Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Quantum Coherence in a Superconducting Flux Qubit[1] T. HIME, B.L.T. PLOURDE, P.A. REICHARDT, T.L. ROBERTSON, C.-E. WU, JOHN CLARKE, University of California, Berkeley — We report observations of quantum coherence in a superconducting flux qubit. As the flux applied to the qubit was swept through the degeneracy point, $(n + 1/2)\Phi_0$, we could resolve the change in qubit screening flux produced by the reversal of the qubit circulating current. By applying microwave radiation to the qubit, we observed resonant excitation when the qubit level splitting matched the energy of the microwave photons, corresponding to a change in the qubit screening flux. We varied the microwave frequency and mapped out the dispersion of the excited state transition which fit well to the expected hyperbolic dependence. With high-resolution spectroscopy, we measured anomalous structure and splittings on the excited state line, which may correspond to coupling to defect states in the junction tunnel barriers. We performed coherent manipulation of the qubit state by applying microwave pulses of fixed amplitude and frequency, but variable width. This resulted in Rabi oscillations with a Rabi frequency which scaled linearly with the amplitude of the microwave pulses.

[1]Supported by AFOSR, ARO, ARDA, NSF

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Date submitted: 30 Nov 2004 Electronic form version 1.4