times larger than in optical. However, the bright optical nebula would correspond to a MC swept up by the SNR, and consequently the interaction SNR-MC is limited to the central portion of the SNR.

We aimed to study the overall structure of N63A, using near-IR imaging and spectroscopic observations to obtain the physical parameters of the atomic shocks, and also to understand how the SNR- MC interaction works and reveal the structure of the shocked cloud as well as the consequences of the impact of the SNR shock on the MC, comparing information obtained in different wavelengths.

[포 IM-04] On the claimed X-shaped structure in the Milky Way bulge

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A number of recent studies have claimed that the double red clump observed in the Milky Way bulge is a consequence of an X-shaped structure. In particular, Ness & Lang (2016) report a direct detection of a faint X-shaped structure in the bulge from the residual map of the Wide-Field Infrared Survey Explorer (WISE) image. Here we show, however, that their result is seriously affected by a bulge model subtracted from the original image. When a boxy bulge model is subtracted, instead of a simple exponential bulge model as has been done by Ness & Lang, we find that most of the X-shaped structure in the residuals disappears. Furthermore, even if real, the stellar density in the claimed X-shaped structure appears to be too low to be observed as a strong double red clump at $l = 0^\circ$

[포 IM-05] Density-Magnetic Field correlation in MHD turbulence driven by forcing with different correlation time

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We study the effect of driving scheme on the density-magnetic field correlation. We numerically investigate how the correlation time of driving affects the correlation between density and magnetic field. We performed MHD turbulence simulation using two different driving schemes – a finite-correlated driving and a delta-correlated driving. In the former, the forcing vectors change continuously with a correlation time comparable to the large-eddy turnover time. In the latter, the direction and amplitude of driving changes in a very short time scale.

[포 IM-06] Multiwavelength Millimeter Observations of Dense Cores in the L1641 Cloud

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The L1641 cloud in Orion is an active site of star formation. We mapped a square region of 60 arcmin by 60 arcmin in the continuum emission from 0.89 mm to 2.0 mm wavelength using MUSIC mounted on the Caltech Submillimeter Observatory 10.4 m telescope. Eight sources were detected in at least two wavelength bands, and all the detected emission comes from thermal dust continuum radiation of dense cloud cores. Their spectral energy distributions were characterized. The dust emissivity spectral index is beta = 1.3 on average, within the range of typical cores in nearby star-forming regions. Two cores, V380 Ori NE and HH 34 MMS, have unusually low emissivity index of beta = 0.3. These cores may contain millimeter-sized dust grains, which suggests that the lifetime of some dense cores can be much longer than the free-fall timescale.

[포 IM-07] Different chemical and dynamical environments in two massive star forming regions, G19.61-0.23 and G75.78+0.34

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Complex organic molecules (COMs) are commonly detected in star forming regions and considered important species since they are seeds of prebiotic molecules. Although COMs form in ice mantles on dust grains, they are preferentially detected in the gas phase. The origin of the gaseous COMs highly depends on the circumstance of each star forming region. Therefore, the distribution of COMs emission reflects the physical and chemical conditions of the region. We present the newly detected COMs, especially methanol emission lines toward two massive star forming regions, G19.61-0.23 and G75.78+0.34 in the Atacama Large Millimeter/submillimeter Array Band 3 observations during the Cycle 2 phase. Multiple transitions of methanol are detected in both regions but show different emission morphology. The origin of the desorption (e.g. shocks or high energy photons) is discussed.

[포 IM-08] Statistical study of turbulence from polarized synchrotron emission

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When turbulent motions perturb magnetic field lines and produce magnetic fluctuations, the perturbations leave imprints of turbulence statistics on magnetic field. Observation of synchrotron radiation is one of the easiest ways to study turbulent magnetic field. Therefore, we study statistical properties of synchrotron polarization emitted from media with magnetohydrodynamic (MHD) turbulence, using both synthetic and MHD turbulence simulation data. First, we obtain the spatial spectrum and its derivative with respect to wavelength of synchrotron polarization arising from both synchrotron radiation and Faraday rotation. The study of spatial spectrum shows how the spectrum is affected by Faraday rotation and how we can recover the statistics of underlying turbulent magnetic field as well as turbulent density of electrons from interferometric observations that incorporate the effects of noise and finite telescopic beam size. Second, we study quadrupole ratio to quantitatively describe the degree of anisotropy introduced by magnetic field in the presence of MHD turbulence. We consider the case that the synchrotron emission and Faraday rotation are spatially separated, as well as the situation that the sources of the synchrotron radiation and thermal electrons causing Faraday rotation exist in the same region. In this study, we demonstrate that the spectrum and quadrupole ratio of synchrotron polarization can be very informative tools to get detailed information about the statistical properties of MHD turbulence from radio observations of diffuse synchrotron polarization.

[포 IM-09] Obtaining the driving scale of turbulence from observations

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To maintain turbulence in astrophysical fluids, driving is required. Constraining the driving scale of turbulence is important to identify the driving mechanism and also to obtain more accurate turbulence statistics from observations. We discuss how to obtain the driving scale of turbulence from observations. First, we explain the method to obtain the driving scale from the standard deviation of centroid velocity (i.e. the first moment of the line profile). Second, we discuss other techniques to obtain the driving scale.

~~[포 IM-10] Correlation between Orion A Molecular Cloud's Velocity Gradient and Cloud Collision~~

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~~오리온 A 분자운은 은경 204°~220°, 은위 -17°~-21°영역에 분포하고 있다. 여기서 V_{lsr} 은 은경이 증가함에 따라 감소하는 모습을 보이고 있다. 이러한 속도 기울기의 기원은 분자운의 회전에 의한 것이라는 이론(Kutner et al. 1977; Maddalena et al. 1986)과 Ori OB1 으로 발생한 항성풍이 주도하는 큰 규모의 팽창에 의한 것이라는 이론(Bally et al. 1987)등 여러 가지가 있다. 이 연구에서는 TRAO, FCRAO 관측 데이터를 이용하여 충돌하는 분자운과 오리온 A 분자운의 속도 기울기 사이에 어떠한 상관관계를 가지는지 알아보고자 한다.~~

천문우주 관측기술

[포 AT-01] Optic-axis Alignment and Performance Test of the Schwarzschild-Chang Off-axis Telescope