

Influence of correlations on transitive electron-phonon couplings in cuprate superconductors

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We study a model for the CuO_2 plane of high- T_c superconductors where the charge carriers are coupled to A_{1g} and B_{1g} symmetric out-of plane vibrations of the oxygen atoms in the presence of local Hubbard correlations. The coupling is implemented via a modulation of the hopping integral and we calculate the renormalization of vertex and pairing scattering functions based on the time-dependent Gutzwiller approximation. Contrary to local electron-phonon couplings we find that the transitive coupling can even be enhanced by correlations for certain momenta and symmetries of the vibrations. While this effect may be important for certain properties, we find that, with regard to superconductivity, electron-electron correlations still generically lead to a suppression of the pairing correlations. Our results allow for an estimate of correlation effects on the electron-phonon induced pair scattering from weak electron-electron interactions up to the Mott regime. For onsite repulsions relevant to cuprate superconductors our calculations reveal a significant contribution of B_{1g} phonons to d-wave superconductivity.