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Strong-field ionization and fragmentation of acetylene, ethylene, and ethane

E. WELLS, A. VOZNYUK, D.G. SCHMITZ, J.B. MAHOWALD, S.N. TEGEGN, J.L. NAPIERALA, T.G. BURWITZ, Department of Physics, Augustana University, Sioux Falls, SD 57197 USA, BETHANY JOCHIM, M. ZOHRABI, T. SEVERT, N.G. KLING, K.J. BETSCH, BEN BERRY, M.F. KLING, K.D. CARNES, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, Kansas 66506 USA — Velocity-map-imaging is used to examine the momentum distributions of photofragments arising from strong-field ionization of deuterated acetylene, ethylene, and ethane. The kinetic energy release and photofragment angular distributions of several dissociation processes are examined as a function of laser intensity and pulse duration. Notably, we examine elimination of one or two neutral hydrogen atoms following single ionization, the bond-rearrangement processes that lead to D$_3^+$ fragments from ethane and CD$_3^+$ from ethylene, and the transition of the angular distribution of symmetric and near-symmetric dissociation channels from alignment with the laser polarization at high laser intensity to more complex angular distributions at lower laser intensity.

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