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A Detailed Investigation of Certain Electronic Transitions of the BaD Molecule for Astrophysical Applications(Article)

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Abstract

The spectroscopic and ro-vibrational constants, FCFs and r-centroids have been evaluated in the present study for $A\,^2\Pi_{1/2}$–$X\,^2\Sigma$, $A\,^2\Pi_{3/2}$–$X\,^2\Sigma$, $B\,^2\Sigma$–$X\,^2\Sigma$, $E\,^2\Pi_{1/2}$–$X\,^2\Sigma$, $E\,^2\Pi_{3/2}$–$X\,^2\Sigma$, $F\,^2\Sigma$–$X\,^2\Sigma$, and $L\,^2\Pi$–$X\,^2\Sigma$ band systems of the barium deuteride (BaD) molecule by adopting a reliable numerical integration procedure. The physical and astrophysical significances of the evaluated FCFs and r-centroids are discussed for all these band systems. The effect of vibration rotation interaction (VRI) on FCFs for the bands of the chosen band systems of BaD molecule is also studied. It is found from the results that the effect of VRI on FCFs is not so significant for the rotational quantum number (J) up to J = 50. For higher values of J like J = 100, there is a slight change in the value of FCFs due to the VRI effect. © 2019, Springer Science+Business Media, LLC, part of Springer Nature.

Author keywords

BaD molecule | Celestial environment | Franck–Condon factors | r-centroids | VRI effect

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