observations of the Spitzer and AKARI revealed a signature caused by substantial heating, toward many embedded protostars at the quiescent phase.

We present the AKARI IRC 2.5-5.0 μm spectra for embedded protostars to trace down the characteristics of accretion burst across the evolutionary stages. The ice compositions obtained from the absorption features therein are used as a clock to measure the timescale after the burst event, comparing the analyses of the gas component that traced the burst frequency using the different refreeze-out timescales. We discuss ice abundances, whose chemical change has been carved in the icy mantle, during the different timescales after the burst ends.

[포 IM-05] Chemical and Kinematic Properties of Sagittarius Stellar Streams

Gwibong Kang[1], Young Sun Lee[2], Young Kwang Kim[2]
[1]Department of Astronomy, Space Science, Chungnam National University, Daejeon 34134, South Korea

We use Sloan Digital Sky Survey, Large Sky Area Multi-Object Fibre Spectroscopic Telescope, and Apache Point Observatory Galactic Evolution Experiment data to analyze the kinematic and chemical properties of stellar members in Sagittarius(Sgr) tidal streams. Using distances, positions, proper motions, and angular momenta of stars around the Sgr streams, we gather clean sample of Sgr member stars. We find that the leading arm has different chemical, kinematic, orbital characteristics from those of the trailing arm and the remnant of Sgr. In particular, the leading arm shows relatively lower eccentricity distribution than the trailing arm, suggesting their origin may differ or they have experienced different dynamical evolution, which is in somewhat mystery.

[포 IM-06] Investigation of heating and accretion event of Milky Way disk

Ayeon Lee[1], Young Sun Lee[2], Young Kwang Kim[2]
[1]Department of Astronomy, Space Science, and Geology, Chungnam National University, Daejeon 34134, South Korea
[2]Department of Astronomy and Space Science, Chungnam National University, Daejeon 34134, South Korea

We present preliminary results on the chemical and kinematic analysis of accreted and heated metal-rich (-1.0 < [Fe/H] < -0.3) stars in the Galactic disk. These stars are in the ranges of e > 0.7, -100 < V_ϕ < 100 km/s, and |Z| < 3 kpc, and are presumably heated (accreted) by (from) past merger events such as Gaia Enceladus and Sausage (GSE). These stars are largely separated into two groups based on the level of [α/Fe] and radial velocity dispersion. The first group has low [α/Fe] and high radial velocity dispersion, and the second group shows high [α/Fe] and low radial velocity dispersion. We propose that the first group of stars are accreted from the GSE galaxy, whereas the second group of stars are dynamically heated by the GSE merger event.

외부은하/은하단

[포 GC-01] Properties of Shocks in Simulated Merging Clusters

Eunyu Lee[1], Dongsu Ryu[1] and Hyesung Kang[2]
[1]Department of Physics, College of Natural Sciences, UNIST
[2]Department of Earth Sciences, Pusan National University

Shocks are induced in the intracluster medium by mergers of subclusters during the hierarchical structure formation of the universe. Radio relics detected in the outskirts of galaxy clusters have been interpreted as diffuse synchrotron emission from cosmic ray electrons accelerated at such merger shocks. Using a set of cosmological hydrodynamic simulations, we study how the properties of merger-driven shocks depend on the parameters such as the mass ratio and impact parameter of mergers. In particular, we examine the distribution of the Mach number and energetics of shocks associated with synthetic radio relics in simulated merging clusters. In this poster, we will present the preliminary results and the implications.

[포 GC-02] How to quantify the similarity of 2D distributions: Comparison of spatial distribution of Dark Matter and Intracluster light

Jaewon Yoo[1,2], Jongwan Ko[1,2], Cristiano G. Sabiu[3], Kyungwon Chun[1], Jihye Shin[1], Ho Seong Hwang[4], Rory Smith[1,2], Hyowon Kim[1,2]
[1]Korea Astronomy and Space Science Institute (KASI),
[2]University of Science and Technology (UST),
[3]University of Seoul (UoS),
[4]Seoul National University (SNU)

