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Laboratory studies in support of the Cassini-Huygens mission

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Titan's atmosphere mainly made of nitrogen and methane is rich in organic molecules: hydrocarbons and nitriles. Hydrocarbons form from the photolytic and catalytic dissociation of CH_4. Nitriles are created by dissociation of N_2 from ultraviolet sunlight and impacts by energetic electrons from photoionization and the magnetosphere followed by reactions with hydrocarbons radical. In order to understand the physicochemical mechanisms involved, responsible for the evolution of Titan's atmosphere, photochemical models are built. The latter need constrains for vertical profiles of organic compounds from the high thermosphere down to the low stratosphere as well as photodissociation rate and thus the knowledge of absorption coefficients. Those profiles can be deduced from Cassini observations, in particular by limb sounding, coupling infrared and ultraviolet spectroscopy. However, in order to interpret the data obtained from the ultraviolet (UVIS) and infrared (CIRS) spectrometers on board Cassini's spacecraft, precise spectroscopic parameters of some molecules are needed. We will review the current knowledge in this field of planetary spectroscopy. Then, we will point out the lack of spectroscopic parameters of already detected species. We will also underline the needs for the determination of spectra of undetected molecules but expected to be present in Titan's atmosphere according to laboratory simulations. Infrared and Ultraviolet spectroscopic data recovered by our team for some compounds of Titan's atmosphere interest (polyynes : $C_{2n}H_2$ and cyanopolyynes : $HC_{(2n+1)}N$) will be presented.