

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Lateral spin-orbit coupling and the Kondo effect in quantum dots

EDSON VERNEK, Instituto de Física - Universidade Federal de Uberlândia - Brazil, ANH NGO, SERGIO ULLOA, Nanoscale & Quantum Phenomena Institute, Department of physics, Ohio University, 45701 USA — We present studies of the Coulomb blockade and Kondo regimes of transport of a quantum dot connected to current leads through *spin-polarizing* quantum point contacts (QPCs) [1]. This configuration, arising from the effect of *lateral* spin-orbit fields, results in spin-polarized currents *even in the absence of external magnetic fields* and greatly affects the correlations in the dot. Using an equation-of-motion technique and numerical renormalization group calculations we obtain the conductance and spin polarization for this system under different parameter regimes. Our results show that both the Coulomb blockade and Kondo regimes exhibit non-zero spin-polarized conductance. We analyze the role that the spin-dependent tunneling amplitudes of the QPC play in determining the charge and net magnetic moment in the dot. We find that the Kondo regime exhibits a strongly dependent Kondo temperature on the QPC polarizability. These effects, controllable by lateral gate voltages, may provide a new approach for exploring Kondo correlations, as well as possible spin devices. Supported by NSF DMR-MWN and PIRE. [1] P. Debray *et al.*, Nature Nanotech. **4**, 759 (2009).

Anh Ngo
Nanoscale & Quantum Phenomena Institute and
Department of Physics, Ohio University - USA

Date submitted: 08 Dec 2009

Electronic form version 1.4