Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Deterministic creation of Schrodinger cat states in a superconducting waveguide cavity BRIAN VLASTAKIS, GERHARD KIRCHMAIR, ZAKI LEGHTAS, Yale University Dept. of Applied Physics, SIMON NIGG, Yale University Dept. of Physics, LUIGI FRUNZIO, Yale University Dept. of Applied Physics, STEVEN GIRVIN, Yale University Dept. of Physics, MAZYAR MIRRAHIMI, INRIA Paris-Rocquencourt, ROBERT SCHOELKOPF, Yale University Dept. of Applied Physics — Off-resonant coupling of a superconducting transmon qubit to a three-dimensional waveguide cavity provides a dispersive qubit/cavity interaction much stronger than any decay rates in the system. Using a two-cavity/single-qubit architecture, we utilize this interaction to deterministically map a qubit state to a superposition of coherent states in a cavity (up to a 40 photon separation). By measuring photon-number parity, we perform Wigner tomography that shows the characteristic interference inherent in quantum superpositions, thus confirming the non-classical properties of the cavity state. Furthermore, we extend this method[1] to create multi-component Schrodinger cat states including the four-component compass state. [1] Z. Leghtas et al. Deterministic protocol for mapping a qubit to coherent state superpositions in a cavity. arXiv.org quant-ph 1208.1603 (2012).

Brian Vlastakis
Yale University Dept. of Applied Physics

Date submitted: 08 Nov 2012 Electronic form version 1.4