GAS PHASE ROVIBRATIONAL SPECTROSCOPY OF DMSO, PART II: TOWARDS THE TERAHERTZ OBSERVATION OF 4-FOLD CLUSTERS

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Benefiting of the exceptional properties of the AILES synchrotron beamline[a], the gas phase Far-IR spectrum of DMSO has been recorded and resolved [b]. The rovibrational analysis allowed to discover a new rotational behaviour for a polyatomic molecule: the gyroscopic destabilization. [c] In order to explain this phenomenon, we looked for four-fold energy clusters in the high resolution ground state THz spectrum of DMSO recorded with a sub-THz spectrometer based on a frequency multiplication chain [d]. Pure rotational lines in the 5 lowest vibrationnally excited levels have been recorded below 700 GHz. With near 1000 rotational transitions assigned, high quantum numbers have been reached allowing to discover sequence of four-fold clusters in the out of plane bending mode of DMSO and to study the vibrational dependence of an unusual rotational dynamics.

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[d] G. Mouret, M. Guinet, A. Cuisset, L. Croizet, S. Eliet, R. Bocquet, F. Hindle, *IEEE Sensors Journal*, **13**, 1, 2013.