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Pulse duration dependence of strong-field-induced fragmentation of ethylene and acetylene molecules[1] YUBARAJ MALAKAR, FARZANEH ZIAEE, SURJENDU BHATTACHARYYA, KEYU CHEN, KURTIS BORNE, WRIGHT LEE PEARSON, DANIEL ROLLES, ARTEM RUDENKO, J. R. Macdonald Laboratory, Department of Physics, Kansas State University — Understanding the fragmentation of small polyatomic molecules induced by a strong laser field is one of the key steps towards laser-controlled chemistry. For hydrocarbons, such fragmentation dynamics often involve hydrogen migration in different stages of the breakup process. Here we show how the breakup patterns of ethylene and acetylene molecules exposed to intense 800 nm laser fields change as a function of a laser pulse duration. Performing coincident momentum imaging of ionic fragments resulting from two- and three-body breakup of doubly and triply ionized molecules, we trace the signatures of hydrogen migration, analyze the role of different intermediate states, and discuss possible contributions of "concerted" and "sequential" fragmentation pathways.

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