

magnetic fields in star-forming regions. Through the polarimetric data of J, H, and Ks bands, we examined the magnetic field structures in the N159/N160 complex. In this presentation, we show complex distribution of the magnetic fields associated with dust and gas structures. We verify the local magnetic fields in each star-forming region, which appear to be related with local environments, such as interior and boundary of shell structure, star-forming HII regions, and boundaries between HII regions and dense dark clouds. We discuss the formation scenario of the N159/N160 complex suggested from the magnetic field structure.

#### [구 SF-04] Packages of Unified modeling for Radiative transfer, gas Energetics, and Chemistry (PUREC)

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Protoplanetary disks (PPDs) are a natural consequence of star formation and play crucial roles in planet formation. Atacama Large Millimeter/submillimeter Array (ALMA) has provided sub-mm data for the PPDs with a high angular resolution and sensitivity, and it makes us enable to study PPDs in detail. We have developed Packages of Unified modeling for Radiative transfer, gas Energetics, and Chemistry (PUREC), which consists of a self-consistent thermo-chemical model and line and continuum radiative transfer models, in order to interpret and predict the ALMA observations for PPDs. In this talk, we introduce capabilities of PUREC.

#### [구 SF-05] Sub-mm variability of a YSO (EC53) in Serpens main region : JCMT Transient survey

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Stars form through the gravitational collapse of molecular clouds. However, the rate at which a star gains most of its mass and the physics that drives the main phase of stellar growth is still unclear. The typical luminosity of observed protostars is smaller than what expected from the Shu's inside-out collapse model, which predicts a

constant mass accretion rate. The episodic accretion model has been suggested as a solution of this luminosity problem. The JCMT Transient survey is a long term monitoring program using JCMT/SCUBA-2 to detect accretion variability of protostars in the eight nearby star-forming regions. Recently, we found a rise of the 850 micron flux at a clump in the Serpens main region at the rate of ~17% relative to the mean flux over previous observations. The submm clump is associated with a class I protostar, EC53, which has been reported as a binary system with a periodic variability. In this talk, we will provide a brief overview of the JCMT Transient Survey project, present the detection of the variable source, and discuss about follow-up observations.

#### [구 SF-06] MIRIS Paschen- $\alpha$ Galactic Plane Survey : Comparison with WISE catalog and IPHAS H $\alpha$ data in Cepheus

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To see scientific potential of MIRIS Paschen- $\alpha$  (Pa $\alpha$ ) Galactic Plane Survey (MIPAPS), we have selected a portion, Galactic longitude from +96° to 116°, and inspected Pa $\alpha$  detections for 212 sources in WISE H II region catalog. We also list up 35 Pa $\alpha$  large features and 32 Pa $\alpha$  point-like blobs, which have not been cataloged in WISE catalog. For all the sources, we have performed the photometry of Pa $\alpha$  emission line, and obtained their Pa $\alpha$  intensities and Pa $\alpha$  fluxes. For the quantitative comparison, we also make the H $\alpha$  mosaic image of the same region by using IPHAS data which have been globally calibrated and released recently. Comparing MIPAPS Pa $\alpha$  fluxes with the IPHAS H $\alpha$  fluxes enables us to estimate dust extinction and spectral types of ionizing sources. We present the results for some sources.

## 우주관측 및 기술

#### [구 ST-01] Feasibility Study of a Future Korean Space Telescope

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According to the Korean government's Long-term Space Development Plan 2040, "Creative space science research" is included in a statement to investigate the origin and evolution of the universe by conducting a series of Korean space telescope missions: launch of space telescopes on a small satellite and an international collaboration explorer by 2020, a mid-size domestic space telescope by 2030, and a large size Korea leading international space telescope by 2040. We studied the feasibility of the future Korean Space Telescope (KST) for a mid-size domestic satellite platform. In order to pursue the uniqueness of the science program, we consider a wide range of observing wavelength (0.2um ~ 2.0um) with a spectral resolution of R~6 in the NUV and optical bands, and R~30 for NIR, utilizing an off-axis TMS(Three Mirror System) optics with a wide field of view (2x4 degrees) which is optimized for ultra-low surface brightness sources. The main science goals of the mission include investigations of the galaxy formation, cosmic web, and the cosmic background radiation in the NUV-NIR regions. In this paper, we present the science cases and several technical challenges to be resolved along with the future milestones for the success of the KST mission.

**[구 ST-02] Status Report of the Flight Model of the NISS onboard NEXTSat-1**

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The NISS (Near-infrared Imaging Spectrometer for Star formation history) is the near-infrared spectro-photometric instrument optimized to the Next Generation of small satellite series (NEXTSat). To achieve the major scientific objectives for the study of the cosmic star formation in local and

distant universe, the spectro-photometric survey covering more than 100 square degree will be performed. The main observational targets will be nearby galaxies, galaxy clusters, star-forming regions and low background regions.

The off-axis optics was developed to cover a wide field of view (2 deg. x 2 deg.) as well as the wide wavelength range from 0.95 to 2.5um, which were revised based upon the recent test and evaluation of the NISS instrument. The mechanical structure were tested under the launching condition as well as the space environment. The signal processing from infrared sensor and the communication with the satellite were evaluated after the integration into the satellite.

The flight model of the NSS was assembled and integrated into the satellite. To verify operations of the satellite in space, the space environment tests such as the vibration, shock and thermal-vacuum test were performed. The accurate calibration data were obtained in our test facilities. Here, we report the test results of the flight model of the NISS.

**[구 ST-03] CubeSat Application for Space Astronomy**

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인공위성을 이용한 우주망원경 및 우주탐사장비는 천문학 및 우주과학 연구에 매우 중요한 관측 장비로서 지상에서 불가능한 다양한 파장대에서 관측을 수행하고 있다. 이러한 우주망원경의 경우 개발기간과 비용 또한 상대적으로 매우 큰 규모를 가지고 있다. 또한 장시간의 관측을 위한 관측위성의 운영 신뢰도 확보와 결과 활용을 위해 많은 연구 인력이 투입되는 거대 연구개발 사업이다.

그러나 최근에는 초소형 인공위성을 이용하여 여러 우주관측 및 실험이 수행되고 있다. 큐브위성으로 명명되어 있는 초소형 인공위성은 크기와 전력의 제한은 있지만 상대적으로 단기간의 개발일정과 저비용으로 전 세계적으로 폭발적인 성장을 하고 있는 관측기술이다. 경희대학교에서는 CINEMA라는 2개의 큐브위성을 개발 운영하였고, SIGMA 라는 큐브위성을 개발하여 발사를 기다리고 있다. 또한 향 후 광학관측을 위한 초소형 인공위성을 기획하고 있다. 국내에서는 천문우주용으로 제작되는 위성 이외에도 다양한 기술검증용 위성이 10여기 이상 제작되고 있는 상황이다. 이에 초소형인공위성의 동향과 향 후 천문우주 관측에 활용 할 수 있는 방안에 대하여 논의 하였다.

**[구 ST-04] Small scale magNetospheric and Ionospheric Plasma Experiments; SNIPE mission**

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