

perpendicular to dense ones. Furthermore, the magnetic field directions with respect to density gradients vary again with density in denser core regions, which is understood by core formation and pinched fields.

Note: (PI) D. Ward-Thompson, (co-PIs) P. Bastien, T. Hasegawa, W. Kwon, S. Lai, and K. Qiu

[표 IM-04] MIRIS Pa α Galactic Plane Survey: The results in $l = 276^\circ$ - 296°

Il-Joong Kim¹, Jeonghyun Pyo¹, Woong-Seob Jeong¹
¹*Korea Astronomy and Space Science Institute*

The Multipurpose InfraRed Imaging System (MIRIS) Pa α Galactic Plane Survey (MIPAPS) covers the whole Galactic plane with the latitude range of $-3^\circ < b < +3^\circ$. Next to the first result in $l = 96^\circ$ - 116° (Cepheus), we present the results in $l = 276^\circ$ - 296° (Carina). This region with the direction toward the inner Galaxy, has much higher extinction but much more Pa α -emitting sources than Cepheus. We list up the detected Pa α sources, and compare them with the WISE H II region catalog (there are 308 H II regions and candidates in this region) and VPHAS+ H α image. By detecting the Pa α and H α recombination lines, 71 H II region candidates are newly confirmed as definite H II regions, out of which 53 H II regions are detected at Pa α . For the Pa α -detected sources, we measure the Pa α and H α fluxes and estimate the E(B-V) color excesses for the extended sources.

[표 IM-05] Determination of Nitrogen Abundance Ratio from Low-Resolution Stellar Spectra

Changmin Kim¹, Young Sun Lee²
¹*Department of Astronomy, Space Science and Geology, Chungnam National University, Daejeon, South Korea*

²*Department of Astronomy and Space Science, Chungnam National University, Daejeon, South Korea*

We present a method for determining the abundance ratio of nitrogen to iron ([N/Fe]) from low-resolution ($R \sim 2000$) stellar spectra from large spectroscopic surveys such as Sloan Digital Sky Survey (SDSS) and Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST). The basic idea of the method is to match a grid of synthetic spectra with an observed spectrum in the CN band region around 3883 Å. To calibrate our estimate of [N/Fe], we make use of the giants observed in Apache Point Observatory Galaxy Evolution Experiment (APOGEE), which are also observed in the SDSS. This method will be applied

to the Galactic halo stars to determine [N/Fe], and the measured nitrogen abundance ratios will be used to investigate the C-N anti-correlation, which is observed in globular clusters, to trace their origin with their kinematic properties.

[표 IM-06] Spatial Variations of Chemical Abundances in The Galactic Disk

Ayeon Lee¹, Young Sun Lee², Young Kwang Kim²
¹*Department of Astronomy, Space Science, and Geology, Chungnam National University, Daejeon 34134, South Korea*

²*Department of Astronomy, Space Science, Chungnam National University, Daejeon 34134, South Korea*

We present spatial variations of chemical abundances ([Fe/H] and [α /Fe]) in the Galactic disk, using a large number of dwarfs and giants from Large Sky Area Multi-object Fiber Spectroscopic Telescope (LAMOST). Specifically, we investigate how the metallicity distribution function (MDF) and the alpha abundance distribution function (ADF) change with the distance from the Galactic center to understand the chemical evolution history of the Galactic disk. We also study the difference (if any) in the MDF and ADF between dwarfs and giants to provide valuable clues to the formation history of the Galactic disk.

[표 IM-07] On the properties of six cores in the λ Orionis cloud: triggered or non-triggered star formation?

Hee-Weon Yi¹, Jeong-Eun Lee¹, Tie Liu^{2,3}, and Kee-Tae Kim³

¹*Kyung Hee University, 2Shanghai Astronomical Observatory, 3Korea Astronomy and Space Science Institute*

