PHOTOASSOCIATIVE SPECTROSCOPY OF Cs_2 MOLECULE

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We report the spectroscopy of molecular 1_g, 0_u^+, 0_g^- and 1_u state potentials below the dissociattion limit $6s^2S_{1/2}$ + $6p^2P_{3/2}$ by using the molecular photoassociation technique of cold Cs atoms, in a vapor-cell magneto-optical trap. The 1_g and 0_u^+ states are detected by trap losses. The 0_g^- and 1_u states, which lead to the formation of cold molecules [1], are detected by photoionizing them into Cs_2^+ and detecting with a time-of-flight mass spectrometer, while the 1_g and 0_u^+ states are detected by trap losses. We give the spectra of the whole series 0_g^- and 1_u. The 0_g^- series is analyzed in a RKR approach and the hyperfine structure of the 1_u series will be discussed. The observed modulation of intensities of the lines is due to Franck Condon factors characterizing the photoassociative transition between the initial state of two free atoms and the finalro-vibrational level. The intensity modulation can give access to the scattering lengths of the ground state. This possibility will be discussed.

[1] A. Fioretti, D. Comparat, A. Crubellier, O. Dulieu, F. Masnou-Seeuws, P. Pillet, submitted to Phys. Rev. Lett.