

Abstract Submitted
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Strong-field induced dissociation dynamics in 1,2-dibromoethane traced by femtosecond XUV transient absorption spectroscopy A. S. CHATTERLEY, F. LACKNER, Lawrence Berkeley National Lab, D. M. NEUMARK, S. R. LEONE, University of California Berkeley, O. GESSNER, Lawrence Berkeley National Lab — Strong field induced dissociation dynamics of the small haloalkane 1,2-dibromoethane (DBE) have been explored using femtosecond XUV transient absorption spectroscopy. Dynamics are initiated by a near IR pump pulse with intensities between 75 and 220 TW cm⁻², and are probed by the atomic site specific XUV absorption of the Br 3d levels. Immediately upon ionization, the spectral signatures of molecular ions appear. These molecular peaks decay in tandem with the appearance of atomic Br peaks in charge states of 0, +1 and +2, which are all monitored simultaneously. Neutral Br atoms are eliminated in 300 fs, presumably from statistical dissociation of vibrationally hot DBE⁺ ions, Br⁺ ions are eliminated in 70 fs from a more energetic dissociative ionization pathway, and Br⁺⁺ ions are eliminated within the duration of the 35 fs pump pulse. The simultaneous recording of multiple parent molecule and fragment ion traces enables new insight into predominant dissociation pathways induced by strong field ionization of organic molecules.

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