

## ACETYLENE $^{12}\text{C}_2\text{H}_2$ LABORATORY MEASUREMENTS FOR ASTROPHYSICAL APPLICATIONS

D. JACQUEMART, L. GOMEZ, N. LACOME, *Université Pierre et Marie Curie-Paris 6; CNRS; Laboratoire de Dynamique, Interactions et Réactivité (LADIR), UMR 7075, Case Courrier 49, 4 Place Jussieu, 75252 Paris Cedex 05, France*; J.-Y. MANDIN, *Université Pierre et Marie Curie-Paris 6; CNRS; Laboratoire de Physique Moléculaire pour l'atmosphère et l'astrophysique (LPMAA), UMR 7092, Case courrier 76, 75252 Paris Cedex 05, France*; O. PIRALI, and P. ROY, *Synchrotron SOLEIL, L Orme des Merisiers Saint-Aubin, 91192 Gif-sur-Yvette cedex, France*.

The acetylene molecule is important for atmospheric, planetary, and astrophysical applications. This organic molecule, known as a precursor of amino acids, shows numerous vibration-rotation bands in the IR. Two recent works on line intensities measurements will be presented.

A study around  $7.7 \mu\text{m}$  was motivated by SPITZER observations of  $\text{C}_2\text{H}_2$  in this spectral region that cannot be modeled using the current line list of HITRAN/GEISA due to the lack of data<sup>a</sup>. High resolution spectra have been recorded with the Bruker HR IFS 120 of the LADIR and analyzed to deduce absolute line intensities of several bands included the one present in HITRAN, the  $(\nu_4+\nu_5)^0_+$  strong band<sup>b</sup>. On the whole, line intensities of 2 cold bands and 15 hot bands have been studied, and a complete line list has been generated<sup>c</sup>.

Another study using SOLEIL synchrotron will be presented in the spectral region around  $100 \text{ cm}^{-1}$  of interest for astrophysical applications (SPITZER, ALMA, HERSCHEL...). High resolution spectra have been recorded with the Bruker HR IFS 125 of SOLEIL. For accurate line intensities measurement based on the FIR beam of the synchrotron, the strong wavenumber dependence of the beam radius had to be modeled in the apparatus function calculation. Absolute line intensities of the intense  $\nu_5-\nu_4$  band have been measured<sup>d</sup>, and those of the 4 weaker hot bands are in progress.

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<sup>a</sup>M. Matzura et al. Non. Not. R. Astron. Soc. 371, 415-420, 2006.

<sup>b</sup>J. Vander Auwera. J. Mol. Spectrosc. 242, 25-30, 2007.

<sup>c</sup>L. Gomez, D. Jacquemart, N. Lacome and J.-Y. Mandin. JQSRT 110, 2102-2114, 2009.

<sup>d</sup>D. Jacquemart, L. Gomez, N. Lacome, J.-Y. Mandin, O. Pirali and P. Roy. JQSRT in press.