北大-清华-物理所“量子物质科学协同创新中心”

Novel properties of 5d transition metal oxides

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地点： 理科五号楼607会议室

Abstract

In 5d transition metal oxides such as the iridates and osmates, novel properties arise from the interplay of electron correlations and spin-orbit interactions. We investigate the electronic structure of the pyrochlore iridates, Spinel and Perovskite osmates using density functional theory, LDA+U method, and effective low energy models. We propose that pyrochlore iridates can be a Weyl semimetal, with vanishing density of states at the Fermi energy. It also exhibits topological properties - manifested by special surface states in the form of Fermi arcs, that connect the bulk Weyl points. We propose that hypothetical spinel osmates compounds such as CaOs2O4 and SrOs2O4 show some exotic electronic and magnetic properties in a reasonable range of on-site Coulomb correlation U such as ferromagnetism and orbital magnetoelectric effect characteristic to Axion electrodynamics. We also confirm NaOsO3 is a slater insulator.

About the Speaker

万贤纲，男，2000年毕业于南京大学物理系，获博士学位。2003-2005年在日本国立材料研究所做博士后研究，2005--2007在加州大学Davis分校访问。2009年起任南京的大学物理系教授。主要研究方向是基于第一性原理的电子结构方法的发展，程序化，和在实际材料中的应用。