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A Multiorbital DMFT Analysis of Electron-Hole Asymmetry in the Dynamic Hubbard Model

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The dynamic Hubbard model (DHM) improves on the description of strongly correlated electron systems provided by the conventional single-band Hubbard model through additional electronic degrees of freedom, namely a second, higher energy orbital and associated hybridization parameters for interorbital transitions. The additional orbital in the DHM provides a more realistic modeling of electronic orbital “relaxation” in real lattices. One result of orbital relaxation is a clear electron-hole asymmetry, absent in the single-band case. We have employed the computational technique of dynamical mean field theory, generalized to the two-orbital case, to study this asymmetry with respect to varying system parameters, including both intersite and intrasite orbital hybridization as well as the role played by Mott physics. Our results stand in good agreement with previous exact diagonalization studies of the DHM.

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