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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Theory of Condensed Matter: Hard Condensed Matter

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

Tobias Meng
Technische Universitt 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.

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