北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Rotated Heisenberg Model

Time: 4:00pm, 20 May, 2015 (Wednesday)
时间：2015年5月20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

Abstract

Rotated Heisenberg model is a new class of quantum spin models to describe quantum magnetisms in systems with strong spin-orbit coupling (SOC). It originates from the strong coupling limit of interacting fermions of spinor bosons at integer fillings in a lattice in the presence of a SOC. In this talk, we focus on Rotated Ferromagnetic Heisenberg model (RFHM).We introduce Wilson loops to characterize frustrations and gauge equivalent class. For a special equivalent class, we identify a new spin-orbital entangled commensurate ground state. It supports not only commensurate magnons, but also a new gapped elementary excitation: in-commensurate magnons with two gap minima continuously tuned by the SOC strength. When applying a Zeeman field to the RFH, we find that the condensations of the in-commensurate magnons lead to rich and new quantum phases through new universality class of quantum phase transitions. These quantum phases include two collinear states at low and high Zeeman field, two co-planar canted states at two dual related SOC strengths respectively, also a non-coplanar incommensurate Skyrmion (IC-SkX) crystal phases surrounded by the 4 phases. We also explore new universality classes of