Abstract Submitted for the MAR13 Meeting of The American Physical Society

Catch-Disperse-Release Readout for Superconducting Qubits¹ EYOB A. SETE, ERIC MLINAR, ALEXANDER N. KOROTKOV, University of California, Riverside, ANDREI GALIAUTDINOV, University of Georgia, Athens, JOHN M. MARTINIS, University of California, Santa Barbara — We analyze a qubit readout scheme for superconducting qubits via controlled capture, dispersion, and release of a microwave field. A tunable coupler is used to decouple the microwave resonator from a transmission line during dispersive interaction with the qubit, thus circumventing the Purcell effect. We show that fast and high-fidelity qubit readout can be achieved for nonlinear dispersive qubit-resonator interaction and for sufficiently adiabatic tuning of the qubit frequency. Interestingly, the Jaynes-Cummings nonlinearity results in quadrature squeezing of the microwave field which leads to a significant decrease in measurement error. The effects of qubit anharmonicity and imperfect quantum efficiency of the microwave amplification on the measurement error are also discussed.

¹Supported by IARPA/ARO.

Eyob A. Sete University of California Riverside

Date submitted: 09 Nov 2012

Electronic form version 1.4