detected in the first 105 months of observations with the Burst Alert Telescope (BAT) on board the Neil Gehrels Swift observatory. The 105 month Swift-BAT survey is a uniform hard X-ray all-sky survey performed in the 14−195 keV band. The Swift-BAT 105 month catalog provides 1632 (422 new detections) hard X-ray sources in the 14 - 195 keV band above the 4.8 sigma significance level. Adding to the previously known hard X-ray sources, 34% (144/422) of the new detections are identified as Seyfert AGN in nearby galaxies (z < 0.2). The majority of the remaining identified sources are X-ray binaries (7%, 31) and blazars/BL Lac objects (10%, 43). As part of this new edition of the Swift-BAT catalog, we release eight-channel spectra and monthly sampled light curves for each object in the online journal and at the Swift-BAT 105 month Web site.

[구 GC-18] An Interesting Story of Four Gamma-ray Bright AGNs by the iMOGABA

Sang-Sung Lee and the iMOGABA team
[1]Korea Astronomy and Space Science Institute
[2]University of Science and Technology

A Korean VLBI Network key science program, the Interferometric Monitoring of Gamma-ray Bright AGNs (iMOGABA) program continues to reveal the nature of the gamma-ray flares in active galactic nuclei (AGNs). Here in this presentation, we would like to introduce an interesting story about four gamma-ray bright AGNs – BL Lac, 1633+382, 3C 84, and M87 - based on the recent results of the iMGOABA. The results will include a) a sad story of an 'orphan' gamma-ray flare from BL Lac, b) a position offset of 40 pc for a gamma-ray flaring site from the radio regions in 1633+382, c) a position alignment of a gamma-ray flaring site with a central engine region in 3C 84, and d) a flat millimeter spectrum of a core in M87 revealed by the iMOGABA.

[구 GC-19] Ionized gas outflows in z~2 WISE-selected Hot Dust Obscured Galaxies

Hyunsung Jun
Korea Institute for Advanced Study, Seoul, Korea

The Wide-field Infrared Survey Explorer (WISE) mission has been efficient in selecting Active Galactic Nuclei (AGN) with high luminosities and large obscuration. According to the merger driven AGN powering scenarios, luminous and obscured AGN are in a stage where they go through feeding of gas accretion into the central black hole, and feedback to the host galaxy through outflows. We report the rest-frame UV-optical spectra of 11 Hot Dust Obscured Galaxies (Hot DOGs) at z~2, WISE color-selected to be extremely reddened AGN. A fraction of the targets show blueshifted and broadened [OIII] profiles indicative of ionized gas outflows. We present the occurrence and strength of the outflows, and discuss what impact these AGN activity could give on their hosts.

[박 GC-20] Unveiling Intrinsic Properties of Dusty Red AGNs

Dohyeong Kim (김도형) and Myungshin Im (임명신)
CEOU, Seoul National University (서울대학교)

Theoretical simulation studies suggest that dust-obscured AGNs appear for a certain period when merger-driven star-forming galaxies evolve to unobscured type 1 AGNs. The dust-obscured AGNs would have red colors due to the dust extinction in their host galaxies, and they are expected to have higher accretion rates than unobscured type 1 AGNs. Red AGNs are found by selecting type 1 AGNs with very red colors, and they have been suspected as the intermediate-stage, dusty AGNs. However, it is not yet clear if red AGNs really correspond to the dusty AGNs due to a lack of intrinsic properties of red AGNs. For unveiling intrinsic properties of red AGNs, we study the NIR and MIR spectra of unobscured type 1 AGNs and red AGNs. There are three main themes: (i) derivation of NIR and MIR BH mass estimators can be used for red AGN study; (ii) investigation of red AGN selection methods to test its usefulness to identify dusty red AGNs; and (iii) investigation of the accretion rates of red AGNs to see if they have the properties as predicted in the simulation studies.

[구 GC-21] High-z Universe probed via Lensing by QSOs (HULQ): Expected Number of QSOs acting as Gravitational Lenses

Yoon Chan Taak[1,2], MyungshinIm[1,2]
[1]Center for the Exploration of the Origin of the Universe,
[2]AstronomyProgram,DepartmentofPhysicsandAstronomy,SeoulNationalUniversity

The HULQ project proposes to use gravitational lensing to determine the masses of QSO host galaxies, an otherwise difficult goal. If these host galaxy masses, along with their SMBH masses from single-epoch measurements, are estimated for a substantial number of QSOs at various redshifts, the co-evolution of SMBHs and their host galaxies can be studied for a large portion of the history of the universe. To determine the feasibility of this study, we present how to estimate the number of

sources lensed by QSO hosts, i.e. the number of lensing QSO host galaxies (hereafter QSO lenses).

