Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

RF critical current of Josephson junction VLADIMIR MANUCHARYAN, ETIENNE BOAKNIN, MICHAEL METCALFE, R. VIJAY, Department of Applied Physics, Yale University, IRFAN SIDDIQI, Department of Applied Physics, Yale University, Department of Physics, University of California, Berkeley, ANDREAS WALLRAFF, R.J. SCHOELKOPF, MICHEL DEVORET, Department of Applied Physics, Yale University — The Josephson junction is the only radio-frequency electrical element which can be both non-dissipative and non-linear at low temperatures. While the stability of the junction dynamics in presence of a DC drive has been extensively studied, the microwave drive case is relatively poorly understood, at least experimentally. It is explored by driving an increasing AC current through a Josephson junction which is effectively biased by an AC voltage generator in series with a finite linear imbedding impedance $Z(\omega)$. For small signal amplitude, the junction behaves as a linear inductor. For higher signal amplitudes, we show that there exists a critical current I_c^{RF} beyond which the dynamics of the junction changes qualitatively as a result of its non-linear characteristic. This AC critical current depends strongly on the biasing impedance. We provide a detailed stability diagram from experimental measurements and show that it obeys the simple theory of nonlinear resonance.

Etienne Boaknin
Department of Applied Physics, Yale University

Date submitted: 30 Nov 2005 Electronic form version 1.4