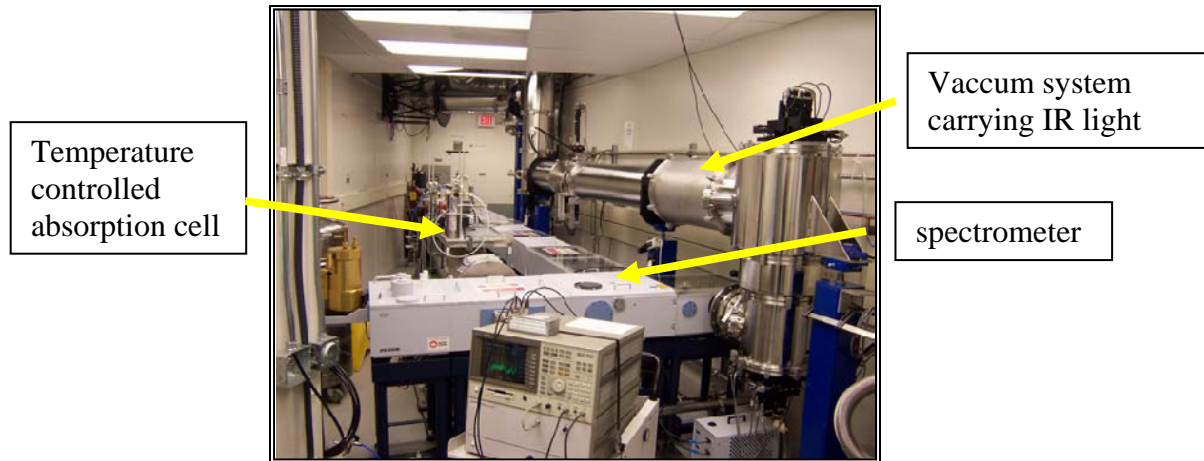


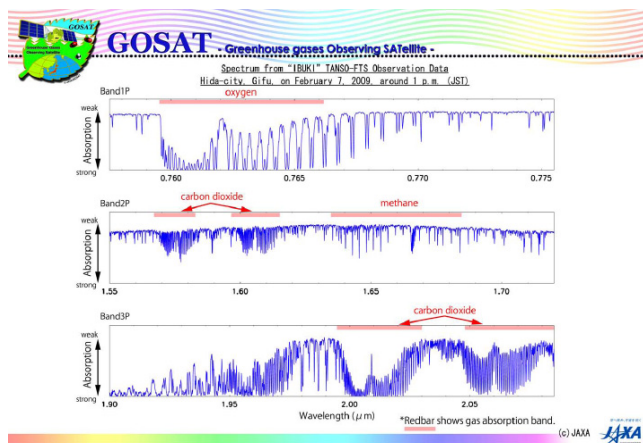
Far Infra-red Beamline

Operating at far infrared wavelengths ($5\text{-}1000\text{ cm}^{-1}$), this beamline is used primarily for ultrahigh resolution investigations of gas phase molecules. When molecules absorb infrared light, they vibrate and rotate. This absorption can be measured and displayed as a spectrum of lines, or a spectral signature, that is unique to the molecule and provides insight into the structure of that molecule. To conduct studies on this beamline, gas samples are stored in a temperature controlled absorption cell (metal tank shown in the picture below). Infrared light from the synchrotron travels through the chamber to the detector where the amount and frequency of light absorbed is measured.

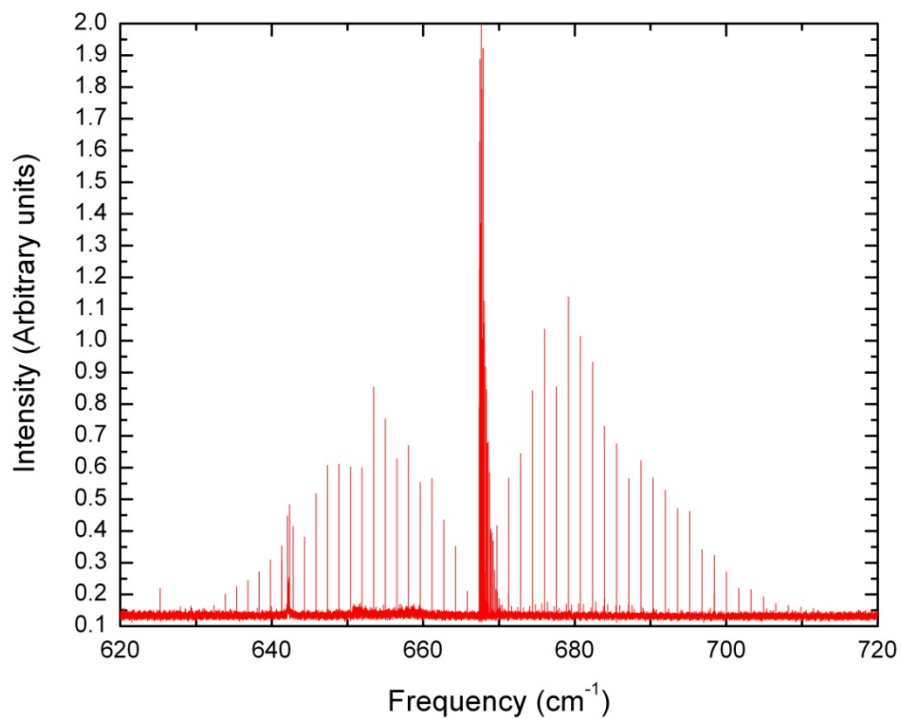


Far IR beamline experimental hutch. Image courtesy of beamline staff.

What can we use this for? To answer this, we present an example from Dr. Predoi-Cross: “Synchrotron based spectroscopic techniques have the potential to increase our understanding of planetary atmospheres through studies that will enable more accurate modelling ... we have studied the spectral signatures of several molecules over a wide range of pressures and temperatures using the facilities available at the far-infrared beamline.” This information is important as the results determined in the lab can be used to interpret real life situations.



Data showing spectra of O, CO₂, and methane, presented by Dr. Adriana Predoi-Cross (Professor in the Department of Physics and Astronomy, University of Lethbridge).



An example of a spectrum of a pure CO₂ collected at the FarIR beamline by a Students on the Beamline group from Toronto working with Dr. Brant Billinghurst, Beamline Scientist studying the vapours given off by yeast, including CO₂.