MA 17: INNOMAG e.V. Diplom-/Master Prize 2019

Die Arbeitsgemeinschaft Magnetismus der DPG hat einen Diplom-/Masterpreis ausgeschrieben, welcher auf der Frühjahrstagung der DPG im März 2019 in Regensburg vergeben wird. Ziel des Preises ist die Anerkennung herausragender Forschung im Rahmen einer Diplom-/Masterarbeit und deren exzellente Vermittlung in Wort und Schrift. Im Rahmen dieser Sitzung tragen die drei besten der für ihre an einer deutschen Hochschule durchgeführten Masterarbeit Nominierten vor. Im direkten Anschluss entscheidet das Preiskommittee über den Gewinner bzw. die Gewinnerin des INNOMAG e.V. Diplom/Master-Preises 2019 in Höhe von 500 EURO. Talks will be given in English!

Time: Tuesday 11:30–12:30 Location: H48

MA 17.1 Tue 11:30 H48

Annealing methods for rapidly quenched ribbons using exothermic self-heating — •Findan Block[1], Jeffrey McCord[1], and Mie Marsilius[2] — [1]CAU Kiel, Institute for Materials Science, Nanoscale Magnetic Materials-Magnetic Domains, Kaiserstr. 2, 24143 Kiel, Germany — [2]Vacuumschmelze GmbH & Co. KG, Grüner Weg 37, 63450 Hanau, Germany

Since their development 30 years ago nanocrystalline ribbon wounded cores are used in electronic devices due to their superior soft magnetic properties. These are essentially influenced by parameters like the heating and cooling rate, during the transformation from an amorphous into a nanocrystalline material. Here, the development of a fast annealing process for ribbon wounded cores is introduced, which delivers comparable magnetic properties for the cores as for ribbons treated by the continuous annealing method. Cores out of $Fe_{75.7}Cu_{0.8}Nb_{1.5}B_{6.5}Si_{15.5}$ are brought in contact to a sheathed thermocouple, so that the exothermic effect during the crystal formation is observable. This is irrelevant for normal ribbon annealing, but leads to a rise of over 100 $^{\circ}C$ in the larger cores. By exploiting this effect and using short times and high heating rates it was possible to achieve smaller coercivity and magnetostriction in comparison with ribbon samples annealed under similar conditions, what enables faster production and the usage of a broader spectrum of alloys. In addition the structure parameters grain size and crystalline volume fraction could be linked to the magnetic property gradients inside the core, which are neglectable for the best combination of annealing parameters.

MA 17.2 Tue 11:50 H48

Design of cavity optomagnonic systems with magnetic textures: Coupling a magnetic vortex to light — •Jasmin Graf — Max Planck Institute for the Science of Light, Staudtstraße 2, 91058 Erlangen, Germany

In optomagnonics, light coherently couples to collective magnetic excitations in solid state systems. This topic is currently of high interest for quantum information processing at the nanoscale. A unique feature of optomagnonic systems is the possibility of coupling light to magnetic excitations on top of a textured magnetic ground state. A paradigmatic example of a magnetic texture is a vortex, which is the ground state configuration of a magnetic microdisk. The lowest energy magnetic excitations of this system are localized at the vortex core. In our work, we derive the optomagnonic coupling for magnetic textures and develop a numerical method to evaluate the coupling. We apply our results to the case of the micromagnetic disk. We show that the localized magnon modes can coherently couple to light confined in whispering gallery modes of the disk. The resulting optomagnonic coupling has a rich structure, and can be tuned by an externally applied static magnetic field. Our results predict cooperativities at maximum photon density (an important figure of merit in these systems) of the order of $\mathcal{C} \approx 0.01$ by proper engineering of these structures. These values show promise for future design of cavity optomagnonic systems.

Reference: J. Graf, H. Pfeifer, F. Marquardt, S. Viola-Kusminskiy; PRB 98, 241406(R) (2018)

MA 17.3 Tue 12:10 H48

Spin-Pumping and Spin Wave Damping in $Co_{25}Fe_{75}$ Thin-Film Heterostructures — •Luis Flacke — Walther-Meißner-Institut, Garching, Germany — Physics-Department, Technical University of Munich, Garching, Germany

Itinerant ferromagnets offer advantages in spintronic and magnonic devices, like e.g. compatibility with charge transport based technology. Typically they also suffer from drastically higher Gilbert damping than insulating ferrimagnets, which leads to an apparent trade-off. M. Schoen reported on "Ultra-low magnetic damping" in $Co_{25}Fe_{75}$ alloys [1], which could merge the two properties of low damping with the benefits of electrical conducting materials. During my master thesis I fabricated low-damping $Co_{25}Fe_{75}$-heterostructures by sputter deposition and separated Gilbert damping and spin pumping to the total damping using broadband ferromagnetic resonance spectroscopy. From the measurements, it was extrapolated that the intrinsic damping of the magnetic alloy reaches the low 10^{-4} regime. With Brillouin light scattering we confirmed low damping in structured $Co_{25}Fe_{75}$ by finding spin propagation length scales of more than $5.5\,\mu$m. The easy and fast fabrication process and its beneficial properties make $Co_{25}Fe_{75}$ a promising candidate for future, novel technologies in the field of spintronics.

[1] M. Schoen *et al.*, Nat. Phys. **12**, 839 (2016)

Financial support by Deutsche Forschungsgemeinschaft via projects WE5386/4 and WE5386/5 is gratefully acknowledged.