성간물질

[포 IM-01] Ionized Fe Objects in UWIFE survey and IGRINS

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The UKIRT Wide-field Infrared survey for Fe+ (UWIFE) is an unbiased survey of the first Galactic quadrant, with narrow-band filter centered on 1.644 μm. This survey covers 7° < l < 62° and |b| < 1.5°, where active interaction of stars and interstellar medium is expected. With median seeing of 0.8 arcsec, 5 – sigma detection limit of 18.7 mag and surface brightness limit of 8.1 × 10^{-20} W m^{-2} $arcsec^{-2}$, this survey gives an opportunity to statistically study Galactic [Fe II] – emitting sources for the first time. In order to identify Ionized Fe Objects (IFOs) in survey area systematically, we conducted visual inspection and automatic detection simultaneously. Total of ~300 extended IFOs are identified, most of them are found out to be part of supernova remnants (SNRs), young stellar objects, HII regions and planetary nebulae. The majority of IFOs are new discoveries which reveal shocked structures in high-extinction region. Spatial distribution of IFOs suggest that they trace Galactic structure.

As a part of spectroscopic follow-up, we observed SNR candidate IFO J183740.829-061452.41 with IGRINS (Immersion Grating Infrared Spectrograph, Yuk+2010), mounted on 2.7m Harlan Smith telescope. This unknown arc-like, 6'-long IFO is coincident with inner part of radio continuum loop G25.8+0.2, which has been known as HII region. However, interior of this radio shell is filled with diffuse soft X-ray emission, and possible association of hard X-ray pulsar / pulsar wind nebula makes the nature of the IFO unclear. The H and K-band 2D spectrum shows shock-ionized [Fe II] filaments, which is apart from photoionized HII filaments. In this presentation we present basic statistics of newly identified IFOs, as well as the follow-up study of IFO J183740.829-061452.41.

[포 IM-02] High-resolution Optical and Near-infrared Spectra of 2MASS J06593158-0405277

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We present the results of high-resolution optical (R ~ 30,000) and near-infrared (R ~ 45,000) spectroscopic monitoring observations of a new FU Orionis-like young stellar object, 2MASS J06593158-0405277. FU Orionis objects (FUors) are well-studied examples of episodic accretion because of their outburst phenomenon. Recently, 2MASS J06593158-0405277 exhibited an outburst and was identified as an FUor. It provides an important opportunity to investigate the whole FUors phenomenon from its pre-outburst to its post-outburst phase. We observed 2MASS J06593158-0405277 with the Bohyunsan Optical Echelle Spectrograph (BOES) of the Bohyunsan Optical Astronomy Observatory (BOAO) and the Immersion GRating INfrared Spectrograph (IGRINS) of Harlan J. Smith Telescope (HJST) at the McDonald observatory since December 24, 2014. We detected a number of lines and present here our analysis for time variations of those spectral lines.

[포 IM-03] A multi-wavelength study of N63A: A SNR within an H II region in the LMC.

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The nature and physical environments of SNRs are diverse, and for this reason, the understanding of the properties of nearby SNRs is useful in interpreting the emission from SNRs in remote galaxies where we cannot resolve them. In this regard, the LMC is a unique place to study SNRs due to its proximity, location, and composition compared with our galaxy.

We carried out a multi-wavelength study of SNR N63A in the LMC, a young remnant of the SN explosion of one of the most massive (> 40 Msun) stars in a cluster. It is currently expanding within a large H II region formed by OB stars in the cluster and engulfing a molecular cloud (MC). As such, N63A is a prototypical SNR showing the impact of SN explosion on the cluster and its environment. Its morphology varies strongly across the wave bands, e.g. the size in X-ray is three

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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