

# 구두발표초록

## 초청강연

### [초 IT-01] Status of the Concordance Model of Cosmology

Arman Shafieloo  
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I review the status of the concordance (standard)  $\Lambda$ CDM model of cosmology in light of current observations discussing about the apparent tensions in estimation of the key cosmological parameters. I will also briefly discuss the future of the field at the era of the next generation of the astronomical/cosmological surveys.

### [초 IT-02] 40 Years of Radio Astronomy Research

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1980년 3월 국립천문대에 들어와 14m 전파망원경 건설사업 준비 단계부터 시작한 전파천문연구는 이제 40년이 되었다. 1985년 일본 동경대에서 일본국립천문대 노베야마 45m 전파망원경을 사용하여 학위를 마친 후 귀국하여 한국천문연구원 대덕 14m 전파망원경의 설치 운영과 이를 활용한 관측연구 및 한국우주전파관측망의 추진, 건설과 그 관측연구에 이르기까지 그 간의 전파천문연구에 대해서 발표하고자 한다.

### [초 IT-03] Large-scale Structure Studies with Mock Galaxy Sample from the Horizon Run 4 & Multiverse Simulations

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Cosmology is a study to understand the origin, fundamental property, and evolution of the universe. Nowadays, many observational data of galaxies have become available, and one needs large-volume numerical simulations with good quality of the spatial distribution for a fair comparison with observation data. On the other hand, since galaxies' evolution is affected by both gravitational and baryonic effects, it is nontrivial to populate galaxies only by N-body simulations. However, full hydrodynamic simulations with large

volume are computationally costly. Therefore, alternative galaxy assignment methods to N-body simulations are necessary for successful cosmological studies.

In this talk, I would like to introduce the MBP-galaxy abundance matching. This novel galaxy assignment method agrees with the spatial distribution of observed galaxies between 0.1Mpc ~ 100Mpc scales. I also would like to introduce mock galaxy catalogs of the Horizon Run 4 and Multiverse simulations, large-volume cosmological N-body simulations done by the Korean community. Finally, I would like to introduce some recent works with those mock galaxies used to understand our universe better.

## 외부은하 / 은하단

### [구 GC-01] nfrared Weak-lensing Detection of an Emerging Galaxy Cluster SpARCSJ1049+56 at $z=1.71$

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Structure in the universe forms hierarchically with the small scales forming first and merging into larger scales. Galaxy clusters are at the pinnacle of the formation process. Peering far into the universe, we can observe galaxy clusters early in their evolution. SpARCSJ1049+56 is a galaxy cluster located at a redshift of 1.71. It has been shown to be rich in cluster galaxies, to have intense star formation, and to have a significant amount of molecular gas. Through careful control of systematics, we detected the weak-lensing signal from this distant galaxy cluster. I will present our *HST* infrared weak-lensing detection of the cluster with a focus on the method. Our lensing analysis found that the cluster is massive and is rare in a  $\Lambda$ CDM universe. I will also present the *Chandra* X-ray discovery of cold gas coincident with the intense star formation and discuss the implications of the detection.

### [구 GC-02] An Improved Weak-Lensing Analysis of the Galaxy Cluster ACT-CL J0102-4915 with New Wide-Field HST Imaging Data

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We present an improved weak-lensing (WL) study of the high- $z$  ( $z=0.87$ ) merging galaxy cluster ACT-CL J0102-4915 (“El Gordo”), the most massive system known to date at  $z > 0.6$ . El Gordo has been known to be an exceptionally massive and rare cluster for its redshift in the current  $\Lambda$ CDM cosmology. Previous multi-wavelength studies have also found that the cluster might be undergoing a merging event showing two distinctive mass clumps and radio relics. The previous WL study revealed a clear bimodal mass structure and found that the entire system is indeed massive ( $M_{200a} = (3.13 \pm 0.56) \times 10^{15} M_{\text{sun}}$ ). This mass estimate, however, was obtained by extrapolation because the previous HST observation did not extend out to the virial radius of the cluster. In this work, we determine a more accurate mass estimate of the cluster using WL analysis utilizing a new set of WFC3/IR and wide-field ACS observations. While confirming the previous bimodal mass structure, we find that the new data yield a  $\sim 20\%$  lower mass for the entire system ( $M_{200a} = (2.37 \pm 0.28) \times 10^{15} M_{\text{sun}}$ ). We also discuss the rarity of the cluster in the  $\Lambda$ CDM paradigm and suggest an updated merging scenario based on our new measurement.

### [ㄱ GC-03] Discovery of a Radio Relic in the Massive Merging Cluster SPT-CL J2023-5535 from the ASKAP-EMU Pilot Survey

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The ASKAP-EMU survey is a deep wide-field radio continuum survey designed to cover the entire southern sky and a significant fraction of the northern sky up to  $+30^\circ$ . Here, we report a discovery of a radio relic in the merging cluster SPT-CL J2023-5535 at  $z=0.23$  from the ASKAP-EMU pilot 300 square degree survey (800-1088 MHz). The deep high-resolution data reveal a  $\sim 2$  Mpc-scale radio halo elongated in the east-west direction, coincident with the intracluster gas. The radio relic is located at the western edge of this radio halo stretched  $\sim 0.5$  Mpc in the north-south orientation. The integrated spectral index of the radio relic within the narrow bandwidth is  $\alpha_{800\text{MHz}}^{1088\text{MHz}} = -0.76 \pm 0.06$ . Our weak-lensing analysis shows that the system is massive ( $M_{200} = 1.04 \pm 0.36 \times 10^{15} M_{\odot}$ ) and composed of at least three subclusters. We suggest a scenario, wherein the radio features arise from the collision between the eastern and middle subclusters. Furthermore, the direct link between the local AGN and the relic along with the discontinuities in X-ray observation hint us that we are looking at the site of re-acceleration.

### [ㄱ GC-04] Circumnuclear gas around the central AGN in a cool-core cluster, A1644-South

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We present the properties of circumnuclear gas associated with the AGN located in the center of Abell 1644-South. A1644-S is the main cluster in a merging system, which is also known for gas sloshing in its core as seen in X-ray. The X-ray emission of A1644-S shows a rapidly declining profile, indicating the presence of cooling gas flow.