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Nonequilibrium dynamical mean-field analysis of strongly photoexcited states of a Mott insulator NAOTO TSUJI, TAKASHI OKA, HIDEO AOKI, Department of Physics, University of Tokyo — Recent progress in pump-probe reflectivity and photoemission spectroscopy measurements has enabled us to drive correlated electron systems into highly excited states to detect their ultrafast relaxation dynamics. Theoretically, a crucial interest is how a Mott insulator changes its nature when the pump light creates photo-carriers that should significantly alter the physical properties from the Mott's insulating state.
In order to explore this, we adopt Floquet's method (for strong ac fields) as combined with the nonequilibrium dynamical mean-field theory, and apply this to the Hubbard model at half-filling. As a solver for the nonequilibrium impurity problem, we mainly use the iterated perturbation theory. The result for the optical conductivity exhibits that a low-energy peak of the spectral weight evolves with the intensity of the pump light, where the width of the peak does not follow the Fermi-liquid behavior, which implies that the system turns into an anomalous metallic state. A change from the insulator to a metallic behavior is also observed in the single-particle spectrum and the nonequilibrium distribution function. We will further discuss how such excited states relax after the pump light is turned off.

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