Abstract Submitted to the
3rd Conference on Concepts in Electron Correlation
30 September - 5 October, 2005
Hvar, Croatia

Static and dynamic properties of the spinless Falicov-Kimball model
K.W. Becker¹, S. Sykora¹, V. Zlatic²

¹ Institut für Theoretische Physik, Technische Universität Dresden, D-01062 Dresden, Germany
² Institute of Physics, Bijenicka c. 46, P.O.B. 304, 10000 Zagreb, Croatia

The spinless Falicov-Kimball model in one dimension is studied by use of a recently developed projector-based renormalization method (PRM) for many-particle Hamiltonians. The method is used to analyze static and dynamic low-temperature properties of the model at half-filling. To these belong the quasiparticle excitation energy $\tilde{\varepsilon}_k$ and the momentum distribution $n_k$ of the conduction electrons and the spatial correlation function of the localized electrons. One of the remarkable results is the appearance of a gap in $\tilde{\varepsilon}_k$ at the Fermi level of order $U$ which is accompanied by a smooth behavior of $n_k$. The density of states of the conduction electrons and the one-particle spectral functions of the localized electrons are also discussed. In both quantities a gap opens with increasing $U$.

Keywords : Strongly correlated electrons, renormalization approach