

X-ray photoemission spectra for the Falicov-Kimball model with correlated hopping

Monday, 23 December 2019 11:35 (20 minutes)

We present the results of the investigation of X-ray photoemission spectra (XPS) for the strongly correlated electron system with both local and nonlocal correlations (correlated hopping). We consider the Falicov-Kimball model, the simplest model of strongly correlated electrons, extended by the inclusion of the interaction with deep core-hole state. Despite its simplicity, the Falicov-Kimball model has a metal-insulator transition for large Coulomb repulsion and is exactly solvable via dynamical mean-field theory in infinite dimensions. XPS response at finite temperatures is connected with the core-hole propagator, which is exactly expressed by the functional determinants on the Keldysh contour in time domain.

Present study is a continuation of our previous works, which considered the effect of correlated hopping on thermal transport and optical spectra. As we found previously for a wide range of the correlated hopping parameters, there are some singularities on the single-particle density of states and on the transport function ("quasiparticle" scattering time). Due to these anomalies and violation of the electron-hole symmetry, there is a huge enhancement of the thermoelectric properties and optical conductivity exhibits a number of interesting features in the vicinity of these singularities. We show to what extent these anomalous features can be manifested on the X-ray photoemission spectra at finite temperatures.

Primary author: DOBUSHOVSKYI, Danylo (Institute for Condensed Matter of the National Academy of Sciences of Ukraine, Lviv)

Presenter: DOBUSHOVSKYI, Danylo (Institute for Condensed Matter of the National Academy of Sciences of Ukraine, Lviv)

Session Classification: Condensed Matter Physics

Track Classification: Condensed Matter Physics