

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**Waveguide implementation of a fluxonium qubit**<sup>1</sup> W.C. SMITH, A. KOU, I.M. POP, R.J. SCHOELKOPF, M.H. DEVORET, Department of Applied Physics, Yale University — Enclosing a fluxonium qubit in a 3D cavity has recently been shown to provide remarkable qubit relaxation times of order 1 ms. This is realized by inductively coupling the qubit to an on-chip antenna, itself electromagnetically coupled to a microwave readout cavity. In order to improve measurement contrast, we propose reading out the on-chip antenna directly by embedding the substrate in a rectangular waveguide impedance-matched to open coaxial lines. This scheme allows for greater flexibility in engineering the dispersive shift of the readout resonator. Independently, we can optimize the readout resonator external quality factor to maximize measurement contrast. Results of dispersive shift calculations, electromagnetic simulations, and experimental design will be discussed.

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

Clarke Smith  
Yale University

Date submitted: 13 Nov 2013

Electronic form version 1.4