LABORATORY SPECTROSCOPY FOR ASTROCHEMISTRY: A ROTATIONAL INVESTIGATION OF 3-AMINO-2-PROPENENITRILE

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In order to unveil how chemistry complexity build up in space, Complex Organic Molecules (COMs) are receiving more and more attention from the astrochemical and astrobiological community. Nowadays, especially after the glycine detection in the 67P/C-G comet, there is a strong interest to detect amino acids and their precursors in space, with the aim of gaining understanding in their formation process. The most promising pathways to the synthesis of amino acids, namely photochemically and through the Strecker synthesis, include in their final step the hydrogenation of an aminonitrile molecule. It's in this context that the importance of 3-amino-2-propenitrile (APN) makes its appearance. This aminonitrile is simply obtained in gas phase or in solution by mixing cyanoacetylene (HCCCN) and ammonia (NH_3), both largely present in the Universe.

Therefore, starting from previous work taken as reference, the APN spectrum has herein collected and characterised using the MPE's CASAC (Center of Astrochemical studies Absorption Cell). Here the frequency modulated signal of synthesiser, locked to a Rb atomic clock, is multiplied several times to cover a possible frequency range from 40 GHz to 1.6 THz. The interaction of the radiation source with the molecular sample is hence acquired by a InSb hot electron bolometer detector, and demodulated by a lock-in amplifier.

The unprecedented level of detail in the data has therefore allowed the characterisation of the rotation and distortion constants of the APN at a deeper standard, providing a new level of precision for the hunt of this molecule in space with the highest level of confidence since now.