

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Analysis of Random Telegraph Signals from Vertical “Enhancement Mode” Quantum Dot Devices MARK GYURE, GEOFFREY SIMMS, RICHARD ROSS, EDWARD CROKE, HRL Laboratories, LLC — Clear signatures of single electron tunneling in vertical “enhancement mode” semiconductor quantum dot devices have recently been observed. These devices hold great promise for future scalability of semiconductor-based quantum information processing because they require only a single gate electrode to create the quantum dot. In this talk, we present a detailed analysis of the random telegraph signals observed in these devices as various N to $N+1$ electron transitions are swept through by varying the gate voltage and magnetic field. This analysis allows us to extract a variety of information about the transitions and further supports our conclusion that electrons are tunneling between the gate-induced quantum dot and the readout channel below. Results of self-consistent Schrodinger-Poisson simulations of these devices are presented that also support this interpretation of the experimental results.

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Date submitted: 04 Dec 2005

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