### Estimation of Na Abundance from Low-resolution Stellar Spectra.

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It is inferred that many stars in the Galactic halo or bulge were once members of globular clusters (GCs), which are now dissolved. To distinguish the GC-originated stars, which can provide valuable information on the origin of the bulge and halo, from the in situ field stars, the Na abundance plays an important role. However, the interstellar Na in certain directions can unnecessarily enhance the estimate of the Na abundance from stellar spectra due to blended Na D lines unless the spectral resolution is very high, which allows to resolve the lines from the interstellar Na. In this study, we present a means of correcting the Na abundance affected by the interstellar Na in the low-resolution of the Sloan Digital Sky Survey stellar spectra.

### [포 IM-11] ALMA Observations of a Massive-star-forming Infrared Dark Cloud Core MSXDC G053.11+00.05 MM1

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We present the ALMA observations of the infrared dark cloud (IRDC) core MSXDC G053.11+00.05 MM1 at the distance of 1.7 kpc. While the core was first identified at 1.2 mm with a mass of 124 Msun, recent near- and mid-infrared observations have revealed a parsec-scale molecular hydrogen (H2 1-0 S(1) at 2.12 micron) outflow and two early class young stellar objects (YSOs) at the center of the core, one of which is likely massive (M > 8 Msun). From the ALMA Band 7 observations with a resolution of 0.5", we have found a dust filament of < 0.1 pc in which five dense cores are embedded in the 870 micron continuum. The brightest core is consistent with one of the two previously-detected YSOs, but the other four are newly discovered implying their very deeply embedded status. We have also detected several molecular line emission including H13CO+ and C17O as well as 13CO outflow with complicated morphology. At the brightest core, the methanol line (CH3OH) shows velocity gradients, which may support the existence of a circumstellar disk around a high-mass protostar. Based on the derived properties of the dense cores, we discuss their association with the two YSOs and H2 outflow detected in infrared and high-mass star-formation process occurring in IRDC cores.

### [포 IM-12] TRAO Survey of Nearby Filamentary Molecular Clouds, the Universal Nursery of Stars (TRAO FUNS). III. Dynamics of filaments in different star forming environments

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Recent high resolution IR observations reveal that molecular clouds are filamentary and such a structure is ubiquitous over various star-forming environments, and it is clear that filaments play a crucial role in the formation of cores and stars. However, the formation process of dense cores in the filaments are still unknown. To investigate this issue in detail, we have carried out TRAO FUNS (TRAO survey of nearby Filamentary molecular clouds, the Universal Nursery of Stars) toward various star forming filamentary molecular clouds.

In this presentation, we will report the first look results of filaments and dense cores in MCLD 123.5+24.9 and IC 5146, which are known as a quiescent, non-star-forming region and an active, high-mass star forming region, respectively. By comparing the kinematic properties of filaments and dense cores in different star forming environments, we verified the formation scenario of filaments and dense core, i.e., gravoturbulent fragmentation via supersonic motions.

### [포 IM-13] JCMT-CHIMPS2 Survey

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The CHIMPS2 survey is to extend the JCMT HARP $^{13}CO/C^{18}O$ J=3-2 Inner Milky-Way Plane Survey (CHIMPS) and the $^{12}CO$ J=3-2 survey (COHRS) into the inner Galactic Plane, the Central Molecular Zone (CMZ), and a section of the Outer Plane. When combined with the complementary $^{12}CO/^{13}CO/C^{18}O$ J=1-0 survey at the Nobeyama 45m (FUGIN) at matching 15" resolution and sensitivity, and other current CO surveys, the results will provide a complete set of transition data with which to calculate accurate column densities, gas temperatures and turbulent Mach numbers. These will be used to: analyze molecular cloud properties

across a range of Galactic environments; map the star-formation efficiency (SFE) and dense-gas mass fraction (DGMF) in molecular gas as a function of position in the Galaxy and its relation to the nature of the turbulence within molecular clouds; determine Galactic structure as traced by molecular gas and star formation; constrain cloud-formation models; study the relationship of filaments to star formation; test current models of the gas kinematics and stability in the Galactic center region and the flow of gas from the disc. It will also provide an invaluable legacy data set for JCMT that will not be superseded for several decades. In this poster, we will present the current status of the CHIMPS2.

### [포 IM-14] Investigation of the apparent α-bimodality among the galactic bulge stars from the APOGEE database

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Recent investigation of the APOGEE bulge stars by Zasowski et al. (2018) shows a fraction of stars enhanced in O, Ca, and Mg abundances. It is not clear, however, that this apparent α-bimodality is reflecting a real feature or an artifact from spectral fitting. We will report our progress in understanding the nature and reality of this phenomenon. We will also discuss the spread in Na abundance among the inner bulge stars with respect to that observed among disk sample.

### [포 IM-15] Effects of radiation-modulated cooling on the momentum transfer from stellar feedback

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Strong radiation fields can change the ionization state of metals and hence cooling rates. In order to understand their effects on the momentum transfer from radiation and supernova feedback, we perform a suite of radiation-hydrodynamic simulations with radiation-modulated metal cooling. For this purpose, we pre-tabulate the metal cooling rates for a variety of spectral shapes and flux levels with the spectral synthesis code, Cloudy, and accurately determine the rates based on the local radiation field strength. We find that the inclusion of the radiation-modulated metal cooling decreases the total radial momentum produced by photo-ionization heating by a factor of ~3 due to enhanced cooling at temperature T~10^3-4 K. The amount of momentum transferred from the subsequent SN explosions, however, turns out to be little affected by radiation, as the main cooling agents at T~10^5-6 K are only destroyed by soft X-ray radiation which is generally weak. We further discuss the total momentum budget in various conditions.

### [포 IM-16] Dense Core Formation in Filamentary Clouds: Accretion toward Dense Cores from Filamentary Clouds and Gravitational Infall in the Cores

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Understanding how the filamentary structure affects the formation of the prestellar cores and stars is a key issue to challenge. We use the Heterodyne Array Receiver Program (HARP) of the James Clerk Maxwell Telescope (JCMT) to obtain molecular line mapping data for two prestellar cores in different environment, L1544 in filamentary cloud and L694-2 in a small cloud isolated. Observing lines are $^{13}CO$ and $C^{18}O$ (3-2) line to find possible flow motions along the filament, $^{12}CO$ (3-2) to search for any radial accretion (or infalling motions) toward the cores of gas material from their surrounding regions, and $HCO^+$ (4-3) lines to find at which density and which region in the core gases start to be in gravitational collapse. In the 1st moment maps of $^{13}CO$ and C18O , velocity gradient patterns implying the flow of material were found at the cores and its surrounding filamentary clouds. The infall asymmetry patterns of HCO+ and $^{13}CO$ line profiles were detected to be good enough to analyze the infalling motions toward the cores. We will report further analysis results on core formation in the filamentary cloud at this meeting.

### [포 IM-17] Discovery of a New Mechanism to Release Complex Molecules from Icy Grain Mantles around Young Stellar Objects

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