Abstract Submitted
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Spatio-temporal imaging of multimode vibrational wave packets in strong-field ionization and excitation of iodomethane[1] Y. MALAKAR, M. ZOHRABI, W.L. PEARSON, B. KADERIYA, F. ZIAEE, KANAKA RAJU P., I. BEN-ITZHAK, D. ROLLES, A. RUDENKO, J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 — We report on the experimental characterization of a vibrational wave packet created in iodomethane molecule (CH_3I) irradiated by an intense laser field. Using a combination of a pump-probe setup employing two 25 fs, 800 nm pulses and an ion momentum imaging apparatus, we identify the signatures of vibrational motion in different electronic states by channel-selective Fourier spectroscopy. The delay-dependent yields of parent ions and iodine fragments from dissociative ionization are dominated by the vibrations in the ground state of the neutral molecule and manifest the opposite phase behavior, which is consistent with the bond softening mechanism of vibrational excitation [1]. For the doubly charged parent ions vibrational motion in the ground cationic state plays a more important role. Finally, in the Coulomb explosion channels structures reflecting vibrations in the first excited state of the cation can be clearly identified if the pump pulse intensity is kept sufficiently low to avoid the dissociation of this state within the pump. [1] Z. Wei et al., Nature Communications 8, 735 (2017)

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