**Influence of the correlated hopping on the X-ray photoemission spectra**

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We present results of the investigation of X-ray photoemission spectra (XPS) for the strongly correlated electron system with both local and nonlocal correlations. We consider the Falicov–Kimball model with correlated hopping, 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.

The present study is a continuation of our previous works [1–2] 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 on the thermoelectric properties and the 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.

1. Dobushovskyi D.A., Shvaika A.M., Zlatić V. Resonant enhancement of thermoelectric properties by correlated hopping for the Falicov–Kimball model on Bethe lattice. Phys. Rev. A 95, 125133 (2017).
2. Dobushovskyi D.A., Shvaika A.M. Nonlocal correlations in the optical conductivity spectra. Condens. Matter Phys. 21, 6, 23702 (2018).