oretical work the spin-dynamics and the switching properties of a magnetic nanoparticles (Stoner-particles) using the Landau-Lifshitz-Gilbert equation extended for the case of finite temperatures, a task which has not been tacked by previous studies [2]. In particular, we are interested in the minimal amplitudes of the switching fields and the corresponding reversal times of the magnetic moment of the nanoparticle both for static and time-dependent external fields depending on the damping. Optimal parameters for the magnetization reversal and their temperature dependence are worked out.

References:
[1] C. Thirion, W. Wernsdorfer and D. Mailly, Nat. Mater. **2**, 524 (2003).
[2] Z. Z. Sun and X. R. Wang, Phys. Rev. Lett. **97**, 077205 (2006).

MA 24.9 Thu 12:15 H23

Spin transfer induced magnetization dynamics using the Ag/Fe(100) interface — •Ronald Lehndorff, Daniel E. Bürgler, and Claus M. Schneider — Institut für Festkörperforschung and cni - Center of Nanoelectronic Systems for Information Technology, Forschungszentrum Jülich GmbH, D-52425 Jülich

Spin-polarized currents in magnetic nanostructures induce magnetization dynamics, which differ strongly from magnetic field induced dynamics [1, 2]. The Ag/Fe(100) interface has been predicted to have a strong spin dependence of the interface resistance and should therefore be a good spin polarizer [3] and give strong spin transfer effects. We study spin transfer induced magnetization dynamics in single-crystalline, layered systems grown by molecular beam epitaxy. The layer sequence is 2 nm Fe/ 6 nm Ag/ 20 nm Fe. The topmost layer is structured by e-beam lithography and ion beam etching into a circle of 65 to 85 nm in diameter. To characterize the structures we measure the current-perpendicular-plane giant magnetoresistance. Current induced switching and current driven high-frequency excitations of the free layer are recorded under different angles of the magnetic field with respect to the crystal axes of the Fe(100) layers.

[1] J.C. Slonczewski, J. Magn. Magn. Mater. **159**, L1 (1996)
[2] L. Berger, Phys. Rev. B **54**, 9353 (1996)
[3] D. Stiles, A. Zangwill, Phys. Rev. B **66**, 014407 (2002)

MA 24.10 Thu 12:30 H23

Ferromagnetic resonance study of the interlayer exchange coupled NiFe/Ru/NiFe films — •Mohamed Belmeguenai, Tobias Martin, Georg Woltersdorf, and Günther Bayreuther — Institut für Experimentelle und Angewandte Physik, Universität Regensburg, 93040 Regensburg, Germany

Ferromagnetic bilayers exchange coupled through a non-magnetic metallic layer are used in magnetic recording devices. Their dynamics at 1 to 10 GHz which present a fundamental limit to increasing data rates have been studied in this work. We used conventional ferromagnetic resonance (FMR) and vector network analyzer FMR to study the different excited dynamic modes in exchange coupled Si/Ta/NiFe(30 nm)/Ru(dRu)/NiFe(30 nm)/Ta films with variable Ru thicknesses dRu. The interlayer exchange coupling (IEC) constants are determined by VSM and MOKE. The dynamic measurements show the existence of an optic and an acoustic precession mode. Their resonance frequencies and therefore the IEC are found to oscillate as a function of dRu with a period of 8.5 Å. The frequency oscillations of the optic mode are coupling-dependent while those of the acoustic mode are indirectly related to coupling via the canting angle of the layer magnetizations. The FMR measurements carried out at 22 and 35 GHz revealed clearly different behaviors of the FMR linewidths as a function of dRu for the optic and acoustic modes and we observed perpendicular standing spin-waves. The FMR linewidth of the different excited modes increases with the microwave frequencies and typical damping constants of 0.0073 have been measured.

MA 25: Invited Talks Michels / Fuchs

Time: Thursday 14:00–15:00 Location: H10

Invited Talk MA 25.1 Thu 14:00 H10

Magnetische Wechselwirkungen in nanokristallinen Ferromagneten: Untersuchungen mit Neutronenstreuung — •Andreas Michels — Technische Physik, Universität des Saarlandes, Saarbrücken

Verglichen mit konventionellen Ferromagneten zeichnen sich nanokristalline magnetische Materialien durch eine stark inhomogene magnetische Mikrostruktur aus. Die wesentliche Ursache dieser intrinsischen Inhomogenität im Spinsystem ist die räumlich inhomogene Verteilung des magnetischen Anisotropiefeldes, welches auf einer charakteristischen Längenskala von der Größenordnung der mittleren Kristallitgröße $D = 10\,\text{nm}$ zufällig in Stärke und/oder Orientierung variiert. In meinem Vortrag wird gezeigt werden, wie man mittels magnetfeldabhängiger Neutronenkleinwinkelstreuung (NKWS) die magnetischen Wechselwirkungen in Nanomagneten quantifizieren kann. Insbesondere wird ein auf der Theorie des Mikromagnetismus basierendes Modell für den NKWS-Streuquerschnitt vorgestellt, welches es erlaubt, Austauschkonstante, Anisotropiefeld, magnetostatisches Streufeld und eine charakteristische Spinfehlorientierungslänge zu bestimmen. Messungen an der zweiphasigen Fe-basierten Legierung Nanoperm zeigen eine erstmals beobachtete „kleeblattförmige“ Winkelanisotropie auf, die mit der Existenz von dipolaren Korrelationen erklärt werden kann.

Invited Talk MA 25.2 Thu 14:30 H10

Strain induced ferromagnetic order in undoped $LaCoO_3$ thin films — •Dirk Fuchs[1], Christian Pinta[1,2], Thorsten Schwarz[1,2], Peter Scheiss[1], Peter Nagel[1], Stefan Schuppler[1], Rudolf Schneider[1], Michael Merz[3], Georg Roth[3], and Hilbert von Löhneysen[1,2] — [1]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, 76021 Karlsruhe — [2]Physikalisches Institut, Universität Karlsruhe, 76128 Karlsruhe — [3]Institut für Kristallographie, Rheinisch-Westfälische Technische Hochschule Aachen, 52066 Aachen

Despite the well established nonmagnetic low spin (S = 0) ground state of $LaCoO_3$ there are many publications reporting on the existence of either long- or short-range ferromagnetic order. For example, Yan et al.[1] have found a ferromagnetic component with a $T_c = 85$ K and have suggested a ferromagnetic coupling of surface cobalt atoms. In the presence of the conflicting results the origin of the observed ferromagnetism in $LaCoO_3$ is still a challenging question and motivated this work. In order to scrutinize the proposed surface ferromagnetism by Yan et al. we have carried out experiments on thin films prepared by pulsed laser deposition which inherently show an extremely large surface/volume ratio. In contrast to polycrystalline $LaCoO_3$ films which did not show ferromagnetism down to T = 5 K epitaxial films with the same surface/volume ratio showed clear ferromagnetic order at $T_c = 85$ K. We discuss this surprising result in terms of ferromagnetic order induced by epitaxial strain.

[1] J. Q. Yan et al., Phys. Rev. B 70, 014402, (2004).