

Abstract Submitted
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Formation and Dissociation of Transient Molecular States with Ultrafast X Rays JAMES GLOWNIA, JAMES CRYAN, PHILIP BUCKSBAUM, RYAN COFFEE, The PULSE Institute, SLAC National Accelerator Lab, LCLS AMO 02709 COLLABORATION¹ — We report the first pump-probe spectra using 1 keV pulses from LCLS to excite N₂ in delayed coincidence with 800 nm laser pulses. The relative timing between the pump and probe was controlled to within 100 femtoseconds. We determined the timing based on the rapid formation of nitrogen dications by x-ray core ionization and subsequent Auger relaxation into a quasi-bound final state. Our operating photon energy primarily photoionized *K*-shell electrons. *KLL* Auger relaxation rapidly follows, frequently leaving the molecule in one of several quasi-bound dicationic states. We subsequently triggered dissociation of these quasi-bound states by dressing the dications in the optical laser field, thus bond-softening the potentials into dissociation.

¹www.pulse.slac.stanford.edu/amo02709

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