SMBH masses in the literature are transformed into the velocity dispersions of their host galaxies using the M_BH -sigma relation, and in turn the Einstein radii for each QSO -source redshift combination is calculated, assuming singular isothermal spherical mass distributions. Using QSOs and galaxies as potential sources, the probability of a QSO host galaxy being a QSO lens is calculated, as a function of limiting magnitude. The expected numbers of QSO lenses are estimated for ongoing and future wide-imaging surveys, and the Hyper Suprime-Cam Wide survey is illustrated as an example.

우주론

[구 GC-22] Impact of Massive Neutrinos and Dark Radiation on the High-Redshift Cosmic Web

Graziano Rossi
Sejong University

With upcoming high-quality data from surveys such as eBOSS or DESI, improving the theoretical modeling and gaining a deeper understanding of the effects of neutrinos and dark radiation on structure formation at small scales are necessary, to obtain robust constraints free from systematic biases. Using a novel suite of hydrodynamical simulations that incorporate dark matter, baryons, massive neutrinos, and dark radiation, we present a detailed study of their impact on Lyman-Alpha forest observables. In particular, we accurately measure the tomographic evolution of the shape and amplitude of the small-scale matter and flux power spectra and search for unique signatures along with preferred scales where a neutrino mass detection may be feasible. We then investigate the thermal state of the intergalactic medium (IGM) through the temperature-density relation. Our results indicate that the IGM at z ~ 3 provides the best sensitivity to active and sterile neutrinos.

[구 GC-23] Graphical study of cosmic inhomogeneity using CMASS galaxy sample

Yigon Kim[1], Chan-Gyung Park[2], Jai-chan Hwang[1], Hyerim Noh[3]
[1]*Department of Astronomy and Atmospheric Sciences, Kyungpook National University, Daegu, Korea,* [2]*Division of Science Education and Institute of Fusion Science, Chonbuk National University, Jeonju,* [3]*Korea,Center for Large Telescope, Korea Astronomy and Space Science Institute, Daejeon, Korea*

Sloan Digital Sky Survey 12번째 Data release의 CMASS catalog를 이용하여 우주의 균일, 등방성 여부를 조사하였다. Redshift 범위에 따라 얻은 2차원 영역들을 조사한 결과, CMASS 은하들은 통계조사가 가능한 최대 규모인 반지름 300Mpc/h에서도 여전히 Random catalog에 비해 불균일하게 분포하고 있음을 보였다. 결과를 더 명확하게 보여주기 위해 은하의 분포가 불균일함을 나타내는 통계량을 여러 방법으로 시각화하는 연구를 진행하였다. 밀도 분포를 입체적으로 나타낸 그림에서 최대, 최소 밀도의 차이는 300Mpc/h규모에서 약 27%에 달한다. 이는 같은 규모에서 최대 약 4.5%의 차이만이 나타나는 Random catalog의 밀도 분포와는 상이한 결과로, 이 규모에서조차 우주에서 은하는 균일하게 분포하고 있지 않다는 것을 밝혔다.

[구 GC-24] Understanding reionization and cosmic dawn with galaxies and 21-cm

Jaehong Park[1], Andrei Mesinger[1], Bradley Greig[2,3]
[1] *Scuola Normale Superiore, Piazza dei Cavalieri 7, I-56126 Pisa, Italy*
[2]*ARC Centre of Excellence for All-Sky Astrophysics in 3 Dimensions (ASTRO 3D), University of Melbourne, VIC 3010, Australia*
[3]*School of Physics, The University of Melbourne, Parkville, VIC 3010, Australia*

The properties of unseen high-redshift sources (and sinks) are encoded in the 3D structure of the cosmic 21-cm signal. Here I introduce a flexible parametrization for high-z galaxies' properties, including their star formation rates, ionizing escape fraction and their evolution with the mass of the host dark matter halos. With this parametrization, I self-consistently calculate the corresponding 21-cm signal during reionization and the cosmic dawn. Using a Monte Carlo Markov Chain sampler of 3D simulations, 21CMMC, I demonstrate how combining high-z luminosity functions with a mock 21-cm signal can break degeneracies, resulting in ~ percent level constraints on early universe astrophysics.

[석 GC-25] Regional anomalies of cosmic microwave background power spectrum

Young Ju[1], Chan-Gyung Park[2], Jai-Chan Hwang[1]
[1]*Kyungpook National University,*
[2]*Chonbuk National University*

We analyze the Planck 2015 cosmic microwave background temperature fluctuation data to find any anomaly in the angular power spectra