



Seminar

"Magnetic monopole" condensation transition out of U(1) quantum spin liquid: connect emergence to reality

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Time: 2:00pm, Nov. 2, 2016 (Wednesday)

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Venue: Room w563, Physics Building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

We study the proximate magnetic orders and the related quantum phase transition out of U(1) quantum spin liquid. We apply the electromagnetic duality of the compact quantum electrodynamics to analyze the condensation of the "magnetic monopoles" for U(1) quantum spin liquid. The monopole condensation transition represents a unconventional quantum criticality with unusual scaling laws. The magnetic monopole condensation leads to the magnetic states that belong to the "2-in 2-out" spin ice manifold and generically have an enlarged magnetic unit cell. We demonstrate that the antiferromagnetic state with the ordering wavevector $Q = 2\pi(001)$ is proximate to U(1) quantum spin liquid while the ferromagnetic state with the ordering wavevector $Q = (000)$ is not proximate to quantum spin liquid. This implies that if there exists a direct transition from U(1) quantum spin liquid to the ferromagnetic state, the transition must be strongly first order. We apply the theory to the puzzling experiments on two pyrochlore systems Pr₂Ir₂O₇ and Yb₂Ti₂O₇.

[1] Gang Chen, arXiv 1602.02230 (Phys. Rev B 2016, in Press)

About the speaker

陈钢, 2004年本科毕业于中国科学技术大学, 2010年博士毕业于University of California, Santa Barbara. 2015年复旦大学教授 (研究员), 研究领域主要是强关联理论, 包括量子磁性、强自旋轨道耦合体系、拓扑序、过渡金属氧化物、非费米液体等等。