

# Theory of Condensed Matter: Hard Condensed Matter

Nov. 20, 2018 at 2 p.m.  
Galilei Room, 01-128 (Staudinger Weg 9)

Tobias Meng  
Technische Universität Dresden

## **Weyl semimetals with single Weyl nodes, and the fate of their chiral anomaly**

Weyl semimetals are defined by the presence of isolated points in the Brillouin zone at which a conduction and a valence band touch. The so-called Nielsen-Ninomiya theorem requires these points (the Weyl nodes) to appear in pairs. This theorem, however, is only valid for interactions of sufficiently short range. In this talk, I will discuss that long-range interactions can break the Nielsen-Ninomiya-theorem, and provide an explicit construction for an interacting tight-binding model that contains only a single Weyl node. I will then analyze the fate of the chiral anomaly in such single Weyl node semimetals, and demonstrate that the chiral magnetic effect remains intact for arbitrarily strong interactions in such a single node Weyl semimetal, while it is at most robust up to a critical interaction strength if the interaction gaps all Weyl nodes.