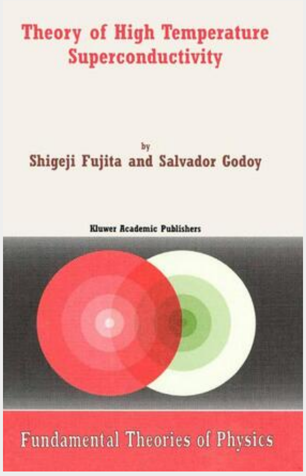
Godoy / Fujita

Theory of High Temperature Superconductivity

Flux quantization experiments indicate that the carriers, Cooper pairs (pairons), in the supercurrent have charge magnitude 2e, and that they move independently. Josephson interference in a Superconducting Quantum Int- ference Device (SQUID) shows that the centers of masses (CM) of pairons move as bosons with a linear dispersion relation. Based on this evidence we develop a theory of superconductivity in conventional and mate- als from a unified point of view. Following Bardeen, Cooper and Schrieffer (BCS) we regard the phonon exchange attraction as the cause of superc- ductivity. For cuprate superconductors, however, we take account of both optical- and acoustic-phonon exchange. BCS started with a Hamiltonian containing “electron” and “hole” kinetic energies and a pairing interaction with the phonon variables eliminated. These “electrons” and “holes” were introduced formally in terms of a free-electron model, which we consider unsatisfactory. We define “electrons” and “holes” in terms of the cur- tures of the Fermi surface. “Electrons” (1) and “holes” (2) are different and so they are assigned with different effective masses: Blatt, Schafroth and Butler proposed to explain superconductivity in terms of a Bose-Einstein Condensation (BEC) of electron pairs, each having mass M and a size. The system of free massive bosons, having a quadratic dispersion relation: and moving in three dimensions (3D) undergoes a BEC transition at where is the pair density.

Springer Book Archives



160,49 €
149,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9789048158836
Medium: Buch
ISBN: 978-90-481-5883-6
Verlag: Springer Netherlands
Erscheinungstermin: 04.12.2010
Sprache(n): Englisch
Auflage: 2001
Serie: Fundamental Theories of Physics
Produktform: Kartoniert
Gewicht: 604 g
Seiten: 374
Format (B x H): 155 x 235 mm