

A SURVEY FOR HIGH-VELOCITY CLOUDS IN THE INNER GALAXY

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The results from a search for high-velocity hydrogen around the direction to the galactic center are presented. About 2000 positions were surveyed with the 43-m radiotelescope of NRAO with a rms of 0.03 K on a velocity interval of -1000 to $+1000$ km s^{-1} .

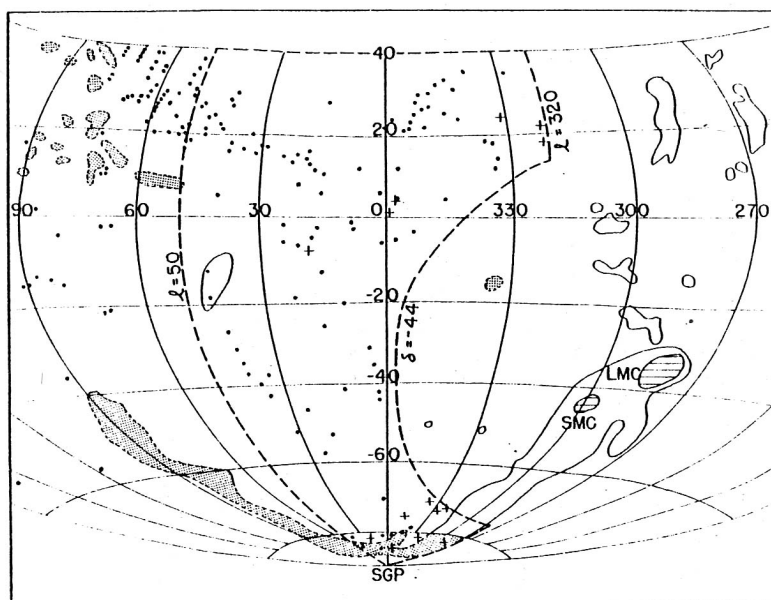


Figure 1. Distribution of HI with $|V_{\text{LSR}}| > 80$ km s^{-1} in the inner Galaxy. The area surveyed by us is limited by the broken lines at $l=50^\circ$, $b=+40^\circ$ and $\delta=-44^\circ$, the southern limit of the observable sky with the 43-m telescope of NRAO. Data outside that area are from surveys by other authors (Mirabel, 1981 and references therein). Dots are clouds smaller than 3° with $V_{\text{LSR}} < -80$ km s^{-1} . Crosses are clouds smaller than 3° with $V_{\text{LSR}} > +80$ km s^{-1} . Contours with hatching are clouds greater than 3° with $V_{\text{LSR}} < -80$ km s^{-1} . Contours without hatching are clouds greater than 3° with $V_{\text{LSR}} > +80$ km s^{-1} .

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Figure 1 shows the presence of several streams or complexes. In the first place, there appears a stream that extends from $\ell=5^\circ$ $b=+5^\circ$ to $\ell=90^\circ$ $b=+40^\circ$. This stream has velocities in the range of -80 to -140 km s^{-1} and extends up to $\ell=120^\circ$ $b=+55^\circ$ (Giovanelli, 1980). On the other hand, there seems to be a stream of small and faint clouds with $V_{\text{LSR}} < -140$ km s^{-1} extending from $\ell=20^\circ$ $b=-55^\circ$ to $\ell=48^\circ$ $b=+26^\circ$. It is interesting that this stream could stretch out from the southern into the northern galactic hemisphere, across the galactic plane.

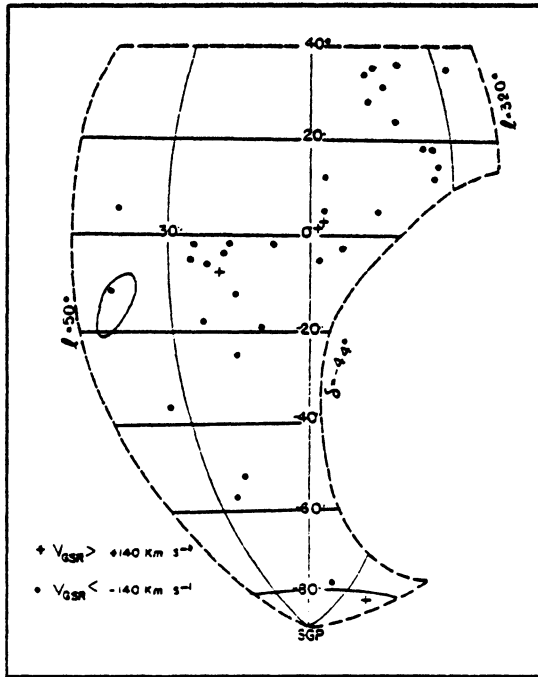


Figure 2. Distribution of clouds with very high galactocentric velocities ($|V_{\text{GSR}}| > 140$ km s^{-1}) in the region surveyed around the direction to the galactic center. More than 85% of the very-high-velocity detections are negative in sign. There appears a complex of clouds with very high negative velocities in the region $330^\circ < \ell < 30^\circ$ $-40^\circ < b < +40^\circ$, with a striking void at $\ell > 0^\circ$ $b > 0^\circ$. There are clouds at angular distances smaller than 2° from the galactic plane (e.g. HVC 24.4-1.9-293).

Since similar extreme velocities of about -200 km s^{-1} are observed in the galactic center and anticenter, these results are strong evidence for a high-velocity inflow of neutral hydrogen toward the Milky Way. Assuming that the gas that is infalling with velocities greater than 140 km s^{-1} is at a distance of 20 kpc from the galactic center, we estimate a present net influx of $0.2 M_\odot \text{ yr}^{-1}$ toward the Galaxy.

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REFERENCES

- Giovanelli, R.: 1980, *Astron. J.* 85, 1155.
 Mirabel, I.F.: 1981, *Rev. Mexicana Astron. Astrof.* 6, 245.