PFI-ZEKE photoelectron spectra of H_2O^+ in the first excited electronic state

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H_2O^+ is a prototypical Renner-Teller system. In the linear configuration, the ground $^2\Pi_u$ electronic state is degenerate, giving rise to the $\tilde{X}^2B_1$ and $\tilde{A}^2A_1$ states in the bent configuration. Jet-cooled rotationally resolved spectra between the bent ground electronic state of H_2O and the first excited linear $^2A_1$ state of H_2O^+ have been recorded. The sensitivity and the high resolution (~ 1 cm^{-1}) of PFI-ZEKE photoelectron spectroscopy allowed us to probe low bending vibrational levels of the $\tilde{A}^2A_1$ state despite unfavourable Franck-Condon factors for the first time. From our experiments we reconstructed the energy structure of the vibrational levels with $_{2,linear}$ in the range 1-8. These results will be compared with previous *ab initio* calculations [1] and spectroscopic measurements on levels with $_{2,linear}$ 6-8 [2,3,4].

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