

Real space pairing in high temperature superconductors and heavy fermions: Beyond renormalized mean-field theory and comparison to experiment

Józef Spałek¹

¹*Instytut Fizyki im. Mariana Smoluchowskiego,
Uniwersytet Jagielloński, PL-30-059 Kraków, Poland*

I overview our comprehensive studies of real space pairing carried out in the period 2011-2014. The paired state results from the combined effect of strong kinetic exchange interaction with a correlated motion of the electron forming the pair in real space. In the case of high- T_C superconductivity we have also corrected some of the results coming from the Renormalized Mean-Field Theory and have developed subsequently a systematic diagrammatic approach of the Gutzwiller wave function. The results are compared quantitatively with experiment. I will also address briefly the question of pairing by the Kondo interaction combined with that by the kinetic exchange, with an application to the heavy fermion systems, where coexistence with antiferromagnetism often takes place. We have also applied the method to the spin-triplet pairing. At the end, I address the question of pseudogap within a unified approach (spin-fermion model).

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