Abstract Submitted
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Multiple ionization and fragmentation of diatomic molecular ions in intense ultrashort laser pulses[1] B. GAIRE, J. MCKENNA, NORA G. JOHNSON, A.M. SAYLER, E. PARKE, K.D. CARNES, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University — Studies on small diatomic molecules benefit our understanding of laser-molecule interactions. Traditionally experiments are performed on neutral gas-phase targets. To create diversity, we have studied the ionization and fragmentation of several diatomic molecular ions (N_2^+, CO^+, NO^+, and O_2^+) in intense (up to 5×10^{15} W/cm^2) ultrashort (8 and 40 fs), 790 nm laser pulses. Coincidence 3D-momentum imaging is employed to separate and obtain the kinematics of all the breakup channels. The measured kinetic energy release and the angular distributions of the breakup processes suggest that the multi-electron dissociative ionization (MEDI) of molecules is a ladder-like process, where the molecules stretch prior to each ionization step in a sequential manner. This behavior is consistent with some earlier studies that use neutral molecules as targets.

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Bishwanath Gaire
J.R. Macdonald Laboratory, Dept of Physics, Kansas State University

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