THE PFI-ZEKE SPECTRUM OF HfF^+, IN SUPPORT OF FUNDAMENTAL PHYSICS

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The HfF^+ cation has been identified as a molecule with favorable properties for investigation of the dipole moment of the electron. The ion is predicted to have a $^1\Sigma^+$ ground state, but the state of greatest interest is the low-lying $^3\Delta_1$ state, which correlates with $Hf^+(6s5d)F^-$. A high internal electric field may be generated when the Ω=1 state is polarized by a modest external field. In the present work, spectroscopic data for the ground and low-lying states HfF^+ have been obtained using the technique of pulse field ionization - zero electron kinetic energy (PFI-ZEKE) spectroscopy. Sequential two-photon excitation was used, with the first photon set to excite a transition near 28593 cm^{-1}. This previously unreported band was used as it is at slightly less than half of the ionization energy (IE), and therefore not subject to one-color, two-photon ionization. PFI-ZEKE spectra were recorded for the levels $X^1\Sigma^+$ (v=0-6), $^3\Delta_1$ (v=0-3), $^3\Delta_2$ (v=0-3), and $^3\Delta_3$ (v=0,1). Rotational resolution was achieved using single rotational line excitation of the intermediate state. The IE for HfF was found to be 59477 cm^{-1}. Term energies and molecular constants for the ground and low-lying states of HfF^+ will be reported.