Abstract Submitted
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Examination and control of H_3^+ formation in ethane with intense laser pulses[1] CHARLES J. SCHWARTZ, NAOKI IWAMOTO, S. ZHAO, J.L. NAPIERALA, S.N. TEGEGN, A. SOLOMON, E. WELLS, Department of Physics, Augustana University, Sioux Falls, SD 57197 USA, BETHANY JOCHIM, KANAKA RAJU P., T. SEVERT, PEYMAN FEIZOLLAH, K.D. CARNES, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 USA — Guided by COLTRIMS identification of H_3^+ fragmentation channels, an adaptive learning algorithm supplied with 3D momentum based feedback is used to identify intense laser pulse shapes that control H_3^+ formation from ethane. Since a $C_2D_4^{2+}$-D_2 intermediate state is thought to lead to D_3^+ formation via roaming of the D_2, we use the D_3^+:$C_2D_4^{2+}$ ratio as the control objective. In a similar measurement, we control the ratio of D_2H^+ to D_3^+ produced from the D_3C-CH_3 isotopologue of ethane, which selects between trihydrogen cations formed from atoms on one or both sides of ethane. Both the D_3^+:$C_2D_4^{2+}$ and D_2H^+:D_3^+ ratios can be modified by a factor of two or more. In addition, 2D scans of linear chirp vs. third-order dispersion are conducted for a few fourth-order dispersion values while the D_2H^+ and D_3^+ production are monitored. These dispersion scans are not as successful at modifying the D_2H^+:D_3^+ ratio as the adaptive search.

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Eric Wells
Augustana University

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