

photons can be characterized by strong linear polarization depending on their scattering optical depth. We performed Monte Carlo simulations of polarized radiative transfer of Ly α adopting simple scattering geometries relevant to the unification model of AGN. We find that for a low torus the Rayleigh scattered Ly α is polarized in the direction parallel to the symmetry axis with the polarization degree dependent on wavelength. In the case of a high torus, the core part of Ly α is polarized in the direction perpendicular to the symmetry axis whereas the wing part is parallelly polarized. We conclude that careful spectropolarimetry around Ly α can be useful in testing the AGN unification model.

[ㄱ GC-13] BAT AGN Spectroscopic Survey-III. An observed link between AGN Eddington ratio and narrow emission line ratios.

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The ultra hard X-ray band (14-195 keV) provides an important and unbiased way to understand black hole growth and relationship to the host galaxy. The Burst Alert Telescope (BAT) instrument on the Swift satellite has surveyed sky to unprecedented sensitivity, improving the number of known hard X-ray sources by more than a factor of 20 to 836 nearby AGN. The BAT AGN Spectroscopic Survey (BASS) is a study for the first large (N>600) and complete sample of ultra hard X-ray selected AGN with optical spectroscopy. In this talk, I present the observed relationship between black hole mass, bolometric luminosity, and Eddington ratio with optical emission line ratios. We show that [NII]/Ha ratio exhibits a significant correlation with Eddington ratio. We propose that the [NII]/Ha ratio is a useful indicator of Eddington ratio with 0.6 dex of scatter, and that it can be used to measure Eddington ratio and thus black hole mass from the measured bolometric luminosity, even for high redshift obscured AGN.

[ㄱ GC-14] A Mid-infrared View on the Fast Galaxy Evolution in Compact Groups

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We study the mid-infrared (MIR) properties of galaxies in compact groups and their environmental dependence using the Wide-field Infrared Survey Explorer data. We use a sample of 670 compact groups and their 2175 member galaxies with $M_r < -19$ and $0.01 < z < 0.0741$ from Sohn et al. (2016), which were identified through a friends-of-friends algorithm. We find that the MIR [3.4]–[12] colors of early-type galaxies in compact groups are on average bluer than those of early-type galaxies in clusters. Furthermore, we find that when compact groups have both early- and late-type member galaxies, the MIR colors of the late-type galaxies in those compact groups can be bluer than those of late-type galaxies in clusters. We also find that as background galaxy number densities of compact groups increase, compact group galaxies have higher early-type galaxy fractions and bluer MIR colors. These trends are also seen for background galaxies. However, at a given background density, compact group galaxies always have higher early-type galaxy fractions and bluer MIR colors than the background galaxies. Our findings suggest that the properties of compact group galaxies depend on both internal and external environments of the compact groups, and that galaxy evolution is faster in compact groups than in clusters.

[ㄱ GC-15] Ram Pressure Stripping of an elliptical galaxy in Abell 2670

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Ram pressure stripping of early-type galaxies has been largely neglected until now because of their gas poor nature. MUSE IFU observation vividly reveal the presence of star-forming blobs and ionised gas tails, around an early-type galaxy in Abell 2670. The galaxy was identified as a post-merger galaxy with disturbed faint features, in MOSAIC 2 deep optical images. The imaging also revealed a series of star-forming blobs, situated in

the direction facing away from the cluster centre. Thanks to the revolutionary wide field-of-view of the MUSE, combined with 8.2-m VLT (UT-4) at Cerro Paranal, we could simultaneously obtain IFU spectra of the blobs, as well as the galaxy. The MUSE spectra clearly confirms that the star-forming blobs are associated with the early-type galaxy. Moreover, MUSE reveals long ionised-gas tails, emanating from the galaxy. The quantity of gas indicates a gas rich progenitor has merged with the early-type galaxy. However the direction of the tails and blobs, and the blob morphology, appears to indicate that strong ram-pressure stripping may have stripped out gas brought in by the merger. We will present kinematic structure of the whole system (the galaxy, star-forming blobs, and gas tails), as well as the star formation history of the system, supporting a scenario where a recent galaxy merger is subjected to cluster environmental mechanisms.

[7 GC-16] Photometric Pixel-Analysis of the BCGs in Abell 1139 and Abell 2589

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To understand the coevolution of Brightest Cluster Galaxies (BCGs) and their host clusters, we conduct a case study on the BCGs in dynamically young and old clusters, Abell 1139 (A1139) and Abell 2589 (A2589). We analyze the pixel color-magnitude diagrams (pCMDs) using deep *g*- and *r*-band images, obtained from the CFHT observations. (1) While the overall shapes of the pCMDs are similar to those of typical early-type galaxies, the A2589-BCG tends to have redder mean pixel color and smaller pixel color deviation at given surface brightness than the A1139-BCG. (2) The mean pixel color distribution as a function of pixel surface brightness indicates that the A2589-BCG formed a larger central body by major dry mergers at an early epoch than the A1139-BCG, while they have grown commonly by subsequent minor mergers. (3) The spatial distributions of the pixels with deviated colors reveal that the A1139-BCG experienced considerable tidal events more recently than the A2589-BCG, whereas the A2589-BCG has an asymmetric compact core possibly resulting from

major dry merger at an early epoch. (4) The A2589-BCG shows a very large faint-to-bright pixel number ratio compared to early-type non-BCGs, whereas the ratio for the A1139-BCG is not distinctively large. These results imply that the BCG in the dynamically older cluster (A2589) formed earlier and is relaxed better.

[7 GC-17] Lyman alpha emitting blobs at the epoch of cosmic reionization

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Lyman alpha photons emitted from the early generation galaxies are scattered through the intergalactic medium, and can be observed as Lyman alpha emitting sources. We examine the Lyman alpha line transfer mechanism by tracing the random scattering histories of Lyman alpha photons in the intergalactic medium of the early universe. The density and ionization fields are based on the 3D map by N-body + radiation transfer simulations of the epoch of reionization. The calculation is compared with analytical models, too. The emergent line profile and the size of the Lyman alpha blob are strongly tied to the density and ionization environment, likely to give constraints when high-*z* Lyman alpha blobs are observed.

[7 GC-18] BCCOMICS: Baryon-Cold dark matter COsmological Initial Condition generator for Small-scale structures

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Density and velocity perturbations in scales most relevant for the first galaxy formation are strongly affected by large-scale density perturbations, velocity-divergence perturbations and the baryon-cold dark matter (CDM) streaming velocities. Even at redshifts as high as $z \sim 200$, this mode-mode coupling imprints a significant impact on the small-scale perturbations, at the wavenumber $k > \sim 100 \text{ Mpc}^{-1}$, as was calculated in our recent work. This implies that cosmological initial conditions based on the usual linear theory is no longer valid in these scales. We present a new cosmological initial condition generator, BCCOMICS, which generates initial conditions for the cold dark matter (CDM) and baryons in scales most relevant for the first galaxy formation.