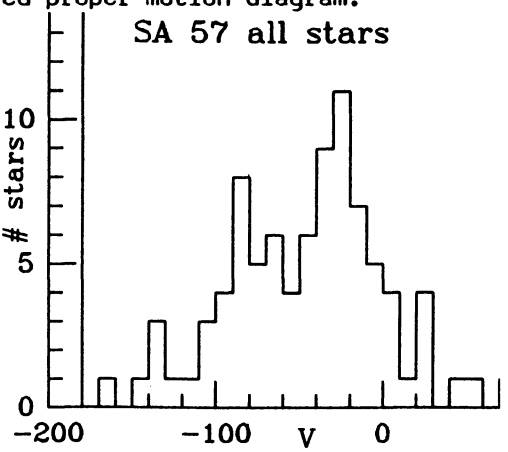
Kinematics of the Galactic Inner Spheroid

G. Gilmore*, R. Wyse**
*Institute of Astronomy, Cambridge
**University of California, Berkeley

Analysis of the detailed photometric, kinematic and chemical properties of stellar populations constrains the formation history of the Galaxy. We have completed a photometric survey and initiated a spectroscopic survey, obtaining radial velocities and abundances for volume complete samples of spheroid dwarfs in situ, to distances of a few kpc. Three fields under study are those for which Chiu (Ap.J.Suppl. 1980) obtained proper motions - SA 57 (NGP), SA51 (anticenter field) and SA68. Two of these fields are on the sun - Galactic center meridional plane (SA57 and SA51) so that (U,V) and (V,W) components of space motion respectively may be derived on the basis of the proper motions alone, once distances have been obtained. Our initial distance estimates are from Chiu's photometry and population classes, which are based on the position of the star on the reduced proper motion diagram.

As may be seen from the figure, there is a peak at V-velocities $\sim$ 80 - 100 kms^{-1} with respect to the sun. The stars in this peak also have a U and W velocity dispersion intermediate between the thin disk and extreme spheroid. The other features of the UVW distributions are compatible with a centrifugally supported thin disk, after taking account of asymmetric drift and differential rotation, plus a non-rotating extreme spheroid, seen in the last velocity bin in the figure.



Chiu however did not allow for the existence of an intermediate population when classifying the stars. It is more self consistent to derive distances iteratively by adopting an initial disk main sequence classification for all stars, and modelling population changes by a suitable abundance gradient. Our results shown in the Figure are robust, since there is no qualitative change in the UVW distributions using the latter approach. The importance of Chiu's sample is that though a proper motion sample it is magnitude limited and hence free of kinematic bias. The results found here are in good agreement with those found in Eggen's kinmatically selected proper motion sample, and in spectroscopically selected samples (Gilmore & Wyse, A.J. 1985). More detailed information about the kinematics and metallicity of the inner spheroid, and about the Galactic potential, will be available once we analyse the extensive radial velocity dataset we have obtained for our photometrically defined samples.

J. Kormendy and G. R. Knapp (eds.), Dark Matter in the Universe, 33.