POLARIZATION QUANTUM BEAT SPECTROSCOPY OF HCF (A^1A''): ^{19}F AND ^{1}H NUCLEAR HYPERFINE STRUCTURE AND THE ZEEMAN EFFECT

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To investigate the ^{19}F and ^{1}H nuclear hyperfine structure and Zeeman effect in the simplest singlet carbene, HCF, we recorded polarization quantum beat spectra (QBS) of $^rR_0(J)$ lines of the pure bending transitions 2_0^n and combination bands $1_0^1 2_0^n$ and $2_0^n 3_0^1$ in the HCF A^1A''-X^1A' system. The spectra were measured under jet-cooled conditions using a pulsed discharge source, both at zero-field and under application of a weak magnetic field (< 30 G). Analysis yielded the nuclear spin-rotation constants (C_{aa}) and weak field Lande g_{aa} factors. Consistent with theoretical expectations, the majority of vibrational levels exhibit a linear correlation of C_{aa} and g_{aa}, from which the a hyperfine constants were estimated. The derived values are consistent with expectations based on the known hyperfine constants of related molecules.