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Ionization of Excited Atoms in Intense, Low Frequency Single-Cycle Fields SHA LI, ROBERT JONES, University of Virginia — We have employed intense THz pulses to explore strong-field, single-cycle ionization of low-lying Rydberg states in the low-frequency limit. In contrast to the ground-state atoms commonly used as targets for intense laser experiments, excited atoms and polar molecules can exhibit large linear Stark shifts in the presence of static or slowly varying fields. These shifts can have a significant effect on the ionization probability and dynamics in the field. In the experiments, sodium Rydberg atoms are laser-excited using two ns dye lasers and then exposed to a single-cycle, ps THz pulse produced via optical rectification in LiNbO3 of a tilted pulse front, 100fs, 780nm laser pulse. A time-of-flight spectrometer is used to record the ionization yield and energy distribution of the ejected electrons as a function of principal quantum number and the THz field strength. The measurements are compared with those of previous experiments on long-pulse microwave and ramped-field ionization of higher-lying Rydberg states and with the results of classical Monte Carlo simulations.

Robert Jones
University of Virginia

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