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.

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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.

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