Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Two Electron Singlet Triplet Spectroscopy IULIANA RADU, D.M. ZUMBÜHL, C.R. DILLARD, G. GRANGER, M.A. KASTNER, MIT, M.P. HANSON, A.C. GOSSARD, UCSB — We present measurements of few electron quantum dots formed by lateral depletion of a GaAs/AlGaAs 2D electron gas by surface gates. The two electron regime, on which we focus here, is characterized by singlet and triplet states which are relevant for quantum computation proposals. These two states are revealed in electronic transport through the dot in various ways: sequential tunneling, inelastic cotunneling as well as by an additional mode of transport we ascribe to sequential tunneling activated by inelastic cotunneling. These various signatures provide independent ways to measure the singlet-triplet energy splitting J over large ranges of gate voltages. We present the temperature, magnetic field and tunnel-coupling dependence of these transport features, which are in good agreement with recent theory. Further, we observe signatures of spin-blockade that becomes visible for source-drain voltages exceeding the triplet energy. This work was partially supported by the ARO (W911NF-05-1-0062), by the NSEC program of the NSF (PHY-0117795) and by NSF (DMR-0353209).

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Date submitted: 04 Jan 2006 Electronic form version 1.4