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Pump-probe time-dependent interferometry performed using an infrared pump and soft x-ray probe in a COLTRIMS geometry P. RANITOVIC, B. GRAMKOW, A. HUPACH, A. ALNASER, C. MAHARJAN, D. RAY, I. BOCHAREVA, Z. CHANG, I. LITVINYUK, L. COCKE, Kansas State University — We have developed an apparatus for performing laser-pump/x-ray-probe experiments in a COLTRIMS (Cold Target Recoil Ion Momentum Spectroscopy) geometry. A soft x-ray beam is produced by focusing an intense ($2{\cdot}10^{14}$ W/cm^2–$2{\cdot}10^{15}$ W/cm^2) and fast (6 fs – 50 fs) laser beam into a thick (5 Torr – 80 Torr) gaseous medium using three different techniques: an effusive jet, a gas cell and a hollow fiber. This beam is crossed with a room-temperature effusive (10^{-3} Torr) gaseous target of Ar or Ne. The x-ray beam is analyzed in terms of its flux, harmonic energies and angular divergence by measuring full three dimensional photoelectron momentum images in coincidence with the recoil-ions. This apparatus will be used to perform time-dependent interferometry of dissociating H_2^+ (D_2^+) ions. Neutral H_2 (D_2) will be ionized and excited using an infrared pump pulse and probed after a time delay up to 240 fs with the soft x-ray pulses. The x-rays will be focused onto the target, and delayed relative to the pump pulse, using a two-component coaxial coated mirror to select a photon energy band in the 36-48 eV range. Preliminary results will be presented. *This work was supported by Chemical Sciences, Geosciences and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U. S. Department of Energy.

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