

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Cavity Josephson Bifurcation Amplifier: an improved microwave readout for a superconducting qubit MICHAEL METCALFE, ETIENNE BOAKNIN, VLADIMIR MANUCHARYAN, RAJAMANI VIJAYARAGHAVAN, LUIGI FRUNZIO, MICHEL DEVORET, Qlab, Department of Applied Physics, Yale University — Dispersive readouts for superconducting qubits have the advantage of speed and minimal invasiveness. We have developed a new type of dispersive bifurcating amplifier, which consists of a Josephson junction imbedded in a microwave on-chip resonator. In contrast with the Josephson bifurcation amplifier [1,2,3], which has an on-chip capacitor shunting a junction, the resonator is based on a simple coplanar waveguide imposing a pre-determined frequency and whose other RF characteristics like the quality factor are easily controlled and optimized. Furthermore, readout frequencies ranging from 1 to 10GHz have been realized. Under proper microwave irradiation conditions, the resonator has two metastable states. Which state is adopted by the resonator depends on the state of a qubit coupled to the readout junction. We present the characterization of the Cavity Bifurcation Amplifier and demonstrate its application as a readout for the Quantonium qubit.

[1] I. Siddiqi et al. Phys. Rev. Lett 93, 207002 (2004)

[2] I. Siddiqi et al. Phys. Rev. Lett. 94, 027005 (2005)

[3] I. Siddiqi et al. Phys. Rev. B. 73, 0054510 (2006)

Michael Metcalfe
Qlab, Department of Applied Physics, Yale University

Date submitted: 30 Nov 2006

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