

Abstract Submitted
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Photoassociation spectroscopy of long range molecular states ^{87}Rb . Lu-Fano analysis and improved Le Roy-Bernstein HAIKEL JELASSI, BRUNO VIARIS DE LASEGNO, LAURENCE PRUVOST, Laboratoire Aimé Cotton-Orsay — In the poster, we present experimental results of the photoassociation (PA) of ^{87}Rb cold atoms in the asymptotic range of -12 cm^{-1} below the $5\text{S}_{1/2}+5\text{P}_{1/2}$ dissociation limit. The PA spectrum, obtained by trap loss spectroscopy, exhibits vibrational progressions corresponding to the 1_g , 0_u^+ and 0_g^- molecular states. We are interested first in the 0_g^- states. Using a Lu-Fano approach and the LeRoy-Bernstein formula we deduce from data, the quantum defect associated to each level. To explain its linear variation versus the energy, we show that an improved LeRoy-Bernstein model has to be applied. This approach lets us to determine the phaseshift of the wavefunction at the dissociation limit and the slope of the linear variation. These parameters, coupled to simple proposed analytic models, allow to deduce short range potential characteristics, as the location of the barrier and the minimum. With the same approach, we analyze 0_u^+ levels. The Lu-Fano graph allows to exhibit the coupling of the $(5\text{S}_{1/2}+5\text{P}_{1/2})0_u^+$ series to the $(5\text{S}_{1/2}+5\text{P}_{3/2})0_u^+$ ones due to spin-orbit interaction. We value the coupling, identify two $(5\text{S}_{1/2}+5\text{P}_{3/2})0_u^+$ levels and predict the energy and the width of the first predissociated level of $(5\text{S}_{1/2}+5\text{P}_{3/2})0_u^+$ series. Experimental investigations confirm these predissociation predictions.

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