Rev. Mexicana Astron. Astrof., **13**, 69-71 (1986)

H I AROUND THE DWARF GALAXY IN PHOENIX. (Research Note)

R. Morras[1,2] and E. Bajaja[1]
Instituto Argentino de Radioastronomía
Argentina

Received 1986 February 19

RESUMEN

Un relevamiento de H I en la línea de 21-cm, alrededor de la galaxia enana en Phoenix, mostró que el gas a altas velocidades existente en la región puede estar relacionado con la Corriente Magellánica. No fue encontrada ninguna clara correlación con la galaxia enana.

ABSTRACT

A brief survey of H I in the 21-cm line, around the dwarf galaxy in Phoenix, shows that the gas spread over the region can be related to the Magellanic Stream. No feature clearly correlated with the galaxy has been found.

Key words: GALAXIES-LOCAL GROUP —— NEUTRAL HYDROGEN

I. INTRODUCTION

During the observation of the dwarf galaxy in Phoenix (R.A. = 1^h49^m, DEC = $-44°42'$) (Caterna and Flower 1977) in the HI 21-cm line, we detected a weak signal at V(lsr) = 128 km s^{-1}. In order to verify whether this signal had originated in the galaxy, we observed the surroundings and we found that the signal was in fact spread out over a rather extended region. This seemed to discard the possibility for the HI to be associated with the galaxy, and we considered its possible association with the Magellanic Stream (MS) (Mathewson, Clearly, and Murray 1974; Morras 1983, 1985).

The MS runs close to the position of the dwarf galaxy (at a distance of about 7° in sky) and at the nearest positions its velocities differ by only 20 to 30 km s^{-1} from what we have detected. Furthermore, one of us (Morras 1983) also detected in the region an HI structure with a velocity which differed from the MS by almost 40 km s^{-1}.

In view of these data we decided to carry out a brief survey in the region in order to see what the connections are between the different features.

II. THE OBSERVATIONS

The observations were carried out during June 1984, using the 30-m dish of the Instituto Argentino de Radioastronomía. The dish, illuminated by a scalar feed at the primary focus, provides a circular beam with a half power width of 34′. The receiver front-end was equipped with a non-cooled parametric amplifier and the system temperature was 83 K.

We started observing the galaxy using in the backend 84 analog channel filters, 75.8 kHz (16 km s^{-1}) wide, with a spacing equal to their width. The LO frequency was set to cover a velocity range from −350 to 915 km s^{-1}. The total integration time was 130 minutes at both positions, on and off the source, switching against a load at room temperature. In this way, the rms of the antenna temperature in the observed profile was 0.01 K. A signal of about 0.08 K was seen on three channels centered at about 130 km s^{-1}.

The observation was then repeated using 112 – 10 kHz (2 km s^{-1}) wide channel filters, which provided a full velocity coverage of 224 km s^{-1}. The LO oscillator frequency was set this time to have the signal at the center of the band, and the observing mode was frequency switch. The rms noise with type of observation, amounted to about 0.03 K for 60 minutes of integration time. The galaxy was observed integrating during 200 minutes. The baseline correction in the velocity profile was done adjusting a low order polynomial on the HI free channels.

To observe the surroundings of the galaxy the 10 kHz filters were also used, with the same procedure but with different integration times. Having found the same type of HI profile around the galaxy, at distances much larger than the beam size, we extended the observations on a larger area of about 30 square degrees.

1. Member of the Carrera del Investigador Científico of the Consejo Nacional de Investigaciones Científicas y Técnicas.

2. Member of the Universidad Nacional de La Plata, Argentina.

III. RESULTS

The results of these observations can be seen in Figure 1, which shows the HI column density distribution, N_H, over the observed region. The dashed lines define two regions surveyed with different sensitivities. In the region which contains the dwarf galaxy, the signal was very weak and the profiles were obtained with an integration time of one hour. In the other region, in which

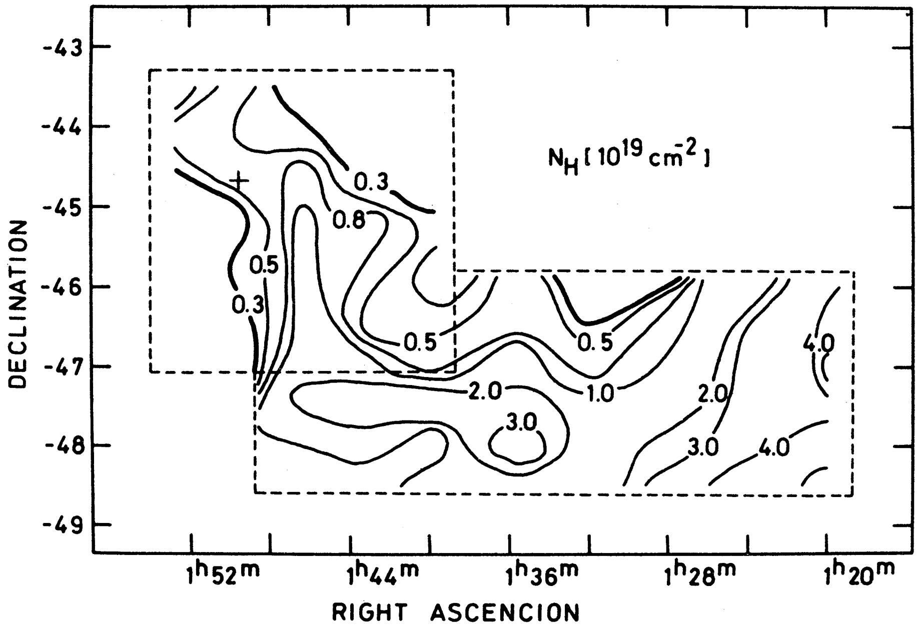

Fig. 1. HI distribution contour map. The two regions defined by the dashed lines have been observed with different integration times: 60 minutes for the one at the upper left and 30 minutes for the other. The position of the dwarf galaxy is indicated with a cross. The shaded area belongs to the Magellanic Stream.

