复旦大学物理系物质科学报告

Physics Department Colloquium

Prospect and Challenges of Quantum materials with Ultracold Atoms

(超冷原子量子物质研究的前景和挑战)

Prof. Gyu-Boong Jo (曹圭鵬)

HKUST

Abstract

Ultracold atoms in optical lattices provide an ideal test bed simulating the ground state for model many-body Hamiltonians, such as Hubbard model, which capture essential features in quantum materials. In this talk, I will first discuss the recent progress on the realization of optical lattice geometries containing a flat band in the non-trivial crystalline structure for ultracold atoms. In kagome, Lieb and sawtooth lattices, for example, a flat band provides a unique platform supporting an interaction-induced quantum phenomena such as flat-band ferromagnetism. I will briefly introduce the experimental challenges for addressing the flat band with cold atoms, and discuss our approach to implement a flat band for ultracold atoms.

In the second part of the talk, I will report ongoing experimental efforts at HKUST to implement a Ytterbium Fermi gas under the high-resolution optical microscope. Fermionic ytterbium atoms exhibit complex internal structure with SU(N) spin symmetry offering a unique opportunity to explore a new class of the many-body problems due to the enhanced degeneracy. I will share our recent development and plans for investigating various many-body phenomena in the Ytterbium Fermi gas system.

Time： 2:00pm, Wednesday, 2015.9.23

Location： Physics Building, Room 221B

(Cookies and coffee are served from 1:30 pm)