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MILKY WAY HALO GAS KINEMATICS

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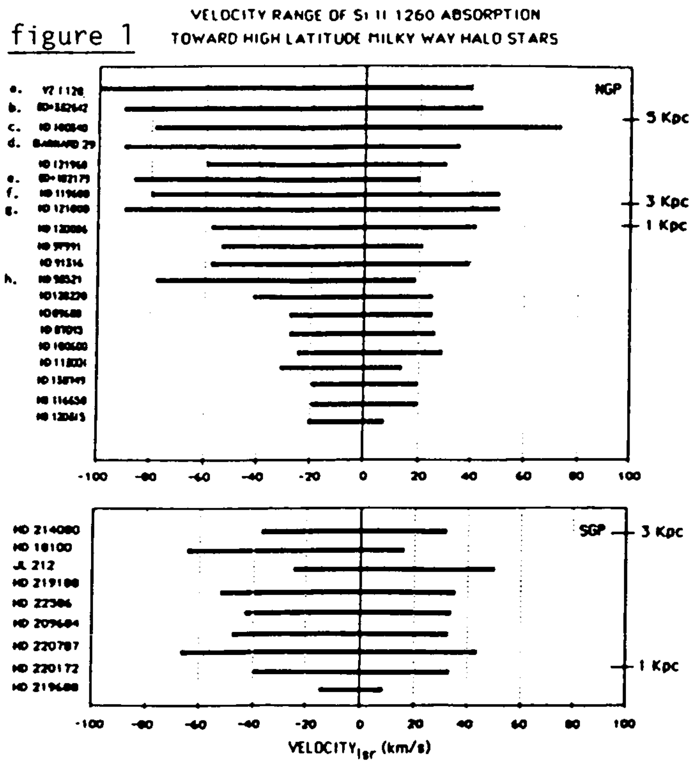
Measurements of high resolution, short wavelength absorption data taken by IUE toward high latitude O and B stars are presented in a discussion of the large scale kinematic properties of Milky Way Halo gas. An analysis of these data demonstrates that: **(a)** the observed absorption widths (FWHM) of Si II are very large, ranging up to 150 Km/s for the most distant halo star; this is much larger than is generally appreciated from optical data; **(b)** the absorption is observed to be systematically negative in radial velocity, indicating that cool material is, on the whole, flowing toward the disk of the galaxy; **(c)** there is some evidence for asymmetry between the northern and southern galactic hemispheres, in accordance with the HI 21 cm data toward the galactic poles; **(d)** low column density gas with highly negative radial LSR velocity (V < -70 km/s) can be found toward stars beyond 1-3 kpc in the northern galactic hemisphere in all four quadrants of galactic longitude; and **(e)** only the profiles toward stars in the direction of known high velocity HI features show a clear two component structure. The figures below illustrate these results.

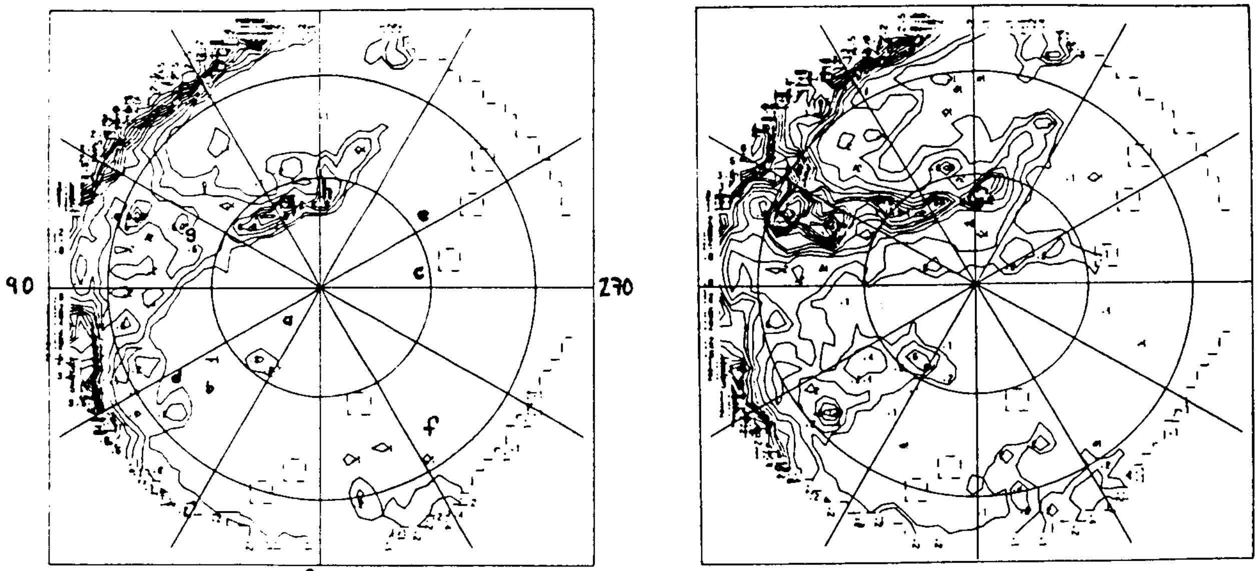
Figure 1 shows the measured full width at half intensity of Si II λ1260 for each star, shown in order of increasing distance from the galactic plane. The z-distance is *not shown to scale*. Observations toward the north and south galactic poles are shown separately. In both hemispheres, the velocity of interstellar gas is shown to be systematically negative with respect to the local standard of rest, although this effect is much more evident toward the north galactic pole than toward the south galactic pole. In the northern galactic hemisphere, highly negative velocity interstellar material (V_{lsr} < -70 Km/s) is commonly found toward targets beyond about 1 Kpc. The southern hemisphere, however, shows little evidence for material with this velocity between 1 and 3 Kpc. Additional observations have been granted by IUE to permit a more conclusive comparison between the hemispheres. Figures 2a and b show the distribution on the sky of those stars in the northern galactic

figure 1



hemisphere which show absorption from highly negative material along the line of sight. The letters correspond to the lettered targets in Figure 1. The plotted positions are superimposed on a map of 21 cm emission from neutral Hydrogen detected by the Bell Laboratory horn survey (Stark, Bally, Linke and Heiles, 1986, in preparation). Contours of emission from material with a velocity in the range of -100 to -85 km/s and -85 to -70 km/s are shown. From these diagrams, it can be seen that targets showing highly negative velocity material in absorption can be found in all four galactic quadrants, with *no obvious correlation* between the widths and the features seen in 21 cm emission over the same velocity range. However, it is interesting that the profiles toward targets g and h do show an obvious two-component structure, while the profiles toward the other targets "grow" smoothly in width as lower column density material is sampled by lines with increasing f-values.

Figure 2a 2b



SBLH NH. -100<V<-85 KM/SEC SBLH NH. -85<V<-70 KM/SEC

In conclusion, any complete description of halo gas must include gas with two distinctive types of absorbing characteristics:

(a) higher column density material in the form of condensed "clouds" seen over a range of velocities. Distance estimates based on these absorption data show that some of the gas in the emission feature in the second and third quadrants is within z=1.3 kpc, while clouds with more extreme velocities are distributed beyond this distance.

(b) low column density, possibly pervasive material which, in the solar neighborhood, is only encountered at distances beyond 1-3 kpc. This material has a column density that is too low to be detected previously with optical absorption studies.