FLUORESCENCE DEPLETION SPECTROSCOPY AND PHOTODYNAMICS OF THE $\tilde{A}^2E$ ELECTRONIC STATE OF THE CADMIUM MONOMETHYL RADICAL

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The fluorescence depletion spectroscopy (FDS) technique has been applied to the $\tilde{A}^2E$ electronic state of the $CdCH_3$ radical to investigate "dark" vibronic levels. The observed FDS spectrum complements the sparse laser induced fluorescence (LIF) spectrum. Both the upper and lower spin components of the vibrationless level as well as excitations involving the symmetric ν_2 and ν_3 modes, and the antisymmetric ν_6 mode in combination with both symmetric modes, were observed. A combined Jahn-Teller and spin-orbit coupling model was used to explain the vibronic structure in the ^2E electronic state as well as strong variations in the Coriolis coupling constants obtained from the resolved rotational K-structure. Lifetimes for fluorescing levels have been determined from their temporal decay and those for some of the dark levels via lifetime broadening measurements. The selectivity of the radiationless decay channel and it's possible attribution to an isomerization process will be discussed.