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Adiabatic Approximation for Atomic Ionization YOULIANG YU, BRETT ESRY, Kansas State Univ — Strong-field processes involving long wavelengths (longer than 800 nm) have attracted particular attention in recent years due to the highly nonlinear nature of its interaction with atoms and molecules. Although numerically solving the time-dependent Schrödinger equation (TDSE) is the only way to describe these interactions in a fully quantitative manner, it usually requires intensive computational resources. For example, the usual single active electron calculation for single set of laser parameters under typical laboratory conditions can take several hours to several days to compute. In this work, we take advantage of the fact that the Hamiltonian varies slowly in the long-wavelength limit compared to the intrinsic time scales of the system to derive an approximate solution. Specifically, we expand the solution of the TDSE on the adiabatic basis calculated from the instantaneous Hamiltonian. The field strength is thus treated as the slowly varying parameter; and the non-adiabatic couplings, as a time-dependent perturbation. Results from this static field perturbation theory are compared with direct TDSE calculations for a model potential.

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