Fourier Transform Far-Infrared Spectroscopy of HN_2^+ on the AILES Beamline of Synchrotron SOLEIL

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Ions are present in the interstellar medium and play a crucial role in the space chemistry. Their quantitative detection is mandatory and, to this end, highly sensitive laser spectroscopyhas already provided a great wealth of laboratory data [1]. In order to increase the experimental data set of cationic species, we developed a liquid nitrogen cooled hollow cathode discharge cell on the AILES beamline of synchrotron SOLEIL. The goal is to record the Fourier Transform (FT) pure rotational broadband spectra of cations in the far-infrared.

The set-up was optimized by recording rotation-vibration spectra of H_3^+ (ν_2 band centered at 2530 cm^{-1}), HN_2^+ (ν_1 band centered at 3224 cm^{-1}) [2], HCO^+ (ν_1 band centered at 3088 cm^{-1}) [3] and we report the first pure rotation spectrum of cationic molecule (HN_2^+) obtained with a FT instrument.These results demonstrate the feasibility to record far-infrared (far-IR) spectra of cationic species using FT broadband spectroscopy associated to the bright synchrotron radiation continuum.We will present in the poster the experimental details as well as the analysis of our spectra and the different perspectives of spectroscopic studies with this new set-up.

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