reconnection. In this reconnection process, the plasma in the loop system is redistributed in such a way that a smaller potential energy of the system is attained. We have performed numerical MHD simulations to investigate the plasma redistribution in coalescence of many small flux ropes. Our results clearly show that the redistributed plasma is more accumulated between flux ropes rather than near the magnetic axes of flux ropes. The Joule heating, however, creates a different temperature distribution than the density distribution. Our study may give a hint of which part of magnetic field we are looking to in an observation.

[구 SS-20] A New Method of Coronal Magnetic Field Reconstruction

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In the past two decades, diverse methods and computer codes for reconstruction of coronal magnetic fields have been developed. Some of them can reproduce a known analytic solution quite well when the magnetic field vector is fully specified by the known solution at the domain boundaries. In practical problems, however, we do not know the boundary conditions in the computational domain except the photospheric boundary, where vector magnetogram data are provided. We have developed a new, simple variational method employing vector potentials. We have tested the computational code based on this method for problems with known solutions and those with actual photospheric data. When solutions are fully given at all boundaries, the accuracy of our method is almost comparable to best performing methods in the market. When magnetic field vectors are only given at the photospheric boundary, our method excels other methods in "figures of merit" devised by Schrijver et al. (2006). Our method is expected to contribute to the real time monitoring of the sun required for future space weather prediction.

별 생 성

[구 SF-01] ALMA Observations of a Keplerian Disk in the Infalling Envelope of L1527

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We report Atacama Large Millimeter/submillimeter Array (ALMA) cycle I observations of L1527, a class 0 object with an infalling envelope and a rotating disk. HCO+ and HCN J=4-3 show strong redshifted absorption against the bright continuum emission associated with the optically thick disk or inner envelope. This redshifted absorption dip is an unambiguous evidence of infall. In addition, these lines and CS J=7-6 present the Keplerian rotation profile at their position-velocity diagrams, suggesting the formation of a Keplerian disk very early in star formation. We will present a model combining an infalling envelope and a Keplerian disk to fit the ALMA observations.

[구 SF-02] IGRINS observations toward Class I disk sources, IRAS03445+3242 and IRAS0429+2436

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We present the high-resolution Immersion GRating INfrared Spectrograph (IGRINS) spectra of two Class I sources, IRAS03445+3242 and IRAS04239+2436. Both sources show the evidence of Keplerian disks; the broadened CO overtone ($\Delta v=2$) transitions in emission and neutral metal lines (Mg I, Fe I, and Al I) in absorption. The thin Keplerian disk with a rotational velocity of ~100 km s-1 and a gas temperature of 5000 K at the innermost annulus can reproduce the CO overtone transitions including the bandhead emission. The outer dusty disk or the envelope needs to fit the narrow absorption features overlaid on the broad emission lines in the CO overtone transitions.

[구 SF-03] Infrared and Radio observations of a small group of protostellar objects in the molecular core, L1251-C

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We present a multi-wavelength observational study of a low-mass star-forming region, L1251-C, with observational results at wavelengths from the near-infrared to the millimeter. Spitzer Space Telescope observations confirmed that IRAS 22343+7501 is a small group of protostellar objects. The extended emission to east-west direction with its intensity peak at the center of L1251A has been detected at 350 and 850 ❍m with the CSO and JCMT telescopes, tracing dense envelope materials around L1251A. The single-dish data from the KVN and TRAO telescopes show inconsistencies between the intensity peaks of several molecular line emission and that of the continuum emission, suggesting complex distributions of molecular abundances around L1251A. The SMA interferometer data, however, show intensity peaks of CO 2-1 and ^{13}CO 2-1 located at the position of IRS 1, which is both the brightest source in IRAC image and the weakest source in the 1.3 mm dust continuum map. IRS 1 is the strongest candidate for being the driving source of a newly detected the compact CO 2-1 outflow. Over the whole region (14′x14′) of L125l-C, 3 Class I and 16 Class II sources have been detected, including three YSOs in L1251A. A comparison with the average projected distance among 19 YSOs in L1251-C and that among 3 YSOs in L1251A suggests L1251-C is an example of low-mass cluster formation, where protostellar objects are forming in a small group.

[구 SF-04] Blue profile in different evolutionary stages of massive star forming regions

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Gravitational collapse is a dynamical process associated with star formation. One observational evidence of such infall motion is so called "blue asymmetry" profile, which is the optically thick line profile with the intensity peak skewed blueward relative to the intensity peak of optically thin lines. We analyzed both HCN J=1-0 and HNC J=1-0 line profiles to study the inflow motion in different evolutionary stages of massive star formation; Infrared dark clouds (IRDCs), High-mass protostellar object (HMPOs), and Ultra-compact HII regions (UCHIIs). The infall asymmetry in the HCN spectra seems to be more prevalent than the HNC spectra throughout all the three evolutionary phases. The prevalence of the blue profile in the HCN spectra is found in every evolutionary stage, with IRDCs showing the largest blue excess. In the case of the HNC spectra, only IRDCs show the blue excess statistically significant. These results suggest that HCN may be a better infall tracer in massive star forming region. In addition, even though the characteristics of the blue profile largely depend on the suitable combination of optical depth and critical density, our analyses also indicate that IRDCs may have the most active infall process compared to other evolutionary phases.

[구 SF-05] [Fe II] 1.64 μm Outflow Features around Ultracompact H II Regions in the First Galactic Quadrant

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We present [Fe II] 1.644 μm features around ultracompact H II regions (UCHIIs) found on a quest for the "footprint" outflow features of UCHIIs —the features produced by outflowing materials ejected during an earlier, active accretion phase of massive young stellar objects (MYSOs). We surveyed 237 UCHIIs in the first Galactic quadrant, employing the CORNISH UCHII catalog and UWIFE data, which is an imaging survey in [Fe II] 1.644 μ m performed with UKIRT-WFCAM under ~0.''8