MA 21 Invited Talks Hickey / Temst

Time: Wednesday 14:00–15:00 Room: HSZ 03

Invited Talk

MA 21.1 Wed 14:00 HSZ 03

Spin Transport across interfaces — •B J Hickey[1], L Michez[1], K McKenna[1], G J Morgan[1], S Shatz[2], and N Wiser[2] — [1]E C Stoner Laboratory, Department of Physics and Astronomy, University of Leeds, Leeds LS2 9JT, UK — [2]Department of Physics, Bar-Ilan Univeristy, Ramat Gan, Israel

A fundamental aspect of the operation of any spintronic device is the transport of electrons across an interface. It is accepted that spin-dependent scattering, mainly at interfaces, is at the heart of spintronics but there are many experimental examples that theory cannot easily explain. In this talk we shall review some of the more intriguing results and discuss how well they are presently understood. It is well-known that the accumulation of spin near interfaces is an intrinsic feature of transport in magnetic multilayers. It has, until recently, been thought that this feature was intimately connected with electron scattering. It was thought that for currents applied perpendicular to the plane of the layers, the relaxation length for the spin accumulation, the spin diffusion length, was also the length scale for determining the electron transport. We shall present new experimental data which investigates the effects of interface scattering as a function of the number of interfaces and the proximity of the scattering interfaces. We shall show that these results can be understood without the need to introduce spin-flip scattering and that the length scale for the transport is the momentum relaxation length - the mean free path. Additionally, we shall confirm these results in calculations where we have developed models of transport in spintronic devices which incorporate spin-relaxation through spin-orbit scattering.

Invited Talk

MA 21.2 Wed 14:30 HSZ 03

Exchange bias in patterned magnetic structures — •Kristiaan Temst[1], Elena Popova[1], Steven Brems[1], Chris Van Haesendonck[1], Helmut Fritzsche[2], Marita Gierlings[2], Florin Radu[3], Hartmut Zabel[3], Peter Leunissen[4], and Rik Jonckheere[4] — [1]Laboratorium voor Vaste-Stoffysica en Magnetisme, K.U.Leuven, Belgium — [2]BENSC, Hahn-Meitner-Institut, Berlin, Germany — [3]Experimentalphysik/Festkörperphysik, Ruhr-Universität Bochum, Germany — [4]IMEC vzw, Leuven, Belgium

We have studied the influence of finite dimensions and shape anisotropy on the exchange bias effect in patterned polycrystalline Co/CoO ferromagnet/antiferromagnet exchange bias systems prepared by combining electron beam lithography and thin-film deposition methods. A particular feature of Co/CoO exchange bias systems is that they exhibit a strong asymmetry in the magnetization reversal mechanism: the magnetization reversal mechanism is different in the two branches of the hysteresis loop. We have investigated by polarized neutron reflectivity experiments if and how this asymmetry is affected by the finite size and shape anisotropy of the Co/CoO structures. We will demonstrate that the asymmetry remains present even down to very small structure size, but that the shape anisotropy does have a strong influence on the presence of the asymmetry. This effect may be explained by the presence of interfacial domains at the Co/CoO interface. Anisotropic magnetoresistance measurements and magnetization experiments show that it is possible to re-induce the untrained state by applying a field in the direction perpendicular to that of the initial cooling field.