The links between super-massive black hole masses and their host galaxy properties are observed, indicating that black hole growth and host galaxy evolution are closely related. Reverberation mapping, which uses the time delay from the central black hole to broad line regions, is one of the best methods to estimate masses of black holes of active galactic nuclei (AGNs). However, only masses of about 50 black holes have been determined in reverberation mapping studies so far, and most of them are limited to optical luminosities below 10^45 erg/s due to the challenges of long-term time domain observations in both photometry and spectroscopy. In this project, we expand reverberation mapping samples to higher luminosities of > 10^44.5 erg/s at 0.1 < z < 0.35, that have expected time lags of 40 - 250 light days. Photometric (using LOAO 1-m and MDM 1.3-m) and spectroscopic (using MDM 2.4-m and Lick 3-m) monitoring campaigns are being conducted for a 3 year duration and 20 day cadence. Precedent photometric observations in 2015B show some targets with variability and follow-up spectroscopic observations are on-going. In this presentation, we introduce our project, present reverberation mapping simulation results, and preliminary results on photometry. These reverberation mapping masses of relatively high luminous AGNs will provide a strong constraint on black hole mass calibration, e.g., the single-epoch mass estimation.

[포 GC-23] Photometric Reverberation Mapping with SQUEAN: A Test Study using Medium Bands

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Photometric reverberation mapping is an effective alternative to time consuming spectroscopy. It usually employs narrow bands to track the luminosity variations of broad emission lines, such as Balmer lines, and broadbands for the continuum variability. Here, we investigate the feasibility of substituting these for medium bands, with 50nm widths, that are currently being used on the SED Camera for QUasars in EArly uNiverse (SQUEAN) installed on the 2.1m Otto Struve Telescope at McDonald Observatory. Three targets with recent variability and/or short expected time lags were selected, and observed for 15 minutes each in the medium band containing Hα, and the two adjacent bands for continuum subtraction afterwards. Analysis shows that for one of the objects, SDSS J0350+0037, the pure Hα emission line flux has a S/N ~ 12, so that variabilities up to ~ 8% are detectable. Thus, future observations using these medium bands on SQUEAN seem to be practical.

[포 GC-24] Weak-Lensing Study of Galaxy Cluster PLCKG287.0+32.9

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Merging galaxy clusters, such as PLCKG287.0+32.9, provide a window into the formation process of the large scale structure of the universe. PLCKG287.0+32.9 is an enormous merging galaxy cluster with mass estimated to be ~10^15 Msun. It hosts a pair of mega-parsec sized radio relics with projected offsets from the X-ray center of approximately 350kpc and 2.7Mpc, suggesting a NW-SE merging scenario with relics originating from two separate passes (Bonafede et al. 2014). A detected radio halo coincides with the center of x-ray emission. We present the motivation for our weak lensing study of the merging galaxy cluster PLCKG287.0+32.9 using recent Subaru optical imaging. We discuss the basics of weak-lensing and the criteria for source selection. In addition, we describe our method of PSF modeling and mass reconstruction.

[포 GC-25] Parametric modelling of the velocity dispersion profiles of 11 elliptical galaxies : dark matter versus MOND

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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 ΛCDM패러다임의 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 부합하나 타원은하에 대해서는 불명확하다. 여기서 우리는 ATLAS3D project 에서 얻어진 260개의 조기형 은하 중 거의 원형인 11개의 타원은하

들을 선별하여 표준패러다임(뉴턴역학과 암흑물질)과 MOND 하에서 속도분산 윤곽에 대한 모델링을 수행하였다. 속도분산 anisotropy에 대한 parametric 모형을 가정하고 다음의 결과를 얻었다. (1) anisotropy가 속도분산 윤곽에 큰 영향을 준다는 것을 확인하였고, (2) 전체적으로 표준패러다임과 MOND 중 어느 패러다임이 관측된 속도분산 윤곽에 더 잘 부합하는지 결론을 도출하기가 어려웠고, (3) 은하 개별적으로는 표준패러다임 하에서 요구되는 암흑물질의 양이 달랐고, 선호되는 MOND 모형에서도 미세한 차이가 나타나는 것으로 보였다. 이 결과는 anisotropy에 대한 더 나은 이해를 바탕으로 개선될 수 있을 것이다.

[포 GC-26] Cosmic Web traced by ELGs and LRGs from the Multidark Simulation

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Current and planned large-volume surveys such as the Sloan Digital Sky Survey extended Baryon Oscillation Spectroscopic Survey (SDSS IV-eBOSS) or the Dark Energy Spectroscopic Instrument (DESI) will use Luminous Red Galaxies (LRGs) and Emission Line Galaxies (ELGs) to map the cosmic web up to z~1.7, and will allow one to accurately constrain cosmological models and obtain crucial information on the nature of dark energy and the expansion history of the Universe in novel epochs - particularly by measuring the Baryon Acoustic Oscillation (BAO) feature with improved accuracy. To this end, we present here a study of the spatial distribution and clustering of a sample of LRGs and ELGs obtained from a sub-volume of the MultiDark simulation complemented by different semi-analytic prescriptions, and investigate how these two different populations trace the cosmic web at different redshift intervals - along with their synergy. This is the first step towards the interpretation of upcoming ELG and LRG data.

[포 GC-27] Properties of High- and Low-Redshift Quasars from the extended Baryon Oscillation Spectroscopic Survey

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The SDSS-IV extended Baryon Oscillation Spectroscopic (eBOSS) will provide new photometry and spectroscopy of an unprecedented number of quasars in a novel redshift range, along with some re-observations of SDSS DR12 objects. We present here an observational study of the geometry, spatial distribution, luminosity function, and clustering of a sample of low- and high-z quasars obtained from the first SDSS-IV data release (DR13). In particular, we characterize the amount of overlapping between different data releases, and then focus on the synergy among high- and low-z quasars as tracers of the cosmic web, particularly considering their cross-correlations and cosmological implications.

성간물질

[포 IM-01] Kinematics of the Envelope and Two Bipolar Jets in L1157

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A massive envelope and a strong bipolar outflow are the two most distinct structures of youngest protostellar systems. We present observational results from the Combined Array for Research in Millimeter-wave Astronomy (CARMA) toward the youngest (Class 0) protostellar system L1157. At an angular resolution of 5 arcseconds, we mapped its well-developed outflow in CO 2-1 over a span of approximately 5 arcminutes. Additionally, we imaged the central envelope with CO isotopes, CS, CN, and N2H+ with an angular resolution of about 2 arcseconds. We show that the bipolar outflow may be represented with a two jet model and constrain its physical properties such as precession/rotation directions, velocities, inclinations, and position angles via cube data fitting. In addition, we discuss the kinematic features of the envelope detected in CO isotopes and N2H+ and present the radius-dependent dust opacity spectral index.

[포 IM-02] The Propagation of Cosmic Ray in Protoplanetary Disks

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