Abstract Submitted for the DAMOP12 Meeting of The American Physical Society

Two are better than one: Combining ATI and KER spectra¹ C.B. MADSEN, B.D. ESRY, J.R. Macdonald Laboratory, Department of Physics, Kansas State University — Molecular breakup in a strong laser field is a vital topic, because measurement of the resulting fragments is a key tool for learning about their dynamics. Studies of kinetic energy release (KER) and above-threshold-ionization (ATI) spectra as a function of, e.g., molecular alignment and carrier-envelope-phase have revealed important information about both nuclear and electronic behavior. We explore the potential of gaining even more insight by investigating the breakup probability as a function of all fragment energies at once. As ATI and KER spectra are projections of the joint energy spectrum, this joint spectrum gives a more detailed look into fragmentation dynamics. Validating our strong-field-approximation-based qualitative picture for H_2^+ allows us to generalize our studies to larger molecules. In particular, we show that when the fragmentation probability of even a complex molecule is resolved onto the energies of all fragments, the probability peaks on surfaces separated by the photon energy where the distribution on a given multiphoton surface reflects structure and dynamics of the molecule.

¹Supported by Kansas State University and by the Chemical Sciences, Geosciences, and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy.

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Date submitted: 25 Jan 2012

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