ZEEMAN PATTERNS IN FOURIER TRANSFORM RESOLVED FLUORESCENCE SPECTRA OF NiH

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We have found that dispersed laser induced fluorescence spectra of NiH produced in a discharge source are characterized by remarkably strong emission bands from upper state levels populated by collisional energy transfer.[a] When the molecules are formed in the presence of a static magnetic field, magnetic response can be measured simultaneously for many transitions, under identical experimental conditions. Working with magnetic fields of 5000 - 10000 Gauss, the Zeeman patterns of many lines are at least partially resolved, at Doppler limited resolution. If the initial excitation process is chosen to be isotopically selective, the entire spectrum features emission from a single isotopologue, which simplifies analysis considerably. M_J selectivity is also possible in some cases. Measurements have been made so far for ^{58}NiH and ^{60}NiH. The magnetic response of NiH in the low-lying states W_1 $^2\Pi_{3/2}$, X_2 $^2\Delta_{3/2}$, and X_1 $^2\Delta_{5/2}$ states evidently changes with v''. This illustrates the effects of mixing between states, described by the supermultiplet $3d^9$ complex model given by Gray $et\ al.$[b] The intensity distributions of the M_J components in these spectra will be discussed.

[a] R. Vallon $et\ al.$ Astrophys. J. 696 172 (2009)
[b] J. A. Gray, M. Li, T. Nelis, and R. W. Field, J. Chem. Phys., 95 7164 (1991)