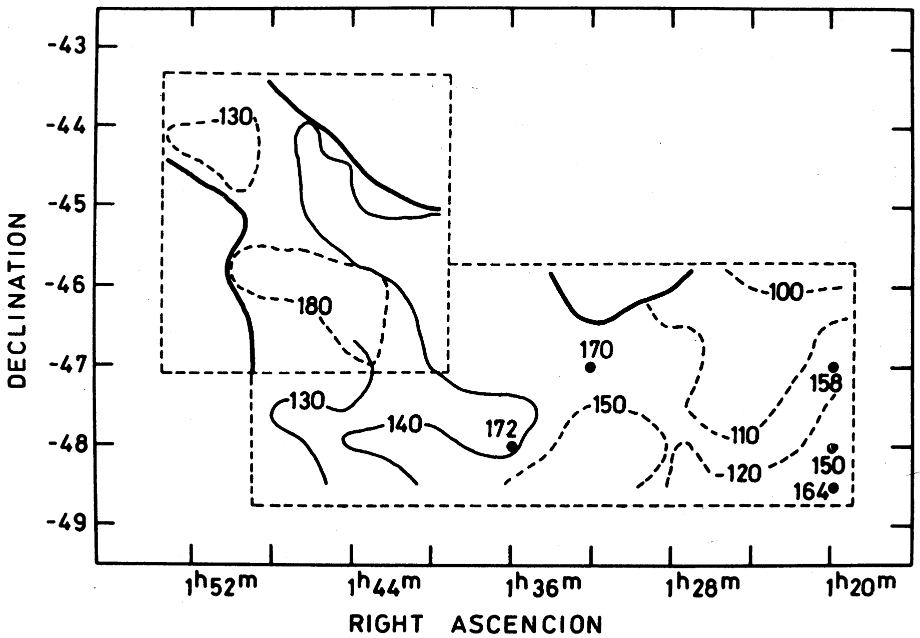

Fig. 2. Velocity contour map. Full lines are for the lower velocity component and dashed lines for the upper velocity. The position of the galaxy is indicated with a dot.

part of the MS can be seen (between 1^h20^m and 1^h28^m of R.A.), the integration times were of 30 minutes.

The figure shows that there is a continuity in the HI distribution over the whole region though not at a single and uniform velocity, as shown in Figure 2. One velocity component is seen to vary smoothly between 1^h28^m and 1^h52^m in R.A. Comparing the distribution of this component with the one shown by Morras (1983) in his Figure 2, for the main section of the MS in that region, it can be concluded that both are directly connected. In addition, Figure 2 shows that there are other components in the region, overlapping with the extended one. These have been indicated with dots.

On the basis of these and other similar observational evidences (Morras 1985), we believe that all this gas is a product of the same process that originates the MS. The mass of the filament, excepting the region belonging to the main stream, was estimated to be 390 R^2 $M_\odot$, where R is the distance in kpc.

It may be that part of this gas belongs to the dwarf irregular galaxy in Phoenix. Unfortunately, its radial velocity is not known from other measurements and the angular resolution of the IAR radiotelescope is not good enough to study the region in detail. In fact, we have here two options: *a*) the HI profile at the position of the galaxy corresponds to the HI of the galaxy, or *b*) no HI has been detected. If *a*) is the case then the galaxy has more or less the same velocity as the HI seen around in projection and its parameters are the following: central velocity = 133 km s^{-1}; velocity width (at 0.25 level) = 44 km s^{-1}; profile area = 26 Jy km s^{-1}; HI mass = 2.1×10^7 $M_\odot$. For the mass determination the distance of 1.85 Mpc estimated by Caterna and Flower (1977) was used.

If instead we assume that no galactic HI has been detected, i.e. all the HI signals have originated in the MS extensions, then, assuming a velocity width of 100 km s^{-1}, the upper value for the HI mass would be around 2×10^7 $M_\odot$. Both values are consistent with typical values for irregular galaxies so we cannot discard the possibility that part of the detected gas may belong to the galaxy in Phoenix.

REFERENCES

Caterna, R. and Flower, P.J. 1977, *Ap. J. (Letters)*, **212**, L57.

Mathewson, D.S., Clearly, M.N., and Murray, J.D. 1974, *Ap. J.*, **190**, 291.

Morras, R. 1983, *A.J.*, **88**, 62.

Morras, R. 1985, *A.J.*, in press.

Esteban Bajaja and Ricardo Morras: Instituto Argentino de Radioastronomía, C.C. No. 5, 1894 Villa Elisa, Buenos Aires. Argentina.