Prof. Giorgio Sangiovanni (Universität Würzburg):

Topological nature and symmetry protection of low-energy electronic bandstructures

Abstract:

In the field of topological insulators the focus is currently on large-gap quantum spin Hall materials as these are believed to be essential to room-temperature operability.

Apart from the technological aspects, the fundamental physical question to be answered is how topologically non-trivial gaps as well as symmetry-protected degeneracies react to electron-electron interaction.

In this talk I will address many-electron Hamiltonians and their novel types of fermionic quasiparticles. Since their internal structure is determined by the dimensionality of the irreducible representations of the relevant symmetry groups in momentum space, these can be richer than conventional Dirac or Weyl nodes [1].

Even if fully compatible with the lattice symmetry, a sufficiently strong electron-electron repulsion drives these nodal semimetals away from the perturbative regime and breaks the protected degeneracies opening a Mott gap [2].

I will discuss how correlation modifies the Fermi liquid properties of the Dirac/Weyl semimetallic phase and discuss the fate of the symmetry-protected crossings after the Mott transition [3].

[1] B. Bradlyn, et al. Science 353, 558 (2016)

[2] D. Di Sante, et al. PRB 96, 121106 (2017)

[3] N. Wagner, et al. PRL 126, 206601 (2021)

Zoom-Link:

https://uni-due.zoom.us/j/99654364004?pwd=NktMTmJwRzVLSmwvM0RuWkpIWHhWZz09
Meeting ID: 996 5436 4004
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