

Theory of Condensed Matter: Hard Condensed Matter

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Seminar room K

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Disordered Weyl Semimetals

Weyl semimetals are paradigmatic topological gapless phases in three dimensions. After a general introduction, we discuss the effect of disorder on charge transport in Weyl semimetals. For a single Weyl node with energy at the degeneracy point and without interactions, theory predicts the existence of a critical disorder strength beyond which the density of states takes on a nonzero value. Predictions for the conductivity are divergent, however. We present a numerical study of transport properties for a disordered Weyl cone at zero energy. For weak disorder our results are consistent with a renormalization group flow towards an attractive pseudoballistic fixed point with zero conductivity and a scale-independent conductance; for stronger disorder diffusive behavior is reached. We identify the Fano factor as a signature that discriminates between these two regimes.