HIGH-RESOLUTION SPECTROSCOPY OF MOLECULES WITH ENVIRONMENTAL INTEREST USING ELECTRONIC, OPTOELECTRONIC AND SYNCHROTRON THz SOURCES

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High-resolution THz spectroscopy provides a wonderful playground to study with a high degree of selectivity a large variety of gas phase compounds (small and middle-sized molecules) with environmental and atmospheric interests by probing their pure rotational transitions and/or the rovibrational transitions of low-frequency vibrational modes. Considering during long time as a spectral gap, the THz frequency range is accessible from the millimeter-wavelengths with electronic sources and from the Far-IR with optical sources. Moreover, the development of optoelectronic solutions allowed to cover very large THz frequency range. Since more than 20 years, the LPCA of Dunkirk used electronic, optoelectronic and optical sources to develop new instrumentation in the THz domain and to perform fundamental and applied spectroscopy studies of key-molecules for the understanding of the atmosphere. The presentation will be shared in two parts:

- In a first part, the contribution of the optoelectronic continuous-wave photomixing spectrometer via high accuracy THz line profile analyses to the improvement on CH$_3$X molecules data in the international spectroscopic databases will be presented.¹,²

- In a second part, recent studies on aromatic oxygenated biogenic precursors on secondary organic aerosols will highlight the capability of millimeter-wave rotational and synchrotron based Far-IR rovibrational spectrosopies to provide ambient temperature line lists as a first step of the atmospheric monitoring of these semi-volatile compounds.³,⁴

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