[구GC-03] The Origin of the Dispersion in the Size Distribution of Red Early-Type Galaxies

Joon Hyeop Lee[1], Minjin Kim[1,2], Chang Hee Ree[1], Sang Chul Kim[1], Jong Chul Lee[1], Hye-Ran Lee[1,3], Hyunjin Jeong[1], Kwang-Il Seon[1], Jaemann Kyeong[1], Kyuseok Oh[4]

[1]Korea Astronomy and Space Science Institute, Korea, [2]The Observatories of the Carnegie Institution for Science, USA, [3]University of Science and Technology, Korea, [4]Yonsei University, Korea

The sizes of galaxies are known to be closely related with their masses, luminosities, redshifts and morphologies. However, when we fix these quantities and morphology, we still find large dispersions in the galaxy size distribution. We investigate the origin of these dispersions for red early-type galaxies, using two SDSS-based catalogs. We find that the sizes of faint galaxies ($\log(M_{dyn}/M_{\odot}) < 10.3$ or $M_r > -19.5$) are affected more significantly by luminosity, while the sizes of bright galaxies ($\log(M_{dyn}/M_{\odot}) > 11.4$ or $M_r < -21.4$) are by dynamical mass. At fixed mass and luminosity, the sizes of low-mass galaxies ($\log(M_{dyn}/M_{\odot}) \sim 10.45$ and $M_r \sim -19.8$) are relatively less sensitive to their colors, color gradients and axis ratios. On the other hand, the sizes of intermediate-mass ($\log(M_{dyn}/M_{\odot}) \sim 10.85$ and $M_r \sim -20.4$) and high-mass ($\log(M_{dyn}/M_{\odot}) \sim 11.25$ and $M_r \sim -21.0$) galaxies significantly depend on those parameters, in the sense that larger red early-type galaxies have bluer colors, more negative color gradients (bluer outskirts) and smaller axis ratios. These results indicate that the sizes of intermediate- and high-mass red early-type galaxies are significantly affected by their recent minor mergers or rotations. Major dry mergers also may have influenced on the size growth of high-mass red early-type galaxies.

[구GC-04] EFFECT OF SECOND GENERATION POPULATIONS ON THE INTEGRATED COLOR OF METAL-RICH GLOBULAR CLUSTERS IN EARLY-TYPE GALAXIES

Chul Chung, Sang-Yoon Lee, Suk-Jin Yoon, and Young-Wook Lee

Department of Astronomy & Center for Galaxy Evolution Research, Yonsei University

The mean color of globular cluster (GCs) systems in early-type galaxies (ETGs) is, in general, bluer than the integrated color of field stars in their host galaxies. Recently, Goudfrooij & Kruijssen (2013) reported that even red GCs in the ETGs show bluer colors than their host field stars and suggested the different initial mass function (IMF) for red GCs and field stars to explain the observed offset in color. Here we suggest an alternative scenario that explains the observed color offsets between red GCs in ETGs and the field stars in the parent galaxies without invoking to the variation of the IMF. We find that the inclusion of second-generation (SG) helium-enhanced populations in the model fully explains the observed color offset between red GCs and field stars in the host galaxies. We have also tested the effect of the IMF slope on our models, but the effect is relatively small compared to the effect of the SG population. Our new model suggests that, in order to explain far-UV strong metal-rich GCs in M87 and the observed color offset between metal-rich GCs and the field stars in ETGs simultaneously, the inclusion of the SG populations with enhanced helium abundance is a more natural solution than the model that only adopted variations in the IMF.