



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

学术报告

- Title:** Symmetry enriched U(1) quantum spin liquids
- Speaker:** Liujun Zou (MIT)
- Time:** 4:00pm, Monday, Jan. 8, 2018
- Venue:** Conference Hall 322, Science Building, Tsinghua University

Abstract

We classify and characterize three dimensional U(1) quantum spin liquids (deconfined U(1) gauge theories) with global symmetries. These spin liquids have an emergent gapless photon and emergent electric/magnetic excitations (which we assume are gapped). In this talk, I will discuss in great details the case of a U(1) quantum spin liquid with SO(3) spin rotational symmetry. We find there are 2 distinct such quantum spin liquids based on the properties of their bulk excitations. We identify another anomalous state, and I will show how to understand its anomaly. Then I will summarize a general framework that can be applied to classify and characterize symmetry enriched U(1) quantum spin liquids with a general symmetry. After this, as an application, I will show what other lessons we can learn from the study of symmetry enriched U(1) quantum spin liquids. In particular, I will propose a nontrivial topological material, a "doubled topological insulator", which can host two surface Dirac cones and is protected by charge conservation, time reversal and mirror symmetries.

References: LZ, Chong Wang and T. Senthil, arXiv 1710.00743.

LZ, arXiv 1710.03090.