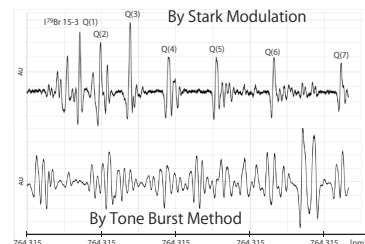


# SPECTROSCOPIC CONSTANTS AND POTENTIAL FUNCTIONS FOR THE $A^3\Pi_1$ AND $X^1\Sigma^+$ STATES OF IBr BY USING MERGED DATA OF STARK SPECTROSCOPY

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The  $A \leftarrow X$  electronic transition spectra of halogen diatomic molecules have been measured to determine the molecular constants and the parameters of potential energy by various researchers.<sup>a,b,c</sup> In 2002, the Dunham coefficients of the  $X$  state and rotation-vibration parameters of the  $A$  state of IBr were determined by using the assigned line position of spectroscopic data in the range from  $v' = 3 - 20$  to  $v'' = 1 - 6$  and nuclear quadrupole coupling constants were also reported.<sup>d</sup> An anomalous fluctuations in the  $v -$  dependence of the first differences of the inertial rotational constant,  $\Delta B'_v = B'_{v'+1} - B'_v$  in the  $A^3\Pi_1$  was found more than  $v = 19$  region. In 2015, we reported a new nonlinear direct potential fitting (DPF) analysis that uses “robust” nonlinear least-squares fits to average properly over the effect of such fluctuations in order to provide an optimum delineation of the underlying potential energy curve(s).<sup>e</sup>



In the near dissociation limit, it would be difficult to assign the spectra, because in that area, too dense spectra would be observed. By adopting Stark spectroscopy, the relatively low  $J$  spectra are emphasized and the high  $J$  spectra become smaller as shown in the figure. This makes it easier to assign the low  $J$  spectra even in dense regions. This work reports the spectroscopic constants refined and the parameters of potential energy curve recalculated.

<sup>a</sup>Selin et al, *Ark. Fys.* **21** (1962) 479.

<sup>b</sup>Coxon et al, *JMS* **79** (1983) 363, 380.

<sup>c</sup>Heddrich et al, *JMS* **79** (1992) 384.

<sup>d</sup>Yukiya et al, *JMS* **214** (2002) 132.

<sup>e</sup>Le Roy, *J.Quant.Spectrosc.Rad.Trans.* **186**(2017) 179.