HIGH RESOLUTION SPECTROSCOPY OF RELATIVELY LARGE RADICAL SPECIES IN THE SUB-MILLIMETER WAVE RANGE USING ZEEMAN AND FARADAY ROTATION ACQUISITIONS. FIRSTS RESULTS ON VINOXY, ACETYL, AND ACETONYL RADICALS.

R. CHAHBAZIAN, L. JUPPET M.-A. MARTIN-DRUMEL, O. PIRALI,
Université Paris-Saclay, CNRS, Institut des Sciences Moléculaires d'Orsay, 91400 Orsay, France

Molecular radicals are key species for chemical reactions occurring in combustion processes as well as in atmospherical and astrophysical environments[1]. However, the characterization of "large" radicals (defined here as containing more than 5 atoms) using high-resolution gas phase absorption spectroscopic techniques remains tedious and requires the development of specific experimental setups to increase the sensitivity of the spectrometers. To this end, we associated a frequency multiplication chain spectrometer, allowing high-resolution spectral acquisition in the 75-900 GHz range, with a relatively specific technique of radical synthesis based on H abstraction on a given precursor by reaction with F atoms in a flow cell[2,3]. Since paramagnetic species (e.g., radicals) are sensitive to the magnetic field, an alternative magnetic field was generated in the cell allowing the use of Zeeman Modulation[4] (ZM) as well as Faraday Rotation Modulation[5] (FRM) techniques to record broadband and "radical-only" spectra. Using these techniques, the spectra of the vinoxy radical (CH_2CHO), the acetyl radical (CH_3CO), and the acetonyl radical (CH_3COCH_2) have been recorded. I will present these instrumental developments as well as the associated preliminary spectroscopic results.

[1] Hirota, Eizi, *Springer Series in Chemical Physics*, **40** (1985)

[2] G. Inoue and H. Akimoto, *J. Chem. Phys.* **74** 425 (1981)

[3] O. Chitarra, O. Pirali, J.-T. Spaniol, T. S. Hearne, J.-C. Loison, J. F. Stanton, and M.-A. Martin-Drumel, *The Journal of Physical Chemistry A*, **126** 7502 (2022)

[4] M.Elhanine, R.Farrenq and G.Guelachvili, *Mikrochimica Acta*, **95** 265 (1988)

[5] G. Litfin, C.-R. Pollock, R.-F. Curl and F.-K. Tittel, *The Journal of Chemical Physics*, **72** 6602 (1980)

p-number: p054 **Submitted on Thu, 08 Jun 2023 16:46:55 +0200**