We present preliminary results of 1.1 and 1.3 mm dust continuum and ¹²CO (J=2-1) line data obtained with the Submillimeter Array toward six cores harboring Class 0/I objects in the λ Orionis cloud. They are located in bright rimmed clouds, which are exposed to the far-ultraviolet radiation field by the O-type star λ Ori. Compact dust continuum emission is observed from all six cores. Among the six cores, only one core G196.92-10.37 shows a signature of binarity with separation of 4000 AU. The numbers of singles and binaries in our sample are five and one, respectively and the derived multiplicity frequency (MF) is 0.17. This value is lower than those found in the binary surveys toward Class 0/I objects, which may be a hint for negative feedback by the nearby massive

star, λ Ori. The derived excitation temperature (T_{ex}) using ^{12}CO emission shows a lower median value (20 K) than those of triggered star-forming regions (30 K). The lower MF and T_{ex} support our previous study that star formation was not triggered in the λ Orionis cloud. We aim to further investigate whether the Class 0/I YSOs in the λ Orionis cloud have less circumstellar materials and smaller accretion rates than in other filamentary clouds (e.g., Orion A & B), which might be attributed to negative feedback from the massive star in limiting accretion of protostars

[포 IM-08] The Early Assembly History of the Milky Way with Extremely Metal-Poor ($[\text{Fe}/\text{H}] < -3.0$) Stars

Miji Jeong¹, Young Sun Lee², Young Kwang Kim²

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*

Extremely metal-poor (EMP; $[\text{Fe}/\text{H}] < -3.0$) stars are thought to be genuine second-generation of stars because they were born from relatively pristine gas chemically enriched by one or two supernovae. So, the EMP stars presumably originated from outside the Milky Way (MW) are important tracers for the early chemical evolution and assembly history of the MW. In this study, we present the preliminary results on the early assembly history of the MW inferred by associating the dynamical properties of our EMP stars with those of known substructures in the MW. We also explore the star formation history of the progenitor galaxies of our EMP stars by investigating the elemental abundances of the EMP stars associated with the substructure.

[포 IM-09] Grain Growth Revealed by Multi-wavelength Analysis of Non-axisymmetric Substructures in the Protostellar Disk WL 17

Ilseung Han^{1,2}, Woojin Kwon^{3,2}, Yusuke Aso²

¹*University of Science and Technology,*

²*Korea Astronomy and Space Science Institute,*

³*Department of Earth Science Education, Seoul National University*

Disks around protostars are the birthplace of planets. The first step toward planet formation is grain growth from μm -sized grains to mm/cm-sized grains in a disk, particularly in

dense regions. In order to study whether grains grow and segregate at the protostellar stage, we investigate the ALMA Band 3 (3.1 mm) and 7 (0.87 mm) dust continuum observations of the protostellar disk WL 17 in ρ Ophiuchus L1688 cloud. As reported in a previous study, the Band 3 image shows substructures: a narrow ring and a large central hole. On the other hand, the Band 7 image shows different substructures: a non-axisymmetric ring and an off-center hole. The two-band observations provide a mean spectral index of 2.3, which suggests the presence of mm/cm-sized large grains. Its non-axisymmetric distribution may imply dust segregation between small and large grains. We perform radiative transfer modeling to examine the size and spatial distributions of dust grains in the WL 17 disk. The best-fit model suggests that large grains (>1 cm) exist in the disk, settling down toward the midplane, whereas small grains (~ 10 μm) well mixed with gas are distributed off-center and non-axisymmetrically in a thick layer. The low spectral index and the modeling results suggest that grains rapidly grow at the protostellar stage and that grains differently distribute depending on sizes, resulting in substructures varying with observed wavelengths. To understand the differential grain distributions and substructures, we discuss the effects of the protoplanet(s) expected inside the large hole and the possibility of gravitational instability.

[포 IM-10] Spiral Magnetic Field Lines in a Hub-Filament Structure, Monoceros R2

Jihye Hwang^{1,2}, Jongsoo Kim^{1,2} and BISTRO team

¹*Korea Astronomy and Space Science Institute,*

²*Affiliation University of Science and Technology, Korea*

We present the results of polarization observations at submillimeter wavelengths towards Monoceros R2 (Mon R2). The polarized thermal dust emission was obtained from SCUBA-2/POL-2 at 450 μm and 850 μm , simultaneously. This observation is a part of the JCMT BISTRO survey project. The polarization angle distributions at 450 μm and 850 μm are similar and the mean value of angle differences at two wavelengths is 5.5 degrees. The Mon R2 is one of massive star-forming regions containing a clear hub-filamentary structure. The hub region shows star formation activities, and surrounding filaments provide channels for matters to move into the hub region. It is not well known the role of magnetic fields in a hub-filamentary structure. Some studies have shown well-ordered polarization segments along a filamentary structure and