Femtosecond Photoelectron Imaging of Dissociating and Autoionizing States in Oxygen

ALEXANDER PLUNKETT, ARVINDER SANDHU, Univ of Arizona — Time-resolved photoelectron spectra from molecular oxygen have been recorded with high energy and time resolution using a velocity map imaging (VMI) spectrometer. High harmonics were used to prepare neutral Rydberg states converging to the $e^4\Sigma_u^-$ ionic state. These states display both autoionization and predissociation. A femtosecond laser pulse centered at 780 nm was used to probe the system, ionizing both the excited molecular states and the predissociated neutral atomic fragments. Electrons were collected in the 0-3 eV range using a VMI spectrometer and their spectra were reconstructed using a Fast Onion-peeling algorithm. By looking at IR modification to the electron spectrum, new features are observed which could originate from long-range columbic interactions or previously unobserved molecular decay channels. Ongoing studies extend this technique to other systems exhibiting non-adiabatic dynamics.

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