



## Walther-Meißner-Seminar

Walther-Meißner-Institute, Seminar Room 143

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**Date:** Friday, 25 November 2022, 11:15 h

**Speaker:** Dr. Jan Masell

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**Title:** Boring phases with interesting features: Helitronic pumps and transport by fluctuations

### Abstract

Usually, I talk about my research on fancy magnetic textures in two or dimensions, such as skyrmions and hopfions. Textures, which have non-trivial real-space topology, can be manipulated by currents and field, hold potential for applications, twists the magnetization in so many ways that visualization of data becomes art. However, there is also a lot of hidden beauty in much more trivial and, thus, seemingly “boring” phases and it turns out that in many cases they are not as trivial as we believed for a long time.

In this seminar talk, I plan to present our recent research on (i) magnetic spiral phases and (ii) the fluctuation disordered phase above the critical temperature, two seemingly boring magnetic phases. I will explain which non-trivial transport phenomena we predict for magnetic spirals and they might pump spin and charge like an Archimedean screw or Thouless pump (or none). [1] Moreover, I will show recent experimental data and introduce the idea of helitronics, i.e., spintronic applications using helical/spiral phases of magnets. [2] Finally, I will present our recent experimental and theoretical results on new yet ubiquitous transport signals in magnets in the fluctuating regime above the Curie temperature, where the topology of the crystal can or cannot introduce Hall signals. [3]

### References

- [1] D. Kurebayashi, Y. Liu, J. Masell, and N. Nagaosa, [Phys. Rev. B \*\*106\*\*, 205110 \(2022\)](#)
- [2] J. Masell, X. Z. Yu, N. Kanazawa, Y. Tokura, and N. Nagaosa, [Phys. Rev. B \*\*102\*\*, 180402\(R\) \(2020\)](#)
- [3] K. K. Kolincio, M. Hirschberger, J. Masell, *et al.*, [PNAS \*\*118\*\* \(33\), e2023588118 \(2021\)](#);  
K. K. Kolincio, M. Hirschberger, J. Masell, *et al.*, [arXiv:2206.05756](#)