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Hyperfine Structure of the B State and Predictions of Optical Cycling Behavior of the X-B transition in TlF[1] ERIC NORRGARD, EUSTACE EDWARDS, DANIEL MCCARRON, MATTHEW STEINECKER, DAVID DEMILLE, Yale University, SHAH ALAM, STEPHEN PECK, NEHA WADIA, LARRY HUNTER, Amherst College — The rotational and hyperfine spectrum of the $X^1\Sigma^+ \rightarrow B^3\Pi_1$ transition in TlF molecules was measured using laser excitation and detection of the resulting fluorescence from a molecular beam. Rotational and hyperfine constants are obtained from a least-squares analysis. The large magnetic hyperfine interaction of the Tl nuclear spin leads to significant mixing of the lowest B state rotational levels. Updated, more precise measurements of the $B \rightarrow X$ vibrational branching fractions are also presented. The combined rovibrational branching fractions allow for the prediction of the number of photons that can be scattered in a given TlF optical cycling scheme, which will be critical knowledge for the CeNTREX collaboration's upcoming precision measurement of the Schiff Moment of the Tl nucleus using TlF.

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