

dwarf ETGs. Our result suggests that blue, young normal ETGs may serve as links between (passive) normal ETGs and dwarfs. We discuss the possibility of blue, young ETGs being progenitors of dwarf ETGs.

### [발표취소] Star formation in overdense region around $z=1.44$ radio galaxy 6CE 1100+3505

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Star formation in galaxies that lie in dense environment tends to increase as the redshift of the cluster increases. At  $z \sim 1.4$ , the situation turns to be complex; some clusters still harbor galaxies with vigorous star formation, and others are populated with relatively old, massive galaxies. We present the result from narrow-band photometric study of the fields around the radio galaxy 6CE 1100+3505 at  $z=1.44$ . Deep H- and H-narrow band data have been obtained using CFHT/WIRCAM which cover the corresponding wavelengths for redshifted H $\alpha$ . While the number of IRAC 3.6, and 4.5 $\mu$ m selected sources show clear excess within the central  $\sim 1$ Mpc area from the radio galaxy, number of galaxies identified to show excess in H-narrow band is very small. We discuss the possible integrated star formation rate in this overdense structure, and the implication to the evolution of cosmic star formation rate as a function of environment.

### [포 GC-08] Discovery of high redshift galaxy clusters and superclusters and study of star formation-density relation

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Galaxy cluster is the most important laboratory to study the effect of environment on galaxies, one of key questions in astronomy. In the local universe, it is well known that red, passive galaxies are concentrated in the cluster core. However, it is still controversial whether the star formation-density relation at the low redshift is retained in the distant universe.

Many surveys have tried to find galaxy clusters at various epochs. However the optical dataset has limitations in finding galaxy clusters at  $z > 1$ , since the bulk of stellar emission of  $z > 1$  galaxies is redshifted into the near-IR regime. We used the multi-wavelength data from the UKIDSS DXS (J and K bands), the SWIRE (4 IRAC bands), and the PAN-STARRS (g, r, i, z, y bands) and IMS (J band; Im et al. 2015, in preparation) in the European Large Area ISO Survey North1 (ELAIS-N1) field to search for high redshift galaxy clusters and study the properties of member galaxies.

Using the multi-wavelength data, we investigated overdensities of galaxies at  $0.2 < z < 1.6$  based on the photometric redshift information. We found several superclusters where cluster candidates are concentrated within scales of few tens of Mpc at  $z \sim 0.9$ . Interestingly, some of the supercluster candidates consist of galaxy clusters which are dominated by blue galaxies. We will present high redshift galaxy cluster and supercluster candidates in ELAIS-N1 field and galaxy properties in different environments including dense clusters and fields.

### [포 GC-09] Stellar and Ionized Gas Kinematics of Blue-cored Early-type Dwarf Galaxies in the Virgo Cluster

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Early-type dwarf galaxy (ETDG), the most abundant galaxy type in clusters, were recently shown to exhibit a wide variety in their properties. Particularly, the presence of blue cores in some ETDGs supports the scenario of late-type galaxy infall and subsequent transformation into red, quiescent ETDGs. While several transformation mechanisms for these ETDGs with blue core within cluster environment have been proposed, all these processes are able to explain only some of the observational properties of ETDGs such as stellar populations and structural parameters. In this context, internal kinematic properties of blue-cored ETDGs provide the most crucial evidence to discriminate different processes for the formation of these galaxies. We present a kinematic analysis of two blue-cored ETDGs in the Virgo cluster based on long-slit data obtained from Gemini Multi-Object Spectrographs (GMOS) observations. We find that the observed galaxies show kinematically decoupled sub-components in the velocity profile such as discontinuity or counter-rotating component. We discuss possible

scenarios of formation of these transitional galaxies.

**[포 GC-10] Nonlinear Color-Metallicity Relations of Globular Clusters: an Observational Approach**

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The origin of globular cluster (GC) color bimodality, which is one of the salient phenomena observed in most large galaxies, has not yet been fully resolved. The phenomenon has conventionally been interpreted as a bimodal metallicity distribution based on an assumption of linear GC color-metallicity relations (CMRs). Recent studies however suggest that nonlinear GC CMRs can cause a bimodal color distribution even from a single-peaked metallicity spread. Using photometric and spectroscopic data on GCs in NGC 5128 (Cen A) and NGC 4594 (Sombrero), we investigate the nonlinearity of GC CMRs and compare the observed GC CMRs with the predictions of stellar population simulation models. Our careful selection of old GCs effectively reduces the scatter and reveals the nonlinear nature of the GC CMRs for various colors. The overall shape of the observed CMRs agrees well with that of the modeled CMRs, while offsets are present for some colors. We discuss the implications of our results in terms of the GC color bimodality and GC formation in NGC 5128 and NGC 4594.

**우주론/암흑물질에너지**

**[포 CD-01] A Study of Halo-Galaxy Correspondence from the Horizon Run 4**

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The Horizon Run 4 is a huge cosmological simulation intended for the study of evolution of dark matter halos in a side of volume of 3150 h-1 Mpc.

Using the halo merger trees of most bound

particles, we test various models on the survivals of satellites in clusters and will compare them with observed satellite galaxies in a one-to-one correspondence model.

We estimate the abundances of central and satellite subhalos, and compare them with the SDSS main-galaxy group catalogue provided by Tempel et al. (2014).

Based on these comparisons we will study the mass-to-light relations, environmental effects on morphology and luminosity function, halo occupations in clusters, and nonlinear dynamics of clusters of galaxies.

**[포 CD-02] Cosmological Research with Isolated Galaxy Pairs**

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고립된 은하쌍 내의 두 은하의 스핀 각운동량의 각도 차이의 분포를 구하고 이를 통계적으로 분석한 결과를 관측 데이터와 수치 시뮬레이션 데이터 간에 비교함으로써  $\Lambda$ CDM 모형이 아닌 다른 우주 모형의 주요 변수를 규제할 수 있다. 이 연구에서는 결합된 암흑 에너지 (coupled dark energy, cDE) 모형의 주요 변수인 결합 함수를 규제하기 위해 서로 다른 조건의 cDE 모형과  $\Lambda$ CDM 모형에 따라서 생성한 수치 데이터의 스핀 정렬을 Argudo-Fernandez et al. (2015) 에서 인용한 관측 데이터의 스핀 정렬과 비교하였고,  $\Lambda$ CDM 모형과 대부분의 cDE 모형의 수치 데이터는 관측 데이터와 부합하나 일부 cDE 모형은 부합하지 않아서 제외될 가능성이 높음을 확인하였다.

**[포 CD-03] Convolution and Deconvolution Algorithms for Large-Volume Cosmological Surveys**

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Current and planned deep multicolor wide-area cosmological surveys will map in detail the spatial distribution of galaxies and quasars over unprecedented volumes, and provide a number of objects with photometric redshifts more than an order of magnitude bigger than that of spectroscopic redshifts. Photometric information is statistically more significant for studying cosmological evolution, dark energy, and the expansion history of the universe at a fraction of the cost of a full spectroscopic survey, but