



Seminar

Detecting hidden orders in frustrated magnets

Gang Chen

Fudan University

Time: 2:00Pm, Oct. 22, 2018 (Monday)

时间: 2018年10月22日 (周一) 下午2:00

Venue: Room W563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

Hidden order is an unresolved issue in modern condensed matter physics and has puzzled us for more than three decades. Motivated by the rapid experimental progress on the spin-orbit-coupled Mott insulators, we propose and study a generic spin model that describes the interaction between the non-Kramers doublets on a triangular lattice and is relevant for triangular lattice rare-earth magnets. We predict that the system supports both pure quadrupolar orders and intertwined multipolar orders in the phase diagram. Besides the multipolar orders, we explore the magnetic excitations to reveal the dynamic properties of the systems. Due to the peculiar properties of the non-Kramers doublets and the selective coupling to the magnetic field, we further study the magnetization process of the system in the magnetic field. We point out the selective measurements of the static and dynamic properties of the intertwined multipolar orders in the neutron scattering, NMR and μ SR probes and predict the experimental consequences. The relevance to the existing materials such as $TmMgGaO_4$, Pr-based and Tb-based magnets, and many ternary chalcogenides is discussed. Our results illustrate the rich physics and the promising direction in the interplay between strong spin-orbit-entangled multipole moments and the geometrical frustration.

Refs:

Changle Liu, Yaodong Li, Gang Chen*, Phys. Rev. B, 98, 045119 (2018)

Yaodong Li, Xiaoqun Wang, Gang Chen*, Phys. Rev. B, 94, 201114(R) (2016)

Yao Shen, Changle Liu,, Gang Chen*, Jun Zhao, arXiv 1810.05054 (2018)

About the speaker

Dr. Gang Chen is currently a Professor of Physics at Fudan University. He did his undergraduate in USTC and graduated with the highest honor. He received his Phd from UC Santa Barbara, working with Prof Leon Balents at Kavli Institute for Theoretical Physics. He held independent postdoc fellows at CU Boulder and Univ of Toronto. In Dec 2014, he was appointed Professor of Physics by Fudan University where he started this job in the spring of 2015. He has a rather broad interest in hard condensed matter physics, particularly on quantum matters and strongly correlated systems. Due to his contribution to the field, he was award “2017 Daniel Tsui Fellowship” by the Univ of Hong Kong and the “2018 Qiushi outstanding junior scientist” by the Qiushi foundation of Hong Kong. Besides his works in physics, he has talents in advising and mentoring students. The students, under his supervision, are confident and active, and are gradually pushing the frontiers of modern condensed matter physics.