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Vertex corrections on the one- and two-particle level

With the advent of vertex-based extensions of dynamical mean-field-theory for calculating properties of strongly correlated electron lattice systems, it became possible to treat non-local strongly coupled electrons. Due to its simpler behaviour in comparison to the Hubbard model, the Falicov-Kimball model [1,2] provides an excellent test-bed for new methodic developments.

We investigate the Falicov-Kimball model within the dual-fermion framework, calculating self-energy corrections due to non-local correlations[3], as well as conductivities. Vertex-corrections to the conductivity of the system are calculated, taking into account the tendency of electrons to move as pairs. This kind of corrections is also responsible for Anderson-localisation and superconductivity.

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