DOUBLE RESONANCE EXCITATION OF THE RUBIDIUM DIMER : THE 2 $^1\Pi_g$ STATE

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We have performed a series of optical-optical double resonance experiments with one or two cw Ti:sapphire lasers, to excite the 2 $^1\Pi_g$ state of Rb_2, recording infrared fluorescence from 2 $^1\Pi_g$ on a Fourier transform spectrometer. Fluorescence from the lower vibrational levels of 2 $^1\Pi_g$ (T_e = 22069.56 cm^{-1}) is dominated by transitions to the B $^1\Pi_u$ state studied by Amiot and Vergès[a]. Vibrational and rotational relaxation from laser-pumped levels v' $<$ 15 now give a rather complete description around the potential minimum of the 2 $^1\Pi_g$ state, completing the observations for 6 $\leq$ v $\leq$ 50 reported by Han *et al*[b] last year. Fluorescence from v' $>$ 35, occurs also to the 0^+ components of the A $^1\Sigma_u^+$ $\sim$b $^3\Pi_u$ complex. Fitting all available 2 $^1\Pi_g$ $\rightarrow$B $^1\Pi_u$ data for $^{85}Rb_2$ and $^{85}Rb^{87}Rb$ (several thousand transitions) has also given an improved description of the bottom of the B $^1\Pi_u$ state potential well. The 2 $^1\Pi_g$ state correlates at long-range with Rb 5s + Rb 4d $^2D_{3/2}$ atoms[c], giving a dissociation energy of 1279.6 cm^{-1}. Most new data lie below v = 45, 250 cm^{-1} below this dissociation threshold.

[a] Amiot and Vergès, *Chem. Phys. Lett.* 294 91-98 (1997)
[b] X. Han *et al*, *Chem. Phys. Lett.* 538 1-4 (2011)
[c] A.-R.Allouche, M. Aubert-Frécon, *J. Chem. Phys* 136 37-41 (2012)