Local Mass Density of Halo Stars

Lee, Sang-Gak
Department of Astronomy, Seoul National University

From the kinematically unbiased sample of halo stars, the local mass density of halo dwarfs is estimated as $6.0\sim6.3\times10^{-4}m_{\odot}/pc^3$ by adopting a color-magnitude relation and a mass-luminosity relation. The derived halo mass density is not much different from the results of previous studies, which were derived from the kinematically biased sample of halo stars. Therefore it is confirmed that the local mass density of halo stars is far less than that required by Ostriker-Peebles to stabilize the galactic disk against barlike instabilities.

Helium Abundances and Age of Globular Clusters

Lee, See-Woo
Department of Astronomy, Seoul National University

For the well observed 16 globular clusters with known metal abundance (Z), the helium abundances (Y) and ages are determined by various methods, and the relations between Y, Z and age are examined. The luminosity L_{RR} of RR Lyrae stars is known to be dependent of evolutionary models and pulsation theory in the sense that the pulsation theory and horizontal branch (HB) models yield the anticorrelation between L_{RR} and Z whereas main sequence (MS) and red giant branch (RGB) models yield the direct correlation between them. Similarly the anticorrelation between Y and Z is obtained from the HB models and pulsation theory whereas the direct correlation between them is obtained when the RGB model is applied. The current evolutionary models yield the anticorrelation between Z and age of clusters whenever the direct correlation between Y and Z holds. However when anticorrelation between Y and Z is applied for age determination, the similar age of clusters is obtained as shown by Sandage (1982).

The ages, which are determined by the fitting of C-M diagrams to isochrones in the $(M_v, B-V)$-plane, suggest the two different chemical enrichment processes, which could be accounted for by the disk-halo model for the chemical evolution of the Galaxy (Lee and Ann 1981). Also it is known that the R-method is very useful for Y-determination and the derived Y's show the increasing rate of $\frac{\Delta Y}{\Delta Z}\simeq0.5$ which is comparable to the observed value of $\frac{\Delta Y}{\Delta Z}\simeq0.3$ from HII regions and planetary nebulae by Peimbert and Torres-Peimbert (1976). In this case, the age-metallicity relation of globular clusters could be explained by the disk-halo model.