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SEARCH FOR THE NEAR INFRARED COUNTERPARTS OF COMPACT H II REGIONS AND/OR H_2O MASERS

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RESUMEN. Presentamos los resultados preliminares de una búsqueda en el Plano Galáctico de contrapartidas en el infrarrojo cercano de regiones H II compactas y/o máseres H_2O probablemente asociados con fuentes IRAS (situadas a distancias inferiores a 1' de las regiones H II y/o máseres H_2O). Damos la fotometría J,H,K,L y M de 10 nuevas fuentes.

ABSTRACT. We present the preliminary results of a search for near infrared counterparts of compact H II regions and/or H_2O masers in the Galactic Plane, probably associated with IRAS sources (at angular distances less than 1'). J,H,K,L and M photometry of 10 new detections is reported.

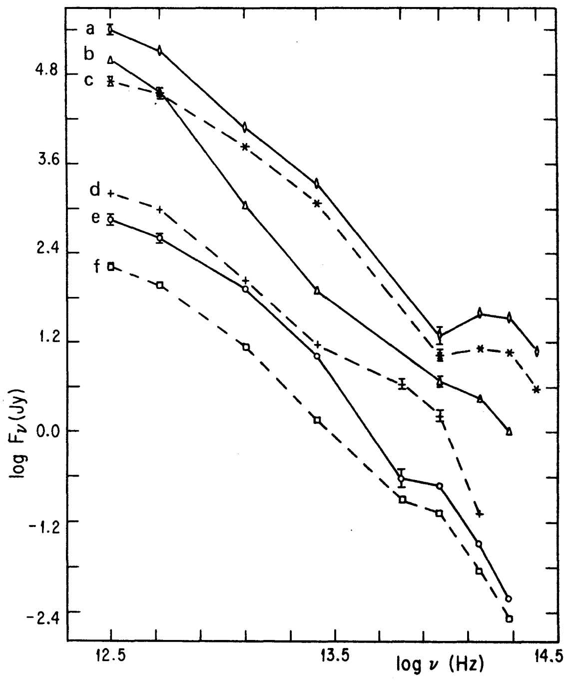
Key words: INFRARED SOURCES — MASERS — NEBULAE-H II REGIONS

I. INTRODUCTION

Stars in the Galactic Plane exciting young ultracompact HII regions and/or H_2O maser emission, are young, massive objects, still embedded in their protostellar dust shells, being detected only at infrared wavelengths. With the aim of discovering infrared protostars, systematic searches towards H_2O masers and compact HII regions have been carried out in the last years (Epchtein and Lepine 1981; Moorwood and Salinari 1981a, 1981b; Braz and Epchtein 1982; Habing and Israel 1979; Wynn-Williams 1982), yielding the detection of an homogeneous class of infrared objects which exhibit compactness and infrared colours 2<K-L<5 equivalent to dust temperatures in the range 500-1000 K. Apart from the interest in the study of infrared protostars themselves, their importance is emphasized by the fact that the knowledge of the luminosity of protostars over the whole Galaxy is the only way to determine directly the Galactic Initial Mass Function. Even though the IRAS data are necessary in the determination of the bolometric luminosity of infrared protostars (most of their energy is radiated in the mid and far infrared) they are not sufficient to determine the Galactic IMF, since the large beam of IRAS would consider as a single object, protostars which may be clustered together, something which occurs frequently.

II. OBSERVATIONS AND RESULTS

The observations were performed on the 1.55 m Sánchez Magro Telescope in Observatorio del Teide (Izaña, Islas Canarias) on July and September 1986. We used an infrared photometer, equipped with InSb (PV) detector operating at 60 K with 12" aperture and 22" chopper throw. The photometric magnitudes of the detected sources are given in table I. In figure 1 we show spectral energy distributions constructed with the observed 1-5 μm fluxes combined with the available 12-100 μm fluxes from IRAS Point Source Catalogue (Table 2). These IRAS sources have colour temperatures of about $T_{100/60}$= 35 K, $T_{60/25}$= 60 K and $T_{25/12}$= 125 K (assuming an emissivity proportional to frequency).



