

## 천문화학/천문생물학

**[포 AA-01] Understanding Correlations among Observed Interstellar Molecules with Numerical Simulations (성간 물질에서 발견되는 분자들 사이의 상관 관계를 이해하기 위한 전산 모사 연구)**

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성간 물질의 분광선 관측을 통해 측정된 분자들의 기동 밀도 사이에 상관 관계가 존재하는 것이 알려져 있다. 가령 같은 시선 방향을 따라 측정된 H<sub>2</sub>, CO, CH 분자의 기동 밀도가 서로 선형 상관 관계를 갖고 있음이 최근 밝혀졌다. 이러한 분자들의 상관 관계는 분자 구름의 물리, 화학적 기원 및 성질과 관련이 있을 것으로 추측되지만 아직까지 상관 관계를 설명하기 위한 연구는 활발히 이루어지지 않고 있다. 본 연구에서는 성간 물질 혹은 구름 모형의 전산 모사를 통해 이러한 상관 관계를 재현함으로써 성간 분자 구름의 물리적 특성, 화학적 조성, 그리고 환경 변수들을 영향을 이해하려고 한다. 성간 분자 구름의 화학적 조성이 시간에 따라 변화하는 것을 계산하기 위해 Astrochem을 이용하였다.

## 외부은하/은하단

**[포 GC-01] Escape of LyC and Ly $\alpha$  Photons from Simulated Turbulent Clouds**

Taysun Kimm (김태선), Jeremy Blaizot<sup>2</sup>, Thibault Garel<sup>2</sup>, Leo Michel-Dansac<sup>2</sup>, Harley Katz<sup>3</sup>, Joakim Rosdahl<sup>2</sup>, Anne Verhamme<sup>4</sup>, Martin Haehnelt<sup>5</sup>  
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Understanding how ionizing radiation propagates from molecular clouds to the intergalactic space is the key to the study of reionization and the emergence of Ly $\alpha$  emission from galaxies. In this contribution, I will present our new efforts to better understand the escape of UV photons from turbulent clouds with different masses, star formation efficiencies, and spectral energy distributions using radiation-hydrodynamic simulations. I will also show predicted Ly $\alpha$  profiles from turbulent clouds and discuss a few interesting differences identified when compared with the properties of the local green pea galaxies.

**[포 GC-02] A new KVN key science program: the iMOGABA to the AiMOGABA**

Sang-Sung Lee and the iMOGABA team

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A Korean VLBI Network 1<sup>st</sup> generation key science program, the Interferometric Monitoring of Gamma-ray Bright AGNs (iMOGABA) program has revealed various natures of gamma-ray flares in active galactic nuclei (AGNs). Here in this presentation, we would like to introduce a new candidate of KVN 2<sup>nd</sup> generation key science program, so called, the AiMOGABA (Astrometric iMOGABA), aiming at studying a wondering radio core effect of relativistic jets from AGNs with high resolution VLBI astrometric monitoring of high-energy bursting AGNs with KVN as well as a Australian millimeter radio telescope MOPRA. The introduction will include the current scientific highlights of the iMOGABA, and the overview of the AiMOGABA.

**[포 GC-03] The medium-band observation of the neutrino source, TXS 0506+056**

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The TXS0506+056 is a blazar and counterpart of the neutrino event IceCube-170922A. It is the first time that the neutrino event and flaring event in electromagnetic wave (EM) coincided. We observed TXS0506+056 with medium-bands in optical using 0.25m and 2.1m telescope at McDonald observatory about a month after the neutrino event. We tracked the variability of SED of the target for three weeks, and our observation showed no abrupt variability in optical range during this period. We concluded that a month after the neutrino event, the TXS0506+056 became less active and shows no feature of the energetic event. We also concluded that the medium-bands are well suited for tracking SEDs of objects. Our result demonstrates the potential of the wide-field 0.25m telescope (5.5 deg<sup>2</sup>) for finding transient objects and track the variability of sources like AGNs.

**[포 GC-04] Ly $\alpha$  spectrum regulated by the cold interstellar medium surrounding H II regions**

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Studying the amount and kinematics of circum- and intergalactic medium (CGM and IGM) is key to understanding the role of feedback and environment (cold streams and galactic winds) in the evolution of galaxies. In particular, Ly $\alpha$  emission line has been utilized to investigate the density structure and kinematics of the (most abundant) H I gas in the CGM and IGM around galaxies. Therefore, modeling Ly $\alpha$  radiative transfer through multiphase interstellar medium (ISM), CGM and IGM is crucial in understanding the galaxy evolution. As discussed in Kakiichi & Dijkstra (2018), most Ly $\alpha$  RT effects would occur on interstellar scales. This is because the main source of Ly $\alpha$  photons would be H II regions, which are in most cases, if not all, surrounded by “cold” photo-dissociation regions. However, most Ly $\alpha$  RT studies have been performed in the CGM and IGM environments with  $T \sim 10,000\text{K}$ . In this talk, we present how the Ly $\alpha$  RT effect in the cold ISM with  $T \sim 100\text{K}$  regulates the Ly $\alpha$  spectral properties.

#### [포 GC-05] Hubble Space Telescope Survey of Host Galaxies of Hard X-ray-Selected AGNs

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We present an ongoing imaging survey of the host galaxies of hard X-ray-selected active galactic nuclei (AGNs) observed with the Hubble Space Telescope (HST). The snapshot images are taken with the Advanced Camera for Surveys through an HST gap-filler program. The sample, selected from the 70-month Swift-BAT X-ray source catalog, represents an unbiased and uniform AGN population, which will enable us to test the AGN unification model and explore the physical connection between host galaxies and central supermassive black holes. We also plan to investigate the AGN triggering mechanism by examining merger signatures and searching for dual nuclei. We present the pipeline for imaging analysis and the current status of the survey.

#### [포 GC-06] Spectroscopic observation of the massive high- $z$ ( $z=1.48$ ) galaxy cluster SPT-CL J2040-4451 using Gemini Multi-Object Spectrographs

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Mass measurement of high-redshift galaxy clusters with high accuracy is important in constraining cosmological parameters. Extremely massive clusters at high redshift may impose a serious tension with the current  $\Lambda$ CDM paradigm. SPT-CL J2040-4451 at  $z=1.48$  is considered one such case given its redshift and mass estimate inferred from the SZ data. The system has also been confirmed to be indeed massive from a recent weak-lensing (WL) analysis. Comparison of the WL mass with the spectroscopic result may provide invaluable information on the dynamical stage of the system. However, the existing spectroscopic coverage of the cluster is extremely poor; only 6 blue star-forming galaxies have been found within the virial radius, which results in highly inflated and biased velocity dispersion. In this work, we present a spectroscopic analysis of the member candidates using Gemini Multi-Object Spectrographs (GMOS) observation in Gemini South. The observation was designed to find early-type member galaxies within the virial radius and to obtain reliable velocity dispersion. We explain our selection scheme and preliminary results of the spectra. We also compare the dynamical mass estimate inferred from the velocity dispersion with the WL mass.

#### [포 GC-07] Star-gas misalignment in Horizon-AGN simulation

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Recent Integral Field Spectroscopy (IFS) studies revealed that not only late type galaxies (LTGs) but also early type galaxies (ETGs) have various kinds of kinematic rotation. (e.g. not clearly detectable rotation, disk-like rotation, kinematically distinct core (Cappellari 06)) Among the various studies about galactic kinematics, one of the most notable anomalies is the star-gas misalignment. The gas