

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  $z \sim 1.7$ , 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 N<sub>2</sub>H<sup>+</sup> 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 N<sub>2</sub>H<sup>+</sup> and present the radius-dependent dust opacity spectral index.

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

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For the development of magneto rotational instability, which drives mass accretion in protoplanetary disks, sufficient ionization degree is needed. Cosmic rays are believed to be one of the dominant ionization sources for protoplanetary disk gas. In previous studies, ionization rates are computed by considering the effect of attenuation of the cosmic ray (CR) intensity as a function of column density in an unmagnetized cloud. However, in reality particles should sweep up larger column density to reach at the midplane of disk due to their gyromotion. In this study, we investigate the propagation of CR protons in a protoplanetary disk by solving transport and energy loss equations. We discuss the change in CR intensity due to magnetic field in a protoplanetary disk.

**[포 IM-03] 14 Planck Galactic Cold Clumps in the  $\lambda$  Orionis Complex: No dense cores detected with SCUBA-2**

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We present preliminary results of the submillimeter continuum observations of 14 Planck Galactic Cold Clumps (PGCCs), located in the  $\lambda$  Orionis Complex. This region is the nearest large HII region, which is an ideal site for a study of the stellar feedback to its surroundings. We observed 14 PGCCs with JCMT/SCUBA-2 and used J=1-0 transitions of CO isotopologues from the PMO mapping observation. Several sub-clumps toward three PGCCs were detected at 850  $\mu$ m. In order to examine whether these clumps can be candidates for pre-stellar cores, we compared each clump mass calculated from the 850  $\mu$ m continuum map to its Virial mass and Jeans mass calculated from the <sup>12</sup>CO and C<sup>18</sup>O (1-0) spectra, respectively. All clumps have masses smaller than their Virial and Jeans masses, indicating that none of them are gravitationally bound and thus in the pre-stellar core stage. Also, the CO depletion factor, which has been derived from the dust continuum and the C<sup>18</sup>O(1-0) line and can be an indicator of core evolution, toward the clumps is in the range of 1

to 5, suggesting that they are not very evolved dense pre-stellar cores. In addition, within individual PGCCs, we found clear gradients of velocity ( $\sim 1 \text{ km s}^{-1} \text{ pc}^{-1}$ ) and temperature ( $\sim 10 \text{ K pc}^{-1}$ ) in the <sup>13</sup>CO (1-0) first moment map and the <sup>12</sup>CO (1-0) excitation temperature map, respectively. This can be attributed to the compression and external heating by the HII region, which may prevent clumps from forming gravitationally bound structures and eventually disperse clumps. These results could be a hint about the negative effect of stellar feedback on core formation.

**[포 IM-04] SgrA\* 22/43GHz KaVA observation and its Amplitude Calibration**

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We present the results of KaVA SgrA\* observation together with Takahagi(32m), Yamaguchi(32m) and Nobeyama(45m) telescopes at 22 and 43GHz, respectively. In early 2014, G2 cloud was expected to encounter with SgrA\* and to make a significant flux variation, but it has not been measured yet. So it's worth to check our amplitude calibration method to confirm if we have a missing flux caused by uncertainty in measuring it. We have tested both a standard method using system noise temperature(Tsys) with antenna gain information, and a template method in order to calibrate antenna gain using nearby maser source. As a result, we found that the latter method is useful for antennas which have inaccurate gain information or poor Tsys measurements, and is especially effective for sources at low elevation like SgrA\*. In addition, the comparison shows that the amplitude calibration by standard method can be improved up to 10% with a correction factor using a template method. This result implies we can get more accurate flux from a standard method when any maser source not exists around target.

**천문우주 관측기술**

**[포 AT-01] Comparison Surface Error Measurements of Aspherical Mirror (비구면 반사경 표면의 형상오차 측정법 비교)**