

Abstract Submitted  
for the DAMOP08 Meeting of  
The American Physical Society

**Weakly bound molecules. Analysis by the Lu-Fano method coupled to the LeRoy-Bernstein model.** LAURENCE PRUVOST, HAIKEL JELASSI, BRUNO VIARIS DE LESEGNO, lab Aimé Cotton, cnrs Orsay, LAC TEAM — We have realized the photo-associative spectroscopy of cold  $87\text{Rb}$  atoms, below the  $(5s_{1/2}+5p_{1/2})$  dissociation limit. Recorded spectra exhibit 3 molecular vibrational series :  $0g-$ ,  $0u+$  and  $1g$ . Such weakly bound molecules (WBM) are described by the dipole-dipole interaction ( $1/R^3$  or as  $1/R^6$ ). WBM energies are described by the Le Roy-Bernstein (LRB) model. The discrepancies to LRB law are due to the short distance behaviour of molecular potentials or to couplings between molecular series due to interactions such as spin-orbit or spin-spin interactions. To analyse the data, we have adapted the Lu-Fano (LF) method - well-known for Rydberg atoms - to WBM. Using the LRB law, a molecular quantum defect is defined and plotted versus the energy. The obtained LF graph allows us to characterise the molecular potential and the interactions. The  $0g-$  LF graph is a linear, signature of the short range behaviour of the molecular potential. A model connects the slope to short range behaviour [1]. The  $0u+$  LF graph exhibits sharp variations, signatures of a coupling with a neighbouring series. A two series model allows us to evaluate the coupling, identify two perturbing levels of the  $(5s_{1/2}+5p_{3/2})$   $0u+$  series and do predictions about its first pre-dissociated level [2]. [1] H. Jelassi, B.Viaris De Lesegno, L. Pruvost, Phys. Rev. A. 73, 32501 (2006) [2] H. Jelassi, B.Viaris De Lesegno, L. Pruvost, Phys. Rev. A. 74, 12510 (2006)

Laurence Pruvost  
lab Aimé Cotton, cnrs Orsay

Date submitted: 05 Feb 2008

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