# Extended Falicov-Kimball Model: Rigorous Analytic Solution in Large Dimensions

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The Falicov-Kimball model is a simplified version of the Hubbard model, where only electrons with, e.g., spin down, are itinerant and the other are localized [1-3]. Here, we discuss results for the extended Falicov-Kimball model (including also intersite interactions) on the Bethe lattice in the large-dimension limit derived within the dynamical mean field theory formalism, which is an exact approach in this limit [3-6]. Within this method, we found rigorously analytic expressions for the temperature-dependent density of states at half-filling [4,5]. We detected stability regions of eight different kinds of ordered phases, where both charge order and antiferromagnetism coexist (five of them are insulating and three are conducting) as well as three different nonordered phases. Moreover, we analyzed their thermodynamic properties [5-7]. The results are compared to those obtained within the standard Hartree-Fock approximation [6,7]. For small interactions the anomalous temperature dependence of the order parameter, characterized by the sharp reduction near $T \approx T_C/2$, occurs [6].

**References:**

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