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**Towards single shot read-out in circuit quantum electrodynamics (QED)** ANDREAS WALLRAFF, DAVID SCHUSTER, ALEXANDRE BLAIS, JAY GAMBETTA, LUIGI FRUNZIO, JOE SCHREIER, BLAKE JOHNSON, ANDREW HOUCK, WILL BRAFF, HANNES MAJER, MICHEL DEVORET, STEVE GIRVIN, ROB SCHOELKOPF, Depts. of Applied Physics and Physics, Yale University — In recent experiments we have demonstrated the resonant coherent coupling of individual photons to a single qubit implemented as a Cooper pair box in a high quality superconducting cavity [1]. In the non-resonant case, the dispersive coupling between the qubit and the cavity field is used to perform quantum non-demolition (QND) measurements of the qubit state [2]. Using this read-out technique we have performed high visibility measurements of Rabi oscillations and Ramsey fringes [3]. Here we present a detailed experimental and theoretical analysis of the cavity response for continuous and pulsed measurements in a wide range of cavity drive amplitudes. We also discuss an optimal read-out strategy for qubits in a continuous QND measurement and aim at demonstrating single shot read-out in the circuit QED architecture [4].

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- [2] D. I. Schuster et al. Phys. Rev. Lett. 94, 123602 (2005)
- [3] A. Wallraff et al. Phys. Rev. Lett. 95, 060501 (2005)
- [4] A. Blais et al. Phys. Rev. A 69, 062320 (2004)

Andreas Wallraff  
Yale University

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