

Theory of the electronic structure and spin susceptibility of $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$

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Abstract

We solve the problem of the effect of strong electron correlations on the homogeneous spin susceptibility of current carriers in CuO_2 planes. We show that the dependence of the spin susceptibility $\chi(T)$ of high- T_c superconductors of the $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ type on temperature and the doping index x can be explained fairly well by the two-band model suggested earlier (the singlet-correlated oxygen band plus the lower Hubbard band of copper). The model has features in common with the phenomenological t - J model but cannot be reduced to the latter completely. In contrast to the t - J model, the density of states of the oxygen holes has a peak near the bottom of the band. It is the presence of this peak together with the non-Fermi-liquid properties that explain the unusual behavior of the spin susceptibility of $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$. © 1997 American Institute of Physics.
