

ELECTRONIC PHASE TRANSITIONS IN THE TWO DIMENSIONAL SPIN-ONE-HALF FALICOV-KIMBALL MODEL

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The extrapolation of finite cluster calculations is used to study the ground-state properties of the spin-one-half Falicov-Kimball model in two dimensions. Particular attention is paid on the description of the ground state phase diagram and the corresponding picture of valence and metal-insulator transitions. A number of remarkable results are found. (i) The phase separation in the spin-one-half Falicov-Kimball model takes place for a wide range of f -electron concentrations n_f and d - f interactions U , including U large. (ii) For weak and intermediate interactions ($U = 1$ and $U = 2$) the model exhibits an inhomogeneous charge ordering (the axial charge stripes). (iii) In the strong coupling limit the model exhibits a pressure induced discontinuous insulator-metal transition from an integer-valence state ($n_f = 1$) into another integer-valence state ($n_f = 0$). (iv) For small and intermediate values of U the model undergoes a few consecutive discontinuous and continuous intermediate-valence transitions.

13.4 cm

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9.7 cm