SUPERCONDUCTING PAIRING IN THE t-J MODEL USING DECOUPLED SPIN AND CHARGE VARIABLES.

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9.7 cm

Using the mapping of the single-occupation space of the t-J model onto the tensor-product space of local spin -1/2 and holon states, the correspondence between the electron Green functions (both the normal and anomalous ones) and the holon ones is deduced. Searching for the onset of the off-diagonal order, the Eliashberg equations for the holon Green functions are deduced. The spin-dependent transport and the terms representing the deviation of the exchange Hamiltonian of the t-J model from the unperturbed antiferromagnetic one lead to the hole pairing mediated by the spin excitations. Assuming the hole-like Fermi-surface centered at (π, π) in the momentum space, the contributions of possible spin-holon interactions to the pairing potential are considered. In particular, we found the magnon exchange processes not discussed in the treatment of the t-J model so far, which seem to be decisive for the existence of the d-wave component of the superconducting gap. At the same time, the latter part of the pairing potential comes from the holes located both in the different sublattices and in the same ones - in agreement with recent exact numerical calculations.

13.4 cm

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