CMT 19P TWO IMPURITIES MODEL OF STRONGLY CORRELATED ELECTRON SYSTEMS

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There are many systems with strongly correlated electrons where there is also a strong coupling to the lattice, for example V_2O_3 [1], [2], manganites [3] and fullerides [4]. The strong electron-electron interactions can be described by Hubbard [5] and Anderson [6] models. The Holstein model [7] has been used to examine electron-phonon interactions.

The advances in the field of molecular electronics have revived the interest to the problem of electron-phonon interaction because electron-vibrational coupling within the molecule is important for understanding the properties of such devices.

In this work, unlike the previous [8], wherein is used the single impurity Anderson-Holstein model we have developed a diagrammatic approach for the two impurities Anderson-Holstein model in the case of strong Coulomb intra-atomic interaction of impurity electrons and strong electron-phonon interaction of the impurity electrons with optical phonons. Both interactions are taken into account as the main part of the Hamiltonian. This model will allow us to trace the role of interference effects.

To eliminate the Hamiltonian term linear in phonon coordinate, we make the Lang-Firsov transformation [9]. As a result of phonons exchange arises electron-electron interaction , which modifies the initial Coulomb repulsion.

In the perturbation approach elaborated by us we shall use the generalized Wick theorem proposed in [10-14] for strongly correlated systems. The generalized theorem will be employed for the impurity subsystem and the standard theorem will be used for conduction electrons and optical phonons.

We have indentified the diagrams of the second-order perturbation theory and formulated the system of Dyson-Larkin type equations which determines the relation between the full propagators of impurity electrons and their correlation functions. The system of equations can be closed by summing the infinite series of ladder diagrams containing irreducible Green's functions. In the used approximation only the simplest irreducible Green's function of the localized electrons is considered and iterated many times.

The two-particle irreducible Green's function was established for arbitrary values of the chemical potential.

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