effect. This study highlights the importance of the past history of galaxies, especially in group halos, before joining the current cluster when understanding the excess of passive galaxies in clusters.

[구 GC-09] Statistical Properties of Flyby Encounters of Galaxies in Cosmological N-body Simulations

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Using cosmological N-body simulations we investigate statistical properties of flyby encounters between halos in comparison with mergers. We classify halo pairs into two groups based on the total energy (E12); flybys (E12 > 0) and mergers (E12 < 0). By measuring the flyby and merger fractions, we assess their dependencies on redshift (0 < z < 4), halo mass (10.8 < log Mhalo/Msun < 13.0), and large-scale environment (from field to cluster). We find that the flyby and merger fractions similarly increase with redshift until z = 1, and that the flyby fraction at higher redshift (1 < z < 4) slightly decreases in contrast to the continuously increasing merger fraction. While the merger fraction has little or no dependence on the mass and environment, the flyby fraction correlates negatively with mass and positively with environment. The flyby fraction exceeds the merger fraction in filaments and clusters; even 10 times greater in the densest environment. Our results suggest that the flyby makes a substantial contribution to the observed pair fraction, thus heavily influencing galactic evolution across the cosmic time.

[박 GC-10] A Multi-Wavelength Study of Galaxy Transition in Different Environments (다파장 관측 자료를 이용한 다양한 환경에서의 은하 진화 연구)

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Galaxy transition from star-forming to quiescent, accompanied with morphology transformation, is one of the key unresolved issues in extragalactic astronomy. Although several environmental mechanisms have been proposed, a deeper understanding of the impact of environment on galaxy transition still requires much exploration. My Ph.D. thesis focuses on which environmental mechanisms are primarily responsible for galaxy transition in different environments and looks at what happens during the transition phase using multi-wavelength photometric/spectroscopic data, from UV to mid-infrared (MIR), derived from several large surveys (GALEX, SDSS, and WISE) and our GMOS-North IFU observations. Our multi-wavelength approach provides new insights into the *late* stages of galaxy transition with a definition of the MIR green valley different from the optical green valley. I will present highlights from three areas in my thesis.

First, through an in-depth study of environmental dependence of various properties of galaxies in a nearby supercluster A2199 (Lee et al. 2015), we found that the star formation of galaxies is quenched before the galaxies enter the MIR green valley, which is driven mainly by strangulation. Then, the morphological transformation from late- to early-type galaxies occurs in the MIR green valley. The main environmental mechanisms for the morphological transformation are galaxy-galaxy mergers and interactions that are likely to happen in high-density regions such as galaxy groups/clusters. After the transformation, early-type MIR green valley galaxies keep the memory of their last star formation for several Gyr until they move on to the next stage for completely quiescent galaxies.

Second, compact groups (CGs) of galaxies are the most favorable environments for galaxy interactions. We studied MIR properties of galaxies in CGs and their environmental dependence (Lee et al. 2017), using a sample of 670 CGs identified using a friends-of-friends algorithms. We found that MIR [3.4]-[12] colors of CG galaxies are, on average, bluer than those of cluster galaxies. As CGs are located in denser regions, they tend to have larger early-type galaxy fractions and bluer MIR color galaxies. These trends can also be seen for neighboring galaxies around CGs. However, CG members always have larger early-type fractions and bluer MIR colors than their neighboring galaxies. These results suggest that galaxy evolution is faster in CGs than in other environments and that CGs are likely to be the best place for pre-processing.

Third, post-starburst galaxies (PSBs) are an ideal laboratory to investigate the details of the transition phase. Their spectra reveal a phase of vigorous star formation activity, which is abruptly ended within the last 1 Gyr. Numerical simulations predict that the starburst, and thus the current A-type stellar population, should be localized within the galaxy's center (< kpc). Yet our GMOS IFU observations show otherwise; all five PSBs in