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Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme
Fachbereich Physik, Universität Stuttgart

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Hybrid

Login data will be announced by e-mail and on the colloquium webpage.

Dienstag, 29. November 2022 | **16.15 Uhr** | **Hörsaal 2D5**

Stuttgarter Max-Planck-Institute, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

Gapless topology driven by strong correlations

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Abstract

Quantum matter has traditionally been classified in terms of quantum phase transitions between ground states with different types of order. However, the last decade has seen a plethora of developments in what we now call topological quantum matter. Here, the topological nature – a global characteristic of the system – takes the role of the local order parameter. Much progress has been made in topological insulators and noninteracting or weakly interacting topological semimetals, but the field of gapless topological phases driven by strong electronic correlations is only just emerging.

I will report on the recent discovery of the first such materials class – Weyl-Kondo semimetals – and the material, the heavy fermion compound $Ce_3Bi_4Pd_3$, that coined this term. It exhibits giant signatures of electronic topology due to Weyl nodes in close proximity to the Fermi level, giving rise to quasiparticles with ultraslow velocities. In this system, genuine topology control can be achieved by magnetic field tuning, leading to the annihilation of Weyl nodes at moderate fields. I will also discuss design strategies for further correlation-driven topological semimetals, ranging from symmetry considerations to the possible role of quantum criticality and emergence.