Seminar

Topological engineering in $Pr_2Ir_2O_7$

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Time: 16:00pm, Jan. 10, 2018 (Wednesday)

时间: 2018年1月10日 （周三）下午 16:00

Venue: Room W563, Physics Building, Peking University

地点：北京大学物理楼 西563

Abstract

We study the band structure topology and engineering from the interplay between local moments and itinerant electrons in the context of pyrochlore iridates. For the metallic iridate $Pr_2Ir_2O_7$, the Ir 5d conduction electrons interact with the Pr 4f local moments via the f-d exchange. While the Ir electrons form a Luttinger semimetal, the Pr moments can be tuned into an ordered spin ice with a finite ordering wavevector, dubbed “Melko-Hertog-Gingras” state, by varying Ir and O contents. We point out that the ordered spin ice of the Pr local moments generates an internal magnetic field that reconstructs the band structure of the Luttinger semimetal. Besides the broad existence of Weyl nodes, we predict that the magnetic translation of the “Melko-Hertog-Gingras” state for the Pr moments protects the Dirac band touching at certain time reversal invariant momenta for the Ir conduction electrons. We propose the magnetic fields to control the Pr magnetic structure and thereby indirectly influence the topological and other properties of the Ir electrons. Our prediction may be immediately tested in the ordered $Pr_2Ir_2O_7$ samples. We expect our work to stimulate a detailed examination of the band structure, magneto-transport, and other properties of $Pr_2Ir_2O_7$.

Reference:

Xu-Ping Yao, Gang Chen, arXiv:1712.06534

About the Speaker

Dr. Gang Chen received his PhD at UC Santa Barbara with Leon Balents and then took independent postdoc positions at CU Boulder and Univ of Toronto. He was appointed Professor of Physics at Fudan University in Winter 2014 and started the position in Summer 2015. He has a broad interest in strongly correlated systems, and most of his works are experimentally motivated.