DESTRUCTION OF ANTIFERROMAGNETIC ORDER BY LOCALIZED POLARONS

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9.7 cm

The formation of Mott polarons is connected with the breaking of antiferromagnetic order and the induction of magnetic moments by strong coupling. Here we show that also weaker *p*-*d* coupling suitable for HT_C-superconductors may lead to localization of carriers and reduction of the AF correlation range. We consider a 2D Heisenberg antiferromagnet composed from localized *d*-spins which interacts with *p* hole by exchange coupling and solve the problem exactly.
We find that *p*-*d* interaction lowers the energy inversely proportional to the polaron localization range σ. Since the kinetic energy increases as a square of $1/\sigma$ the total energy has a minimum. The corresponding localization radius σ is of the order of 10 Å for CuO_2 planes. We show that in our approach localization leads to a reduction of AF correlation range by compensation and adjustment of AF spins to a hole perturbation. Magnetic properties of the localized polarons, and the resulting destruction of the long range antiferromagnetic order correspond well to experimental results.

13.4 cm

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