# 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