Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Dephasing Measurements of a Cooper-pair box VITALEY ZARETSKEY, Dept. of Physics, Univ. of Maryland, S. NOVIKOV, B. SURI, Z. KIM, Dept. Of Physics, Univ. Of Maryland, F. C. WELLSTOOD, JQI, CNAM, Dept. of Physics, Univ. of Maryland, B. S. PALMER, Lab. For Physical Sciences
— We present data on the dephasing properties of our $Al/AlO_X/Al$ Cooper-pair box (CPB) qubit. The CPB had a charging energy $E_C/h = 6.25$ GHz and a maximum $E_J/h = 19$ GHz which was decreased by an external magnetic field to an effective E_J/h of 6.1 GHz. The qubit was capacitively coupled to a lumped element microwave resonator ($f_0 = 5.446$ GHz, $Q_L = 1.8 \times 10^4$) which was in turn coupled to a transmission line. To manipulate the qubit, a microwave pulse at 6.1 GHz was sent to the transmission line. The state of the qubit was then measured by sending a second microwave pulse at f_0 and measuring the amplitude and phase of the transmitted power. We observed Rabi oscillations with Rabi frequencies from 1.94 to 5.32 MHz decay with time constants in the range T' = 0.6 to 1.6 μs. We measured an inhomogeneous dephasing time (T_2*) of 322 ns by performing a Ramsey fringe experiment. Assuming $1/f$ charge noise is the dominant dephasing mechanism we extracted a $1/f$ charge noise amplitude of $1.6 \times 10^{-3} e/\sqrt{Hz}$ at 1 Hz.

Vitaley Zaretskey
Dept. of Physics, Univ. of Maryland

Date submitted: 08 Dec 2010 Electronic form version 1.4