GROUND STATES OF $S = 1/2$ FALICOV-KIMBALL MODEL

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9.7 cm

The Falicov-Kimball model with spin 1/2, as proposed by Brandt et al. and used to describe electronic properties of rare-earth compounds, is considered. It describes two sorts of electrons: itinerary d electrons and static f ones.
The Hamiltonian consists of the "classical part" H_0 and the "quantum" part V, where

$$H_0 = U \sum_{i;\sigma,\eta} d^\dagger_{i,\sigma} d_{i,\sigma} f^\dagger_{i,\eta} f_{i,\eta} + \mu_d \sum_{i;\sigma} d^\dagger_{i,\sigma} d_{i,\sigma} + \mu_f \sum_{i;\eta} f^\dagger_{i,\eta} f_{i,\eta}$$

$$V = -t \sum_{<ij>;\sigma} (d^\dagger_{i,\sigma} d_{j,\sigma} + d^\dagger_{j,\sigma} d_{i,\sigma})$$

where i, j are site indices; σ, η – spin indices; $d^\dagger_{i,\sigma}$, $d_{i,\sigma}, f^\dagger_{i,\eta}, f_{i,\eta}$ are creation and annihilation operators of the corresponding particles; U – Coulomb repulsion between d and f electrons; t – hopping constant; μ_d, μ_f – chemical potentials. We assume infinite Coulomb repulsion between f-electrons. The model is considered in the *perturbative regime* $t << U$.
At the Conference we will present the following results: *i)* calculation of an effective Hamiltonian up to fourth order in the perturbation theory; *ii)* analysis of its ground states; there are certain similarities and differences to their counterparts for the spinless FK model). The relationship of our results to experimental data will be also supplied.

13.4 cm

Subject category :

1. Correlated Electrons and High Temperature Superconductors

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