Models of Superconducting Cu:Bi_2Se_3 – Single Versus Two-band Description

Sungkit Yip*

Institute of Physics, Academia Sinica, Taiwan

***Email of Presenting Author: yip@phys.sinica.edu.tw**

Abstract

Starting from a model Hamiltonian for the normal state of the topological insulator Bi_2Se_3, we construct a pseudospin basis for the single-particle wavefunctions. Considering weak superconducting pairing near the Fermi surface, we express the recently proposed superconducting order parameters for Cu doped Bi_2Se_3 in this basis. For the odd parity states, the $\vec{d}(\vec{k})$-vectors specifying the order parameter can have unusual momentum dependence for certain parameter regimes. Some peculiar results in the literature for surface states are discussed in light of the forms of these $\vec{d}(\vec{k})$'s. Properties of the even parity states are also illuminated using this pseudospin basis. Results from this single-band description are compared with those from the full two-band model.

About the speaker

Prof Sungkit Yip obtained his PhD at the University of Illinois at Urbana-Champaign, USA in 1986. He was a postdoc at the University of Florida, Gainsville, and the University of Maryland, College Park. He had also worked at Northwestern University as a postdoc and research faculty. He joined the National Center for Theoretical Sciences, Hsinchu, Taiwan in 1998 as a Junior Research Fellow, and then moved to the Institute of Physics, Academia Sinica in 2000 as a Research Fellow, where he stays till now. His research focuses on superconductivity, especially on unconventional pairing symmetries, and on superfluidity in 3He and multicomponent cold atomic gases. He has won an Outstanding Research Award from the National Science Council and the Academic Award from the Ministry of Education of Taiwan. He is also an Outstanding Referee of the American Physical Society and a current Council Member of APCTP.