ELECTRONIC SPECTROSCOPY OF JET-COOLED HCP$^+$

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Laser-induced fluorescence spectra of jet-cooled HCP$^+$ and DCP$^+$ have been obtained with the pulsed discharge technique using HCP/DCP and argon precursor mixtures. Most of the excited state vibrational fundamentals have been observed and a set of vibrational constants obtained. High resolution spectra of the $^2\Pi_{3/2}$ components of the $0^\prime_0^\prime$ bands of both isotopomers have been recorded, and these spectra show resolved phosphorus hyperfine structure which allowed the determination of the excited state Fermi contact parameter. The $B$ values were used to obtain the ground and excited state effective geometric parameters as $r_{\sigma}^0$(CH) = 1.077(2) Å, $r_{\sigma}^0$(CP) = 1.6013(3) Å, $r_{\pi}^0$(CH) = 1.082(2) Å and $r_{\pi}^0$(CP) = 1.5331(3) Å. The ground state vibrational energy levels reported in the literature were fitted to a Renner-Teller hamiltonian that included the effects of angular momentum coupling as well as spin-orbit, vibrational anharmonicity and Fermi resonance effects.