maps, which are spatially integrated to reproduce the measurements of SDSS AGNs. By comparing the distribution of the measured velocity and velocity dispersion of OIII, with the model grids, we constrain the intrinsic outflow velocities. The outflow velocity ranges from a few hundreds to a thousand km/s, implying a strong feedback to ISM.

[구 GC-04] A NEW TYPE 1 AGN POPULATION AND ITS IMPLICATION ON THE AGN UNIFIED MODEL

Sukyoung K. Yi[1], Kyuseok Oh[2], Kevin Schawinski[2], Michael Koss[2], Benny Trakhtenbrot[2]
[1]Department of Astronomy, Yonsei University, Seoul 120-749, Korea
[2]Institute for Astronomy, Department of Physics, ETH Zürich, Wolfgang-Pauli-Strasse 27, 8093, Zürich, Switzerland

We have discovered an unexplored population of galaxies featuring weak broad-line regions (BLRs) at z < 0.2 from detailed analysis of galaxy spectra in the Sloan Digital Sky Survey Data Release 7. These objects predominantly show a stellar continuum but also a broad Hα emission line, indicating the presence of a low-luminosity active galactic nucleus (AGN) oriented so that we are viewing the central engine directly without significant obscuration. These accreting black holes have previously eluded detection due to their weak nature. The new BLR AGNs we found increased the number of known type 1 AGNs by 49%. Some of these new BLR AGNs were detected at the Chandra X-ray Observatory, and their X-ray properties confirm that they are indeed type 1 AGN. Based on our new and more complete catalogue of type 1 AGNs, we derived the type 1 fraction of AGNs as a function of [OIII] λ5007 emission luminosity and explored the possible dilution effect on the obscured AGN due to star-formation. The new type 1 AGN fraction shows much more complex behavior with respect to black hole mass and bolometric luminosity than suggested by the existing receding torus model. The type 1 AGN fraction is sensitive to both of these factors, and there seems to be a sweet spot (ridge) in the diagram of black hole mass and bolometric luminosity. Furthermore, we present a hint that the Eddington ratio plays a role in determining the opening angles.

This work is submitted to ApJS.

[박 GC-05] Distant Quasars: Black hole mass growth and dust emission

Hyunsung D. Jun
Jet Propulsion Laboratory

The massive limit of black holes (BHs) is observed as present day ten billion solar masses. We search for observational signatures of BHs that become extremely massive (EMBHs, 1-10 billion solar masses). I will report on the evolution of active galactic nuclei (AGNs) through the growth of BH mass and their dust emission strength. First, we measured 26 EMBH masses of quasars at $1<z<2$ from rest-frame optical spectroscopy, to better define the massive limit of BH masses of AGNs from rest-UV spectroscopy, and to test for additional uncertainties in the measurements. Next, using a sample of 155 luminous quasars at $3<z<6$ observed with the AKARI, we measured the BH masses from rest-frame optical spectra, extending the scaling relations between AGN continuum and line luminosities to luminous, high redshift quasars. We also investigated the BH mass estimator scaling relations of H-alpha, MgII, and CIV compared to the H-beta BH mass estimator, providing constraints on the massive end of BH mass growth at high redshift. Lastly, we identified and characterized a population of luminous dust-poor quasars at $z<5$ - quasars showing little IR emission from the AGN dusty structure. Compiling a rest-frame UV to IR library of 41,000 optically selected type-1 quasars, we fitted the broad-band spectral energy distributions (SEDs) with accretion disk and dust model components. We find that 0.6% of the sample is hot-dust-poor, and present their observed properties.

[구 GC-06] Cosmological Tests using Redshift Space Clustering in BOSS DR11

Yong-Seon Song[1,5], Cristiano G. Sabiu[1,2], Teppei Okumura[3], Minji Oh[1,5], Eric V. Linder[1,6]
[1]Korea Astronomy and Space Science Institute, Daejeon 305-348, Korea,
[2]Korea Institute for Advanced Study, Dongdaemun-gu, Seoul 130-722, Korea,
[3]Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU, WPI), [4]The University of Tokyo, Chiba 277-8582, Japan
[5]University of Science and Technology, Daejeon 305-333, Korea,
[6]Berkeley Lab and Berkeley Center for Cosmological Physics, University of California, Berkeley, CA 94720, USA

We analyze the clustering of large scale structure in the Universe in a model independent method, accounting for anisotropic effects along

and transverse to the line of sight. A large sample of 690,000 galaxies from The Baryon Oscillation Spectroscopy Survey Data Release 11 are used to determine the Hubble expansion H, angular distance D_A, and growth rate GT at an effective redshift of z=0.57. After careful bias and convergence studies of the effects from small scale clustering, we find that cutting transverse separations below 40 Mpc/h delivers robust results while smaller scale data leads to a bias due to unmodelled nonlinear and velocity effects. The converged results are in agreement with concordance LCDM cosmology, general relativity, and minimal neutrino mass, all within the 68\% confidence level. We also present results separately for the northern and southern hemisphere sky, finding a slight tension in the growth rate −− potentially a signature of anisotropic stress, or just covariance with small scale velocities −− but within 68\% CL.

