

HRMS, 24th Colloquium, Dijon, France, 24 - 28 Aug, 2015

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## HIGH-RESOLUTION STIMULATED RAMAN SPECTROSCOPY AND ANALYSIS OF $\nu_2$ AND $\nu_3$ BANDS OF $^{13}\text{C}_2\text{H}_4$ USING THE $D_{2h}$ TOP DATA SYSTEM

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High resolution stimulated Raman spectra of  $^{13}\text{C}_2\text{H}_4$  in the regions of the  $\nu_2$  and  $\nu_3$  Raman active modes have been recorded at room temperature (296 K) based on the quasi continuous-wave (cw) stimulated Raman spectrometer at Instituto de Estructura de la Materia (CSIC) in Madrid. A tensorial formalism adapted to  $X_2Y_4$  planar asymmetric tops with  $D_{2h}$  symmetry has been developed in Dijon<sup>1</sup> and a program suite called  $D_{2h}TDS$  (now part of the XTDS/SPVIEW spectroscopic software<sup>2</sup>) was proposed to calculate their high-resolution spectra<sup>3</sup>. The effective Hamiltonian operator, involving a polyad structure, and transition moment (dipole moment and polarizability) operators can be systematically expanded to carry out global analyses of many rovibrational bands. A total of 172 and 65 lines corresponding to  $\nu_2$  and  $\nu_3$  Raman active modes have been assigned and fitted in frequency with a global root mean square deviation of  $2.0 \times 10^{-4} \text{ cm}^{-1}$ . and  $2.3 \times 10^{-4} \text{ cm}^{-1}$ , respectively. The figure below shows the stimulated Raman spectrum of the  $\nu_2$  band of  $^{13}\text{C}_2\text{H}_4$ , compared to the simulation at 296 k.

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<sup>1</sup>[doi:10.1016/s0022-2852\(02\)00038-3](https://doi.org/10.1016/s0022-2852(02)00038-3), W. Raballand, M. Rotger, V. Boudon, M. Loëte, *J. Mol. Spectrosc.*, **217**, 239–248 (2003).

<sup>2</sup>[doi:10.1016/j.jms.2008.01.011](https://doi.org/10.1016/j.jms.2008.01.011), Ch. Wenger, V. Boudon, M. Rotger, M. Sanzharov, J.-P. Champion, *J. Mol. Spectrosc.*, **251**, 102–113 (2008).

<sup>3</sup>[doi:10.1016/j.jqsrt.2004.11.012](https://doi.org/10.1016/j.jqsrt.2004.11.012), Ch. Wenger, W. Raballand, M. Rotger, V. Boudon, *J. Quant. Spectrosc. Radiat. Transf.*, **251**, 102–113 (2008).

