Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

A quantitative study of spin-flip cotunneling transport in a quantum dot[1] TAI-MIN LIU, U. of Cincinnati, ANH T NGO, Ohio U., BRYAN HEMINGWAY, U. of Cincinnati, SERGIO ULLOA, Ohio U., MICHAEL MELLOCH, Purdue U., STEVEN HERBERT, Xavier U., ANDREI KOGAN, U. of Cincinnati — We report detailed transport measurements in a quantum dot in a spin-flip cotunneing regime, and a quantitative comparison of the data to microscopic theory [1]. The quantum dot is fabricated by lateral gating of a GaAs/AlGaAs heterostructure, and the conductance is measured in presence of an in-plane Zeeman field. We are focusing on the ratio of the nonlinear conductance values at bias voltages exceeding the Zeeman threshold, a regime that permits a spin flip on the dot, to those below the Zeeman threshold, when the spin flip on the dot is energetically prohibited. The data obtained in three different oddly-occupied dot states show a good quantitative agreement with the theory with no adjustable parameters. We also compare the theoretical results to the predictions of a phenomenological form used previously for the analysis of non-linear co-tunneling conductance and specifically the determination of a heterostructure g-factor, and find a good agreement between the two. [1] J. Lehmann and D. Loss, Phys. Rev. B. 73,045328 (2006).

[1]Supported by NSF DMR (0804199), DMR-MWN (07010581),PIRE (0730257), and the University of Cincinnati

Tai-Min Liu
U. of Cincinnati

Date submitted: 20 Nov 2009 Electronic form version 1.4