Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Spin relaxation through Kondo scattering in Cu/Py lateral spin valves. J. T. BATLEY, M. C. ROSAOND, M. ALI, E. H. LINFIELD, G. BURNELL, B. J. HICKEY, University of Leeds — Within non-magnetic metals it is reasonable to expect the Elliot-Yafet mechanism to govern spin-relaxation and thus the temperature dependence of the spin diffusion length might be inversely proportional to resistivity. However, in lateral spin valves, measurements have found that at low temperatures the spin diffusion length unexpectedly decreases. We have fabricated lateral spin valves from Cu with different concentrations of magnetic impurities. Through temperature dependent charge and spin transport measurements we present clear evidence linking the presence of the Kondo effect within Cu to the suppression of the spin diffusion length below 30 K. We have calculated the spin-relaxation rate and isolated the contribution from magnetic impurities. At very low temperatures electron-electron interactions play a more prominent role in the Kondo effect. Well below the Kondo temperature a strong-coupling regime exists, where the moments become screened and the magnetic dephasing rate is reduced. We also investigate the effect of this low temperature regime (>1 K) on a pure spin current. This work shows the dominant role of Kondo scattering, even in low concentrations of order 1 ppm, within pure spin transport.

Joseph Batley
University of Leeds

Date submitted: 06 Nov 2015 Electronic form version 1.4