

Abstract Submitted
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Characterizing multiphoton excitation using time-resolved x-ray scattering¹ PHILIP BUCKSBAUM², PULSE Institute, Stanford University/SLAC, MATTHEW WARE, NOOR AL-SAYYAD, PULSE Institute, Stanford University, ADI NATAN, PULSE Institute, SLAC National Accelerator Laboratory, J. MICHAEL GLOWNIA, LCLS, SLAC National Accelerator Laboratory — Molecular iodine was photoexcited by a strong 800 nm laser, driving Raman excitation of vibrational states on the ground state as well as multiphoton dissociation. The subsequent motion following photoexcitation is observed using time-resolved x-ray scattering (TRXS) and analyzed using the temporal Fourier transform of TRXS, called frequency-resolved x-ray scattering (FRXS). The FRXS signal identifies vibrations with a beat frequency of 40.3 ± 1.0 THz oscillating about an equilibrium position of 0.28 ± 0.01 nm, which match the expected beat frequency and equilibrium position for Raman excited vibrations on the ground state. Molecular dissociation also has a distinct signature in FRXS, which may be used to identify both velocities and initial positions of the dissociation channels.

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