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EINLADUNG zum IFP-SEMINAR

Topological Spin Excitations in a Highly Interconnected 3D Spin Lattice

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Host:	Jan Kuneš
Termin:	Mittwoch, 11 April 2018, 16:00 Uhr
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The recent discovery of topological semimetals, which possess distinct electron-band crossing with non-trivial topological characteristics, has stimulated intense research interest. By extending the notion of symmetry-protected band crossing into one of the simplest magnetic groups, namely by including the symmetry of time-reversal followed by space-inversion, we predict the existence of topological magnon-band crossing in three-dimensional (3D) collinear antiferromagnets. The crossing takes on the forms of Dirac points and nodal lines, in the presence and absence, respectively, of the conservation of the total spin along the ordered moments. In a concrete example of a Heisenberg spin model for a "spin-web" compound, we theoretically demonstrate the presence of Dirac magnons over a wide parameter range using the linear spin-wave approximation, and obtain the corresponding topological surface states [1].

Inelastic neutron scattering experiments have then been carried out to detect the bulk magnon-band crossing in a single-crystal sample. The highly interconnected nature of the spin lattice suppresses quantum fluctuations and facilitates our experimental observation, leading to remarkably clean experimental data and very good agreement with spin-wave calculations. The predicted topological band crossing is confirmed [2].

[1] K. Li *et al.*, *PRL* **119**, 247202 (2017).
[2] W. Yao *et al.*, arXiv:1711.00632.