**Walther-Meißner-Institut**
**Bayerische Akademie der Wissenschaften**

**SS 2024**

# Walther-Meißner-Seminar

**Walther-Meißner-Institute, Seminar Room 143**

**Date:** **Friday, 19 April 2024, 11:15 h**

**Speakers:** **Dr. Helena Reichlová & Dr. Miina Leiviskä**
*Institute of Physics, Czech Academy of Sciences*
*Na Slovance 1999/2, 182 00 Prague 8, Czechia*

**Title:** **Investigating Magneto-Thermal Transport in Altermagnets**

In recent years, the field of antiferromagnetic spintronics has witnessed fast advancements, leading to the uncovering of several new phenomena in magnetically ordered materials that exhibit negligible magnetization [1,2]. Notably, significant transverse phenomena such as the anomalous Hall effect and the anomalous Nernst effect have been discovered in non-collinear antiferromagnets [3,4]. Recently a new class of compensated magnets has been identified [5], which is found in crystals where opposite-spin sublattices are linked by rotational symmetry transformation. This phase features an alternating spin polarization both in the crystal's real-space structure and its electronic structure's momentum-space, suggesting the term altermagnetism.

This presentation will introduce the basic properties of altermagnets and it will focus on experimental verification of the altermagnetic phase across various materials, with an emphasis on transport phenomena. Contrary to previous beliefs that the anomalous Hall effect was non-existent in collinear compensated magnets, the advent of altermagnetism has led to its observation in collinear systems like $RuO_2$ [6], MnTe [7], and $Mn_5Si_3$ [8]. Notably, in the latter two examples, a spontaneous anomalous Hall effect was observed, occurring even in the absence of a magnetic field. Additionally, the talk will cover the detection of the anomalous Nernst effect in a compensated collinear magnet. [9]

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[1] T. Jungwirth *et al.*, Nat. Nano. **11**, 231–241 (2016)
[2] V. Baltz *et al.*, Rev. Mod. Phys. **90**, 015005 (2018)
[3] A. Nayak *et al.*, Sci. Adv. **2**, 1501870 (2016)
[4] M. Ikhlas *et al.*, Nat. Physics **13**, 1085–1090 (2017)
[5] L. Smejkal *et al.*, Phys. Rev. X **12**, 040501 (2022)
[6] T. Tschirner, HR *et al.*, APL Materials **11**, 101103 (2023)
[7] R. D. Gonzalez Betancourt, HR *et al.*, Phys. Rev. Lett. **130**, 036702 (2023)
[8] H. Reichlova *et al.*, Nat. Comm., in press
[9] A. Badura, HR *et al.*, arXiv:2403.12929