Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Low-bandwidth control scheme for an oscillator stabilized Josephson qubit R. H. KOCH, J. R. ROZEN, G. A. KEEFE, F. M. MILLIKEN, C. C. TSUEI, J. R. KIRTLEY, D. P. DIVINCENZO, IBM Watson Research Ctr., Yorktown Heights, NY 10598 USA — We introduce a new flux-based Josephson junction circuit for which quantum operations are realized by low-bandwidth, nearly adiabatic magnetic-flux pulses. Coupling to the fundamental mode of a superconducting transmission line permits a stabilization of the rotation angle of the quantum operation against flux noise. A complete scheme for one-qubit rotations, and high-visibility Ramsey-fringe oscillations, is given. We show that high visibility depends on passing through a portal in the space of applied fluxes, where the width of the portal is proportional to the ramp-up rate of the flux pulse. Initial measurements of such a qubit show a measured visibility of 60 percent and a coherence time of greater than 35 ns. The fundamental mode frequency of the transmission line was 1.54 GHz.

Roger Koch
IBM Research

Date submitted: 01 Dec 2004 Electronic form version 1.4