NEUTRAL HYDROGEN OBSERVATIONS ON H II REGIONS

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Abstract. Nine of the catalogued H II regions in the southern hemisphere have been selected for correlation with neutral hydrogen observed at the 21 cm line.

The radiotelescope used for the H I line observations was the 30 m Carnegie telescope of the Instituto Argentino de Radioastronornia and the 56 channel, 10 KHz bandwidth receiver.

The observational results are analyzed for each H II region. They are compared with previous optical and radio results.

For three of the nine observed regions it has been possible to find neutral hydrogen in absorption with similar velocities. In three cases absorption has been found but no component at the H II region velocity is seen. Finally in three cases, it has not been possible to find any absorption at all.

1. Introduction

Nine of the catalogued H II regions in the southern hemisphere have been selected for correlation with neutral hydrogen observed at the 21 cm line.

The selection has been made on the basis of the characteristics of the radiotelescope used for the observations and the area of the sky intended to survey. The conditions imposed by the telescope are declinations below \(-10^\circ\) and large angular sizes (angular resolution \(=0.5^\circ\)). The area to survey was arbitrarily selected to \(280^\circ < l < 310^\circ\), \(-7^\circ < b < 3^\circ\).

The selected regions are detailed in Table I. Their data have been taken from Georgelin and Georgelin (1970). The first column specifies the region through its R number except for m Centauri. The second and third columns give the galactic coordinates and the third and fourth are the velocities corrected to the standard solar motion (as given by Georgelin and Georgelin) and to the local standard of rest (LSR) respectively. The sizes in minutes arc of are specified in the sixth column and the last column gives other names or reference numbers.

From the Table it is evident that, as a consequence of the small extension in galactic longitude of the area on which the H II regions are located, the velocities, with the
exception of the last two, are quite similar, between $-20$ and $-30 \text{ km s}^{-1}$. The sizes, however, differ considerably from each other. The characteristics of neutral hydrogen determined through the observations, are the height distribution at the velocity of the H II region and the absorption features. The observations and their reduction are described in the next two sections.

In Section 4 the results are analyzed for each H II regions and finally in Section 5 conclusions are derived from the totality of our results.

### 2. Observations

The radiotelescope used for the HI line observations was the 30 m Carnegie telescope of the Instituto Argentino de Radioastronomia (IAR) and the 56 channel, 10 KHz bandwidth receiver (Garzoli, 1970).

The observed points covered the region limited by $280^\circ \leq l \leq 310^\circ$, and $-7^\circ \leq b \leq 3^\circ$, which contains all the selected H II regions.

The observations were carried out in two ways. The first ones, which we call from now on observations A, consisted in a grid of points spaced $1^\circ$ over the entire region. This way of surveying the regions does not take full advantage of the resolution of the antenna. However, because of the sizes of most of the H II regions, some gross features, if present, are expected to be seen and eventually the need for more closely spaced observation points is shown.

The $1^\circ$ grid over the specified region required the observation of 340 points. The integration time was 3 min and every observation was repeated at least once; the total number of observations was around 700 or about 100 h of telescope time, including pointing and oscillator setting.

A half degree grid would mean a multiplication of these figures by four. Instead of spending so much time filling the whole grid, it was decided to complement the observations A of the grid points with the observations B every half degree along