Poster-2-23

Entanglement spectrum across the semimetal-diffusive metal transition in a disordered Weyl system

Vinícius Mohr,[1] Shunji Tsuchiya,[2] and Andras Szabo[1]

[1] *Institute for Theoretical Physics, ETH Zurich, 8093 Zurich, Switzerland*
[2] *Department of Physics, Chuo University, Kasuga, Tokyo 112-8551, Japan*

Disordered Weyl semimetals exhibit an intriguing phase diagram featuring three distinct phases. While the system is stable for weak disorder, it undergoes a quantum phase transition into a diffusive metal at a critical disorder strength, with Anderson localization deferred to even stronger disorder. Here I focus on the Weyl semimetal (WSM)-diffusive metal transition. Specifically, I introduce a real-space partitioning of the system into two subsystems, and showcase the evolution of entanglement spectrum with disorder, which is reconstructed in the two-dimensional momentum space perpendicular to the cut direction. A key observation is that the Fermi arc sruface states, which are a hallmark of the topology of WSMs, leave their imprint on the entanglement spectrum, showing a clear distinction between states that are connected to the atomic limit, and those that represent an obstruction to it. I show that, as the diffusive metal is topologically trivial, this signature gradually fades from the entanglement spectrum, which becomes featureless at the critical disorder strength. I also comment on the scaling of entanglement entropy on either side of the phase transition.