SELF AND N_2 COLLISIONAL BROADENING OF FAR-INFRARED METHANE LINES AT LOW TEMPERATURE WITH APPLICATION TO TITAN

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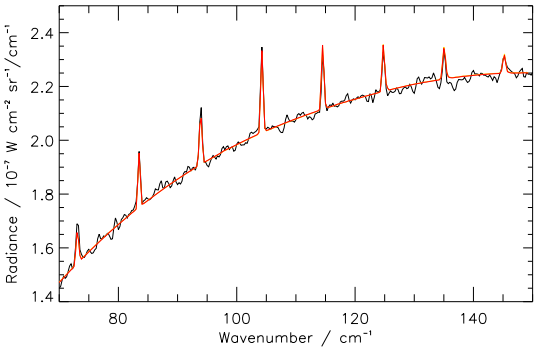
We report the measurement of broadening coefficients of pure rotational lines of methane at different pressure and temperature conditions. A total of 27 far-infrared spectra were recorded at the AILES beamline of the SOLEIL synchrotron at room-temperature, 200 K and 120 K, in a range of 10 to 800 mbar. Self and N_2 broadening coefficients and temperature dependence exponents of methane pure rotational lines have been measured in the 73–136 cm^{-1} spectral range using multi-spectrum non-linear least squares fitting of Voigt profiles. These coefficients were used to model spectra of Titan that were compared to a selection of equatorial Cassini/CIRS spectra, showing a good agreement for a stratospheric methane mole fraction of $(1.17 \pm 0.08)\%$.



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