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Title:High-resolution terahertz spectroscopy of the ¹⁵NH radical X ³ Σ⁻)
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Abstract:Context. High-resolution rotational spectroscopy of the imidogen radical has been limited to the ¹⁴NH and ¹⁴ND isotopologues. Imidogen is an important intermediate in the astronomical synthesis of ammonia. Recently, the ¹⁴N/¹⁵N isotopic ratio in ammonia has been obtained in cold, dense molecular clouds. Aims. We conducted a laboratory search for rotational transitions of ¹⁵NH to investigate in more detail the ¹⁴N/¹⁵N ratio in the interstellar medium. Methods. ¹⁵NH was generated in a positive column discharge in a flowing ¹⁵NH<inf>3</inf>-He (SOLEIL synchrotron) or ¹⁵NH <inf>3</inf>-Ar (PhLAM) mixture. High-resolution spectroscopic study of the ¹⁵NH isotopologue of imidogen in its ground electronic and vibrational state X˜ ³Σ⁻) was carried out in the THz range (up to 225 cm⁻¹) with the AILES beamline of the SOLEIL synchrotron and subsequently with the PhLAM spectrometer (around 942 GHz). The observed fine and hyperfine structures were analysed, yielding an accurate set of rotational, fine, and hyperfine parameters. Results. The reported frequencies and molecular constants are suitable for radioastronomical searches of this key species and for ¹⁴N/¹⁵N isotopic ratio astronomical determination. © 2012 ESO.

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