THERMODYNAMICS OF PSEUDOSPIN-ELECTRON MODEL AT WEAK COUPLING

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9.7 cm

The thermodynamically equilibrium states and phase transitions in the pseudospin-electron model (PEM) with transverse field are studied in the case of weak coupling. The model appeared in connection with the investigation of the role of the anharmonic structure elements in properties of the high-T_c superconductors. On the other hand, the PEM is in a close relation to the Falicov-Kimball (FK) model for which the variety of homogeneous, modulated and incommensurate phases as well as the possibility of phase separation are known. In comparison with PEM there exists a difference in the regime of thermodynamical averaging. Besides, the term with transverse field which is responsible for the proper dynamics in the localized particle subsystem is absent in the FK model; thus, the thermodynamics of the PEM can have its own features. In the $\mu = const$ regime the first order phase transitions within the uniform phase as well as the first or the second order transitions into the chess-board or incommensurate phase are revealed depending on the location of the chemical potential. In the regime $n = const$ it corresponds to the possibility of separation into phases of the different type. We have also investigated the role of the tunneling-like splitting: besides the general decrease of the phase transition temperatures and narrowing of the segregation regions, it influences the conditions of appearance of the modulated or incommensurate phases.

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