observations

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We present a weak-lensing study of the galaxy cluster SPT-CL J2106-5844 at z=1.132 discovered in the South Pole Telescope Sunyaev-Zel'dovich (SPT-SZ) survey. The cluster is claimed to be the most massive system at z > 1 in the SPT-SZ survey. The inferred mass (M_{200c} = (1.27 ± 0.21) × 10^{15} M_{sun}) is somewhat unusual at such a high redshift given the current ΛCDM prediction. The mass estimates, however, may be biased because the hydrostatic assumption may not hold when the universe was about 40% of the current age. In this work, we reconstruct the dark matter distribution and measure the mass of this interesting cluster using weak-lensing analysis based on the images from the Advanced Camera for Surveys and Wide Field Camera 3 on-board the Hubble Space Telescope. We find that the mass distribution of the cluster is unimodal with no significant substructures. The centroid of the dark matter agrees with both galaxy luminosity and number density distributions, as well as the hot gas centroid. We confirm that the cluster is indeed extremely massive (M_{200c} = (1.81 ± 0.47) × 10^{15} M_{sun}) supporting the previous non-lensing measurements. We also discuss the rarity of the cluster in the ΛCDM cosmology, comparing with the expected abundance of similarly massive clusters.

[박 GC-08] KYDISC program: The Impact of Mergers on the Evolution of Galaxies

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In the hope to detect low-surface brightness features ($\mu_{r'}$~27 mag arcsec^{-2}), we carried out KASI-Yonsei Deep Imaging Survey for Clusters (KYDISC) targeting 14 local clusters at 0.016 < z < 0.145 using Magellan/IMACS telescope and CFHT/MegaCam. Out of 1450 cluster galaxies, 18% of galaxies show the signatures of galaxy mergers. We explore merger-driven changes from various point-of-view. We first examine color-magnitude relations, and find that galaxies related to recent mergers are populated more on blue color than their counterparts. Besides, we find the extremely low frequency of mergers on low-mass red-sequence galaxies, suggesting a migration of red galaxies into the green-valley region through merger-driven star-formation. We also study the mass-size relation of our sample, finding a larger galaxy size in galaxies related to recent mergers. Our results suggest that mergers can simultaneously change properties of galaxies, making outliers on galactic scaling relations.

[구 GC-09] Environmental effects in the stellar populations of Compact Elliptical galaxies

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Compact elliptical (cE) galaxies are in a rare class of stellar systems characterized by high stellar densities, small sizes, high velocity dispersion, and high metallicity corresponding to elliptical galaxies. cE galaxies have been observed around massive galaxies, so they could be formed under strong influences of tidal stripping and truncation. However, the recent discovery of isolated cE galaxies requires the need of new formation scenarios. We aim at finding cE galaxies in various environments using SDSS DR12, and studying stellar population of cEs as function of environments. Based on the typical properties of cE galaxies, we selected cE candidates by restricting that low-luminosity Mg > 19.5 mag, small sizes Re < 700 pc, and high velocity dispersions σ > 60 km s^{-1}. Since effect radii of cE candidates are mostly smaller than the seeing size of SDSS photometry, we calculated the effective radius by fitting a Sersic profile. In addition, we assumed that host galaxies have brightness with Mr < -21 mag, and an environmental parameter is computed as distances between cE galaxies and host-galaxies. We found 112 cE galaxies at z < 0.05, which have high sersic indices (mean value is 5.2) similar to the typical massive elliptical galaxies. Mgb values of cE galaxies increase as the distances from the host galaxies decrease. Especially, for cEs close to the host galaxies (NcE; D_{host} < 300 pc), the Mgb values are similar to those of massive elliptical galaxies, which is consistent with the previous studies. On the other hand, cE galaxies distant from the host galaxies (DcE; Dhost >300 pc) have lower Mgb values than the conventional cE. The Mgb values follow the σ-Mgb relation of elliptical galaxies, and are connected to its faint end. This can be explained as a result of different merger histories for differing

environments. For example, NcE galaxies are formed by tidal stripping by massive galaxies as suggested by previous studies, but DcE galaxies could be linked with high-redshift spheroids (e.g. red nuggets) which have not evolved into present-day elliptical galaxies because of the environmental influences.

[초 GC-10] Long lived spiral structures in galaxies

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Spiral structure in disk galaxies is modeled with ncollisionless N-body simulations including live disks, halos, and bulges with a range of masses. Two of these simulations make long-lasting and strong two-arm spiral wave modes that last for about 5 Gyr with constant pattern speed. These two had a light stellar disk and the largest values of the Toomre Q parameter in the inner region at the time the spirals formed, suggesting the presence of a Q-barrier to wave propagation resulting from the bulge. The relative bulge mass in these cases is about 10%. Models with weak two-arm spirals had pattern speeds that followed the radial dependence of the Inner Lindblad Resonance. In addition to these, we also report a few more cases where two-armed spirals are developed and are maintained for a several rotation time scales.

[구 GC-11] Gas structures and star formation in the central region of barred-spiral galaxies in self-consistent 3D simulations

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The central regions of barred-spiral galaxies contain interesting gaseous structures such as dust lanes and nuclear rings with intense star formation. While our previous studies were useful in understanding the formation of these structures star formation history, they were limited to 2D isothermal galaxies in which the stellar disk and halo are modeled by fixed gravitational potentials . To study the effects of bar growth as well as the vertical dimension, we use the mesh-free hydrodynamic code named GIZMO and run 3D simulations by treating the stellar disk and halo as being live. We find that the new 3D models form the gaseous features similarly to the previous 2D models, although the detailed formation processes are quite different. For example, a ring has a large radius when it first forms and shrinks over time in the previous 2D models,. In the 3D live-potential models, however, a ring forms small and grows in size with time. We present the results of the new simulations and discuss them in comparison with the previous 2D results.

[구 GC-12] Cosmic Evolution of Disk Galaxies seen through Bars

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The presence of a bar in disk galaxies indicates that galaxies reached their dynamical maturity,

and secular evolution has started to play key roles in the evolution of disk galaxies. Numerical simulations predicted that as a barred galaxy evolves, the bar becomes longer by capturing its immediate neighbor disk stars. We test the hypothesis by exploring bar lengths and measuring the light deficit around the bar at various redshift. Supplementing already classified barred galaxies in later type disk galaxies ($T \geqq 2$, Sheth et al. 2008), we classify barred galaxies among earlier type disk galaxies ($T<2$) up to z~0.8 using F814W images from the Cosmic Evolution Survey (COSMOS). We estimate the length of bars analytically for ~400 galaxies, and find that there is a slight decrease in bar length with redshift. We also find that longer bars show more prominent light deficit around the bar and this trend is stronger for nearby galaxies. Our results are consistent with the predictions from numerical simulations, and imply that the bar induced secular evolution is already in place since z~0.8.

[구 GC-13] To Be or Not To Be: "We Love Galaxies" Workshop

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"We Love Galaxies"는 외부은하를 연구하는 국내 대학원생들을 위해 마련된 학술 교류의 장입니다. 2014년 여름에 첫 워크숍을 개최한 이래로 꾸준히 워크숍을 개최하