binaries, to see how they behave on a long time scale. The spasmodic emission of radiation due to the unstable mass transfer/accretion process, makes it necessary to open the observing window a bit more in order to detect crucial phenomena at the right moment. From the long-term behaviour of these systems we have probably been able to derive information on their evolutionary scenario.

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IRAS Molecular Clouds in the Hot Local Interstellar Medium

P. ANDREANI[1,2], R. FERLET[1], R. LALLEMENT[1,3] and A. VIDAL-MADJAR[1]

[1] Institut d'Astrophysique, CNRS, Paris, France
[2] ESA Fellow on leave from Dipartimento di Fisica, Università di Roma, La Sapienza, Roma, Italy
[3] Service d'Aéronomie, CNRS, Verrières le Buisson, France

1. Introduction

The picture of the nearby (d ≤ 100 pc) interstellar medium, as resulting from the observations in the wavelength range from X-ray to radio, consists of a very hot, low-density gas, forming a hot bubble, filled with many cloudlets of ionized and neutral material and located near to an interstellar condensation (see the "Local Interstellar Medium", NASA CP-2345, 1984; and Cox and Reynolds, 1987).

Only recently the existence of a colder counterpart in the nearby gas was argued by Magnani, Blitz and Mundi (1985), who reported the detection of a large number of "local" molecular clouds at high galactic latitude and inferred from statistical arguments an average distance of about 100 pc.

A comparison with the IRAS maps showed that all the high latitude molecular clouds can be identified with the cores of the new discovered infrared (60 and 10 μm) features: "the IRAS cirrus" (Weiland et al., 1986).

Nearby molecular clouds are then associated to the cold interstellar material with temperatures ranging from 14 to 40 K.

In order to understand the physical properties of the local medium and their effect on other observations, it is interesting to tackle the problem of the coexistence of a cold and neutral gas with a hot medium and the mixing between these two gaseous phases.

The distance, the morphology and other properties of the clouds, belonging to the local interstellar medium, can be determined by mapping the interstellar absorption lines toward stars at different distances and projected along the line of sight to these clouds.

The feasibility of this procedure has already been demonstrated by Hobbs et al. (1986) who estimate the distance of the cloud Lynds 1457/8 at about 65 pc.

We selected several high latitude clouds detected by IRAS and/or at CO wavelength (2.6 mm) by Magnani, Blitz and Mundi (1985) and gathered echelle spectra of a few stars with the ESO CAT telescope at La Silla, Chile.

2. The Observations

From the IRAS HCON 1 survey (see IRAS Explanatory Supplement, 1984), we selected those clouds at 100 μm, which were already detected at the CO band (Magnani et al., 1985) and located at high galactic latitude (| b | ≥ 25°).

The MIDAS software package (ESO Operating Manual No. 1, 1984) has been used to analyse the IRAS maps. The whole procedure of IRAS images analysis will be published elsewhere (Andreani et al., 1988).

Table 1 lists the known properties of the clouds from infrared and CO measurements. The position, photometry, spectral type and distance are taken from the Bright Star Catalogue for the brightest programme stars, and from the HD Catalogue for the others. Stars were chosen to be bright, hot, and of early spectral type.

High-dispersion Ca II K and Na I D spectra were gathered during 1986–1987 with the Coudé Echelle Spectrometer fed by the 1.4-m CAT telescope and equipped with either a

TABLE 1. *Infrared and CO Properties of the Clouds*

	Cloud	Coordinates				IRAS					CO
#	Name	α (h)	δ (°)	l (°)	b (°)	12 μ	25 μ	60 μ (MJy/sr)	100 μ	T_d (K)	T_a (K)
20	L1642	4 33	−14 20	210.9	−36.5	–	–	.3 ± .2	11.2 ± 2.8	20	6.8
126	ϱ-Oph	16 16.3	−19 48	355.5	−21.1	–	–	10 ± 3	12 ± 3	29	9.2
113	–	15 17.1	−29 25	337.8	−23.04	–	–	13 ± 4	12 ± 4	32	6.1

Reticon or a CCD detector at the ESO Observatory at La Silla, Chile. The resolving power was 60,000 for the CCD spectra and 100,000 for the Reticon ones. The wavelength calibration is provided by a thorium lamp and its internal accuracy is of ± 3 m Å. Details of the observational and reduction procedure can be found in Ferlet and Dennefeld (1984). In order to get rid of the atmospheric water absorption lines, Na I spectra were compared with template spectra of hot stars taken during the same nights of observation (Vidal-Madjar et al., 1986).

3. The Results

Wherever the D lines are clearly free from saturation, the column densities are derived by applying the usual relation for the linear part of the curve of growth, independent of the unknown velocity spread parameter b. On the other hand, saturation allows only to infer lower limits on the N(Na I).

