Single-boson exchange decomposition for the extended Hubbard model with application to the optical conductivity

Daniel Wieser

Technische Universität Wien

The parquet decomposition has proven a versatile tool to compute properties of strongly interacting quantum many-body systems. While it captures vertex corrections unbiased with respect to the scattering channel, it is mainly limited by the vast size of the working variables. Recently, a reformulation of the parquet equations in terms of single-boson exchange diagrams has been put forward. For the Hubbard model, it has already been confirmed that this reduces the memory requirements and thus facilitates the application to larger systems. In order to use this method in the extended Hubbard model, the single-boson exchange decomposition is generalized to non-local interactions. Subsequently, the parquet and single-boson exchange decomposition are applied to the benzene ring in exact diagonalization to identify the contributions which cause the reduction of the optical band gap.