

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Superconducting SET backaction on the Cooper-pair box** JOHANNES MAJER, BENJAMIN TUREK, Yale University, AASISH CLERK, McGill University, STEVEN GIRVIN, ROBERT SCHOELKOPF, Yale University, KEVIN BLADH, DAVID GUNNARSSON, PER DELSING, Chalmers Institute of Technology — We report on measurements of the backaction of a superconducting single electron transistor (SSET) measuring a Cooper-pair box qubit. During the weak, continuous measurement made by the SSET, the charge noise acts on the Cooper-pair box. The quantum nature of that noise is able to dephase, relax and even excite the qubit. This noise depends strongly on the operating point of the SSET. We operate the SSET near the double Josephson quasiparticle (DJQP) feature, where the backaction of the SSET is well understood (A. Clerk, et al., Phys. Rev. Lett. 89, 176804 (2002)), and where there are no quasiparticle poisoning effects. Measurements of the relaxation time of the Cooper-pair box reveal the symmetric component of the quantum noise and measurements of the steady-state polarization reveal the anti-symmetric component. Both measurements vary as expected with SSET operating point and confirm this model of SSET backaction.

Johannes Majer  
Yale University

Date submitted: 04 Jan 2006

Electronic form version 1.4