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Optical Cycling of TlF[1] NATHAN CLAYBURN, TREVOR WRIGHT, Amherst College, DAVID DEMILLE, Yale University, LARRY HUNTER, Amherst College — We investigated optical cycling of the $X^1\Sigma^+$ - $B^3\Pi_1$ transition in TlF by detection of the resulting fluorescence from laser excitation of a cryogenic molecular beam. The X(J=1) level of the ground state contains hyperfine and polarization dark states which decrease the photon cycling rate relative to that of a two-level system. These dark states have been remixed into the optical cycling by rapid switching of the laser's polarization and by resonant microwave mixing with the X(J=0) level. The destabilization of these dark states has increased the measured cycling, and multiple rotational transitions remain promising for significant cycling. Additionally, external electric fields have been used to make Stark shift measurements from which the Ω-doublet of the excited state and the molecule-fixed dipole moment of the excited state can be inferred.

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