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Quantitative comparison of experiment and theory for intense ultrashort laser-induced dissociation of H_2^+[1] A.M. SAYLER, F. ANIS, J. MCKENNA, B. GAIRE, NORA G. JOHNSON, K.D. CARNES, B.D. ESRY, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University — Experimental measurements and theoretical calculations for intense ultrashort pulse laser-induced dissociation of H_2^+ were performed under near identical conditions producing results for quantitative comparison. The 3D momentum distribution was measured for the fragments of an H_2^+ beam after interaction with 10 fs, 790 nm pulses at intensities of 10^{14}, 10^{13}, and 10^{12} W/cm^2. In parallel, the time-dependent Schrödinger equation was solved in the Born-Oppenheimer representation including nuclear, rotational, and electronic excitation. To obtain angularly-resolved kinetic energy release distributions necessary to compare to measurements, the final wavefunctions, projected onto the scattering states, are averaged over the vibrational state, intensity volume, and thermal distribution appropriate to the experiment. The results of these measurements and calculations are contrasted, testing the quantitative agreement of theory and experiment for ultrashort pulses at these intensities.

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