

清华大学高等研究院
Institute for Advanced Study, Tsinghua University
物理学术报告
Physics Seminars (biweekly)

Title: Quantum phases in a Bose-Hubbard model with spin-orbit interactions

Speaker: Shi-Zhong Zhang
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Time: 3:15 pm, Wednesday, Oct 24, 2012
(2:45~3:15pm, Tea, Coffee, and Cookie)

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract:

The realization of synthetic gauge fields and in particular spin-orbit interactions in ultra-cold atomic gases has opened many new frontiers of studies in this field. So far, intensive theoretical work has identified multiple Bose condensed phases and phase transitions between them are now being actively investigated.

In this talk, I will discuss situations when an external optical lattice is present and the system may be described by the Bose-Hubbard model (BHM). As compared with the usual spineless BHM, the inclusion of spin degrees of freedom and spin-orbit interactions offers the possibilities of much more intricate phases. In particular, I will discuss the following three aspects: (1) magnetic Hamiltonian in the strong coupling limit and its phase diagram; (2) magnetic textures in the superfluid phase and (3) quantum phase transitions between them and our attempts at a unified understanding with a new slave boson formulation of the problem.