THE b $^3\Pi_{u0}$ STATE OF $^{39}K_2$

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New observations of the $b\,^3\Pi_{u0}$ state of K_2 have been made by laser induced fluorescence spectroscopy, following single colour OODR excitation with a cw Ti:sapphire laser. Fourier transform spectra revealed two pieces of a progression of the $2\,^3\Pi_g \rightarrow b\,^3\Pi_{u0}$ system, beginning around 14250 cm^{-1}, at $v = 0$, and terminating at 7200 cm^{-1}. The two pieces were unfortunately separated by very strong $A \rightarrow X$ emission, which dominated the region 8000 - 12000 cm^{-1}, so that no measurements could be made for many intermediate vibrational levels. The triplet emission in the visible region was severely affected by spin-orbit interactions with $A\,^1\Sigma_u^+$, whilst the infrared part of the spectrum was much less perturbed.

The intermediate part of the potential is known only through the interactions of the $A\,^1\Sigma_u^+$ and $b\,^3\Pi_u$ states. The spin-orbit interaction between the *A* and *b* states up to v_b = 90 has been modelled using an *ab initio* calculation of the spin-orbit function, which shows a notable dip as a function of *R*. This model allowed us to assign the vibrational quantum numbers in the infrared part of the fluorescence spectrum : the observations cover $89 \leq v \leq 118$. We are fitting the available *A* and *b* state data to Y_{ij} parameters. At present, we have achieved fits (with a standard deviation of 0.025 cm^{-1}) of about 1000 term values or combination differences, corresponding to levels up to 5500 cm^{-1} above the minimum of the *b* state. We intend to continue the fits over a further 1500 cm^{-1} to incorporate all the data, reaching term values 500 cm^{-1} below the 4S + 4P threshold. An asymptotic calculation of the Hund's case c) 0_u^+ states should be able to extend a deperturbed potential curve for the *b* state sufficiently accurately to allow the assignment of existing photoassociation data.