disrupted proto-GCs in the early history of the Milky Way. We will also discuss the implications of this result on the formation of the early-type galaxies in general.

[구 GC-14] Stellar populations of the M87 globular cluster system

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Globular clusters (GCs) are one of the excellent tools to trace the assembly history of their host galaxies. Especially, the ages and abundances of the GCs give important clues about the star formation epochs and merging progenitors. We investigate the stellar population of the GCs in M87 based on a stacking analysis using about 900 MMT/Hectospec spectra of the GCs. We measure the ages, [Z/H], and [a/Fe] from the stacked spectra of the GCs within radial bins based on Lick indices. We find clear radial gradients for [Z/H] and [a/Fe] in the GC system. In addition to the radial trends, we investigate the stellar populations of the GC subgroups divided according to colors, radial velocities, and spatial locations. We discuss the formation history of M87 based on the stellar populations of the GCs.

[구 GC-15] How are S0 galaxies formed? A case of the Sombrero galaxy

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S0 galaxies are mostly known to be formed in dense environments from spiral progenitors. Recently, however, a new formation scenario has been suggested that field S0s can be formed from elliptical progenitors. The Sombrero galaxy (M104, NGC 4594) is a massive disk galaxy located in the field environment, and its morphological type has been controversial from Sa to E. Thus, it is an ideal target to test the new scenario. We trace the giant halo of M104 with globular clusters to test this scenario. From the wide images obtained with CFHT/MegaCam, we find a large number of globular clusters in this galaxy. We also confirm their membership by measuring the radial velocities from the spectra obtained with MMT/Hectospec. The color distribution of these globular clusters is bimodal, and blue (metal-poor) globular clusters are more spatially widely spread than red (metal-rich) globular clusters. This indicates that M104 hosts a giant metal-poor halo as well as an inner metal-rich halo. Combining this result with the fact that M104 is unusually massive and brighter than other spiral galaxies, we infer that M104 was indeed a massive elliptical galaxy that had formed a metal-rich halo by gas-rich mergers and a metal-poor halo by gas-poor mergers. In addition, we find young star clusters around the disk of M104, which shows that the disk formed after the spheroidal halos had formed. In conclusion, we suggest that M104 was originally a massive elliptical galaxy and was transformed to a lenticular galaxy by acquiring its disk later.

[구 GC-16] Passive spiral galaxies: a stepping stone to S0s?

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We investigate the stellar population properties of nine passive spiral galaxies in the CALIFA survey. They have NUV−r > 5 and no/weak nebular emission lines in their spectra. They lie in the redshift range of $0.001 < z < 0.021$ and have stellar mass range of $10.2 < \log(M\bigstar/M\odot) < 10.8$. We analyze the stellar populations out to two effective radius, using the best-fitting model to the measured absorption line-strength indices in the Lick/IDS system. We compare the passive spirals with S0s selected in the same mass range. S0s cover a wide range in age, metallicity, and [α/Fe], and stellar populations of the passive spirals are encompassed in the spread of the S0 properties. However, the distribution of passive spirals are skewed toward higher values of metallicity, lower [α/Fe], and younger ages at all radii. These results show that passive spirals are possibly related to S0s in their stellar populations. We infer that the diversity in the stellar populations of S0s may result from different evolutionary pathways of S0 formation, and passive spirals may be one of the possible channels.

[구 GC-17] A deep and High-resolution Study of Ultra-diffuse Galaxies in Distant Massive