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Quasiparticle States in Dirty d-Wave Superconductors

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A lattice model for disordered d-wave superconductors with spin-rotation and time-reversal symmetries is reconsidered. Near the band center, the lattice model can be described by several Dirac fermions. Each Dirac fermion yields a Wess-Zumino-Witten (WZW) term for an effective action of the Goldstone mode, which is known to play a crucial role in the critical phenomena in two dimensions. The WZW terms, however, cancel out each other in the final action because of the fourfold symmetry of the model., suggesting the quasiparticle states are localized. By explicitly breaking the symmetry of the lattice model, we discuss the possibility of the WZW term.

Chiral feedback mechanism in p-wave superconductors

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In a quasi-two-dimensional p-wave superconductor there find six Cooper pairing states which are degenerate within the weak-coupling approach. We show that this degeneracy can be lifted by feedback effect favoring the so-called chiral p-wave state. This effect is based on the anomalous coupling between charge and current in a system with broken time reversal symmetry and parity.

Reference J. Goryo and M. Sigrist, J. Phys. CM **12** L599 (2000).