VUV pump – infrared probe studies of molecular dissociation following state-selective photoexcitation

Y. MALAKAR, B. KADERIYA, W.L. PEARSON, KANAKA RAJU P., XIANG LI, WEI CAO, I. BEN-ITZHAK, A. RUDENKO, J.R. Macdonald Laboratory, Kansas State University Manhattan KS 66506 USA, D. TRABERT, F. WILHELM, University of Frankfurt, Frankfurt, D-60486, Germany — Time-resolved measurements employing light sources based on high-harmonics generation are typically performed using broad-band pulses aiming at the shortest pulse duration achievable. This inherently results in a population of a superposition of states. In contrast, we employed ~ 100 fs VUV pulses with a narrow bandwidth of ~ 200meV (filtered by a grating pair), to achieve state-selective excitation. We used 11th harmonic pump (centered at 17.3 eV) – 800 nm probe pulse sequence to trigger the dissociative ionization of O$_2$ and CO$_2$, which was characterized by energy- and angle-resolved photoion and photoelectron detection. While for the case of O$_2$ the data can be understood in terms of the (net) absorption of one and two 800 nm photons from the VUV-excited ionic state, the preliminary CO$_2$ results manifest rich dynamics, which surprisingly resembles the behavior observed in a recent experiment [1], where a comb of 11th to 17th harmonics was used.


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