TECHNISCHE UNIVERSITÄT WIEN

INSTITUT FÜR FESTKÖRPERPHYSIK
Institute of Solid State Physics

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EINLADUNG zum IFP-SEMINAR

Fermiology of the 2D kagome lattice

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Host: Silke Bühler-Paschen

Termin: Mittwoch, 28. Juni 2023, 16:00 Uhr

Ort: TU Wien, Freihausgebäude
Wiedner Hauptstraße 8-10, 1040 Wien
Seminarraum DC rot 07 (roter Bereich, 7. OG)
Oder via ZOOM
https://tuwien.zoom.us/j/63020566887?pwd=RmYvRmVwOGU5YVBrOHpodWRKaHFWQT09

Vor dem Vortrag gibt es ab 15:30 Kaffee und Kekse

Abstract:

The kagome lattice is a tiling of two-dimensional space comprised of corner-sharing triangles, having the same point symmetries as the honeycomb lattice (graphene) but a richer electronic structure. Recent theoretical developments suggest that the combination of magnetism, spin-orbit coupling, and geometric frustration in kagome metals is a promising platform to realize phenomena at the intersection of topology and strong correlations, such as the fractional quantum Hall and intrinsic anomalous Hall effect. Here, a major role is played by the three distinctive features of the kagome electronic band structure, namely the Dirac points, the van Hove singularity, and the flat bands. In this talk, I will report on studies of the experimental band structure of various kagome compounds to highlight the rich physics arising from the combination of topology, magnetism, and correlations, and the prospects for realizing new quantum matter phenomena in this class of materials.

In the first part, I will discuss the manifestations of topology in a family of kagome metals (Fe_3Sn_2, FeSn, and CoSn). In these systems which intertwine robust magnetism and electronic topology, we observed the realization of the Kane-Mele model for 2D Dirac fermions with a spin-orbit-induced topological gap, as well as the discovery of the elusive electronic flat bands and their nontrivial topology.

In the second part, I will present recent work on electronic symmetry breaking in a family of ternary kagome superconductors [(K,Rb,Cs)V3Sb5], where superconductivity and charge-density-waves have been found to coexist and compete. Here, I will focus on the role of the van Hove singularity in setting the stage for an electronic instability of the Fermi surface and supporting the emergence of collective electronic phases.

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