

Condensed Matter Theory Center Seminar



Tuesday, February 5
11:00 am – 12:30 pm, Physics Building 2205

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“Zero-energy flat bands in noncentrosymmetric superconductors”

The superconductivity of noncentrosymmetric materials has attracted much attention due to the possible realization of an exotic mixed-parity pairing state. Such systems also show a rich variety of topological phases; in particular, it has recently been pointed out that nodal noncentrosymmetric superconductors are an example of a topologically non-trivial gapless state [1]. In this case a bulk-boundary correspondence can be developed, which guarantees the existence of a nondegenerate zero-energy flat band within the projection of the nodal lines onto the surface Brillouin zone. Using a quasiclassical scattering method [2], I construct the surface bound state spectra, obtain an existence condition for the zero-energy flat bands in terms of the gap sign structure, and show that they leave distinct signatures in the tunneling conductance. Moreover, the surface states are found to be strongly spin-polarized. When placed in proximity contact with a ferromagnet, the coupling to the exchange field generates an interface current that contains signatures of the superconductor's topological state [3]. The presence of flat bands is characterized by an enormous enhancement of the current at low temperatures and a singular dependence on the exchange field strength.

(All are welcome to attend)

