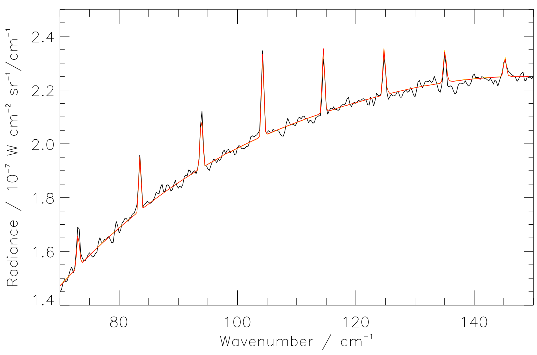
SELF AND N_2 COLLISIONAL BROADENING OF FAR-INFRARED METHANE LINES AT LOW TEMPERATURE WITH APPLICATION TO TITAN

C. RICHARD, V. BOUDON, *Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303 CNRS - Université Bourgogne Franche-Comté, 9 Av. A. Savary, BP 47870, F-21078 Dijon Cedex, France*; **L. MANCERON**, *AILES, Synchrotron SOLEIL, L'Orme des Merisiers Saint-Aubin, F-91192 Gif-sur-Yvette, France*; **J. VANDER AUWERA**, *SQUARES, C.P. 160/09, Université Libre de Bruxelles, B-1050 Brussels, Belgium*; **S. VINATIER, B. BÉZARD, M. HOUELLE**, *LESIA, Observatoire de Paris, Université PSL, Sorbonne Université, Université Paris Cité, CNRS, 5 place Jules Janssen, 92195 Meudon, France*



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 $(1.17 \pm 0.08)\%$.