Treister[5]
[1]*Korea Astronomy and Space Science Institute,* [2]*Yonsei University,* [3]*ESO-Chile,* [4]*University of Concepcion, Chile,* [5]*Pontificia Universidad Catolica de Chile, Chile*

We explored the GALEX UV properties of optical red sequence galaxies in 4 rich Abell clusters at z ~ 0.1. In particular, we tried to find a hint of merger-induced recent star formation (RSF) in red sequence galaxies. Based on the NUV − r' colors of the galaxies, about 36% of the post-merger galaxies were classified as RSF galaxies with a conservative criterion (NUV − r' ≤ 5), and that number was doubled (~ 72%) when using a generous criterion (NUV − r' ≤ 5.4). Post-merger galaxies with strong UV emission showed more violent, asymmetric features on the deep optical images. Also it turned out that all massive RSF galaxies (Mr' < -22 and NUV − r' ≤ 5) exhibited post-merger signatures. Our results suggested that only 30% of RSF red sequence galaxies show morphological hints of recent galaxy mergers. This implies that internal processes (e.g., stellar mass-loss or hot gas cooling) for the supply of cold gas to early-type galaxies may play a significant role in the residual star formation of early-type galaxies at a recent epoch.

[구 GC-08] Merger Induced Kinematic Anomalies in Abell 119

Sree Oh[1], Hyunjin Jeong[2], Yun-Kyeong Sheen[2], Scott Croom[3], Sukyoung Yi[1]
[1]*Yonsei University,* [2]*Korea Astronomy and Spacescience Institude,* [3]*Univeristy of Sydney*

Galaxy clusters are the sites where the most massive galaxies are found, and so the most dramatic merger histories are embedded. Our deep (mu ~ 28 mag/arcsec^2) images of Abell 119 at z = 0.044 using the Blanco 4-m telescope at CTIO revealed post-merger signatures in ~35% of galaxies brighter than Mr < -19.5, suggesting that so many galaxies even in clusters have gone through galaxy mergers at recent epoch. We went further to understand the impact of mergers in cluster galaxies using stellar kinematics from the SAMI Integral Field Unit on the galaxies of Abell 119 in three aspects of kinematics : orientations, levels of rotation, and kinematic shapes. We found that 30% of the merger-featured galaxies show misalignment in the angle between the photometric major and the rotation axes, and most of them show complex kinematics. For comparison, only 5% of non-merger-featured galaxies show the misalignment. Moreover, our analysis using the Tully-Fisher relation shows that galaxy interactions can both enhance or reduce galaxy spin depending on the merger geometry. We present our preliminary result and discussion on the role of galaxy mergers in cluster environment from the perspective of kinematics.

[구 GC-09] Investigating X-ray cavities and the environmental effects

Jaejin Shin[1], Jong-HakWoo[1], and JohnS. Mulchaey[2]
[1]*Seoul National University,* [2]*Carnegie Observatories, Pasadena, CA, USA*

X-ray cavities are typically detected as surface brightness depression in X-ray diffuse emission from hot gas in high resolution X-ray images (i.e., Chandra and XMM-Newton). Showing the coincidence of location with radio jets, X-ray cavities imply that the radio jets interact with interstellar/intergalactic medium. It is important to understand them since they can be a clue of understanding AGN feedback to their host galaxies. To understand the physics of the AGN feedback, X-ray cavity has been actively studied while there are only a few statistical studies on X-ray cavity based on small or incomplete samples. Hence, a systematic study with a large sample is needed. With the condition of sufficient X-ray photons to detect surface brightness depression, we constructed a large sample of 133 galaxy clusters, galaxy groups, and individual galaxies to investigate X-ray cavities. We detected 201 cavities from 94 objects using two detection methods (i.e., beta-modeling and unsharp masking method), and confirmed the cavity size-distance relation over a large dynamical range. The size-distance relation does not vary for different environments (i.e., galaxy cluster, groups, and individual galaxies), suggesting that there is little environmental effect on the formation of X-ray cavity.

