HYPERFINE EFFECTS IN MAGNETIC ROTATION SPECTROSCOPY

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For magnetic rotation spectroscopy studies of diatomic molecules, strong signals occur for transitions involving electronic states with a significant component of electronic magnetic moment along the internuclear axis. Such electronic states are also candidates for large magnetic hyperfine effects. For transitions involving low values of J, it is therefore often difficult to perform a comprehensive analysis of magnetic rotation signals without taking hyperfine effects into consideration, even for Doppler-limited studies. Furthermore, there are contributions to the magnetic rotation signal that arise from interactions induced by the magnetic field between hyperfine levels. These unusual and interesting contributions to the magnetic rotation signal will be discussed. Examples will be given from a recent Doppler-limited magnetic rotation study of the $A^3\Pi_{1u}$–$X^1\Sigma_g^+$ system of $^{79}Br_2$, where hyperfine effects produced structure in the signals for transitions involving low values of J.