

Abstract Submitted
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Imaging three-body breakup involving two identical fragments¹

PEYMAN FEIZOLLAH, T. SEVERT, BETHANY JOCHIM, BEN BERRY, KANAKA RAJU P., M. ZOHRABI, JYOTI RAJPUT, U. ABLIKIM, B. KADERIYA, FARZANEH ZIAEE, A. RUDENKO, D. ROLLES, K. D. CARNES, B. D. ESRY, I. BEN-ITZHAK, J. R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 — We study the strong-field fragmentation of CO_2 and CO_2^+ into $\text{C}^+ + \text{O}^+ + \text{O}^+$ as examples of three-body breakup involving two identical fragments. This process can happen through concerted- or sequential-breakup mechanisms. In concerted breakup, the two O^+ fragments play indistinguishable roles. In sequential breakup, however, one of the O^+ fragments comes from the first fragmentation step of CO_2^{3+} , and the other one comes from unimolecular dissociation of CO^{2+} in the second step. Therefore, in sequential breakup the two O^+ fragments may be distinguished. A method is proposed that allows us to separate the concerted and sequential processes when the lifetime of the intermediate molecule is much longer than its rotational period. As a result, it is possible to experimentally distinguish the two O^+ fragments in the sequential process.

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