OBSERVATION AND LASER SPECTROSCOPY OF YTTERBIUM MONOMETHOXIDE, $YbOCH_3$

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We describe a laser spectroscopic study of ytterbium monomethoxide, a species of interest to search for time-reversal symmetry violation using laser-cooled molecules. We have performed measurements of vibrational structure in the low-lying electronic states, vibrational branching ratios for several electronically excited vibronic states, and radiative lifetimes of low-lying electronic states. Both laser-induced fluorescence and dispersed fluorescence spectra have been recorded and analyzed. In addition, we have recorded the rotationally-resolved high-resolution excitation spectrum of the $\tilde{A}\,^2E_{1/2} \leftarrow \tilde{X}\,^2A_1$ band. *Ab initio* calculations aided the assignment of vibronic emission bands and provide insight into the electronic and vibrational structure. We compare the structure of $YbOCH_3$ to the isoelectronic species YbF and YbOH, as well as to the previously studied alkaline-earth monomethoxides. Finally, we discuss how our results open a path to increased sensitivity to P- and/or T-violating physics in future measurements.