Abstract Submitted
for the NWS14 Meeting of
The American Physical Society

Quantum well state induced oscillation of pure spin currents in Fe/Au/Pd(001) systems[1] ERIC MONTOYA, BRET HEINRICH, EROL GIRT, Simon Fraser University — In normal metals, such as Au, Cu, and Ag, the transport of pure spin current is well described by spin diffusion theory. In nonmagnetic materials having a large Stoner enhancement, such as Pd and Pt, strong spin-spin correlation effects lead to local fluctuating magnetic moments known as paramagnons. Interaction with these paramagnons leads to decoherence of spin currents on much shorter length scales than in normal metals. Since spin transport through Au and Pd is governed by different mechanisms, it is interesting to investigate spin transport in Au/Pd heterostructures. GaAs/ 2.3 nm Fe/ d nm Au/ 9.7 nm Pd/ 4.1 nm Au samples were studied, where d, the Au spacer thickness, has been varied. The ferromagnetic resonance spin pumping mechanism was used to generate spin current at the Fe/Au interface. The net spin pumping rapidly decreased with increase in d. The rate was too great to be caused by spin diffusion in Au, indicating reflection of the spin current at the Au/Pd interface. Furthermore, the spin pumping exhibited an oscillatory dependence on d. This represents, for the first time, the formation of quantum well states that affect the transport of spin currents involving contributions of electrons across the whole Fermi surface.

[1]Financial support from the Natural Sciences and Engineering Research Council of Canada (NSERC) is gratefully acknowledged.

Eric Montoya
Simon Fraser Univ

Date submitted: 20 Mar 2014 Electronic form version 1.4