ABSOLUTE INTENSITIES MEASUREMENTS IN THE $\nu_4 + \nu_5$ BAND OF $^{12}C_2H_2$: ANALYSIS OF HERMAN-WALLIS EFFECTS AND FORBIDDEN TRANSITIONS

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We have measured absolute line intensities in two bands of $^{12}C_2H_2$ near $7.5\mu m$, namely the $\nu_4+\nu_5(\Sigma_u^+)-0(\Sigma_g^+)$ and $\nu_4+\nu_5(\Delta_u)-0(\Sigma_g^+)$ bands, using Fourier transform spectroscopy with an accuracy estimated to be better than 2%. Using theoretical predictions from Watson [a], the observation of the forbidden $\nu_4+\nu_5(\Delta_u)-0(\Sigma_g^+)$ band and the Herman-Wallis behavior exhibited by its rotational lines were studied quantitatively in terms of two types of interactions affecting the levels involved by the band: ℓ-type resonance and Coriolis interaction. In the case of the $\nu_4+\nu_5(\Sigma_u^+)-0(\Sigma_g^+)$ band, the influence of ℓ-type resonance is also confirmed. We also attributed the intensity asymmetry observed between the R and P branches of that latter band to a Coriolis interaction with $\ell=1$ levels. We did not observe the $\nu_4+\nu_5(\Sigma_u^-)-0(\Sigma_g^+)$ band, consisting only of a Q branch, in agreement with Watson's prediction.

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[a] J. K. G. Watson, J. Mol. Spectrosc. 188, 78 (1998)