Abstract Submitted
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Strong-field-induced dynamics in bound and dissociative states of the halomethanes[1] BALRAM KADERIYA, KANAKA RAJU PANDIRI, YUBARAJ MALAKAR, TRAVIS SEVERT, FARZANEH ZIAEE, KURTIS BORNE, WRIGHT LEE PEARSON, JYOTI RAJPUT, ITZIK BEN-ITZHAK, DANIEL ROLLES, ARTEM RUDENKO, J.R. Macdonald Laboratory, Kansas State University, Manhattan, KS 66506 — Halomethanes often serve as prototypical systems for the studies of the laser-controlled chemistry (e.g. bond breaking, bond formation, concerted elimination of the halogens). Here, we present the results of a pump-probe experiment aimed to characterize bound and continuum nuclear wave packets created in diiodomethane (CH_2I_2) and chloroiodomethane (CH_2ICl) molecules irradiated with the intense near-infrared laser pulse. Employing channel-selective Fourier spectroscopy of the delay-dependent ion yields, we identify signatures of the vibrational motion in both, neutral and ionic states, and observe signatures of bending and stretching vibrations. Using coincident 3D ion momentum imaging to disentangle different pathways leading to the doubly and triply charged final states, we trace the spatio-temporal evolution of several dissociation channels triggered by the pump pulse. We focus on the pathways involving a new bond formation, in particular, I_2 or ICl elimination, discuss possible mechanisms of these reactions and their correlation with the bound-state vibrational motion.

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