

Abstract Submitted
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Imaging of metastable CO₂ ions dissociating in flight¹ REID ERDWIEN, BETHANY JOCHIM, PEYMAN FEIZOLLAH, T. SEVERT, BEN BERRY, B. KADERIYA, F. ZIAEE, KANAKU RAJU P., K.D. CARNES, D. ROLLES, A. RUDENKO, I. BEN-ITZHAK, J. R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 USA — Fragmentation of CO₂ molecular ions is a commonly studied process. We examine unimolecular dissociation in flight of metastable CO₂²⁺ ions employing the cold target recoil ion momentum spectroscopy (COLTRIMS) technique. The metastable states responsible for dissociation in flight are populated by ultrashort laser pulses. Data analysis is conducted using a previously described method [1]. Analysis of the high statistics delayed CO₂²⁺ → CO⁺ + O⁺ channel allows us to further demonstrate the power of our method, in particular the direct determination of the lifetime(s) of the decaying state(s) without the need for simulations typically required by other methods. We also extract the 3-D momentum distributions of the dissociating fragments. We compare our findings to existing results.

[1] Bethany Jochim et al., *New J. Phys.* **19**, 103006 (2017).

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