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Evidence of H_2^+ dynamical alignment in short laser pulses[1] FATIMA ANIS, B.D. ESRY, J. R. Macdonald Laboratory, Department of Physics, Kansas State University — We will present theoretical results for H_2^+ dissociation in 10-135 fs laser pulses from calculations including nuclear vibration, rotation, and electronic excitation. Nuclear rotation has commonly been neglected for dissociation in short pulses with the nuclei usually considered to be fixed along laser polarization. We will show that the comparison of the total dissociation probability between calculations with nuclear rotation and without it proves to be a good way to quantify dynamical alignment. For example, we find a large difference in the total dissociation probabilities from the two calculations, indicating that there is significant dynamical alignment of H_2^+ for 135 fs pulses and even for 45 fs pulses. For 10 fs pulses, though, the difference is small, hence there is little dynamical alignment. Our results indicate, however, that the angular distribution of the dissociating fragments can not be obtained correctly — even for very short pulses like 10 fs — when nuclear rotation is neglected. It is therefore important to include nuclear in calculations to obtain results directly comparable with the experiments.

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