Electronic transport in topological semimetals

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Initiated by the discovery of topological insulators, topologically non-trivial matter, especially topological semimetals (TSM), has emerged as a new frontier in the field of quantum materials. The presence of nearly massless quasiparticles near chemical potential gives rise to unique transport properties of TSMs, like ultra-high charge carrier mobility, huge magnetoresistance or/and chiral magnetic anomaly. The intriguing physical phenomena found in TSMs not only provide excellent tests for fundamental theories, but also promise a wide range of possible applications in low-power spintronics, optoelectronics, quantum computing and green energy harvesting.

Here, we first recall some basic concepts in the field of TSMs, and then present a few examples of our own accomplishments in that blooming research area. In particular, we briefly account for our comprehensive experimental studies on the anomalous electronic transport in various topological materials, supplemented by our observations of Dirac/Weyl states by means of angle-resolved photoemission spectroscopy.

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