



PHYSIKALISCHES KOLLOQUIUM

Mittwoch, 02.07.2014, um 16:00 Uhr

Ort: Reichenhainer Str. 90; Neues Hörsaalgebäude, Raum: 2 / N013



Dr. Helmut Schultheiß

Helmholtz-Zentrum Dresden - Rossendorf
Institute of Ion Beam Physics and Materials Research

Spin Wave Transport in Microscopic Magnetic Structures

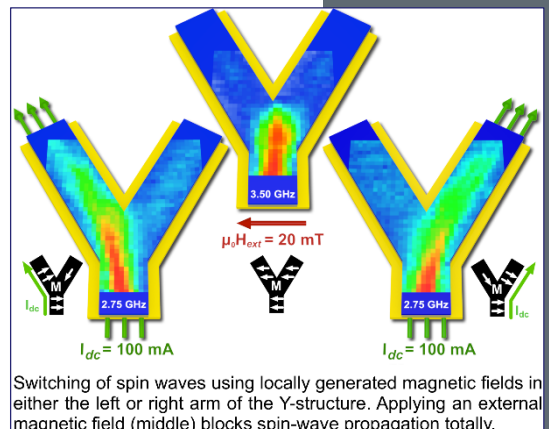
The coherent transport of spin information is one of the great challenges in condensed matter physics and is of fundamental importance for the development of spintronic devices. Similar to spin currents, spin waves carry angular momentum and can be utilized to transport spin information over distances much larger than the spin diffusion length in metals.

Recent experiments showing that spin waves can be manipulated via spin currents and vice versa due to spin torque, spin pumping, spin Hall and spin Seebeck effects have drawn great attention to the transport properties of spin waves.

The main topics in my talk are spin-wave propagation characteristics in microstructures with reduced dimensionality [1, 2], realization of spin-wave transport in two-dimensional waveguides, including directional changes along the spin-wave propagation path [3], and the effect of nonlinear damping mechanisms when spin waves are spatially confined in microstructures.

We use phase- and time-resolved Brillouin light scattering microscopy to address these topics in micron-sized spin-wave conduits made from permalloy. These experiments allow us to develop a simple model for calculating dispersion relations in spin-wave conduits. This model can be applied to understand how spin waves are transported in conduits with broken translation symmetry and how nonlinear damping via four-magnon-scattering is enhanced due to spatial confinement.

At the end of my presentation I will discuss future experiments for analyzing the interaction between spin waves and surface plasmon polaritons. Exploring mechanisms of coupling between spin waves and electrons on one side and spin waves and photons on the other, magnonics can close the gap between spintronics and photonics that still operate on different time and length scales.



Switching of spin waves using locally generated magnetic fields in either the left or right arm of the Y-structure. Applying an external magnetic field (middle) blocks spin-wave propagation totally.

Alle Zuhörer sind ab 15:45 Uhr zum Kaffee vor dem Hörsaal eingeladen.