



Weekly Seminar

Symmetry Enriched U(1) Topological Orders on the Pyrochlore Lattice

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Time: 4:00pm, March. 8, 2017 (Wednesday)

时间: 2017年3月8日 (周三) 下午4:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

Symmetry plays a fundamental role in our understanding of both conventional symmetry breaking phases and the more exotic quantum and topological phases of matter. We explore the experimental signatures of symmetry enriched U(1) quantum spin liquids (QSLs) on the pyrochlore lattice. We point out that the local moment of the newly discovered pyrochlore QSL candidate $\text{Ce}_2\text{Sn}_2\text{O}_7$, is a dipole-octupole doublet. The generic model for these unusual doublets support two distinct symmetry enriched U(1) QSL ground states in the corresponding quantum spin ice regimes. These two U(1) QSLs are dubbed dipolar U(1) QSL and octupolar U(1) QSL. While the dipolar U(1) QSL has been discussed in many contexts, the octupolar U(1) QSL is rather unique. Based on the symmetry properties of the dipole-octupole doublets, we predict the peculiar physical properties of the octupolar U(1) QSL, elucidating the unique spectroscopic properties in the external magnetic fields. We further predict the Anderson Higgs transition from the octupolar U(1) QSL driven by the external magnetic fields. We identify the experimental relevance with the candidate material $\text{Ce}_2\text{Sn}_2\text{O}_7$ and other dipole-octupole doublets systems.

Ref: Yao-Dong Li, Gang Chen, Phys. Rev. B Rapid Communication 95, 041106 (2017)

About the speaker

陈钢, 2004年毕业于中国科技大学, 2010年在University of California Santa Barbara获得博士学位, 导师是Kavli Institute的Leon Balents教授, 2015年初回到中国国内, 2015年夏在复旦大学任职研究员至今。主要从事强关联理论的研究。