MILLIMETER-WAVE SPECTROSCOPY OF AMINOMALONONITRILE

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In low-temperature conditions of the interstellar medium pure HCN and mixtures of HCN with H_2O and NH_3 subjected to high-energy sources can be converted into different HCN polymers[a]. In this context the HCN trimer – aminomalononitrile (AMN, $H_2NCH(CN)_2$) is an interesting candidate for astrophysical detection.

We measured the rotational spectrum of AMN using the Lille BWO-based fast scan spectrometer (120 – 180 GHz) and the spectrometer based on solid state sources (225 – 250 GHz). The spectroscopic work was supported by high level *ab initio* calculations. The spectra observed were assigned only to the asymmetric conformer. The first analysis revealed the regular doublet splittings of rotational lines indicating the possibility of large-amplitude motion (LAM) of amino group. Further examination of the spectra revealed the existence of additional splittings most probably due to the second LAM of amino group. Since the equilibrium structure of AMN has no symmetry, in the group theoretical formalism these two LAMs can be described using G_4 permutation-inversion group. Despite the complexity of the LAMs all the assigned rotational transitions were fitted within experimental accuracy using Pickett's SPFIT program. As a result, a reliable dataset for astrophysical observations was provided.

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[a] Gerakines, P.A., Moore, M.H, Hudson, R.L., *Icarus*, 2004, 170, 203