Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Quantum Dot Spin Valves Controlled by Single Molecule Magnets[1] FATEMEH ROSTAMZADEH RENANI, GEORGE KIRCZENOW, Simon Fraser University — We explore theoretically for the first time the properties of a new class of spintronic nano-devices in which the electrical resistance of a non-magnetic quantum dot contacted by non-magnetic electrodes is controlled by transition metal-based single molecule nanomagnets (SMMs) bound to the dot. Although the SMMs do not lie directly in the current path in these devices, we show that the relative orientation of their magnetic moments can strongly influence on the electric current passing through the device. If the magnetic moment of one of the SMMs is reversed by the application of a magnetic field, we predict a large change in the resistance of the dot, i.e., a strong spin valve effect. The mechanism is resonant conduction via molecular orbitals extending over the entire system. The spin valve is activated by a gate that tunes the transport resonances through the Fermi energy. Detailed results will be presented for the case of Mn_{12} SMMs bound to a gold quantum dot.

[1]This work was supported by CIFAR and NSERC.

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Date submitted: 06 Nov 2012 Electronic form version 1.4