Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Spin Blockade in electronic transport through quantum dots BHASKARAN MURALIDHARAN, SUPRIYO DATTA, Purdue University — Recently, Spin Blockade (SB) transport through quantum-dots has attracted attention owing to potential applications in quantum state control. In this talk, we identify the mechanism underlying current collapse (NDR), current leakage and bias dependent asymmetry in the I-V characteristics of quantum dot systems, which characterize spin blockade transport. As a specific example of this generic mechanism, we examine the conditions for SB to occur in transport through coupled quantum dots. This leads to a consistent interpretation of the non-trivial features in the experimental I-Vs of coupled quantum dots including multiple NDR, gate-able current collapse, and current rectification. Most importantly, our study elaborates on how a delicate interplay of orbital energy offset, delocalization, and Coulomb interaction between conduction electrons localized on either dot, strongly influences the aforementioned transport signatures.

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Date submitted: 20 Nov 2006 Electronic form version 1.4