The presence of the clouds is clearly revealed (see Fig. 1) by the sharp and deep absorption features seen in front of the stars HR 1423, HD 30332, HR 5655, HD 135951, HR 5984, HR 5985, HR 6027 and HR 6118. Small structures detected in front of the stars HR 1438 and HR 6153 could be due either to the fainter boundry of the cloud or to a totally independent, low density nearby medium.

Cloud no. 20

Cloud no. 20 is a suitable candidate because of its small optical extinction and its isolated position towards the galactic anticentre. Its dust properties have been investigated by means of CO and IRAS data (Weiland et al., 1986) and photoelectric and photographic surface brightness observations (Laureijs et al., 1987). The results of our analysis agree with the previous determinations.

From our observations we can infer a distance range between 70 and 220 pc and a mass range of 0.5 and 3.5 $M_\odot$.

Cloud no. 126

The CO cloud no. 126 belongs to the ϱ Ophiucus region, its infrared data at 12 and 25 μm are strongly affected by the zodiacal emission of the ecliptic plane, however, values at 60 and 100 μm are well corrected for this and the incertainties are mainly due to systematic errors related to the calibration problems (IRAS Explanatory Supplement).

Its distance should be of about 100 pc. The estimation to its mass gives 0.15 $M_\odot$.

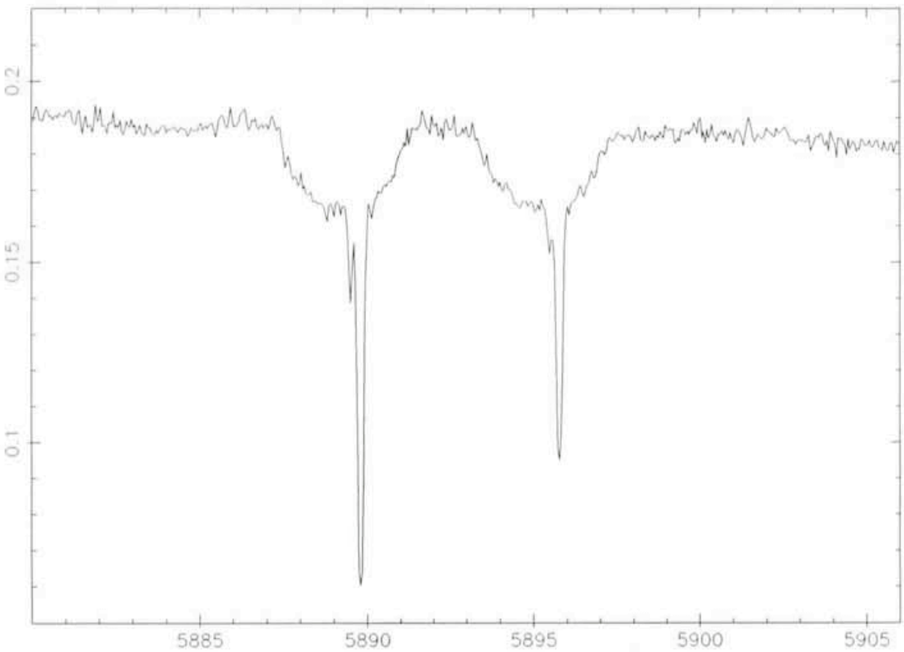

Figure 1: *A one-hour exposure in May 1987 towards HD 135951 at the CAT telescope with the CES and CCD detector. The strong Na I interstellar doublet seen in absorption shows that cloud no. 113 must be less than 90 pc from the sun.*

Cloud no. 113

Only an upper limit to the distance can be deduced since stars located in front of the cloud are not included in our survey. The cloud lies at a distance less than 90 pc and the lower limit to its mass is of .007 $M_\odot$.

4. Conclusions

If the neutral gas in which the strong Na lines arise belong to the IR-CO clouds, then these latter lie relatively close to the Sun and an upper limit to their distance can be inferred from the distance of the selected stars.

Therefore, some molecular clouds very likely lie within the hot, low-density interstellar gas. The new picture of the local interstellar medium resulting from these data must take into account the coexistance of hot and cold gas. New observations are required in order to sketch the properties of the local space and, because of that, several other molecular clouds are under investigation with this procedure.

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LETTER TO THE EDITOR

Fontenelle (*The Messenger*, No. 50, p. 40, December 1987)

I was pleased to read about Fontenelle, but surprised to learn that this author was unknown to you until recently . . . It appears that his celebrity first of all is due to the fact that he lived a hundred years and that, as Perpetual Secretary of Académie des Sciences, he occupied a privileged position in France. On the occasion of the 300th anniversary of the first edition of "Entretiens", the Rouen University organized a 5-day colloquium in October 1987. What concerns more recent editions, there was one by Marabout Université, Editions Gérard et Cie, Bruxelles, in 1973. Fontenelle is also mentioned in the article by J. Lévy (l'Astronomie, December 1986, 549).

S. DÉBARBAT (Observatoire de Paris)