Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

The fluxonium as a lambda system U. VOOL, A. KOU, W. C. SMITH, K. SERNIAK, Department of Applied Physics, Yale University, I. M. POP, Physikalisches Institut, Karlsruhe Institute of Technology, S. SHANKAR, L. FRUNZIO, S. M. GIRVIN, M. H. DEVORET, Department of Applied Physics, Yale University — A lambda system is a 3-level system in which two low-energy states can transition to a third higher-energy state by a coherent drive but not to each other. Lambda systems are commonly implemented in systems relying on atomic transitions. In the field of superconducting quantum circuits, the fluxonium qubit, an artificial atom consisting of a Josephson junction shunted by a super-inductance, is a unique artificial atom with highly non-linear energy levels. At half-flux quantum it has two low-energy states with a long energy lifetime, and so is a perfect candidate for a lambda system. However, selection rules in the fluxonium qubit prohibit transitions between low-energy states and higher-energy states of the same parity - therefore there is no state that both low energy states can couple to. In this talk, we will introduce a method which uses 3-wave coupling to address forbidden transitions between levels of the fluxonium qubit, and present preliminary experimental results.

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Date submitted: 09 Nov 2016 Electronic form version 1.4