FOURIER-TRANSFORM FAR-INFRARED SPECTROSCOPY OF ASTROPHYSICAL SPECIES

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FIRST (Far InfraRed Space telescope) and ALMA (Atacama Large Millimeter Array) are future instruments wich will be used to study galaxies, star formation, interstellar medium, clouds ... These instruments will record spectra of such astrophysical objects in the far-infrared (FIR) spectral region (55-500 μm).

Laboratory measurements are therefore necessary to complete the spectroscopic knowledge of astrophysically important molecules in this spectral region. We have recorded, with our interferometer Bruker IFS-120 (maximum resolution: 0.002 cm^{-1}), emission and absorption spectra of several astrophysical species in the FIR region.

Thermal emission spectra of hot small molecules (NH_3, HCN, H_2O and its isotopomers) have been recorded as well as spectra of radicals (NH_2, NH, OH) using different excitation sources. FIR emission spectroscopy (between 50 and 800 cm^{-1}) of Polycyclic Aromatic Hydrocarbons (PAHs) has also been performed. We have detected the low frequency bending vibrations of the aromatic rings which are the fingerprints of the PAH molecules. The absorption spectrum of Naphtalene in the same spectral range leads to resolve the P, Q and R branches of these vibrational transitions.

As already presented[a], the much brighter FIR continuum source provided by synchrotron radiation will be exploited for further improved absorption measurements.

[a] O. Pirali, J. Orphal, M. Vervloet, J.-B. Brubach, P. Roy, 57^{th} International Symposium on Molecular Spectroscopy, Talk WH01, 2002.