EINLADUNG
ZUM LASER- UND QUANTENOPTIKSEMINAR

Am Freitag, 16.05.2014, um 10:00 Uhr
Raum 46/387-388

Es spricht: Dr. Justin M. Shaw
National Institute of Standards and Technology, Boulder, CO, USA

Thema:

Understanding the magnetic properties and magnetization dynamics in materials with perpendicular magnetic anisotropy

I will present an overview of our latest work aimed at understanding the origin of and link between perpendicular magnetic anisotropy and damping in magnetic materials with perpendicular anisotropy. Such materials are now being applied in several existing and emerging technologies. The increased thermal stability provided by high perpendicular anisotropy materials becomes essential in data storage and magnetic random access memory (MRAM) as the dimensions of “bits” are scaled below 25 nm. In addition, spin-transfer torque oscillators that make use of high perpendicular anisotropy materials can achieve higher frequency output with little to no bias fields. In all of these applications, the dynamics and transient response of the material strongly affect device performance. One critical figure of merit to these dynamics is the magnetic damping parameter. The damping parameter strongly affects both the power needed to reverse a bit as well as the maximum rate at which that can be achieved. In recent years there has been significant controversy about a possible relationship between perpendicular anisotropy and the damping parameter. Such a relationship would have a negative impact on the discussed technologies since scaling requires increased anisotropy in order to maintain thermal stability, but a low damping parameter is required to reduce critical currents. Over the past several years, we have systematically studied the damping process in metallic multilayer/superlattice materials that have perpendicular anisotropy. In this class of material, the anisotropy originates from the interface. As a result, the perpendicular anisotropy can be straightforwardly tuned by controlling the number of interfaces per volume. This tunability enables a better understanding of fundamental phenomena by allowing for systematic investigations. In addition to our latest results, I will give a brief overview of ferromagnetic resonance spectroscopy and the methods needed to disentangle these phenomena.

Der Gast wird betreut von Prof. Dr. M. Aeschlimann
GÄSTE SIND HERZLICH WILLKOMMEN!