EINLADUNG
ZUM PHYSIKALISCHEN KOLLOQUIUM

AM MONTAG, 14.11.2011 UM 17.15 UHR
HS 46/270

ES SPRICHT: Prof. Dr. Hubert Ebert
LMU München

Thema:

“Ab-initio studies on spin-orbit induced properties of magnetic solids”

Spin-orbit coupling gives rise in magnetic solids to a large number of effects that are at the same time of great scientific as well as technological interest. As examples for this, results of recent investigations based on a fully relativistic Dirac formalism on the magneto-crystalline anisotropy, the Gilbert damping parameter and the anomalous Hall effect will be presented. To achieve a coherent treatment of the magnetic anisotropy the Breit interaction was recently included in the underlying Hamiltonian. In this way the spin-orbit induced part of the anisotropy energy as well as the dipolar shape anisotropy are treated on the same quantum mechanical footing. As is demonstrated for various layered magnetic systems, this new approach gives results very similar to the common classical approximation to the shape anisotropy. The magnetization dynamics in magnetic materials is conventionally described in a phenomenological way on the basis of the Landau-Lifshitz-Gilbert (LLG) equation, with the Gilbert damping parameter $\alpha$ representing damping processes. A method to calculate $\alpha$ in an ab-initio way is presented that is based on a scheme introduced few years ago by Brataas et al. (Phys. Rev. Lett. 101, 037207 (2008)), who established a connection between the damping processes and the accompanying energy transfer. Corresponding results for the Gilbert damping parameter and its temperature dependence will be presented and discussed for a number of disordered transition metal alloys. Instead of using the formulation of Brataas et al. in terms of scattering theory we use an equivalent formulation based on Kubo’s linear response formalism. This approach also provides a sound and powerful basis for investigations of transport properties of ferromagnetic alloys giving access in particular to ab-initio investigations on the spontaneous Hall effect. Corresponding results including a decomposition into intrinsic and extrinsic contributions will be presented and discussed for a number of transition alloys.

Der Gast wird betreut von Herrn Prof. Hillebrands.

GÄSTE SIND HERZLICH WILLKOMMEN.
KAFFEENACHFÜLLUNG AB 17.00 UHR

Kaiserslautern, den 08.11.2011

DIE DOZENTEN DES FACHBEREICHS