NH_2 PRODUCT DISTRIBUTIONS FROM THE NONADIABATIC PHOTODISSOCIATION DYNAMICS OF AMMONIA

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Velocity map ion imaging is used to study the photodissociation of ammonia from its first singlet excited state. Kinetic energy distributions are obtained from imaging the dissociation from both the band origin (0^0) and the fundamental umbrella stretch (2^1) of the $\tilde{A}$ state. These are obtained with rotational resolution using (3+1) resonance enhanced multiphoton ionization (REMPI) detection of H-atoms. Below the threshold of 48551 cm^{-1} for forming NH_2 ($^2A_1$) + H, product formation follows nonadiabatic dissociation to form NH_2 ($^2B_1$) + H. Previous work has shown that initial vibrational excitation changes the product branching ratio of two possible pathways. The Doppler profiles with initial excitation of the symmetric (ν_1) and antisymmetric (ν_3) stretch show different H-atom speed distributions which suggests that the antisymmetric products are formed exclusively in the excited state. Imaging confirms these results. The 1^1 excitation gives the kinetic energy distributions covering a wide range of energies agreeing with the Doppler profile. Excitation of 3^1 results in an image containing only a few low energy peaks. Initial fits to term values suggest formation of excited state NH_2.