SPECTROSCOPY OF THE $A^7\Pi$ - $X^7\Sigma^+$ (0,0) BAND OF MANGANESE MONOHYDRIDE, MnH, BY MOLECULAR BEAM PRODUCTION AND LASER INDUCED FLUORESCENCE DETECTION.

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The large magnetic moment and rotational spacing make manganese monohydride a candidate for ultra cold molecule production via magnetic trapping and buffer gas cooling. Here we report on the spectrum of low rotational branch features of the $A^7\Pi$ - $X^7\Sigma^+$ (0,0) band of MnH that has been observed using molecular beam production and laser induced fluorescence (LIF) detection. The sample was prepared by laser ablation of solid Mn in the presence of a supersonic expansion of H_2 . The low rotational temperature (< 50 K) and near natural linewidth (~ 75 MHz) enabled a full analysis of the fine structure and magnetic hyperfine effects from both ^{55}Mn (I=5/2) and ^{1}H (I=1/2) nuclei. The extracted molecular parameters will be compared to results previously obtained by sub-Doppler intermodulated fluorescence[a,b] and Doppler limited infrared[c] measurements. Hyperfine perturbations commented upon in the previous work have now been accurately modeled ($\pm$ 0.0025 cm^{-1}) by inclusion of all off-diagonal matrix elements, thereby simplifying the effective Hamiltonian. Proton hyperfine effects in the (v=0) $X^7\Sigma^+$ state are not completely resolvable in the optical spectra, suggesting gas-phase microwave work be performed.

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