[구 GC−07] Constraints on dark radiation from cosmological probes

Graziano Rossi[1], Christophe Yeche[2], Nathalie Palanque−Delabrouille[2], Julien Lesgourgues[3,4]
[1]*Department of Astronomy and Space Science Sejong University, 209 Neungdong−ro, Gwangjin−gu Seoul, South Korea, 147−747,*
[2]*CEA, Centre de Saclay, Irfu/SPP, F−91191 Gif−sur−Yvette, France,* [3]*CERN, Theory Division, CH−1211 Geneva 23, Switzerland,* [4]*LAPTh, Univ. de Savoie, CNRS, B.P.110, Annecy−le−Vieux F−74941, France*

We present joint constraints on the number of effective neutrino species N_{eff} and the sum of neutrino masses Σm_ν, based on a technique which exploits the full information contained in the one−dimensional Lyman−α forest flux power spectrum, complemented by additional cosmological probes. In particular, we obtain N_{eff} = 2.91 ± 0.22 (95% CL) and Σm_ν < 0.15 eV (95% CL) when we combine BOSS Lyman−α forest data with CMB (Planck+ACT+SPT+WMAP polarization) measurements, and N_{eff} = 2.88 ± 0.20 (95% CL) and Σm_ν < 0.14 eV (95% CL) when we further add baryon acoustic oscillations. Our results tend to favor the normal hierarchy scenario for the masses of the active neutrino species, provide strong evidence for the Cosmic Neutrino Background from $N_{eff} \approx 3$(N_{eff} = 0 is rejected at more than 14 σ), and rule out the possibility of a sterile neutrino thermalized with active neutrinos (i.e., N_{eff} = 4) − or more generally any decoupled relativistic relic with $\Delta N_{eff} \cong 1$ − at a significance of over 5 σ, the strongest bound to date, implying that there is no need for exotic neutrino physics in the concordance ΛCDM model.

[구 GC−08] Statistical property of the velocity dispersion profiles of elliptical galaxies : dark matter versus MOND

In−Taek Gong and Kyu−Hyun Chae
Department of Physics and Astronomy, Sejong University

운동학적으로 측정된 질량과 측광으로 측정된 질량이 불일치하는 질량 불일치 문제는 현대천문학의 중요한 문제이다. 현재 이러한 질량 불일치에 대한 두 가지 해결책이 제시 되었다. 하나는 현대 표준우주론인 ΛCDM 패러다임의 핵심 요소인 암흑물질, 다른 하나는 Milgrom에 의해 제시된 수정된 뉴턴역학(Modified Newtonian dynamics: MOND)이다. 두 방법에 대한 많은 연구가 진행되었는데, 최근 연구 결과에 의하면 나선형 은하의 회전속도 윤곽은 MOND와 잘 부합한다. 여기서 우리는 타원형 은하의 속도분산 윤곽을 분석한다. 속도분산 비등방성의 다양한 가정 하에 거의 구형인 2000여개의 SDSS 은하들의 예측되는 속도분산 윤곽을 계산하고, 이들로부터 얻어진 속도분산 기울기 분포를 15개의 ATLAS^{3D} 구형 은하들의 관측된 분포와 비교하였다. 잘 정의된 하나의 interpolation function을 사용하는 MOND 모형에 의해서 단지 관측된 은하의 항성 질량 분포만으로 관측된 속도 분산 윤곽의 기울기 분포가 잘 설명되었다. 이러한 결과는 표준 패러다임의 경우 관측된 속도 분산 윤곽을 설명하기 위해 개별적인 암흑물질의 양과 밀도 윤곽을 필요로 한다는 점에서 주목할 만하다. 향후 타원형 은하들의 개별적 속도분산 윤곽을 정밀하게 분석하는 것이 매우 유용할 것으로 판단된다.

[구 GC−09] On the Deviation from the Hubble Flows around the Virgo Cluster

Jounghun Lee[1], Suk Kim[2], Soo−Chang Rey[2]
[1]*Seoul National University,*
[2]*Chungnam National University*

은하단 주변 은하의 속도 프로파일을 이용하여 중력 법칙을 검증하는 방법론에 관한 최근 공동 연구 결과 (arXiv:1501.07064, submitted for publication in ApJ)를 발표한다.

[구 GC−10] Dependence of galaxy properties on void filament straightness

Junsup Shim[1], Jounghun Lee[1] and Fiona Hoyle[2]
[1]*Astronomy Program, Department of Physics and Astronomy, Seoul National University,*
[2]*Pontifica Universidad Catolica de Ecuador, 12 de Octubre 1076 y Roca, Quito, Ecuador*