

# Kondo echo dynamics of terahertz-pumped heavy fermions

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We provide a theoretical framework to describe the nonequilibrium temporal dynamics of correlated electron systems for realistic system parameters and the consequent, often exponentially long time scales. It is based on an entirely integro-differential formulation of time-dependent dynamical mean-field theory, the noncrossing approximation, and the quantum representation of a driving electromagnetic field. For heavy-fermion systems, we identify two key nonequilibrium mechanisms governing their time evolution after a single-cycle terahertz excitation: transient, instantaneous shift from the Kondo toward the mixed-valence regime by an enhanced, photoassisted hybridization, and slow recovery of the heavy-fermion state due to the long Kondo coherence time. This explains recent time-resolved terahertz spectroscopy experiments microscopically and establishes the latter as a technique for direct experimental access to the Kondo coherence time and to the heavy-fermion quasiparticle weight, central for the classification of heavy-fermion quantum phase transitions.