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Role of kinetic energy and spin density wave (SDW) interaction in iron-based superconductors: A model study

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Abstract: We report here the interplay of spin density wave (SDW) and kinetic energy hopping integrals in newly discovered oxypnictide iron-based superconductors. The system is described by a minimum two-band model consisting of nearest and next-nearest neighbour intra- and inter-orbital hoppings of electrons of iron ions. Besides, we propose here a Heisenberg type spin-spin interaction among the electrons of iron ions considered within a mean-field approximation. The electron Green's functions are calculated by Green's function technique of Zubarev and hence the gap equation for SDW order is calculated which is solved self-consistently. The interplay is investigated by the variation of temperature dependent SDW gap, the electron density of states (DOS) and temperature dependent electronic specific heat. The results are discussed according to the experimental observations.

Keywords : Two-band model, Spin density wave (SDW), Fe-Oxypinctide, Specific heat, Density of states (DOS).

[Full Paper]