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Coherence effects in the ultra-intense laser-induced ultrafast response of complex atoms YONGQIANG LI, JIANMIN YUAN, National University of Defense Technology — Both coherent pumping and energy relaxation play important roles in understanding physical processes of ultra-intense coherent light-matter interactions. Here, using a large-scale quantum master equation approach, we describe dynamical processes of practical open quantum systems driven by both coherent and stochastic interactions. As examples, two typical cases of light-matter interactions are studied. First, we investigate coherent dynamics of inner-shell electrons of a neon gas irradiated by a high intensity X-ray laser along with vast number of decaying channels. In these single-photon dominated processes, we find that, due to coherence-induced Rabi oscillations and power broadening effects, the photon absorptions of a neon gas can be suppressed resulting in differences in ionization processes and final ion-stage distributions. Second, we take helium as an example of multi-photon and multichannel interference dominated electron dynamics, by investigating the transient absorption of an isolated atto-second pulse in the presence of a femto-second infrared laser pulse..

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