Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

**Homodyne detection of resonance fluorescence in circuit QED**
LEV S. BISHOP, JENS KOCH, Yale University, ERKKI THUNEBERG, University of Oulu, JERRY M. CHOW, STEVEN M. GIRVIN, ROBERT J. SCHOELKOPF, Yale University, YALE CIRCUIT QED TEAM — In circuit QED, the transmon qubit[1] allows long coherence times and strong coupling. In this regime, tuning the qubit into resonance with the cavity leads to vacuum Rabi splitting[2] with two transmission peaks very well-resolved in frequency (∼300 linewidths apart). At low probe power, these peaks have Lorentzian shape. As the probe power is increased, each Rabi peak is observed to split into two peaks. Approximating the combined qubit and cavity as a two-level system and applying the theory of resonance fluorescence reproduces the main features of this phenomenon. We explore the effects of including additional levels of the transmon and cavity in the detailed theoretical modeling of the experiment. Additionally, we discuss the possibility to observe the Mollow triplet in the fluorescence spectrum.
[1] Jens Koch, TM Yu, JM Gambetta, AA Houck, DI Schuster, J Majer, A Blais, MH Devoret, SM Girvin, and RJ Schoelkopf. Phys. Rev. A **76**, 042319 (2007)
[2] A Wallraff, D Schuster, A Blais, L Frunzio, R-S Huang, J Majer, S Kumar, SM Girvin and RJ Schoelkopf, Nature **431**, 162 (2004)

Lev S. Bishop
Yale University

Date submitted: 14 Dec 2007 Electronic form version 1.4