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우리는 동아시아 각국(대한민국, 중국, 일본)의 VLBI관측망을 통합하고 구성될 동아시아 VLBI 관측망(East Asia VLBI Network; EAVN)의 초기 검증 작업을 진행하고 있다. EAVN은 2 ~ 129 GHz로 관측이 가능하는데, 주로 6.7, 8, 22, 43 GHz로의 관측을 상정하고 있다. 또한 최대 기선장은 약 5,000 km으로 공간분해능은 약 0.3 mas(43 GHz로의 관측의 경우)가 된다. 높은 공간분해능과 고감도의 특징을 활용하고 저광도 활동성은하핵이나 우리 은하의 메이저 천체 등의 연구에 대해서 위력을 나타낼 수가 있다. 우리는 EAVN 시험관측, 상관처리, 자료처리의 실행, 및 그것들을 통한 EAVN 운영의 검증을 하는 EAVN Tiger Team을 2013년에 조직하고 현재까지에 8 GHz 및 22 GHz로 8회의 VLBI 시험관측을 실행하였다. 상관처리는 주로 한국천문연구원에서 운영하고 있는 한일공동상관기(KJJVC)와 상하이천문대의 소프트웨어 상관기(DiFX)로 실행되어 있다. 현재까지에 8 GHz 및 22 GHz 쌍방에서 프린지검출에 성공하고 있고, 올해는 영상합성을 포함한 과학적인 관측을 진행할 예정이다. 이 발표에서는 EAVN의 개요와 과학목표, 시험관측 현황과 결과, 및 앞으로의 운영 계획 등을 소개하겠다.

## [포 GC-15] 발표취소

## [포 GC-16] The Environmental Dependence of the Mass-Size Relation in the Most Massive Galaxies.

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We study the environmental dependence of the mass-size relation especially for the most massive early type galaxies ($M>10^{11.2}M_{\odot}$) in the redshift range 0.15~0.25. As a measure of the environment, galaxy number densities are measured by the $10^{th}$ nearest galaxies within 7000km/s from galaxies with spectroscopic redshifts. We find that galaxies more massive than $10^{11.6}M_{\odot}$ show the environmental dependence in the mass-size relation. The galaxies with $M>10^{11.6}M_{\odot}$ located in the densest, cluster like environment have larger sizes than their counterparts located in a low dense environment. We also find that this environmental dependence of the mass-size relation originates from the brightest cluster galaxies (BCG) rather than non-BCG galaxies. Our result can be explained with a hierarchical growth of the most massive galaxies through dissipation-less merger in dense environments.

## [포 GC-17] The WSRT HI Imaging Study of Gas-rich Galaxies in the Outskirts of the Virgo Cluster

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We present the results of the Westerbork Synthesis Radio Telescope (WSRT) HI imaging study of seven late-type galaxies. They are located in the outskirts of the Virgo cluster, possibly along a filament connected to Virgo from the north-west. Most galaxies in this region are found to be HI-rich, containing more HI gas compared to field galaxies with similar size and optical luminosity. The positions of the sample with respect to the cluster and their high HI mass-to-light ratios suggest that the selected galaxies might be accreting more gas from their surroundings while falling into the cluster. By high-resolution HI imaging, we aim to find evidence that galaxies are pre-processed by gas accretion from the intergalactic medium and/or gas-rich neighbors. We probe the detailed HI morphology/kinematics and the star formation properties of the sample. All of these galaxies are found with a large HI disk which is quite extended compared to their stellar disk. Together with kinematical peculiarities, this strongly suggests that cold gas accretion is responsible for active star formation in these galaxies.

