$^{15}N/^{14}N$ RATIO DETERMINATION IN THE ISM WITH HERSCHEL WITH HIGH RESOLUTION SPECTROSCOPY OF NITROGEN RADICALS

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The very high resolution of the HIFI instrument (134 kHz-1MHz) on board of Herschel needs very accurate laboratory measurements to detect unambiguously the signature of stable and unstable molecular species. Concerning the pure rotation spectra of new species, and particularly of open shell molecules, the first prediction could be far away and up to few hundred MHz.

The $^{15}N/^{14}N$ ratio is not well measured in the ISM. However, the $^{15}N/^{14}N$ in the isotopomers is a potential tracer of the formation processes and the possible link with cometary molecules. Recent measurements include the detection of $^{15}NH_2D$[a], $N^{15}NH^+$[b] and $^{15}NH_3$[c]. The NH and NH_2 species are the simplest nitrogen radicals and are intermediate products in the NH_3 synthesis. They have been easily detected by Herschel and it therefore is interesting to now search for ^{15}NH and $^{15}NH_2$. No spectrocopic data have been reported for these two radicals up to now.

We present here the studies with high resolution spectroscopy in the THz range. The high sensitivity and the wide range of Synchrotron (0.6-6 THz) was essential to improve the prediction of the spectra of these two species in order to measure them in Lille (0.6-1 THz) with both a higher accuracy and resolution. The combined studies now give the most accurate predictions. ISM searches on these radicals are in progress in the HERSCHEL spectra.

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[a] M. Gerin, N. Marcellino, N. Biver, et al., *Astron. & Astrophys.* **498** (2009) 9.
[b] L. Bizzochi, P. Caselli, and L. Dore, *Astron. & Astrophys.* **510** (2010) L5.
[c] D. C. Lis, A. Wooten, M. Gerin and E. Roueff, *Astrophys. J.* **710** (2010) L49.