

Electron Spin Resonance of Conduction and Spin Waves Dynamics Investigations in Bi-2223 Superconductor for Decoding Pairing Mechanism

Authors : S. N. Ekbote, G. K. Padam, Manju Arora

Abstract : Electron spin resonance (ESR) spectroscopic investigations of $(\text{Bi, Pb})_2\text{Sr}_2\text{Ca}_2\text{Cu}_3\text{O}_{10-x}$ (Bi-2223) bulk samples were carried out in both the normal and superconducting states. A broad asymmetric resonance signal with side signals is obtained in the normal state, and all of them disappear in the superconducting state. The temperature and angular orientation effects on these signals suggest that the broad asymmetric signal arises from electron spin resonance of conduction electrons (CESR) and the side signals from exchange interactions as Platzman-Wolff type spin waves. The disappearance of CESR and spin waves in a superconducting state demonstrates the role of exchange interactions in Cooper pair formation.

Keywords : Bi-2223 superconductor, CESR, ESR, exchange interactions, spin waves

Conference Title : ICSMMS 2023 : International Conference on Superconducting Materials and Materials Science

Conference Location : London, United Kingdom

Conference Dates : March 16-17, 2023