



S.E.T. U.P. experimental program of Titan's atmosphere simulation : preliminary study of methane photolysis

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As Cassini-Huygens is delivering brand new data on Titan's atmospheric system, it becomes even more pertinent to improve our knowledge of the complex chemistry taking place in its atmosphere. It is with this aim that a new experimental simulation program named S.E.T. U.P. (Theoretical and Experimental Simulations Usefull for Planetology) is being developed at L.I.S.A. This program presents two major specificities :

- a very sensitive absorption technique, Cavity Ring Down Spectroscopy (C.R.D.S.), that will combined *in situ* probing of the experimental medium with time resolved capabilities.
- a combined use of a cold plasma and of an UV source, allowing the dissociation of the initial gas mixture (N_2 , CH_4) by means of both electrons and photons, thus reproducing, for the first time, the nature of the main energy sources available in Titan's atmosphere.

Yet, in our experiment, photolysis of methane will occur via a two-photon process at 248 nm which is energetically equivalent to the single photon process at Lyman- α mainly responsible for the photodissociation of CH_4 in Titan's atmosphere. It appears therefore, that a good understanding of methane photolysis processes at both 121.6 and 248 nm constitutes a preliminary step of this program.

We will present a review of the available literature data about methane Lyman- α photodissociation that led us to focus our interest on the unconstrained CH radical production. Then, some results obtained in collaboration with L.P.P.M. and concerning the detection of CH by means of C.R.D.S. technique will be presented.