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Identifying isotopic effects in intense ultrafast laser-driven D_2H^+ fragmentation[1] K.D. CARNES, A.M. SAYLER, J. MCKENNA, B. GAIRE, NORA G. KLING, B.D. ESRY, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Physics Department, Kansas State University, Manhattan, Kansas 66506 — The triatomic hydrogen molecular ion is instrumental as a benchmark toward understanding the strong-field dynamics of polyatomic molecules. Using a crossed-beams coincidence three-dimensional momentum imaging method, we demonstrate clear isotopic effects in the fragmentation of D_2H^+ induced by 7 fs (40 fs), 790 nm laser pulses at an intensity of 10^16 W/cm^2 (5×10^{15} W/cm^2). Our experiment uniquely separates all fragmentation channels and provides kinematically complete information for the nuclear fragments. We show that for dissociative ionization of D_2H^+ there is a large difference in branching ratios of the two-body channels, where H^++D_2^+ dominates D^++HD^+, and the three-body channels, where H^++D^++D dominates D^++D^++H. In contrast, the dissociation channels display minimal differences.

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