Abstract Submitted
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Coulomb explosion imaging of bound and continuum nuclear wave packets in strong-field ionization of iodomethane[1] Y. MALAKAR, M. ZOHRABI, W.L. PEARSON, B. KADERIYA, KANAKA RAJU P., I. BEN-ITZHAK, D. ROLLES, A. RUDENKO, J.R. Macdonald Laboratory, Kansas State University, Manhattan KS 66506 — As a prototypical polyatomic system with well-studied photodissociation dynamics, the iodomethane molecule (CH_3I) has recently been used to test novel quantum control schemes [1], and to investigate charge transfer processes after X-ray absorption [2]. These applications require a detailed understanding of CH_3I behavior in intense laser pulses. Here we present the results of a time-resolved Coulomb explosion imaging experiment that maps both, bound and dissociating nuclear wave packets in singly and doubly charged ionic states of CH_3I. Measuring energies and emission angles of coincident ionic fragments as a function of time delay between two 25 fs, 800 nm pump and probe pulses, we track the propagation of different dissociation pathways, vibrational motion of the molecule and its impulsive alignment. In particular, a periodic ($\sim$ 130 fs) feature in the delay-dependent ion energy spectra can be assigned to C-I stretching vibrations in the two lowest cationic states, and exhibits intriguing correlation with the oscillations observed in the laser pump / X-ray probe experiment on charge transfer at LCLS [2]. [1] M.E. Coralles et al, Nature Chemistry 6, 785 (2014). [2] B. Erk et al, Science 345, 288 (2014).

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