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Photo double ionization of acetylene and subsequent fragmentation pathways[1] B. GAIRE, P. BRAUN, I. BOCHAROVA, F. STURM, D. HAXTON, A. BELKACEM, TH. WEBER, Lawrence Berkeley National Laboratory, C.L. COCKE, J.R. Macdonald Laboratory, Kansas State University, A. LANDERS, Department of Physics, Auburn University, R. DORNER, University of Frankfurt —
We have investigated the photo double ionization of acetylene (C_2H_2) molecules using photons of 42eV energy. Coincident measurements of both ions and electrons with the COLd Target Recoil Ion Momentum Spectroscopy (COLTRIMS) method make kinematically complete study possible. We extract the 3d-momentum vectors of each particle using the measured flight time to the detector and the position on the detector. We identify the fragmentation pathways by using the measured energy of the photo electrons, kinetic energy release of the nuclear fragments, photon energy, and the ionization potential for a specific dication state evaluated from theory. We mainly discuss the pathways leading to the symmetric breakup (CH^+/CH^+), the deprotonation (H^+/C_2H^+) and the quasi-symmetric fragmentation (C^+/H_2C^+). We explain the importance of such pathways for the study of the time dependent dynamics of the fragmentation.

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