



Beitrag ID: 63

Typ: **Invited talk**

Topological magnons driven by the Dzyaloshinskii-Moriya interaction in the centrosymmetric ferromagnet Mn₅Ge₃

Mittwoch, 8. Oktober 2025 14:00 (30 Minuten)

The phase of the quantum-mechanical wave function can encode a topological structure with wide-ranging physical consequences, such as anomalous transport effects and the existence of edge states robust against perturbations. While this has been exhaustively demonstrated for electrons, properties associated with the elementary quasiparticles in magnetic materials are still underexplored. In our joint project, we have shown theoretically and via inelastic neutron scattering experiments that the bulk ferromagnet Mn₅Ge₃ hosts gapped topological Dirac magnons [1]. Although inversion symmetry prohibits a net Dzyaloshinskii-Moriya interaction in the unit cell, it is locally allowed and is responsible for the gap opening in the magnon spectrum. This gap is predicted and experimentally verified to close by rotating the magnetization away from the c-axis with an applied magnetic field. Hence, Mn₅Ge₃ realizes a gapped Dirac magnon material in three dimensions. Its tunability by chemical doping or by thin film nanostructuring defines an exciting new platform to explore and design topological magnons. More generally, our experimental route to verify and control the topological character of the magnons is applicable to bulk centrosymmetric hexagonal materials, which calls for systematic investigation.

[1] M. dos Santos Dias et al., Nat. Commun. 14, 7321 (2023).

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