THE NANOCOSMOS GAS CELL: A BROADBAND FOURIER TRANSFORM MILLIMETERWAVE SPECTROMETER BASED ON RADIO ASTRONOMY RECEIVERS

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We present the first spectroscopic results on a newly built broadband Fourier transform millimeterwave spectrometer for the laboratory which employs the same detection system as that present in radio-telescopes. The spectrometer is equipped with Q-band (31.5-50GHz) and W-band (72-116GHz) receivers, very sensitive to the rotational emission of the molecules present in a one meter Gas Cell. The technique provides large instantaneous bandwidth, spectral purity, and a linear dependence of the signals with the partial pressure so that it is perfectly suited for high resolution emission spectroscopy of molecules of astrophysical importance. The full description of the cell can be found in the literature[a,b].
In the present contribution we will show the capabilities of the spectrometer. The Gas Cell has been initially tested with molecules whose rotational spectrum was well known (CH_3CN, OCS, SO_2...). High accuracy measurements of the frequencies (38KHz) and intensities (in K) can also be determined using our new instrument. Subsequently, Gas Cell experiments have been devoted to the study the rotational spectra of molecules of astrochemical interest whose millimeterwave spectrum remains unknown. Among these molecules, the formamide derivatives and dinitriles are very attractive because they are candidates to be found in the space and they present low-energy excited vibrational states that can also contribute to the large number of unidentified lines in the millimeter and submillimeter wave surveys.

[a] I. Tanarro *et al.* **2019**, *A&A*, 609, A15
[b] J. Cernicharo *et al.*, **2019**, *A&A*