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**Image-based adaptive femtosecond control of molecules**[1] A. VOZNYUK, T. BURWITZ, D. SCHMITZ, E. WELLS, Department of Physics, Augustana College, Sioux Falls, SD 57197 USA, B. JOCHIM, M. ZOHRABI, K. BETSCH, U. ABLIKIM, M.F. KLING, K.D. CARNES, J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 USA, I. BEN-ITZHAK, Department of Physics, Kansas State University, Manhattan, KS 66506 USA, R. SIEMERING, R. DE VIVIE-RIEDLE, Department für Chemie, Ludwig-Maximilians-Universität München, München, Germany — Incorporating three-dimensional momentum images as feedback into an adaptive control loop allows for identification and manipulation of precise control objectives. For laser control of molecular dynamics, this is accomplished by rapidly inverting velocity map images and deriving a fitness function from the angle-resolved kinetic energy release of the photofragments. We have applied this technique to acetylene, ethylene, and diatomic molecules to explore isomerization and angle-resolved dissociation, among other objectives. Beyond the experiments themselves, the resulting images can also be utilized to unravel the control processes and inform subsequent theoretical efforts. Here we present progress toward understanding the dissociation dynamics in these systems controlled by complex ultrafast laser pulses.

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