Magnetic Interfaces and Nanostructures
Room 204 - Session MI-TuA

Magnetization Dynamics
Moderator: E. Nowak, University of Delaware

2:00pm **MI-TuA1 All Optical Pump/Probe Spectroscopy from Coherent Spin Waves in Exchange Bias Systems**, ***B. Beschoten***, *A. Tillmanns, S. Oertker, G. Guentherodt,* RWTH Aachen, Germany*; I.K. Schuller,* UC San Diego **INVITED**

Time-resolved Kerr rotation is used to generate and to probe coherent spin waves in exchange biased ferro-/antiferromagnetic bilayer films of Fe/MnF@sub 2@. In time-resolved Kerr rotation, an ultrafast laser pump pulse generates an unidirectional anisotropy field pulse which triggers coherent precession of the magnetization in the ferromagnetic layer. This coherent precession can be monitored by a time-delayed laser probe pulse yielding a quantitative method to study local magnetic anisotropies, ultrafast switching and damping phenomena. This time-resolved all-optical technique is combined with static vector MOKE measurements, which allow to link static magnetization reversal processes, such as coherent rotation of the magnetization vector or domain wall nucleation and propagation, with the precessional switching dynamics at all magnetic fields during magnetization reversal. Work supported by DFG/SPP 1133 and by European Community's Human Potential Program/NEXBIAS. Work at UCSD supported by US-DOE and by AFOSR.

2:40pm **MI-TuA3 Current-Driven Magnetization Dynamics: Domain Wall Motion and Thermal Effects**, ***S. Zhang***, *J. He, Z. Li,* University of Missouri-Columbia **INVITED**

The spin current induced spin torque has been written in several different forms, depending on materials as well as geometrical arrangements. We outline the key features of those various forms. Here we concentrate on two interesting issues: the effect of spin torques on the thermal assited magnetization reversal and the domain wall depinning by a spin torque. In the first case, we have demonstrated that a stochastic Fokker-Planck equation which explicitly includes the spin torque can be established and solved when the current is not too large, and thus we are able to predict finite temperature current-driven magnetization dynamics. In the second case, we investigate the effect of currents on geometrically confined domain walls. In particular, we construct domain wall pinning/depinning phase diagrams in terms of the applied magnetic field and the current. Our results agree with existing experimental data.

3:20pm **MI-TuA5 Propagation and Tunneling of Spin Waves through a Magnetic Field Inhomogeneity**, ***B. Hillebrands***, University of Kaiserslautern, Germany*; S.O. Demokritov,* University of Muenster, Germany*; A.A. Serga,* University of Kaiserslautern, Germany*; V.E. Demidov,* University of Muenster, Germany*; M.P. Kostylev,* University of Kaiserslautern, Germany*; A.N. Slavin,* Oakland University **INVITED**

We show experimentally and by numerical simulation, that spin waves propagating in a magnetic film can pass through a region of a magnetic field inhomogeneity, or, alternatively, can be reflected by the region depending on the sign of the inhomogeneous field contribution. If the reflecting region is narrow enough, spin wave tunneling may take place. We investigate the tunneling mechanism and demonstrate that it has a magnetic dipole origin. While travelling through a region of inhomogeneous field, spin waves undergo a phase shift. We show experimental evidence and we discuss that this can be used for designing phase shifters and spin-wave logic elements.

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