Theoretical study of next-nearest-neighbor electron hopping on Superconducting gap in cuprates

P BEURA   AND   K L MOHANTA[*]

Department of Physics, Faculty of Engineering and Technology (ITER),
Siksha 'O' Anusandhan University, Bhubaneswar-751030, Odisha, India,
*Corresponding author,Email: kamalmohanta@soauniversity.ac.in

Abstract. We propose here a single band tight binding model Hamiltonian to describe the effect of next-nearest-neighbor (NNN) electron hopping on superconducting gap in cuprates. The Hamiltonian consists of nearest- and next- nearest- neighbor electron hopping between the copper sides. BCS type superconducting interaction is considered taking d-wave pairing symmetry. The total Hamiltonian is solved by Zubarev's Green function technique. The temperature dependent superconducting gap equation is derived from the correlation functions and are solved self-consistently technique 100×100 grid points of the electron momentum. The evolution of the order parameter is investigated by varying superconducting coupling, and next- nearest- neighbor electron hopping integrals.

Keywords: High-temperature superconductor, d-wave pairing symmetry, next- nearest-neighbor electron hopping.

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