Seminar: Hard Condensed Matter Theory

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Room: Medienraum

Time: June 08th, 2016 at 13:00 (Food from 12:30)

Sarah Schroeter

Universität zu Köln

Skyrmion Caloritronics

We study how skyrmions in insulating chiral magnets can be manipulated by thermal currents. Thermal magnons couple efficiently to skyrmions via an emerging magnetic field arising both from Berry phase effects and spin-orbit coupling. This coupling gives rise to an intrinsic damping mechanism for the skyrmion and to forces both parallel and perpendicular to thermal gradients. In two dimensions we study the crossover from the ballistic limit to the diffusive limit, where magnons interact with defects, other magnons or phonons within the timescale needed to transverse the skyrmion. This crossover is described by a Boltzmann equation in relaxation time approximation. We also investigate the magnon Hall effects arising from the scattering from a finite density of skyrmions. Furthermore, we discuss the validity of semiclassical approximations and why stochastic Landau Lifshitz Gilbert equations are in general not suitable for caloritronics applications.

All interested are cordially welcome!

E. Hilp, Email: ehilp@uni-mainz.de