HIGH RESOLUTION SPECTROSCOPY OF THE CARBON CAGE ADAMANTANE $C_{10}H_{16}$

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Adamantane $C_{10}H_{16}$ is the smallest member of the diamondoid family which consist of diamond-like carbon cages where all carbon atoms are sp^3 hybridised and terminated with hydrogen atoms. The unambiguous presence of presolar diamond nanocrystals in meteorites led several astrophysical groups to look for the signature of this family of molecules in the interstellar medium; mostly comparing IR observations with low resolution laboratory results[ab]. Using the Bruker IFS 125 coupled to a multipass cell (absorption path length of 150 m) of the AILES beamline at SOLEIL, we recorded the IR spectrum of gas phase adamantane in the 300–3000 cm^{-1} spectral region with an unapodized resolution of about 0.001 cm^{-1}. While the most intense 3 μm bands appear as unresolved broad feautures, seven fundamental bands show rotationally resolved structures typical of T_d spherical tops. The analysis of all the resolved bands has been performed thanks to the XTDS and SPVIEW softwares developed in Dijon for such molecules[c]. Each band can be considered as isolated and we get very good fits of line positions, with a root mean square deviation better than 5×10^{-4} cm^{-1} for J values up to 100 or more in each case. The resulting synthetic spectra will permit an active search of this very stable specie in different sources of the interstellar medium.

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[b] Pirali O, Vervloet M, Dahl JE, Carlson RMK, Tielens AGGM, Oomens J, *Ap. J.* , 661, 919–925 (2007)
[c] Ch. Wenger, V. Boudon, M. Rotger, M. Sanzharov and J.-P. Champion, *J. Mol. Spectrosc.*, **251** 102–113 (2008).