

Abstract Submitted
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Characterizing strong-field-induced molecular dynamics employing time-energy-frequency analysis of vibrational wave packet motion¹
YUBARAJ MALAKAR, WRIGHT LEE PEARSON, BALRAM KADERIYA, MOHAMMAD ZOHRABI, KANAKA RAJU PANDIRI, FARZANEH ZIAEE, ITZIK BEN-ITZHAK, DANIEL ROLLES, ARTEM RUDENKO, J. R. Macdonald Laboratory, Department of Physics, Kansas State University, USA, SHAN XUE, School of Nuclear Science and Technology, Lanzhou University, China, ANH-THU LE, Department of Physics, Missouri University of Science and Technology, USA — We employ time-resolved 3D momentum imaging combined with channel- and energy-resolved Fourier spectroscopy to study pathways of strong-field ionization and fragmentation of CH₃I, and to map vibrational wave packet dynamics in the intermediate neutral and cationic states. Analyzing the delay-dependent signals of bound parent ions as well as CH₃⁺ and I⁺ⁿ ($n = 1, 2, 3$) ionic fragments recorded in a pump-probe measurement with two 25 fs, 780 nm laser pulses, we disentangle different reaction channels based on the measured charge states, kinetic energies and angular distributions. Energy-resolved Fourier spectra and the absolute phases of vibrational wave packets extracted from these delay-dependent measurements provide specific information about the intermediate states contributing to particular reaction pathways.

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