

Abstract Submitted
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Coherent control in circuit QED ALEXANDRE BLAIS, JAY GAMBETTA, ANDREAS WALLRAFF, DAVID SCHUSTER, LUIGI FRUNZIO, JOHANNES MAJER, STEVEN M. GIRVIN, ROBERT J. SCHOELKOPF, Yale University — Superconducting charge qubits fabricated inside a transmission line resonator have been used to successfully demonstrate strong interaction of an artificial atom with a single photon [1]. This architecture has also been used to show high-visibility and long coherence time ($T_1 \sim 7 \mu\text{s}$, $T_2 \sim 500 \text{ ns}$) Rabi oscillations [2] and in the detailed study of measurement-induced dephasing [3]. Here we will discuss protocols to realize one and two-qubit logical gates in circuit QED. These are based on resonant and off-resonant irradiation of the transmission line resonator. First experimental results towards the realization of these gates will be presented. Supported by NSA and ARDA under ARO Contract No. W911NF-05-1-0365 and the NSF under Grants No. ITR-0325580 and No. DMR-0342157. [1] A. Wallraff *et al.*, Nature 431, 162 (2004). [2] A. Wallraff *et al.*, Phys. Rev. Lett., 95, 060501 (2005). [3] D. Schuster *et al.*, Phys. Rev. Lett., 94, 123602 (2005).

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