N_2-collisional shift coefficients of lines in the υ_3 band of methane at low temperatures – Work in progress

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The study of the line parameters of methane is very important for the remote sensing of our atmosphere [1] (methane is the third green house gas) but also for the study of the atmosphere of others planets [2,3] and stellar objects [4] such as Jupiter [5] or Titan [4].

In this work, we measured the shift coefficient of absorption lines in the υ_3 band of methane perturbed by nitrogen at different low temperatures (0°C, -25°C, …) using a two-beams tunable diode laser spectrometer.

For each line, we recorded spectra at 4 different pressures of nitrogen. The shifts of lines have been determined using a procedure where a non perturbed line of pure methane is simultaneously recorded with N_2-shifted transitions from the gas sample under study. Each experimental lineshape has been fitted individually with the Rautian-Sobel'mann profile, which includes the Dicke narrowing, in order to obtain the collisional shift. Finally, the coefficient of collisional shift is the slope of the best straight line of linear regression trough the collisional shifts obtained at the 4 different pressures.

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