

Possible origin of dual character of the electrons in iron-pnictides

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Great effort has been devoted to understanding the origin of the magnetism in iron-based superconductors since its discovery. This is due to the fact that the superconducting phases appears mostly in the vicinity of magnetic phases and it is now believed that magnetic fluctuations play important roles in the pairing mechanism. While there exists two contradictory points of view on the mechanism of magnetism in iron-based superconductors, i.e., the nesting effect from itinerant picture versus the spin exchange effect from localized scenario, a combination of these two effects was also proposed, i.e., coexistence of localized and delocalized electrons in the iron-based superconductors. Here, based on the analysis of the band structures obtained from ab initio calculations, we propose a new mechanism for the coexistence of particle-like and wave-like electrons in iron-based superconductors by investigating a multi-orbital Hubbard model and further explain the origin of different magnetic pattern such as collinear and bicollinear antiferromagnetic ordering within such a model.