Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Microwave Spectroscopy of a Cooper-Pair Transistor Coupled to a Lumped-Element Resonator MATTHEW BELL, LEV IOFFE, MICHAEL GERSHENSON, Department of Physics and Astronomy, Rutgers, the State University of New Jersey — We have studied the microwave response of a single Cooper-pair transistor (CPT) coupled to a lumped-element microwave resonator. The resonance frequency of this circuit, f_r , was measured as a function of the charge n_g induced on the CPT island by the gate electrode, and the phase difference across the CPT, ϕ_B , which was controlled by the magnetic flux in the superconducting loop containing the CPT. The observed $f_r(n_g, \phi_B)$ dependences reflect the variations of the CPT Josephson inductance with n_g and ϕ_B as well as the CPT excitation when the microwaves induce transitions between different quantum states of the CPT. The results are in excellent agreement with our simulations based on the numerical diagonalization of the circuit Hamiltonian. This agreement over the whole range of n_g and ϕ_B is unexpected, because the relevant energies vary widely, from 0.1K to 3K. The observed strong dependence $f_r(n_g, \phi_B)$ near the resonance excitation of the CPT provides a tool for sensitive charge measurements.

Michael Gershenson
Department of Physics and Astronomy,
Rutgers, the State University of New Jersey

Date submitted: 28 Nov 2011 Electronic form version 1.4