New Frontiers in Topological Quantum Matter

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Abstract

Topology plays a key role in describing quantum matter, which has been greatly explored in recent decades [for an introduction: M. Z. Hasan & C. L. Kane, Rev. of Mod. Phys. (RMP) 82, 3045 (2010)]. I present how tuning a topological insulator featuring a Dirac fermion can be used as a platform to realize emergent Weyl fermion and "fractional" Fermi surfaces [1-5]; and can also lead to correlated magnetic, Chern, or many-body states. The kagome lattice, which features Dirac fermions, flat bands, and van Hove singularities, can serve as the platform to explore topology, strong correlation, exotic superconductivity and many-body density-wave phenomena as shown in a series of most recent works [4-8]. These novel topological quantum matter harbor properties that provide platforms for the development of next-generation quantum devices and novel technologies.

References

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