

Λ -DOUBLING IN HIGH ANGULAR MOMENTUM STATES: THE PURE ROTATIONAL SPECTRUM OF CoF ($X^3\Phi_i$)

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The pure rotational spectrum of CoF ($X^3\Phi_i$) has been recorded in the frequency range 270-650 GHz - the first high-resolution study to include all three spin components ($\Omega = 4, 3,$ and 2). CoF was created by reacting cobalt vapor with a mixture of 10% F_2 in He. Fourteen rotational transitions were recorded. Λ -doubling was observed in both the $\Omega = 3$ (5 MHz separation) and $\Omega = 2$ (100 MHz) spin components, an unexpected result for a Φ state. In addition, the spectrum is further complicated by the presence of hyperfine interactions arising from both Co ($I = 7/2$) and F ($I = 1/2$) nuclei. The complete data set has been fit with a Hund case (a) Hamiltonian, and rotational, fine structure, Λ -doubling, and hyperfine parameters have been determined. The observation of Λ -doubling is in contrast to CoCl ($X^3\Phi_i$), where the effect was not observed.