, University of Colorado at Boulder, RAYMOND SIMMONDS, NIST — We demonstrate coherent tunable coupling between a superconducting phase qubit and a lumped element resonator. The coupling strength is mediated by a flux-biased RF SQUID operated in the non-hysteretic regime. By tuning the applied flux bias to the RF SQUID we change the effective mutual inductance, and thus the coupling energy, between the phase qubit and resonator. We verify the coupling strength modulation by observing modulation in the size of the avoided crossing in the phase qubit's spectroscopy as well as coherently by observing modulation in the vacuum Rabi oscillation frequency at zero detuning. The measured spectroscopic splittings and vacuum Rabi oscillations are in good agreement with theoretical predictions.

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