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Evolution of the multiband Ruderman-Kittel-Kasuya-Yosida interaction: Application to iron pnictides and chalcogenides

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Abstract

The indirect Ruderman-Kittel-Kasuya-Yosida (RKKY) interaction in iron pnictide and chalcogenide metals is calculated for a simplified four-band Fermi surface model. We investigate the specific multi-band features and show that distinct length scales of the RKKY oscillations appear. For the regular lattice of local moments, the generalized RKKY interaction is defined in momentum space. We consider its momentum dependence in paramagnetic and spin density wave phases, discuss its implications for the possible type of magnetic order and compare it with the results obtained from a more realistic tight-binding-type Fermi surface model. Our finding can give important clues to the magnetic ordering of 4f-iron-based superconductors. © IOP Publishing and Deutsche Physikalische Gesellschaft.

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