COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 4107

Konkoly Observatory
Budapest
31 October 1994
HU ISSN 0374 – 0676

WATER MASERS IN L1251

We report the results of a water maser search carried out with the Effelsberg-100m telescope on 1993 Oct. 3 in the direction of 11 IRAS sources in the L1251 (Lynds, 1962) dark cloud. A 2.0Jy emission was detected in the direction of IRAS 22343+7501.

We observed the $6_{16} \rightarrow 5_{23}$ (22.23508 GHz) transition of H_2O with a beamwidth of 40 arc sec on 1993 Oct. 3 from UTC=12:00 to UTC=19:00. A liquid He cooled maser receiver was used with system temperature in the zenith of about 90K. We used the standard 1024 channel autocorrelator with bandwidths of 12.5 MHz and 6.25 MHz. This corresponds to 0.16 and 0.08 km/s resolution and 165 and 82 km/s velocity coverage respectively. We observed in the position switching mode with 3 minutes integration time on both the OFF and ON positions. NGC 7027 was used for flux calibration (see Baars et al. 1977).

The positions of the far infrared (FIR) sources in Kun & Prusti (1993) (K&P) with serial numbers: 1, 3, 4, 5, 7, 8, 13, 14, 15, 16, 17 were observed.

H_2O maser emission was detected towards IRAS 22343+7501 (#8 of K&P). The spectrum (obtained with 6.25 MHZ bandwidth, 25 min. integration time, RMS noise 0.12 Jy.) is shown in Figure 1.

There is a clear detection of a line at a velocity of 2.6 km/s which is redshifted by about 7 km/s relative to the rest velocity of the cloud ($v_{\rm LSR} \approx -4$km/s, see e.g. Sato and Fukui, 1989), and there is no indication for other lines (i.e. $S > 3\sigma$ peaks) in the velocity range [-40 km/s, +40 km/s]. The detected line has one gaussian component with a FWHM of 0.46 ± 0.02 km/s ($\delta v = 0.45$ km/s after correction for instrumental broadening), a peak flux of 2.0 Jy (rms=0.11 Jy), and line area of 0.97 ± 0.04 Jy km/s. The corresponding luminosity (assumed to be isotropic) at a distance of 350 pc (Balázs, 1994) is $L_{H_2O} = 2.7 \times 10^{-9} L_\odot$.

The FIR colour indices of IRAS 22343+7501 are $\log(F_{25}/F_{12})$=0.72; $\log(F_{60}/F_{25})$=0.40 and $\log(F_{100}/F_{60})$=0.08 similar to other maser sources found in Cepheus by Wouterloot and Walmsley (1986) (W&W). Its total FIR flux is $F_{\rm IRAS} = \int S_\nu d\nu = 2.55 \times 10^{-12}\,{\rm Wm}^{-2}$ which corresponds to $\approx 22.5 L_\odot$ FIR luminosity at a distance of 350 pc, assuming isotropic FIR radiation.

Near-infrared and mm continuum observations of IRAS 22343+7501 by Rosvick & Davidge (1994) indicate that the source is possibly just past the protostellar phase. There is an optical jet (Balázs et al., 1992) and a CO outflow (Sato & Fukui, 1989) associated with this source. The H_2O maser emission in the direction of this source has also been detected by Wilking et al. (1994) and found by them to be variable in time.

The maser emission may originate in the shocked clumps near the driving source of the jet. Interferometric observations of this source with the aim of determining a precise position would help further interpretation.

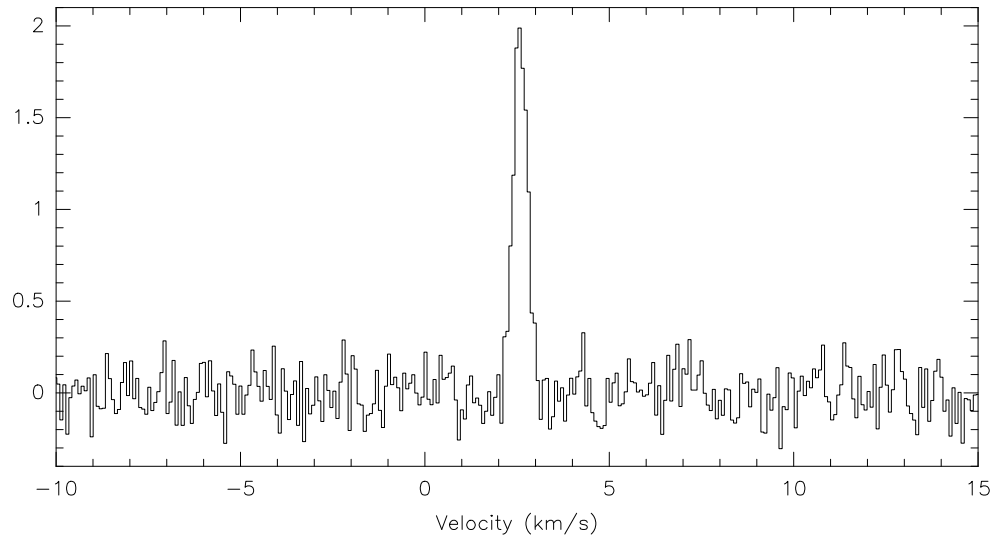

Figure 1. The H_2O $6_{16} \rightarrow 5_{23}$ spectrum of IRAS 22343+7501, (measured on 1993 Oct. 3 in the time interval UTC=16:15 - UTC=18:05).

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References:

Baars, J. W. M., Genzel R., Pauliny-Toth I. I. K., Witzel, A., 1977, *A&A* **61**, 99
Balázs, L. G., Eislöffel, J., Holl, A., Kelemen, J., Kun, M., 1992, *A&A*, **255**, 281
Balázs, L.G., 1994, personal communication
Kun, M. & Prusti, T., 1993, *A&A*, **272**, 235
Lynds, B.T., 1962, *ApJS*, **7**, 1
Rosvick, J.M. & Davidge, T.J., 1994, *The JCMT Newsletter* No. 3, August 1994, p. 38.
Sato, F. & Fukui, Y., 1989, *ApJ*, **343**, 773
Wilking, B., Claussen, M. J., Benson, P. J., Myers, P. C., Terebey, S. and Wootten, A., 1994, *ApJ*, **431**, L119
Wouterloot, J.G.A. & Walmsley, C.M., 1986, *A&A*, **168**, 237