A NEW STUDY OF THE NEUTRAL HYDROGEN IN GOULD'S BELT

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The structure and kinematics of the neutral hydrogen associated with Gould's Belt have been studied using data of high velocity resolution and large latitude extent covering $\ell = 10^{\circ} - 350^{\circ}$. The data comprise the Berkeley Survey of Neutral Hydrogen (Weaver and Williams 1973, 1974), and an unpublished survey by Kerr, Bowers, Kerr, and Jackson (1983) using the 60-foot Parkes telescope. The latter is a fully-sampled survey of the region $\ell = 240^{\circ}$ to 350°, $b = -10^{\circ}$ to $+10^{\circ}$.

In order to separate the Gould's Belt feature from other galactic features, a low-pass velocity filter was applied to the data, thereby reducing features of intermediate and high velocity width while passing the Gould's Belt component and other narrow components. Final separation of the Gould's Belt feature was achieved by requiring the temperatures and velocities of the peaks constituting a single "structure" to vary continuously with longitude and latitude. This procedure was preferred over the more conventional gaussian analysis.

A contour map of the peak temperature of the Gould's Belt gas over the entire region studied was produced. In the northern hemisphere, the belt is well defined in the region $\ell = 150^{\circ} - 220^{\circ}$ (including the Perseus and Orion associations), but is extremely patchy outside this region. Also, the tilt of the gas to the galactic plane is significantly smaller than the recent estimates (Stothers and Frogel 1974) of the tilt of the stars in the belt. There is a large gap in the neutral hydrogen, situated near $\ell \sim 235^{\circ}$ and covering at least 25° in longitude. The gap may actually be over 50° in longitude, but a more extensive analysis of data from the southern hemisphere is needed to establish this.

The velocity-longitude relation of the gas was determined for $\ell = 10^{\circ} - 350^{\circ}$ by interpolating to the optical plane of the belt at each longitude. Figure 1 shows the interpolated values of velocity as a function of longitude. Also shown is a velocity-longitude relation for the gas (solid curve) derived by fitting a Fourier series to the

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observed velocities. It is intended to fit the velocities of Figure 1 with expanding-shell models of the style of Lindblad et al. (1973) and Olano (1982) to obtain new expansion parameters for Gould's Belt.

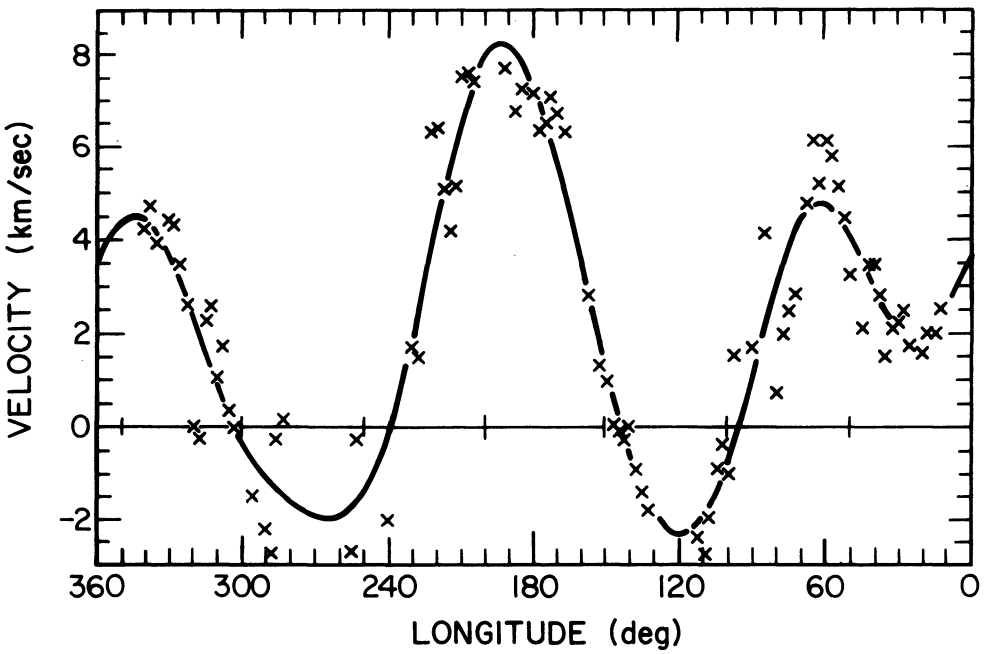

Figure 1: The observed values of velocity for the Gould's Belt gas as a function of longitude(x). Also shown is the "best fit" to the data using a Fourier series analysis (solid curve).

References

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