포 스 터 발 표 초 록

외부은하 / 은하단

[포 GC-01] Tracing the growth of the supermassive black holes with halo mergers

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The formation mechanism of supermassive black holes (SMBHs) at the center of galaxies remains an open fundamental question. Black holes (BHs) are believed to grow by accretion of gas or by merging with other BHs. Motivated by the observation of luminous quasar around redshift z ~ 7 with SMBH mass up to 109 solar mass, we follow the growth of the early assembly of SMBHs that trace the hierarchical evolution of dark matter halos derived from large cosmological simulations. The initial masses of BH seeds in the first halos were set up according to the BH mass - halo mass relation. We assume that mergers of host galaxies cause loss of angular momentum of gas and trigger episodes of gas accretion onto BHs for available durations and at the end of each episode of accretion, BHs merge immediately. We trace the evolution of BH masses for various scenarios for central gas properties in halos. We estimate the BH to halo mass ratio and BH mass function at each redshift.

[포 GC-02] Filament structures around the Virgo Cluster

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We present a large scale structure consisting of eight galaxy filaments around the Virgo cluster in the window of -20 Mpc < SGX, SGZ < 20 Mpc, and 4 Mpc < SGY < 32 Mpc using the HyperLEDA database. While six of the filaments were reported in previous studies, two filaments are newly found in this study. We exploited a large number of faint (M_B < -10) galaxies in comparison with previous studies, which facilitates defining filaments more clearly. The previously known filaments are all in SGY < 16 Mpc and appear to distribute in association with the Virgo cluster in galaxy distribution. Moreover, peculiar velocities of galaxies in these filaments show a distinct offset from the Hubble flow indicating their infall motion toward the Virgo cluster. All of these results confirm that these filamentary structures are under the gravitational influence of the Virgo cluster. Both of the newly discovered filaments are located beyond the 'zero-velocity surface' of the Virgo cluster. One of them is associated in the NGC5353/4 group and the other one appears to penetrates the W and M group of the Virgo cluster. The filamentary structure around the Virgo cluster consisting mainly of the dwarf galaxies allows us to achieve a better understanding of large scale structure and its influence on the build-up of the galaxy cluster at z~0.

[포 GC-03] Study of Environmental Impact on the Galaxy Evolution in the Virgo Cluster

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We present environmental effects on the galaxy evolution in the Virgo cluster focusing on intracluster medium - interstellar medium (ICM-ISM) interactions and gravitational interactions. We identify signatures of these environmental effects for 21 massive late-type galaxies based on the visual inspection of high resolution HI data from VLA Imaging of Virgo spirals in Atomic gas (VIVA) survey comparing with multi-wavelength data. We classify galaxies into three subgroups showing different environmental effects. First and second groups includes galaxies influenced by ongoing/active and past ram pressure stripping effect, respectively. Third group consists of galaxies undergoing gravitational interactions. Additionally, we define neighbor

galaxies for each VIVA galaxies utilizing kinematic data from Extended Virgo Cluster Catalog. Assuming that neighbor galaxies share similar levels of environmental effects with host VIVA galaxies, we investigate environmental effects on galaxy properties in different subgroups using SDSS optical and GALEX ultraviolet photometric data. We find that dwarf neighbor galaxies in first and second groups show rapid quenching of their star formation (SF), while massive counterparts are still in SF activity. On the other hand, most third group galaxies show hints of SF activity regardless of their mass. We conclude that SF and evolution of galaxy in the cluster environment is closely linked to ICM-ISM interactions and dwarf galaxies seem to be more sensitive to this effect compared to massive counterparts.

[포 GC-04] Raman scattering Wings of Hydrogen in Active Galactic Nuclei.

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Active galactic nuclei (AGNs) are powered by a supermassive black hole with an accretion disk and exhibit prominent broad and narrow emission lines. The unification model AGNs requires the presence of a geometrically and optically thick torus component that hides the broad line region from observers lying in the equatorial direction. The strong far UV radiation characterizing AGN spectra is expected to be scattered inelastically in the torus region to reappear around hydrogen Balmer lines or Paschen lines in the form of broad wings. Adopting a Monte Carlo technique we produce broad wings around Hα, Hβ and Paα that are formed through Raman scattering. The widths of the wings are mainly affected by the neutral column density of the torus, and the overall strengths are primarily determined by the covering factor and the column density of the neutral region. It is concluded that deep spectroscopy of AGNs of broad wings around hydrogen emission lines may shed much light on the AGN unification model.

[포 GC-05] A Cluster, Group, and Subgroup Catalog Using SDSS DR12

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Galaxy Clusters with complex inner structures are excellent laboratories with which to study the properties of galaxies and the groups of galaxies in them. To execute a systematic search for flux-limited galaxy groups and clusters based on the spectroscopic galaxies with r < 17.77 of SDSS data release 12, we adopt a modified version of the friends-of-friends algorithm, whereupon a total of 3272 galaxy groups and clusters with at least 10 members are found. In this study, we aim to assign galaxy subgroups within groups and clusters that enable us to investigate the detained star-formation history of galaxies by applying a modified hierarchical grouping method to our galaxy group and cluster catalog. We note that roughly 70% of our galaxy groups and clusters have subgroups. The most remarkable additional results are as follows. The brightest cluster galaxies (BCGs) have brighter luminosities with larger velocity dispersions of groups and clusters. The BCGs are concentrated toward the most massive subgroups than the second and third one. This result implies that the galaxy properties can be affected by different merger and star-formation histories for differing environments.

[포 GC-06] On the two different sequences of the mass-size relation for early-type galaxies

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Scaling relations of early-type galaxies (ETG) provide a deep insight into their formation and evolution. Interestingly enough, most relations extending into the dwarf regimes display non-linear or broken-linear features, unlike the linear relations for normal (i.e., intermediate-mass to giant) ETGs only. Here we investigate the mass-size scaling relation of ETGs using a massive database of galaxies from SDSS DR12. We divide ETGs into two groups by the indication of star formation such as colors, and examine their distinction along the mass-size relation. We find that the mass-size distribution of blue, young normal galaxies is in good agreement with that of