清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

Title: **New quantum anomalies on the side and on the top: boundary manifestations of rotation symmetry protected topological states**

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Time: **4:00pm, Monday, Oct. 23, 2017**

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

The bulk-boundary correspondence principle dictates that the boundary of a topologically nontrivial bulk has to be "anomalous", i.e., cannot be realized on any lattice that has the same dimension as the boundary. People are familiar with anomalous (d-1)-dimensional edge states for a d-dimensional bulk: e.g., the helical 1D modes of a 2D topological insulator and the 2D Dirac cone surface state of a 3D topological insulator. In this talk, I introduce two new types of anomalies related to rotation symmetries, which can be realized on the 2D edge and the 1D edge, respectively, of a new class of 3D topological crystalline insulators. To be specific, consider a bulk TCI protected by n-fold rotation (n=2,4,6) and time-reversal, and cut the sample into a cylinder. On the top (bottom) surface, the anomalous surface has n Dirac cones; and on the side surface, there are n 1D helical edge modes on the otherwise gapped side surface, connecting the top and the bottom surface states. A real space construction of these new topological states can be easily generalized to strongly correlated systems, and give us new SPT states beyond current classification schemes.

References:

[1] Zhida Song, Zhong Fang, and Chen Fang*, "(d−2)-dimensional edge states of rotation symmetry protected topological states", to appear in PRL (2017).

[2] Chen Fang* and Liang Fu*, "Rotation Anomaly and Topological Crystalline Insulators", arXiv:1709.01929 (2017).