SPIN POLARONS IN TWO–DIMENSIONAL SYSTEMS

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9.7 cm

The problem of motion of holes on a square lattice of antiferromagnetically ordered spins is considered. In the first part an overview of the theory of hole dynamics in the antiferromagnetic background will be presented. Motion of a single hole is rather well understood both by numerical and analytical methods. The finite concentration of holes poses challenge. For small but finite concentration of holes a treatment analogous to the standard polaron theory will be discussed starting with an exact mapping of the $t-J$ Hamiltonian into holon and pseudo–spin variables. The Self–Consistent Born Approximation is applied to calculate the energy spectrum of holons interacting with magnons. Both 1– and 2–magnon processes, as well as some corrections from higher order processes are considered. 2–magnon processes appear to contribute heavily to the holon self–energy. This observation, as apparently inconsistent with earlier treatments, will be discussed in details. Finally, extensions of the $t-J$ model will be mentioned and comparisons of the theoretical holon spectra with experimental data will be discussed.

13.4 cm

Subject category :

1. Correlated Electrons and High Temperature Superconductors

Presentation mode :
PLENARY LECTURE

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