THERMODYNAMICS OF PSEUDOSPIN–ELECTRON MODEL IN THE $U = 0$ LIMIT

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9.7 cm

In this work the results of the analytical consideration of a pseudospin–electron model in the absence of electron correlations are presented. Such type model is used to describe an anharmonic vibrations of apical oxygen ions in the YBaCuO type high–T_c superconductors. Mean values of the pseudospin and particle number operators, thermodynamical potential as well as the pair correlation functions are obtained within the one self-consistent scheme in the framework of the GRPA (generalized random phase approximation) with the inclusion of the mean field corrections. The calculations are performed by diagrammatic method.

The pseudospin pair correlator is investigated in the uniform case for different values of the wave vector. Starting from the obtained results, the possibility of the modulated phase appearance is established. The thermodynamics of the chess-board phase is investigated in the framework of the above mentioned approximation. The numerical analysis shows in the $\mu =$ const regime the possibility of either first or second order phase transitions between different uniform phases (bistability) as well as between the uniform and the chess–board ones. In the regime $n =$ const, an instability with respect to phase separation in the electron and pseudospin subsystems can take place for the certain values of the model parameters.

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