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The hyperfine interaction in ^{171}YbF[1] RICHARD MAWHORTER, ZACHARY GLASSMAN, Pomona College, JENS-UWE GRABOW, Leibniz-Universitaet Hannover, ANH LE, TIMOTHY STEIMLE, Arizona State University
— Motivated by recent further improvements in determining the upper limit for the CP-violating electric dipole moment of the electron (eEDM), the pure rotational spectrum of the open shell molecule ytterbium fluoride, ^{171}YbF, in the $X^2\Sigma^+$ (v =0) state has been recorded using Fourier transform microwave (FTMW) spectroscopy and pump/probe microwave optical double resonance (PPMODR) spectroscopy. The pure rotational spectra and precisely measured splittings in the (0,0) $A^2\Pi_{1/2} \leftarrow X\,^2\Sigma^+$ band were analyzed to produce an improved set of fine and magnetic hyperfine parameters for the $X^2\Sigma^+$ (v =0) state of ^{171}YbF. These will be used in conjunction with new FTMW data for ^{170,172,174,176}YbF in a multi-isotope Dunham U_{ij} fit to provide stable predictions for the rotational spectrum of ^{173}YbF. Observing the nuclear electric quadrupole hyperfine structure of this isotopologue will help characterize the critical electric field at the heavy atom nucleus. This provides an important benchmark for the molecular wavefunctions used to calculate the effective internal field strength in this and other species, which in turn go into determining the eEDM upper limit. Similar work with the isotopologues of PbF, where nearby states of opposite parity have already been found, will also benefit proposed anapole moment and variation of fundamental constants studies.

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