[구 GC-10] Phase Space as a Tool for Understanding Galaxy Cluster Environmental Effects

Rory Smith, Jin Su Rhee, Hoseung Choi, Sukyoung Yi
Yonsei University

A galaxy-cluster phase space diagram is a simple plot of clustocentric velocity versus clustocentric radius for each member of the cluster. Using state-of-the-art, cosmological

hydrodynamical simulations, we investigate where simulated galaxies fall in phase space. We find the galaxies with different cluster infall times often separate cleanly in phase space. We also investigate how a galaxy's location in phase space is correlated with its tidal mass loss, and ram pressure stripping. By comparing our simulated cluster galaxies to observed cluster galaxies, we show how phase space diagrams are essential tools for understanding environmental effects acting on cluster galaxies.

[박 GC-11] Study of galaxies in extensive area of the Virgo cluster

Suk Kim[1], Soo-Chang Rey[2], Eon-Chang Sung[1], Helmut Jerjen[3], Thorsten Lisker[4], Youngdae Lee[2], Jiwon Chung[2], Woong Lee[2], Aeree Chung[5], and Hyein Yoon[5]
[1]Korea Astronomy Space Science Institure, Korea, [2]Department of Astronomy and Space Science, Chungnam National University, Korea, [3]Australian National University, Australia, [4]Zentrumfur Astronomie der Universitat Heidelberg, Germany, [5]Department of Astronomy, Yonsei University, Korea

Nearby galaxy clusters and their surrounding regions represent the current endpoint of evolution galaxy cluster evolution. We present a new catalog of 1589 galaxies, what we call Extended Virgo Cluster Catalog (EVCC), in wider area of the Virgo cluster based on the Sloan Digital Sky Survey (SDSS) Data Release 7. The EVCC covers an area 5.2 times larger than the footprint of the classical Virgo Cluster Catalog, and reaches out to 3.5 times the virial radius of the Virgo cluster. The EVCC contains fundamental information such as membership, morphology, and photometric parameters of galaxies. The EVCC defines a comprehensive galaxy sample covering a wider range in galaxy density that is significantly different from the inner region of the Virgo cluster. It will be the foundation for forthcoming galaxy evolution studies in the extended Virgo cluster region, complementing ongoing and planned Virgo cluster surveys at various wavelengths. We also present the large scale structures in the field around the Virgo cluster. We identified seven galaxy filaments and one possible sheet in three dimensions of super-galactic coordinates based on the HyperLEDA database. By examining spatial distribution and Hubble diagram of galaxies, we found that six filaments are directly associated with the main body of the Virgo cluster. On the other hand, one filament and one sheet are structures located at background of the main body of Virgo cluster. The EVCC and the filament structures will be the foundation for forthcoming studies of galaxy evolution in various environments as well as buildup of the galaxy cluster at z ~ 0, complementing ongoing and planned Virgo cluster surveys at various wavelengths.

[구 GC-12] Systemic search for gas outflows in AGNs and star-forming galaxies

Jong-Hak Woo[1], Donghoon Son[1], Hyun-Jin Bae[1,2]
[1]Astronomy Program, Department of Physics and Astronomy, Seoul National University
[2]Department of Astronomy, Yonsei University

We present a census of AGN-driven gas outflows based on the kinematics of ionized gas and stars, using a large sample of ~11,000 emission line galaxies at z < 0.3, selected from SDSS. First, a broad correlation between gas and stellar velocity dispersions indicates that the bulge gravitational potential plays a main role in determining the ionized gas kinematics. However, the velocity dispersion of the [OIII] emission line is larger than stellar velocity dispersion by a factor of 1.3-1.4, suggesting that the non-gravitational (non-virial) component, i.e., outflows, is almost comparable to the gravitational component. Second, gas-to-stellar velocity dispersion ratio increases with both AGN luminosity and Eddington ratio, suggesting that non-gravitational kinematics are clearly linked to AGN accretion. The distribution in the [OIII] velocity - velocity dispersion diagram dramatically expands toward large values with increasing AGN luminosity, implying that the launching velocity of gas outflows increases with AGN luminosity. Third, the fraction of AGNs with a signature of the non-gravitational kinematics, steeply increases with AGN luminosity and Eddington ratio, while the majority of luminous AGNs presents the non-gravitational kinematics in the [OIII] profile. These results suggest that ionized gas outflows are prevalent among type 2 AGNs. On the other hand, we find no strong trend of the [OIII] kinematics with radio luminosity, once we remove the effect of the bulge gravitational potential, indicating that ionized gas outflows are not directly related to radio activity for the majority of type 2 AGNs. We will discuss the implication of these results for AGN feedback in the local universe.

[구 GC-13] Bar effects on the central SF and AGN activities in the SDSS galaxy sample