Step-scan fourier transform infrared absorption spectroscopy in supersonic free jets

Shinichi Hirabayashi[1], Yasuhiro Hirahara[2]

[1] Earth and Environmental Sci., Nagoya Univ, [2] Earth and Planetary Sci., Nagoya Univ

We developed step-scan fourier transform infrared (FT-IR) spectrometer combined with a pulsed nozzle system that is well suited for the spectroscopic study of transient or short-lived molecular species which have been identified in interstellar medium (ISM). In order to improve sensitivity to absorption, a multi-pass optics was incorporated in the vacuum chamber to achieve long path lengths. The infrared absorption spectra of CO and C2H2 in supersonic free jet were recorded with an improved signal-to-noise ratio at resolution of 0.25 cm^-1. The rotational temperature as low as 5 K and 30 K for CO and C2H2, respectively, have been determined from the spectra. The detection limit of our system attained corresponds to 3*10^-4 absorption.