A novel investigation about the perturbations in the N_2 Second Positive System ($C^3\Pi_u \rightarrow B^3\Pi_g$)

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The rotational analysis of the ($C^3\Pi_u \rightarrow B^3\Pi_g$) electronic transition of the N_2 molecule, also known as Second Positive System, was extensively studied at high resolution in the past by [1-4], where some spectroscopy constants were determined through an analysis of this particular system. However, the spectra analyzed in the last two works were produced by a low current radiofrequency discharge through a low-pressure flux of nitrogen, being not possible to obtain more information about higher rotational quantum numbers J values, owing to the low temperature of electrical discharge conditions. Having as motivation the goal of obtaining more data, in this work a new ro-vibrational analysis of the ($C^3\Pi_u \rightarrow B^3\Pi_g$) system is performed by high resolution Fourier transform spectroscopy in the visible-UV region. In the present study the spectra were produced by a DC positive glow discharge, which allows higher vibrational and rotational temperatures, enabling a richer spectrum with higher values of vibrational and rotational quantum numbers. The observed spectral lines were reduced into molecular constants, using simulation and analysis package PGOPHER [5]. Strong rotational perturbations were observed, such as spectral line shift and intensity anomalies, notably at the vibrational level $v' = 1$ and $v' = 2$ of the $C^3\Pi_u$ electronic state [6]. Having this as motivation, new investigations about the observed perturbations have been performed [7].

References

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