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Theoretical Model Study of Superconductivity of 122 type Iron-based Superconductors

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Abstract. We propose here a tight-binding model study of iron-based superconductors taking a one band model approach with the two different electron hopping integrals. Further the superconducting gap in this system is considered using three different pairing symmetries like $s_{\pm}$-wave, d-wave and s-wave. The total Hamiltonian is solved by Zuvarev's Green's function technique and the quasi-particle bands are calculated for the superconducting system. The electron DOS which is proportional to experimentally observed tunneling spectra is calculated from the imaginary part of the electron Green's function. The electron density of states (DOS) is computed numerically taking total Brillouin zone of the system. The electron DOS exhibits asymmetric gap structure with a V-shaped gap with a node for $s_{\pm}$-wave and d-wave, while it shows asymmetric U-shaped gap for s-wave. Finally the computed electron specific heat exhibits a sharp jump near the superconducting transition temperature.

Keywords: Iron-based superconductors, tunneling spectra, specific heat

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[Full Paper]