MILLIMETER WAVE AND TERAHERTZ SPECTRA OF C-13 METHANOL

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Methanol is a very ubiquitous molecule in space. A previous combined analysis of microwave and millimeter wave spectra of C-13 methanol together with Fourier transform far-infrared spectra was limited to the first two torsional states (i.e. $v_t = 0$ and 1 for J values up to 20).[a] We have recently carried out new millimeter and terahertz measurements for $^{13}CH_3OH$ on several different spectrometers in the Cologne laboratory to overcome the limits in frequency and quantum number coverage. The new measurements have been carried out in the frequency windows 34–70 GHz, 75–120 GHz, 240–340 GHz, 370–500 GHz and 1.12–1.35 THz.

With the new data, we are extending our previous global treatment to include the first three torsional states (i.e. $v_t = 0$, 1 and 2 for J values up to 30). We hope to provide the radio astronomical community with a C-13 methanol database that will have been improved substantially compared to the existing one.[b] The new database will be available in the Cologne Database for Molecular Spectroscopy, CDMS[c], in support of present and future astronomical studies associated with the launch of HIFI (Heterodyne Instrument for the Far-Infrared) on board the Herschel Space Observatory, the flying of SOFIA (Stratospheric Observatory For Infrared Astronomy) and the commissioning of ALMA (Atacama Large Millimeter/Submillimeter Array).

[a] Li-Hong Xu, M. S. Walsh, R. M. Lees, 1996, J. Mol. Spectrosc. 179, 269-281.

[b] Li-Hong Xu, F. J. Lovas, 1997, J. Phys. Chem. Ref. Data, 26, 17-156; also available in the CDMS, see [c].

[c] H. S. P. Müller, S. Thorwirth, D. A. Roth, G. Winnewisser, 2001, Astron. Astrophys. 370, L49-L52; H. S. P. Müller, F. Schlöder, J. Stutzki, G. Winnewisser, 2005 J. Mol. Struct. 742, 215-227; web-page: http://www.astro.uni-koeln.de/cdms/.