

## HIGH-RESOLUTION INFRARED SPECTRUM OF THE $3\nu_9 - \nu_9$ HOT BAND OF $\text{HNO}_3$ : STUDY OF CORIOLIS COUPLED $3\nu_9$ AND THE NEARBY DARK STATE

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The high-resolution infrared spectrum of  $\text{HNO}_3$  in the region of  $805\text{--}853\text{ cm}^{-1}$  has been measured and assigned for the  $3\nu_9 - \nu_9$  hot band. The significant splittings in the upper state  $3\nu_9$  arising from the torsional motion of H around ON were observed and identified. It was found that  $3\nu_9$ , which is around  $1289\text{ cm}^{-1}$ , was involved in a strong Coriolis resonance with a dark state near  $1301\text{ cm}^{-1}$ , apart from the slightly higher vibrational state  $\nu_4$ . To account for the corresponding Coriolis perturbations as well as the torsional splittings observed in the  $3\nu_9 - \nu_9$  band, a comprehensive line-position fit was performed by simultaneously adjusting three sets of constants for  $3\nu_{9,1}$ ,  $3\nu_{9,2}$  and the dark state. Accurate rovibrational constants were obtained giving a fit of 947 unperturbed and 146 perturbed lines to the rms accuracy of  $0.00062\text{ cm}^{-1}$  and  $0.00175\text{ cm}^{-1}$ , respectively. The interacting dark state, found at  $1300.7331(19)\text{ cm}^{-1}$ , can be assigned to  $2\nu_6$  which proves to be responsible for the previously unjustified <sup>a</sup>  $\Delta K_c = 6$  resonance observed in the strong  $\nu_3$  band.

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<sup>a</sup>A. Perrin, O. Lado-Bordowsky, and A. Valentin, *Mol. Phys.* 67, 249-270, 1989