



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:

Grassmann tensor product state approach and the emergence of topological superconductivity in 2D strongly correlated doped Dirac systems

Speaker:

Zhengcheng Gu(顾正澄)

Perimeter Institute for Theoretical Physics

Time:

4:00pm, Wednesday, May 20, 2015

(3:30~4:00pm, Tea, Coffee, and Cookie)

Venue:

Conference Hall 322, Science Building, Tsinghua University

Abstract

Searching for p+ip topological superconducting (SC) state has become a fascinating subject in condensed matter physics, as a dream application awaits in topological quantum computation. In this talk, I will report the theoretical discovery of a p+ip SC ground state (coexisting with ferromagnetic order) in honeycomb lattice Hubbard model with infinite repulsive interaction at low doping (< 0.2), by using both the state-of-art Grassmann tensor product state (GTPS) approach and a quantum field theory approach. Our discovery suggests a new mechanism for p+ip SC state in generic strongly correlated systems and opens a new door towards experimental realization. The p+ip SC state has an instability towards a potential non-Fermi liquid below a large but finite U ; however, a small in-plane Zeeman field stabilizes the p+ip SC state. Relevant realistic materials are also proposed. Finally, I will mention some unpublished results for the global phase diagram of honeycomb lattice Hubbard model.