Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Dispersive readout of a flux qubit using a microstrip SQUID amplifier[1] E.M. HOSKINSON, Quantum Nanoelectronics Laboratory and Dept. of Physics, UC Berkeley, D. H. SLICHTER, Quantum Nanoelectronics Laboratory, Dept. of Physics, UC Berkeley, J.E. JOHNSON, Dept. of Physics, UC Berkeley, C. MACKLIN, O. NAAMAN, Quantum Nanoelectronics Laboratory, Dept. of Physics, UC Berkeley, JOHN CLARKE, Dept. of Physics, UC Berkeley, I. SIDDIQI, Quantum Nanoelectronics Laboratory, Dept. of Physics, UC Berkeley — Dispersive techniques for the readout of superconducting qubits offer the possibility of high repetition-rate quantum non-demolition measurement by avoiding dissipation close to the qubit. We demonstrate a dispersive readout scheme in which a three junction aluminum flux qubit is inductively coupled to a 1-2 GHz oscillator formed by a capacitively shunted SQUID. The SQUID in this readout oscillator acts as a nonlinear, flux-dependent inductor so that the oscillator resonance frequency depends on the state of the qubit. Readout is performed by microwave reflectometry; the reflected signal is amplified using a microstrip SQUID amplifier (MSA) with a noise temperature of a few hundred millikelvin. This noise temperature is an order of magnitude lower than that of the HEMT (high electron mobility transistor) amplifier that follows the MSA. We report measurements in both the linear (weak drive) and the bistable (strong drive) oscillator regimes.

[1]This work was funded in part by the U.S. Government and by BBN Technologies.

E. M. Hoskinson
UC Berkeley

Date submitted: 04 Jan 2010 Electronic form version 1.4