GALAXY DISTRIBUTION IN CLUSTERS OF GALAXIES

Difference in Flat and Open Universe

T.OKAMOTO, S.YACHI AND A.HABE
Division of Physics, Hokkaido University
Sapporo 060 Japan

Galaxy distribution in clusters maybe affected by dynamical evolution of clusters and merging process of their member galaxies. In oreder to studey the effect, we study formation and evolution of galaxies in clusters by using N-body simulation. To identify galaxy size dark halos, we use the adaptive friends-of-friends algorithm (van Kampen 1995) at several red-shifts. At the same time, we treat galaxy merging and dark matter accretion to the galaxies by using the simple merging model. In this model we assume that galaxies have the merging cross section proportional to $M_{\rm gal}^{2/3}$ and if they encounter in small relative velocity ($< V_{\rm merge}$), they merge into one galaxy.

We find that galaxy spatial, velocity and mass distributions in clusters in two cosmological models (SCDM ($\Omega = 1$, h = 0.5, b = 1.5) and OCDM ($\Omega = 0.3$, h = 0.5, b = 1.0)) are very resemble each other except near the cluster center. And galaxy mass-functions in clusters are well fitted by the double component Schecheter function, that is steep for lower mass galaxies and flatter for massive galaxies. Our galaxy mass-functions are qualitatively consistent with the observed galaxy luminosity functions in clusters (Smith et al. 1997). On the other hand, in no-merging model mass functions are fitted by a single Schecheter function.

We find that in the central part of the OCDM clusters the number density of lower mass galaxies decreases and such decline cannot see in the SCDM clusters. This difference can be explained by the relation between the merging time scale and the cluster formation time. In the OCDM model galaxy clusters are formed earlier than the SCDM model, so merging time scale of the galaxies near the center is shorter than cluster age, and then the number density of lower mass galaxies decreases.

References

Smith, R., Driver, S., Phillips, S. 1997, MNRAS, 287, 415
van Kampen, E. 1995, MNRAS, 273, 295

K. Sato (ed.), Cosmological Parameters and the Evolution of the Universe, 262.