



# 复旦大学物理系物质科学报告 Physics Department Colloquium

## Topological superconductivity and Majorana zero modes

**Professor Hong Yao**

Tsinghua University

Abstract: We study unconventional superconductivity induced by weak repulsive interactions in 2D electronic systems at Van Hove singularity (VHS) where density of states is logarithmically divergent. Interestingly, for systems at type-II Van Hove singularity renormalization group (RG) analysis shows that weak repulsive interactions favor triplet pairing (e.g. p-wave) when the Fermi surface is not sufficiently nested. For such type-II VHS systems respecting either tetragonal or hexagonal symmetry, topological superconductivity (either chiral  $p+ip$  pairing or time reversal invariant  $Z_2$   $p+ip$  pairing) occurs generally. We shall also discuss relevance of our study to real materials including recently discovered BiS<sub>2</sub>-based superconductors and graphenelike material BC<sub>3</sub>, both of which can be tuned to type-II VHS by doping. I shall also discuss topological superconductivity realized in surface states of topological insulators by proximity to superconductors. In both intrinsic chiral  $p+ip$  superconductors with nontrivial topology and proximity-induced topological superconductivity, Majorana zero mode may be realized.

**Time: 2:00 pm, Tuesday, 2014.4.15**

**Location: Physics Building, Room 221B**

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