ROTATIONAL RAMAN SPECTROSCOPY OF ETHYLENE USING A FEMTOSECOND TIME-RESOLVED PUMP-PROBE TECHNIQUE

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Femtosecond Raman-induced polarization spectroscopy (RIPS) has been conducted at low pressure (170 and 300 mb) in ethylene. The temporal signal, resulting from the beating between pure rotational coherences, was measured with an heterodyne detection at two different temperatures (293 and 373 K). The temporal traces were converted to the frequency domain using a Fourrier transformation and then analyzed thanks to the D_{2h}TDS software[a,b] dedicated to X_2Y_4 molecules with D_{2h} symmetry. The effective Hamiltonian was expanded up to order two, allowing the determination of five parameters with a RMS of 0.017 cm^{-1}. Special care was put on the precise modeling of intensities, taking into account all instrumental effects (pulse durations, *etc*). Relative intensities were fitted and two polarizability operators were determined.

[a] http://www.u-bourgogne.fr/shTDS.html

[b] Ch. Wenger, W. Raballand, M. Rotger and V. Boudon, *J. Quant. Spectrosc. Radiat. Transfer*, in press (2005).