



Festkörper-Kolloquium / Seminar TRR 80

am Donnerstag, 9. Februar 2016

um 17:15 Uhr

spricht

Prof. Dr. Hans-Benjamin Braun
School of Physics, University College Dublin, Ireland

im HS 3 am Physik-Department der TUM

über das Thema

Dynamic and static stabilization of skyrmions and the emergence of chirality in magnets

Topological defects such as domain walls and skyrmions have recently gained prominence as they owe their stability to their robustness against continuous deformations, similar to knots in a rope. Their stability renders them potentially useful for data storage applications similarly to other prominent topological defects such as domain walls in racetrack type memories. In view of the continuous demand of ever-increasing storage density it is important to study skyrmion-type defects on ever-decreasing length scales, in particular in thin films. Therefore it is necessary to understand the mechanisms which ensure the stability of skyrmions when their size becomes comparable to the crystal lattice and when thermal fluctuations are important. Here we discuss how both Dzyaloshinskii-Moriya (DM) and dipolar interactions affect the static stability of skyrmions. It will be discussed how dynamics can endow a skyrmion with stability even in the complete absence of DM interactions which so far have been thought to be necessary to ensure the existence of skyrmions in ultrathin films. It will then be discussed how a skyrmion can also be stabilized dynamically when the strength of the above interactions is not sufficient to stabilize a static skyrmion and may even be absent altogether. This opens up entirely new avenues for materials where skyrmion physics can be studied. The results also shed new light on the fact that the existence of chiral magnetic structures is not restricted to magnets with broken parity symmetry as, e.g., induced by DM-type interactions. Rather, the spontaneous emergence of chirality and spin currents is related to frustration in conjunction with quantum fluctuations as will be discussed at the example of spin chains and low dimensional magnets investigated by neutron scattering.

ab 17:00 Uhr Kaffee vor dem Hörsaal

Einführung: Peter Böni