LASER-INDUCED FLUORESCENCE SPECTROSCOPY OF JET-COOLED NiF: AN INVESTIGATION OF THE Ω-TYPE DOUBLING IN THE Ω=1/2 STATES OF THE $3d^9$ GROUND ELECTRONIC CONFIGURATION

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A recent paper by Hougen[a] presents the hypothesis that the relative parities of Ω=1/2 levels in the $3d^9$ complex of NiF may need to be reconsidered, since the experimental determinations reported in the literature[b c d] via Ω-doubling parameters differ by a sign from those obtained from Hougen's theoretical treatment. We report on an experiment that attempts to resolve the discrepancy via laser-induced fluorescence and dispersed fluorescence spectroscopy of NiF created in the molecular-jet laser-ablation apparatus at the University of New Brunswick. New data involving the [22.9]$^2\Pi_{3/2}$–X $^2\Pi_{3/2}$ and [22.9]$^2\Pi_{3/2}$–[0.25] $^2\Sigma_{1/2}$ transitions were obtained, in which several isotopologues of NiF could be resolved and their spectra analyzed. Dispersed fluorescence spectra were obtained by exciting parity-resolved transitions of the [22.9]$^2\Pi_{3/2}$–X $^2\Pi_{3/2}$ spectrum with a narrow-bandwidth cw laser, then observing the fluorescence to the [0.25] $^2\Sigma_{1/2}$ and [1.5] $^2\Sigma^+_{1/2}$ states with a grating spectrometer. Changes in the dispersed fluorescence pattern as levels of the same J' with different parities were excited will be discussed, and the implications for verifying or refuting Hougen's claim will be presented.

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[b] C. Dufour and B. Pinchemel, *J. Mol. Spectrosc.* **173** (1995) 70–78.
[c] Y. Krouti, T. Hirao, C. Dufour, A. Boulezhar, B. Pinchemel, and P. F. Bernath, , *J. Mol. Spectrosc.* **214** (2002) 152-174.
[d] M. Tanimoto, T. Sakamaki, and T. Okabayashi, *J. Mol. Spectrosc.* **207** (2001) 66–69.