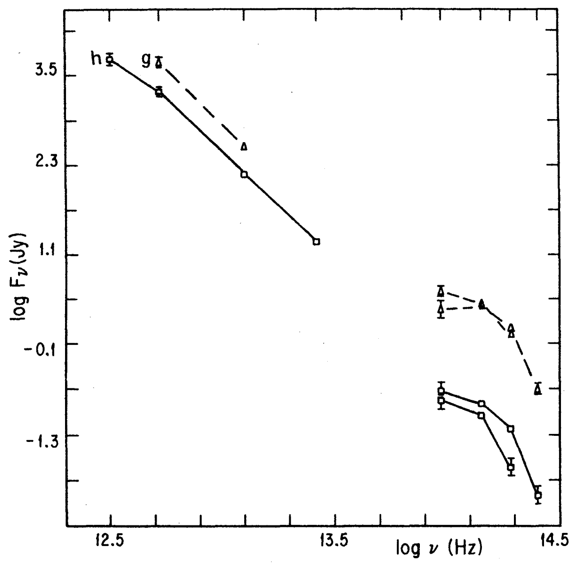


Fig. 1. Energy distribution of G20.99+0.09 IRS (a, x150), G10.46+0.02 IRS (b, x10), G11.94-0.03 IRS (c, x30), G59.78+0.06 IRS (d, x1), G18.30-0.39 IRS (e, /5) and G188.94+0.89 IRS (f, /10). Error bars are shown where they are larger than the symbols sizes.

Fig. 2. The same as Figure 1 for the near infrared and IRAS sources found in the vicinity of G26.10-0.07 (g, x10) and G8.67-0.35 (h, x1).

TABLE 1. PHOTOMETRY OF THE INFRARED SOURCES

GAL.COORD.	HII	H_2O	IR	J	H	K	L	M	K-L
8.67-0.35	+	+	IRS1		11.9 ±0.3	9.69±0.06	8.2 ±0.3		1.5
			IRS2	13.3 ±0.3	10.63±0.05	9.32±0.02	7.9 ±0.3		1.4
10.46+0.02	+	+	IRS		10.08±0.08	8.47±0.04	6.87±0.18		1.6
11.94-0.03	+		IRS	10.32±0.04	8.61±0.02	7.98±0.01	7.20±0.19		0.8
18.30-0.39	+		IRS		11.34±0.06	9.04±0.02	6.13±0.04	5.3 ±0.3	2.9
20.99+0.09	+		IRS	10.8 ±0.1	9.19±0.02	8.56±0.04	8.3 ±0.3		0.3
26.10-0.07	+		IRS1	12.3 ±0.2	9.81±0.03	8.61±0.01	7.7 ±0.3		0.9
			IRS2		10.02±0.04	8.48±0.02	7.08±0.18		1.4
59.78+0.06	+		IRS			9.79±0.07	5.54±0.19	3.90±0.18	4.25
188.94+0.89		+	IRS		11.24±0.06	9.16±0.02	6.25±0.06	5.27±0.11	2.91

Notes: a. Columns 2 and 3 indicate the detection (+) of compact HII regions and H_2O masers respectively. All the compact HII regions are from Wink et al. (1982) and the H_2O masers from Genzel and Downes (1979), Genzel and Downes (1977) and Batchelor et al. (1980) for 8.67-0.35, 10.46+0.02 and 188.94+0.89 respectively.

b. The magnitude errors are 1σ .

TABLE 2. FLUXES (F_ν IN JANSKYS) OF THE IRAS SOURCES

GAL. COORD.	12(μm)	25(μm)	60(μm)	100(μm)
8.67-0.35	19.0±0.9	154± 7	1900±300	5000±1000
10.46+0.02	8.0±0.8	106± 6	3700±500	10000±1200
11.94-0.03	39 ±3	224±18	1200±200	1700± 200
18.30-0.39	52 ±3	420±20	2000±300	3600± 600
20.99+0.09	14.0±0.8	79± 7	861± 17	1700± 300
26.10-0.07		35± 3	470± 70	
59.78+0.06	14.4±0.6	109± 8	980± 60	1630± 130
188.94+0.89	14.0±0.6	140± 6	950± 90	1700± 200

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