

Spectroscopy of Key molecular species in the Far–Infrared

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Instruments on-board FIRST will provide high spectral resolution observations of the Far–Infrared and Submillimeter spectrum of dense molecular clouds. Not only physical, chemical and kinematic environments will be scrutinized. Detection of new polyatomic molecules and the use of known molecules in a broader range of transitions (some of them never observed before!) will offer unique tools for the understanding of dense star forming regions such as Sagittarius B2 molecular cloud. However, determination of the dominant carriers of emission/absorption features in new spectral bands requires an exhaustive knowledge of molecular spectroscopy and some experience with ‘old’ instruments and close wavelengths.

In this poster we analyze the type of molecular transitions and the contribution of polyatomic molecules to the Far–Infrared spectrum of interstellar and circumstellar clouds. For that aim, we present our recent work on **molecular first Far–IR detections**. All the results presented here were taken in the direction of Sgr B2. Our study is based on Fabry-Perot observations carried out with the Infrared Space Observatory (ISO) Long-Wavelength Spectrometer (LWS).

These first Far–IR identifications include: rotational transitions of light molecules with significant electric dipole (NH and NH₂), vibrational bending modes of very low-energy (C₃), b-type transitions of slightly asymmetrical molecules (HOCO⁺) and inversion transitions of molecules having a small barrier in a double minimum vibrational potential (H₃O⁺).