Non-Equilibrium Quantum Spin Systems: Fermi Liquids Out of Their Fields

Kevin S. Bedell[1]

[1] *Department of Physics, Boston College, Chestnut Hill, Massachusetts 02467, USA*

Small moment ferromagnetic metals, in equilibrium, can have rather large spin polarizations. To produce large spin polarizations in strongly correlated metals requires large magnetic fields. Spin polarizations in a metal can be enhanced by spin injection techniques which gives rise to a non-equilibrium magnetization of the metal. We will explore some of the spin transport and dynamic effects of these non-equilibrium Fermi Liquids (FL). Some of the experimental consequences of the non-equilibrium magnetization can be measured using a basic spintronic device, the F/N junction, where F is a ferromagnetic metal and N is a normal metal. These will have some novel characteristics that are enhanced at low temperatures, T (where T is much lower that the lowest Fermi Temperature of the F and N materials), if we can use strongly correlated materials to form the F/N junction. We suggest using a small moment ferromagnetic metal (described by the ferromagnetic FL theory) and a strongly correlated metal (described by a normal FL theory) out of equilibrium for the F/N junction for the maximum effect.