In studying the dynamical evolution of galaxy clusters, one intriguing approach is to compare the spatial distributions of various components, such as the dark matter, the member galaxies, the gas, and the intracluster light (ICL; the diffuse light from stars, which are not bound any individual cluster galaxy). If we find a visible component whose spatial distribution coincides with the dark matter distribution, then we could draw a dark matter map without requiring laborious weak lensing analysis. Furthermore, if the component traces the dark matter distribution better for more relaxed galaxy cluster, we could use the similarity as a dynamical stage estimator of the galaxy cluster. We present a novel new methodology to quantify the similarity of two or more 2-dimensional spatial distributions. We apply the method to a sample of galaxy clusters at different dynamical stages simulated within N-cluster Run, which is an N-body simulation using the galaxy replacement technique. Among the various components (stellar particles, galaxies, ICL), the velocity defined ICL+ brightest cluster galaxy (BCG) component traces the dark matter best. Between the sample galaxy clusters, the relaxed clusters show stronger similarity of the spatial distribution between the dark matter and ICL+BCG than the dynamically young clusters.

[포 GC-03] Large Scale Structures at z~1 in SA22 Field and Environmental Dependence of Galaxy Properties

Minhee Hyun[1,2], Myungshin Im[2], Jae-Woo Kim[1], Seong-Kook Lee[2], and Insu Paek[2]
[1]Korea Astronomy & Space Science Institute (KASI), [2]SNU Astronomy Research Center (SNUARC), Astronomy Program, Dept. of Physics & Astronomy, Seoul National University (SNU)

We study galaxy evolution with the large-scale environment with confirmed galaxy clusters from multi-object spectroscopy (MOS) observation. The observation was performed with Inamori Magellan Areal Camera and Spectrograph (IMACS) mounted on the 6.5 m Magellan/Baade telescope in Las Campanas Observatory. With the MOS observation, we spectroscopically confirm 34 galaxy clusters, including three galaxy clusters discovered in Kim et al. (2016) and 11 of them have halo mass of > $10^{14.5}$ $M_{\odot}$. Among the confirmed clusters, 12 galaxy clusters are part of large-scale structure at z ~ 0.9, and their size stretches to 40 Mpc co-moving scale. In this study, we checked the 'web feeding model,' which postulates that more linked (with their environment) galaxy clusters have less quenched populations by investigating the correlation between properties of confirmed galaxy clusters and the large-scale structure environment. Lastly, we found that galaxy clusters that make up the large-scale structure have larger and widely spread values of total star formation density ($\Sigma SFR/M_{halo}$) than typical clusters at similar redshifts.

[포 GC-04] Discovery of Massive Galaxy Cluster Candidates in the Southern Sky

Bomi Park[1], Myungshin Im[1], Joonho Kim[1], Minhee Hyun[1], Seong-Kook Lee[1], Jae-Woo Kim[2]
[1]SNU Astronomy Research Center, Department of Physics and Astronomy, Seoul National University, Seoul 08826, Korea
[2]Korea Astronomy and Space Science Institute, Daejeon 34055, Korea

Galaxy clusters are the largest structures in the universe located at the top of the cosmological hierarchical model, so the evolution of the universe can be understood by studying clusters of galaxies. Therefore, finding a larger number of galaxy clusters plays an important role in exploring how the universe evolves. A large number of catalogs for galaxy clusters in the northern sky have been published; however, there are few catalogs in the southern sky due to the lack of wide sky survey data. KMTNet Synoptic Survey of Southern Sky(KS4) project, which observes a wide area of the southern sky about 7000 deg^2 with KMTNet telescopes for two years, is in progress under the SNU Astronomy Research Center. We use the KS4 multi-wavelength optical data and measure photometric redshifts of galaxies for finding galaxy clusters at redshift z<1. Currently, the KS4 project has observed approximately 50% of the target region, and a pipeline that measures photometric redshifts of galaxies has been created. When the project is completed, we expect to find more than a hundred thousand galaxy clusters, and this will improve the study of galaxy clusters in the southern sky.

[포 GC-05] HI superprofiles of galaxies from THINGS and LITTLE THINGS

Minsu Kim[1], Se-Heon Oh[2]
[1]Department of Astronomy and Space Science, Sejong University, Seoul, Korea
[2]Department of Physics and Astronomy, Sejong University, Seoul, Korea

We present a novel profile stacking technique based on optimal profile decomposition of a 3D spectral line data cube, and its performance test using the HI data cubes of sample galaxies from HI