SUB-MILLIMETER WAVE LINES OF THE LOWEST ROTATIONAL TRANSITION OF CH RADICAL

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The lowest rotational transition of CH radical, $N = 1, J = 3/2, F_1 \leftarrow N = 1, J = 1/2, F_2$, has been observed in 532.7 GHz and 536.8 GHz regions with a sub-millimeter wave spectrometer operated with a phase-locked backward-wave oscillator as a radiation source. The CH radical was generated in a DC glow discharge with a mixture of CH_4($\sim$4mTorr) and He($\sim$240 mTorr) and all the six hyperfine components were recorded, using frequency-discharge double modulation technique[a]. These transitions had already been observed by using LMR technique[b] and the zero field transition frequencies were calculated with 1.5 MHz accuracy by Brown and Evenson[c].
From our new direct observation, more accurate transition frequencies were determined with typically ± 30 kHz uncertainty. Astrophysically these accurate frequencies will be of great use for probing hydrocarbon chemistry in warmer and denser regions of molecular clouds.

[a] T. Amano, paper RD05, 53rd International Symposium on Molecular Spectroscopy, Columbus, Ohio, USA, June, 1998
[b] J. T. Hougen *et al*, J. Mol. Spectrosc.**72**, 463-483(1978)
[c] J. M. Brown and K. M. Evenson, Astrophys. J.**268**, L51-L56(1983)