

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 Λ 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 Λ 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 ~ 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 ~ 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.