

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**Quantum jumps of a fluxonium qubit**<sup>1</sup> U. VOOL, I.M. POP, K. SLIWA, B. ABDO, T. BRECHT, S. SHANKAR, M. HATRIDGE, R.J. SCHOELKOPF, M. MIRRAHIMI, L. GLAZMAN, M.H. DEVORET, Department of Applied Physics, Yale University — The fluxonium qubit has recently been shown to have energy relaxation time (T1) of the order of 1 ms, limited by quasiparticle dissipation. With the addition of a Josephson Parametric Converter (JPC) to the experiment, trajectories corresponding to quantum jumps between the ground and 1st excited state can be measured, thus allowing the observation of the qubit decay in real time instead of that of an ensemble average. Our measurement fidelity with the JPC is in excess of 98% for an acquisition time of 5 us and we can thus continuously monitor the quantum jumps of the qubit in equilibrium with its environment in a time much shorter than its average relaxation time. We observe in our sample a jump statistics that varies from being completely Poissonian with a long (500 us) mean time in the ground state to being highly non-Poissonian with short (100 us) mean time in the ground state. The changes between these regimes occur on time scales of seconds, minutes and even hours. We have studied this effect and its relation to quasiparticle dynamics by injecting quasiparticles with a short intense microwave pulse and by seeding quasiparticle-trapping vortices with magnetic field.

<sup>1</sup>Work supported by: IARPA, ARO, and NSF

Uri Vool  
Department of Applied Physics, Yale University

Date submitted: 13 Nov 2013

Electronic form version 1.4