High-resolution study of the spectrum of allene around 11 µm

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Allene (propadiene, C_3H_4) was detected in Titan's atmosphere [1] together with its isomer, propyne [2]. Interconversion between these two species can be induced by collisions with atomic hydrogen. The abundance of atomic hydrogen in Titan's atmosphere could therefore be inferred from the ratio of the abundances of allene and propyne [3]. To precisely determine the abundances of allene and propyne, as well as their seasonal and spatial variations, new measurements are required. To do so, high-resolution infrared measurements from ground- and space-based instruments are available. The interpretation of these observations relies on the availability of reference spectroscopic data. The present work aims to improve the description of line positions and intensities in the ν_{10} and ν_9 bands of allene, located respectively near 841 and 999 cm^{-1}. High resolution Fourier transform spectra of pure allene at room temperature were recorded between 600 and 1200 cm^{-1} using a Bruker IFS 125HR spectrometer under various pressure conditions. An effective Hamiltonian model was developed based on a previous work [4]. It led to the identification of more than 5800 transitions in the recorded spectra. The spectroscopic constants are currently being refined. The results of this ongoing study will be presented.

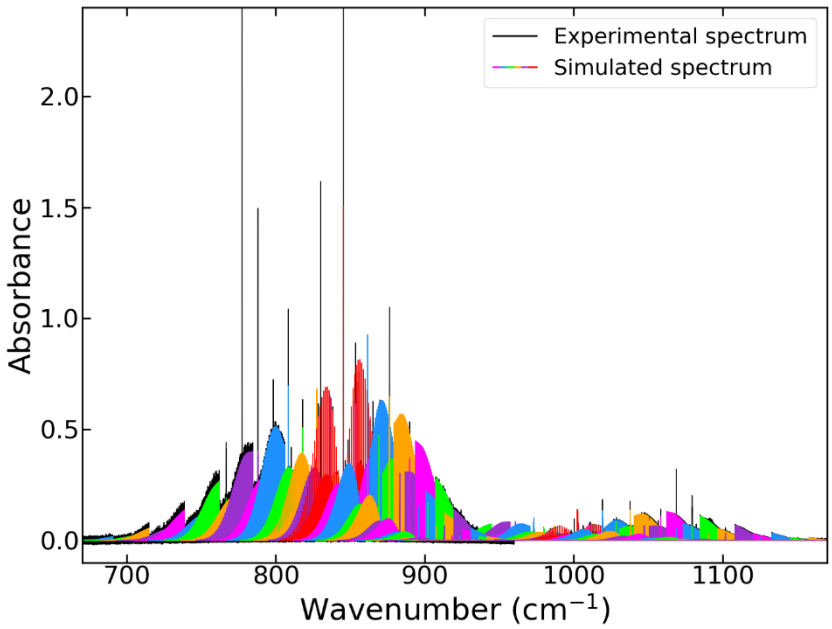

Figure 1 : Experimental and simulated spectra of allene around 11 µm, corresponding to absorption resulting from the excitation of the ν_{10} and ν_9 vibrational modes.

[1] N. A. Lombardo, *et al.*, *Icarus*, **317**, 454-469 (2019)
[2] W. C. Maguire, *et al.*, *Nature*, **292**, 683-686 (1981)
[3] C. Li, *et al.*, *ApJL*, **803**, L19 (2015)
[4] F. Hegelund, *J. Mol. Spectrosc.*, **165**, 586-587 (1994)
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