Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Phase Coherence and Mesoscopic Coulomb Blockade in Open Quantum Dots ILEANA RAU, MICHAEL GROBIS, SAMI AMASHA, RON POTOK, Stanford University, HADAS SHTRIKMAN, Weizmann Institute, DAVID GOLDHABER-GORDON, Stanford University — The phase coherence of electrons in open systems at low temperatures leads to mesoscopic effects such as universal conductance fluctuations and weak localization of electrons. These effects are encountered in open large quantum dots and are explained by a model of non-interacting electrons. We have investigated the transport properties of a 1.5 μm^2 and a 3 μm^2 lateral GaAs/AlGaAs quantum dot in the open regime. The weak localization effect is complicated at low temperatures by the presence of residual interactions (Mesoscopic Coulomb Blockade) that persists even when the dot is coupled by one or two fully transmitting modes to each of the two leads. We present measurements of the electron dephasing rate at low temperatures in the open quantum dots and discuss how they are affected by the suppression of conductance by these Coulomb blockade effects.

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Date submitted: 22 Jan 2009 Electronic form version 1.4