OPTICAL STARK SPECTROSCOPY OF NICKLE MONOHYDRIDE, NiH[a]

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Sometimes ago the MIT group analyzed the Doppler limited optical Stark Spectrum for the $B^2\Delta_{5/2}$-$X^2\Delta_{5/2}$(1,0) Q(2.5) line of NiH to determine the permanent electric dipole moments, nu, of 2.4±0.1 D and 0.3±0.1 D for the $X^2\Delta_{5/2}$ and $B^2\Delta_{5/2}$ states, respectively.[b] The ground state value of nu is routinely predicted to assess the quality of electronic structure predictions.[c] In an effort to reduce the uncertainty in the experimental value of nu we have analyzed the optical Stark spectrum of the Q(2.5) and P(3.5) of a molecular beam sample. A molecular beam was generated by skimming the output of a laser ablation/supersonic expansion. The dipole moments were determined to be 2.44±0.02 D and 0.36±0.02 D for the $X^2\Delta_{5/2}$ and $B^2\Delta_{5/2}$ states, respectively. The observed trends in the nu value for the ground state of the first row transition metal monohydrides will be rationalized.

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[b] J.A. Gray, S.F. Rice and R.W. Field, J. Chem. Phys., 82,4717 (1985).

[c] C.V. Diaconu, A.E. Cho, J.D. Doll and D.L. Freeman, J. Chem. Phys., 121, 10026 (2004).