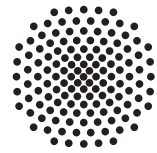


# Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung  
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Hybrid

Name / email address required

Dienstag, 21. November 2023

16.15 Uhr

Lecture Hall 2D5

Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

## Helimagnetism and emergent response: new materials and probes of spin dynamics

**Max Hirschberger**

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### Abstract

Generalized multiferroic conductors enable the cross-control of electric and magnetic properties. Here, starting with G.E. Volovik (1987), the concept of ‘emergent electrodynamics’ was developed to describe virtual electric and magnetic fields generated by the spin sector of the system, which influence the motion of electric charges. I will stress the potential of materials-based research on short-period helimagnets to provide new impetus to this field.

In the van-der-Waals metal  $\text{DyTe}_3$ , we use polarized neutron scattering to report an incommensurate cone-type structure, where insulating magnetic slabs alternate with highly metallic, nonmagnetic tellurium bilayers. Among layered magnets with van-der-Waals layer bonding, this type of helimagnetism, with propagation of magnetic textures in a single plane, is exceedingly rare. We explain the helimagnetic structure through coupling of charge-density wave and magnetic order, as well as unconventionally weak magneto-crystalline anisotropy from mixed covalent / metallic bonding [1].

We also detect spin dynamics in helimagnetic conductors by the thermoelectric Nernst effect [3], and probe the character of low-lying excitations via the ‘emergent’ inductance, that is, the time-delayed voltage response of a magnetic conductor to an applied current [4,5].

[1] S. Akatsuka, S. Esser, et al., arXiv:2306.04854 (2023)

[2] J. Gaudet et al., Nat. Mater. 20, 1650–1656 (2021)

[3] R. Yamada et al., under review (2023)

[4] T. Yokouchi et al., Nature 586, 232–236 (2020)

[5] R. Yamada et al., in preparation (2023)