1612 MHz OBSERVATIONS OF SOUTHERN IRAS SOURCES

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ABSTRACT. Eight of thirty-four previously unobserved IRAS sources were found to be relatively strong 1612 MHz OH emitters. Five of these emit at 1667 MHz. Of the eight half are high velocity range, population I type stars, the other half are low velocity range, population II type stars. The pump efficiencies are in the range $0.018 \leqslant e \leqslant 0.163$.

1. INTRODUCTION

The OH/IR candidates were chosen to fall within the region of variable OH/IR stars in the colour-colour plot of Olnon et al (1984), fig. 2. Assuming a 3σ detection limit of 3 Jy at 1612 MHz, for a 15 minute observation, a minimum maser pump efficiency of 0.02 would allow OH/IR stars with a non colour-corrected flux $S(25) \geqslant 300$ Jy to be detected.

2. OBSERVATIONS AND RESULTS

Observations were made at 1612 MHz with the 26m Hartebeesthoek antenna. The zenith system temperature was 45K. Only left circular polarization was accepted. The 3σ sensitivity limits were 1.5 Jy at 1612 MHz and 1.0 Jy in the main-lines. In the undetected sources, the upper limit on the intensity at 1612 MHz was 3 Jy. Results are listed in Table I. The eight OH/IR stars detected at 1612 MHz were re-observed at 1667 MHz, where maser emission was found in five, and at 1665 MHz where none were detected, with an upper limit of 1 Jy.

3. DISCUSSION

The infrared pump efficiency of 1612 MHz masers, taken from the ratio of the averaged OH flux of the peaks to the 35um flux (Evans & Beckwith 1977), is less than 0.25 (Elitzur et al, 1976). Here, derived pump efficiencies (Table II) were found to be in the range 0.018 to 0.163.

The peak separation, dv, distinguishes population I ($dv \geqslant 29$ km/s) from population II ($dv < 29$ km/s) masers (Baud et al, 1981). Population I

I. Appenzeller and C. Jordan (eds.), Circumstellar Matter, 215–216.

masers in this sample (Table II) lie within 3° of the galactic plane. Three of the four population II masers lie at galactic latitudes well outside the range of population I tracers.

Distances to the stars were estimated from the mean radial velocities of the maser lines. They were obtained directly from a galactic rotation model (R_o = 10 kpc), and by comparison with the velocity-longitude relationships for HI, CO and HII regions. Estimates for population II masers may be unreliable, if they depart greatly from circular rotation.

TABLE I. 18cm OH EMISSION FROM THE EIGHT DETECTED IRAS SOURCES

Object	IRAS ident.	1612 MHz		1667 MHz	
		v(peak) km/s	s(peak) Jy	v(peak) km/s	s(peak) Jy
OH259.8-01.8	11438-6330	-43.8	11.4		
		-16.9	8.5	-16.3	2.2
OH309.6+00.7	13442-6109	-73.2	3.1		< 1
		-24.8	1.8		
OH318.7-00.8	14582-5926	-57.5	4.5		< 1
		-18.5	11.1		
OH329.8-15.8	17319-6234	-20.7	8.6		
		+8.1	5.1	+8.7	2.4
OH338.1+06.4	16105-4205	-96.3	59.8	-97.6	6.2
		-70.3	59.4	-68.9	1.6
OH343.9+02.7	16460-4022	-46.6	10.7		
		-12.2	6.0	-10.9	13.8
OH348.2-19.7	18467-4802	-59.6	25.2	not observed	
		-35.4	20.8		
OH357.3-01.3	17411-3154	-39.4	134.5	-40.7	19.0
		-2.2	134.9	-3.9	13.4

TABLE II. OH/IR STARS - DERIVED PARAMETERS FOR THE DETECTED SOURCES

Object	S(OH)/S(35)	dv (km/s)	Pop.	Vlsr (km/s)	Distance (kpc)	Comments
OH259.8-01.8	0.047	26.9	II	-30.4	-	Large peculiar velocity
OH309.6+00.7	0.018	48.4	I	-49.0	3.2/ 7.6	Centaurus arm, tangent
OH318.7-00.8	0.076	39.0	I	-38.0	2.1/ 0.6	Centaurus arm
OH329.8-15.8	0.047	28.8	II	-6.3	0.3/ (4.4)	Carina arm / Local spur?
OH338.1+06.4	0.148	26.0	II	-83.3	5.4/(10.4)	Norma arm?
OH343.9+02.7	0.033	34.4	I	-29.4	2.6/(13.7)	Centaurus arm
OH348.2-19.7	0.163	24.2	II	-47.5	5 /(11.5)	3 kpc / Norma arm?
OH357.3-01.3	0.099	37.2	I	-20.8	6 /(11)	3 kpc / Norma arm

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