Seminar: Hard Condensed Matter Theory

JG|U

JOHANNES GUTENBERG
UNIVERSITÄT MAINZ

Room: Galilei Room (Staudingerweg 9)
Time: February 4th 2020, 14:00-16:00

Ivan Ado

Radboud University

Chiral Ferromagnetism Beyond Lifshitz Invariants

Spin-orbit coupling (SOC) is known to break spin-rotation symmetry. For magnetically ordered systems, such symmetry breaking should, in principle, reveal itself in rotational and orientational anisotropy of various quantities that depend on the local magnetization direction. Quite recently, SOC-induced anisotropy of Gilbert damping (GD) and Kerr effect has been reported experimentally. At the same time, such an essential source of anisotropy has not yet received almost any attention in the context of chiral magnetic textures. The latter are very often associated with the Dzyaloshinskii-Moriya interaction that is represented, in the continuum limit, by Lifshitz invariants (LI). However, in systems with strong SOC, chiral interactions become anisotropic and one should consider non-LI-type contributions to the micromagnetic energy density as well.

In this talk, I will present results of a microscopic analysis of non-LI terms in a generalized 2D Rashba ferromagnet and discuss the effect of these terms on spin waves dispersion. I will present a point group classification of linear-in-gradient terms in micromagnetic energy density of a ferromagnet, for all 32 crystal classes. For three particular classes, T_d, C_{3h} and D_{3h}, Lifshitz invariants are forbidden by symmetry and, therefore, non-LI-type terms become most important. I will present a model for a magnet of the T_d point group symmetry with non-LI-type term that stabilizes chiral order.

Ado, I. A., et al. "Chiral ferromagnetism beyond Lifshitz invariants." arXiv preprint arXiv:1904.05337 (2019).

All interested are cordially welcome!

Karin Everschor-Sitte, Email: kaeversc@uni-mainz.de