

## **Total Raman scattering features in the CDW chess-board phase of the Falicov-Kimball model**

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Exact solution for the total electronic Raman scattering response function is derived for case of the insulating phase with charge-density-wave (CDW) order. We examine the spinless Falicov-Kimball model on an infinite-dimensional hypercubic lattice. The Falicov-Kimball model is one of the simplest strongly correlated many-body models, which displays rich physics and has an exact solution within dynamical mean-field theory (DMFT), as well as its charge vertex is known.

When the temperature is less than  $T_c$ , the density of states (DOS) displays strong dependence on temperature. That DOS features are reflected in the Raman spectra which also show significant features in  $T$ . Our main result is that there are a large number of strong resonances, which are connected with the peculiarities of the ordered-phase DOS.

We study three common experimental symmetries, which define the polarization of incident and scattered light. The complicated shape of the Raman spectrum and its strong reconstruction with the change of the incident photon energy is caused by the presence of the subbands with strong temperature dependence. The results for the resonance effects give information about the many-body charge dynamics of the CDW-ordered phase. We examine both weakly and strongly correlated cases.