

Abstract Submitted  
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**Strong-field induced bond rearrangement and hydrogen migration in small hydrocarbons**<sup>1</sup> YUBARAJ MALAKAR, WRIGHT LEE PEARSON, ARTEM RUDENKO, J.R. Macdonald Laboratory, Kansas State University, Manhattan, KS 66506 — Imaging and control schemes for photo-induced structural rearrangement dynamics (isomerization, proton migration, H<sub>2</sub>/H<sub>3</sub> elimination etc.) are of particular interest to ultrafast photochemistry. The strong-field regime offers a variety of possibilities to map these reactions (e.g., employing coincident momentum-resolved ion spectroscopy), and to control them by exploiting field-modified or field-induced potentials. Here we report on a series of experiments that study bond rearrangement in small hydrocarbons (CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>4</sub>) irradiated by intense 800 nm laser pulses. We disentangle different fragmentation pathways and identify the isomerization channels by measuring coincident ion momentum patterns for two- or three-body breakup channels. For C<sub>2</sub>H<sub>2</sub> and C<sub>2</sub>H<sub>4</sub> isomerization, we observe the evolution of kinetic energy release spectra with increasing laser pulse duration, which allows us to distinguish the isomerization pathways active within or after the pulse. We demonstrate that a significant (up to an order of magnitude) enhancement of C<sub>2</sub>H<sub>4</sub> isomerization yield and H<sup>3+</sup> elimination from CH<sub>4</sub> for a given light intensity can be achieved with an increase in pulse duration from 25 to 200 fs.

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