THE ZEEMAN EFFECT IN THE OPTICAL SPECTRUM OF MANGANESE MONOHYDRIDE: MnH[a].

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The only successful demonstration of buffer-gas cooling and magnetic trapping of paramagnetic molecules was that performed by Doyle and co-workers in 1998[b]. It is anticipated that the relatively large rotational spacing and small spin-spin and spin-rotation interaction in the $X^7\Sigma^+$ (v = 0) state of MnH is a signature of a favorable ratio of elastic to inelastic collisions with helium atoms which is required for buffer-gas cooling and trapping. Furthermore, the large magnetic moment of the $N = 0$, $X^7\Sigma^+$ (v = 0) state of MnH enables one to create a deep trap, and this allows a large enough trapping time to be able to isolate the sample from its environment by cryopumping the helium away. Here we report on the magnetic properties of MnH studied as a necessary preliminary to our use of it in buffer-gas cooling and magnetic trapping experiments. The Zeeman effect in the $P_1(0)$ branch feature ($\nu$ = 17568.3536 cm$^{-1}$) of the $A^7\Pi - X^7\Sigma^+$ (0,0) band system of MnH was selected for Zeeman measurements. The field free spectra is complicated but has been thoroughly analyzed[c,d,e].

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