us to understand the hierarchical star formation and recent evolution of M33.

[포 GC-11] NIR Spectroscopic Observation of Ultra-Long GRB 111209A and The Early Afterglow

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We observed Ultra-Long GRB 111209A using NASA's 3m InfraRed Telescope Facility (IRTF). The observation was started around 40 min later than T0 = 07:12:08 UT of Swift's BAT, lasted for 24 min. The spectrum was extracted using Spextool package. The NIR SEDs show power law distribution indicating afterglow emission from the GRB according to the fireball model with beta ~ 1.2. Also they do not show thermal emission component compared to the SED of "Christmas burst" GRB 101225A. Because there is no other NIR data with this observation epoch, this data can be compared only with TAROT-R band. It seems NIR data has the same flare which exists in R band as an optical flare.

[포 GC-12] Search for Ultra-faint Dwarfs in the Halo of M60, Giant Elliptical Galaxy in Virgo

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One of the well-known problems in the lambda cold dark matter (ΛCDM) models is a missing satellite problem. The slope of the mass function of low mass galaxies predicted by ΛCDM models is much steeper than that based on the luminosity function of dwarf galaxies in the local universe. This implies that the model prediction is an overestimate of low mass galaxies, or that the current census of dwarf galaxies in the local universe may be an underestimate of dwarf galaxies. Previous studies of galaxy luminosity functions to address this problem are based mostly on the sample of galaxies brighter than Mv ~ -10 in the nearby galaxies. In this study we try to search for ultra-faint galaxies (UFDs), which are much fainter than those in the previous studies. We use multi-field HST ACS images of M60 in the archive. M60 is a giant elliptical galaxy located in the east part of the Virgo cluster, and hosts a large population of globular clusters and UCDs. Little is known about the dwarf galaxies in this galaxy. UFDs are much fainter, much smaller, and have lower surface brightness than normal dwarf galaxies so HST images of massive galaxies are an ideal resource. We present preliminary results of this search.

[포 GC-13] A Gemini/GMOS-IFU Spectroscopy of E+A Galaxies in the Mid-infrared Green Valley: On the Spatial Distribution of Young Stellar Population

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We present the two-dimensional distribution of stellar populations in five E+A galaxies from GMOS-N/IFU spectroscopy (GN-2015B-Q-15). Numerical simulations demonstrated that E+A galaxies formed by major mergers contain young stellar populations (e.g. A-type stars) that are centrally-concentrated within scales of 1 kpc. However, several IFU studies reported that A-type stars are widely distributed on ≫ 1kpc scales. In contrast, Pracy et al. (2013) found a central concentration of A-stars and strong negative Balmer absorption line gradients within 1 kpc scales for local ($z < 0.03$) E+A galaxies. They claimed that previous studies failed to detect the central concentration because the E+A galaxy samples in previous studies are too far ($z \sim 0.1$) to resolve the central kpc scales. To verify Pracy et al.'s argument and the expectation from simulations, we selected five E+A galaxies at $0.03 < z < 0.05$. Furthermore, we selected the targets in the mid-infrared green valley (Lee et al. 2015). Thanks to good seeing (~ $0.4'' \simeq 0.33$ kpc) of our observation, we are able to resolve the central 1 kpc region of our targets. We found that all five galaxies have negative Balmer line gradients, but that three galaxies have flatter gradients than those reported in Pracy et al. We discuss the results in relation with galaxy merger history.

[포 GC-14] Mass inflow history of satellite systems around a dwarf galaxy

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We aim to investigate inflow history of matters that fall into the satellite systems around a dwarf galaxy in Lambda-Cold Dark Matter model. Each satellite system has unique properties because all satellite systems have different mass inflow history by environments and/or the events such as cosmic reionization and merging with other halos. To trace mass inflow history of the satellite systems, we perform three different cosmological zoom simulations whose galaxy mass is ~$10^{10}M_{sun}$. Each initial zoom simulation covers a cubic box of $1Mpc/h^3$ with 17 million particles. Particle mass for dark matter (DM) and gas components is M_{DM} = 4.1×10^3 M_{sun} and M_{gas} = 7.9×10^2 M_{sun}, respectively. Thus, each satellite system is resolved with more than hundreds – thousands of particles. We analyze the influence of the gravitational interaction with host galaxy, baryonic matter inflow by various cooling mechanisms, and merging events with other halos on the mass inflow history of satellite systems.

[포 GC-15] The evolution of a late-type galaxy in a Coma-like cluster

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We study the evolution of a late-type galaxy (LTG) in a rich cluster environment by using N-body/SPH simulations. To do that we perform a set of simulations of a LTG falling in a Coma-like cluster and also the LTG colliding with early-type galaxies (ETGs) multiple times in the cluster environment. We use a catalog of the Coma cluster in order to estimate the typical number of collisions and the closest approach distances that a LTG would experience in the cluster. We investigate the cold gas depletion and star formation quenching of our LTG model influenced by the hot cluster gas as well as the hot halo gas of the colliding ETGs.

[포 GC-16] Intra-night optical variability of AGN in COSMOS field.

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Optical variability is one way to probe the nature of the central engine of AGN at smaller linear scales and previous studies have shown that optical variability is more prevalent at longer timescales and at shorter wavelengths. Especially, intra-night variability can be explained through the damped random walk model but small samples and inhomogeneous data have made constraining this model hard. To understand the properties and physical mechanism of optical variability, we are performing the KMTNet Active Nuclei Variability Survey (KANVaS). Test data of KMTNet in the COSMOS field was obtained over 2 separate nights during 2015, in B, V, R, and I bands. Each night was composed of 5 and 9 epochs with ~30 min cadence. To find AGN in the COSMOS field, we applied multi-wavelength selection methods. Different selection methods means we are looking different region in unification model of AGN, and 100~120, 400~500, 50~100 number of AGN are detected in X-ray, mid-infrared, and radio selection of AGN, respectively. We performed image convolution to reflect seeing fluctuation, then differential photometry between the selected AGN and nearby stars to achieve photometric uncertainty ~0.01mag. We employed one of the standard time-series analysis tools to identify variable AGN, chi-square test. Preliminarily results indicate that intra-night variability is found for X-ray selected, Type1 AGN are 23.6%, 26.4%, 21.3% and 20.7% in the B, V, R, and I band, respectively. The majority of the identified variable AGN are classified as Type 1 AGN, with only a handful of Type 2 AGN showing evidence for variability. The work done so far confirms that there are type and wavelength dependence of intra-night optical variability of AGN.

천문우주 관측기술

[포 AT-01] The Flight Model of the NISS onboard NEXTSat-1