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Quantitative comparison between theory and experiment for dissociation of H_2^+ in ultrashort laser pulses[1] FATIMA ANIS, J. R. Macdonald Laboratory, Department of Physics, Kansas State University, PENGQIAN WANG, Western Illinois University, A. MAX SAYLER, BISHWANATH GAIRE, NORA JOHNSON, ELI PARKE, JARLATH MCKENNA, KEVIN CARNES, ITZIK BEN-ITZHAK, BRETT ESRY, J. R. Macdonald Laboratory, Department of Physics, Kansas State University — We have performed calculations for H_2^+ dissociation in an intense laser pulse including all possible physical processes except ionization. In particular, we have included nuclear vibration and rotation as well as electronic excitation. We compare these results to data we have obtained from kinematically complete measurements, including both the ionic H^+ and neutral H fragments dissociated from an H_2^+ beam, achieved through coincidence three-dimensional momentum imaging. To make the comparison as quantitative as possible, we have averaged the theoretical results over Frank-Condon, intensity, and rotational distributions to best match the experimental conditions. Rotational motion in H_2^+ is found to be important even for ultrashort pulses ranging from 10-45fs FWHM.

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