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Enhanced $s\pm$ pairing due to prioritized diagonal motion of electrons in the iron-based superconductors KAZUHIKO KUROKI, KATSUHIRO SUZUKI, HIDETOMO USUI, Osaka University — In the itinerant spin picture of the iron-based superconductors, the nesting between electron and hole Fermi surfaces is usually considered to be the origin of the spin fluctuation. However, there are now some experimental results suggesting that the nesting is not important for superconductivity. An example is the 1111 materials $LnFeAsO_{1-x}H_x$ (Ln=La,Sm etc.), where over 50% of electron doping can be accomplished. Superconductivity not only survives, but is even enhanced in the largely electron doped regime, in contradition to the expectation from the bad nesting. In $LaFeAsO_{1-x}H_x$ in particular, the x vs. T_c phase diagram exhibits a double dome feature, suggesting a possible difference in the pairing mechanism between the lightly doped and the heavily doped regimes. In the present study, we analyze the five orbital model of this system, and show that a peculiar relation among the real space hoppings is realized in the largely electron doped regime, namely, the next nearest neighbor hopping dominates over the nearest one within the d_{xy} orbitals. We argue that this enhances the $s\pm$ pairing, which is a next nearest neighbor pairing in real space, despite the degraded nesting. We also discuss about some other materials having similar real space hoppings.

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