AN ANOMALOUS VELOCITY NEUTRAL HYDROGEN
STRUCTURE NEAR THE GALACTIC CENTER

I. F. MIRABEL*
Observatorio Astronómico de la Universidad Nacional de La Plata
and
Instituto Argentino de Radioastronomía, Argentina
and
K. C. TURNER
Instituto Argentino de Radioastronomía**
and
Dept. of Terrestrial Magnetism, Carnegie Institution of Washington,
Washington, D.C., U.S.A.

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Abstract. An extensive concentration of neutral hydrogen has been observed in the fourth galactic quadrant, with a mean radial velocity of +44 km s⁻¹ referred to the local standard of rest. At a distance of R kpc from the Sun this structure would contain \( 2.5 \times 10^4 R^2 \) solar masses of neutral hydrogen.

Five possible interpretations of this extensive concentration are considered: (1) part of the shell of a nearby explosive event; (2) a distant spiral arm of the Galaxy; (3) an extragalactic object; (4) material falling into our Galaxy; (5) gas expelled from the galactic center. Arguments are offered against the first three possibilities.

1. Introduction

In this paper a concentration of neutral hydrogen with anomalous radial velocity, located near the coordinates of the galactic center, is studied. The observed distribution and kinematics of this material will be compared to several models.

2. Observations

The observations here reported were made with the 30-m Argentine-Carnegie radio-telescope at the Instituto Argentino de Radioastronomía located in Parque Pereyra Iraola, Province of Buenos Aires, Argentina. The receiver uses a parametric amplifier front end and 56 channels of 10 kHz width spaced every 4 km s⁻¹ at the frequency of

* Member of the Carrera del Investigador Científico del Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina.
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the 21 cm line. System noise temperature is near 250 K. A more complete description of the receiver has been given by Garzoli (1972).

In this study, observations were made at 180 points with an integration time of at least 12 minutes each over the velocity range \(-70\ \text{km s}^{-1}\) to \(+130\ \text{km s}^{-1}\). Observed velocities were reduced to the Sun and to the local standard of rest by removal of the solar motion of 20 km s\(^{-1}\) toward \(\alpha=270^\circ, \delta=30^\circ\) (1900.0).

3. Description of Results

Figure 1 offers as an example a profile taken at \(l=355^\circ, b=-12^\circ\). The 12 K peak at \(+42\ \text{km s}^{-1}\) corresponds to the object under discussion in this paper.

Maps of antenna temperature at constant velocity, as well as diagrams of antenna temperature \(T_a(l, V|b)\) and \(T_a(b, V|l)\) have been constructed from the observations and Figures 2, 3, and 4 show examples of such diagrams for \(b=-12^\circ\), \(b=-9^\circ\), and \(l=355^\circ\).

The intermediate velocity structure appears in general to be well separated from the

![Fig. 1. Profile at \(l=355^\circ, b=-12^\circ\). The 12 K peak at \(V=+42\ \text{km s}^{-1}\) corresponds to the feature under discussion.](image1.png)

![Fig. 2. Antenna temperature \(T_a(l, V|b=-12^\circ)\).](image2.png)