## [포 GC-18] What Do MIR Properties of Galaxies in the Coma Supercluster Tell Us?

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MIR colors are an excellent tool to investigate the transition phase of galaxy evolution in terms of star formation at various phases. The Coma supercluster is the nearest massive supercluster, hosting two main clusters, the Coma (Abell 1656) and Leo (Abell 1367) clusters, and one galaxy group, the NGC 4555 group, providing an ideal laboratory to study how galaxies evolve depending on environment. We present the results of a study

for MIR properties of galaxies in the Coma supercluster using multi-wavelength data from the optical to MIR including the Sloan Digital Sky Survey Data Release 12 and the *Wide-field Infrared Survey Explorer*. We investigate differences in MIR properties of galaxies among three galaxy systems, and discuss the results in relation with star formation history and morphological transformation of galaxies.

## [포 GC-19] The Effective Cross-sections of a Lensing galaxy: Singular Isothermal Sphere with External Shear.

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We present our recent work published in the MNRAS (Lee and Kim, 2014). Numerical studies of the imaging and caustic properties of the singular isothermal sphere (SIS) under a wide range of external shear (from 0.0 to 2.0) are presented. Using a direct inverse mapping formula for this lensing system, we investigate various lensing properties for both low-shear (i.e. $\gamma<1.0$) and high-shear (i.e. $\gamma>1.0$) cases. We systematically analyse the effective lensing cross-sections of double-lensing and quadruple-lensing systems, based on the radio luminosity function obtained by the Jodrell-VLA Astrometric Survey (JVAS) and the Cosmic Lens All-Sky Survey (CLASS). We find that the limit of a survey selection bias (i.e. between brighter and fainter images) preferentially reduces the effective lensing cross-sections of two-image lensing systems. By considering the effects of survey selection bias, we demonstrate that the long-standing anomaly over the high quads-to-doubles ratios (i.e. 50~70 % for JVAS and CLASS) can be explained by the moderate effective shear of 0.16~0.18, which is half that of previous estimates. The derived inverse-mapping formula could make the SIS + shear lensing model useful for galaxy-lensing simulations.

## [포 GC-20] The temperature and density distribution of molecular gas in a galaxy undergoing strong ram pressure: a case study of NGC 4402

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Galaxies are known to evolve passively in the cluster environment. Indeed, much evidence for HI stripping has been found in cluster galaxies to date, which is likely to be connected to their low star formation rate. What is still puzzling however, is that the molecular gas, which is believed to be more directly related to star formation, shows no significant difference in its fraction between the cluster population and the field galaxies. Therefore, HI stripping alone does not seem to be enough to fully understand how galaxies become passive in galaxy clusters. Intriguingly, our recent high resolution CO study of a subsample of Virgo spirals which are undergoing strong ICM pressure has revealed a highly disturbed molecular gas morphology and kinematics. The morphological and kinematical peculiarities in their CO data have many properties in common with those of HI gas in the sample, indicating that strong ICM pressure in fact can have impacts on dense gas deep inside of a galaxy. This implies that it is the molecular gas conditions rather than the molecular gas stripping which is more responsible for quenching of star formation in cluster galaxies. In this study, using multi transitions of 12CO and 13CO, we investigate the density and temperature distributions of CO gas of a Virgo spiral galaxy, NGC 4402 to probe the physical and chemical properties of molecular gas and their relations to star formation activities.

## [포 GC-21] Environmental Dependence of Galactic conformity in the Virgo Cluster

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It is known that the galaxy evolution by direct interaction between galaxies is most active in a galaxy group. As a result, the satellite galaxies are closely related to their central galaxy in properties such as morphology, color and star formation rate (so-called 'galactic conformity'). However, it is not clear yet whether such conformity between galaxies is found in a galaxy cluster. Recently, Lee et al. (2014) have found a measurable correlation between the colors of bright galaxies and the mean colors of their faint companions in a cluster WHL J085910.0+294957 at z = 0.3, using the photometrically-selected cluster members. They suggest that such correlation may be the vestige of infallen groups in the cluster as one possibility. In order to confirm the small-scale conformity in galaxy clusters with higher reliability, we study the Virgo cluster using the Extended Virgo Cluster Catalog (EVCC). The cluster members are selected spectroscopically unlike in WHL J085910.0+294957. We examine the galactic conformity in two distinct