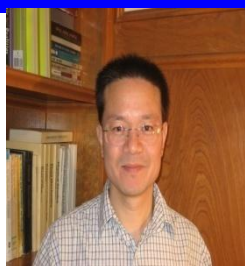




## 中心系列讲座 ICQM Weekly Seminar Series

### Topological Orbital States in Optical Lattices



**Wensheng Vincent Liu**

**University of Pittsburg**

**Time: 4:00 pm, Jun. 20, 2012 (Wednesday)**

**时间: 2012年6月20日 (周三) 下午4:00**

**Venue: Room 607, Conference Room A, Science Building 5**

**地点: 理科五号楼607会议室**

#### Abstract

The recent implementation of orbital degrees of freedom in double-well optical lattices opens up a new avenue towards discovering novel quantum states of matter that have no prior analogues in solid-state electronic materials. In this talk, I will first give a brief review on some of the most exciting developments of p-orbitals in both theory and experiment. Then, I will focus on two examples of topological order. One is a topological semimetal, characterized by a parabolic band-degeneracy point with Berry flux  $2\pi$ , due to the mixing of p and d orbital bands of a two-dimensional optical lattice. Another is the emergence of a  $Z_2$  topological insulator of interacting fermions on a two-leg ladder of s and p orbitals, requiring none of the previously known mechanisms such as spin-orbit coupling, artificial gauge field, or p-wave pairing. The odd parity of p-orbitals is found key to both topological examples.

#### About the speaker

Wensheng Vincent Liu (刘文胜) is Associate Professor of Physics at the University of Pittsburgh. He received his B.S. in 1991 from Jilin University and M.S. in 1994 from Beijing Normal University in China and Ph.D. in Physics in 1999 from the University of Texas at Austin in USA under the supervision of Steven Weinberg. He was a postdoc associate in the condensed matter theory group in the University of Illinois at Urbana-Champaign and then a postdoc fellow at Massachusetts Institute of Technology (MIT) before joining the faculty of Department of Physics and Astronomy at the University of Pittsburgh in 2004. His research on condensed matter and cold atom physics has been honored with awards including in 1999 Best Dissertation in Physics at the University of Texas at Austin, and in 2007 Outstanding Young Researcher Award from Overseas Chinese Physics Association.