

Mission Operation Center (MOC) by IRIDIUM communication module. By measuring time difference of each GRB signals, the technology for localization of GRB will be proved. If the results show some possibilities, we can challenge the new astrophysical mission for investigating the origin of GRB.

[구 AT-03] System Requirement Review of Lunar Surface magnetometer on the CLPS program

Ho Jin¹, Khan-Hyuk Kim¹, Seongwhan Lee²,
Hyojeong Lee³, Daerac Seon⁴, Byungwook Jung¹,
Yunho Jang¹, Hyeonhu Park¹

¹*School of Space Research, Kyung Hee University,*
²*NARA Space Inc,* ³*Intorule Inc,* ⁴*Sensorpia*

The Korea Astronomy and Space Science Institute is participating as a South Korean partner in the Commercial Lunar Payload Services (CLPS) of NASA. In response, the Korea Astronomy and Space Science Institute is currently conducting basic research for the development of four candidate instrument payloads. The magnetic field instrument is one of them and its scientific mission objective is the moon's surface magnetic field investigation. Therefore, the development requirement of the lunar surface magnetic field instrument were derived and the initial conceptual design was started. The magnetic field instrument has a 1.2 meter boom which has two three-axis fluxgate magnetometer sensors and one gyro sensor to get a attitude information of the boom. The concept of measuring the lunar surface magnetic field will carry out using multiple sensors by placing semiconductor type magnetic field sensors inside the electric box including boom mounted fluxgate sensors. In order to overcome the very short development period, we will use the KPLO (Korean Lunar Pathfinder Orbiter) magnetometer design and parts to improve reliabilities for this instrument. In this presentation, we introduce the instrument requirements and conceptual design for the Lunar surface magnetic field instruments.

[구 AT-04] Introduction of the UVOMPIS (UV-Optical Multiband Polarizing Imager System) onboard the CAS500-3

Daehee Lee et al.
Korea Astronomy and Space science Institute

500kg급 차세대중형위성은 공공분야 위성 수요에 효과적으로 대응하고, 국내 위성산업 저변 확대 및 산업체 육성을 위한 사업으로 개발되고 있다. 국내 산업체에서 개발

되는 표준 위성 플랫폼이 적용될 예정인 차세대중형위성3호는 우주과학/기술검증용 위성으로, 특히 한국형발사체에 의해 2023년 발사된다는 점이 특별하다.

본 발표에서는 차세대 중형위성 3호에 제안한 우주망원경 UVOMPIS (UV-Optical Multiband Polarizing Imager System)에 대한 개념 설계 결과 및 과학 임무에 대한 소개를 통해 국내 학계와 산업계의 협력과 관심을 유도하고자 한다.

[구 AT-05] Space Telescope Plan of KASI for the Next Decades (2030년대 우주망원경 운영을 대비한 한국천문연구원의 우주망원경 기획연구 활동 소개)

Bongkon Moon(문봉곤)¹, Dae-Hee Lee(이대희)^{1,2},
Young-Jun Choi(최영준)¹, Wonyong Han(한원용)¹,
Ukwon Nam(남옥원)¹, Youngsik Park(박영식)¹,
Won-kee Park(박원기)¹, Jakyoung Nah(나자경)¹,
Woojin Kim(김우진)¹, Jeong-Yeol Han(한정열)²,
Kyoungho Kim(김경호)³

¹*Space Science Division, Astronomy and Space Science Institute(한국천문연구원 우주과학본부),*
²*Technology Center for Astronomy and Space Science, Korea Astronomy and Space Science Institute(한국천문연구원 천문우주기술센터),*
³*Policy Division, Korea Astronomy and Space Science Institute(한국천문연구원 정책부)*

한국천문연구원은 천문우주분야의 과학임무 탑재체 개발을 주도적으로 수행해오고 있다. 과학기술위성1호 주탑재체 원자외선영상분광기 FIMS 개발, 과학기술위성3호 주탑재체 다목적외선영상시스템 MIRIS 개발, 차세대소형위성1호 주탑재체 근적외선영상분광기 NISS 개발을 수행하였고, 현재는 NASA와 국제협력으로 SPHEREx 우주망원경을 개발하고 있다.

이러한 개발 과정을 거치면서 주경 20cm 이하의 소형 탑재체 과학임무 한계와 더불어 연구 현장에서 더 큰 우주망원경의 수요가 제기되었고, 현재의 국가우주개발 중장기계획에도 2030년대 한국형 우주망원경을 포함하게 되었다. 이러한 일정에 발맞추어 한국천문연구원은 2030년대 한국형 우주망원경 독자 운영을 대비하기 위해서 2020년 1월부터 주요 사업으로 한국형 우주망원경 개발을 위한 기획연구를 시작하였다. 이 기획연구는 2년 동안 수행할 예정이며, 이 기획연구를 통해서 학계의 과학임무 요구사항을 사전에 충분히 조사하고, 국내외 산학연 전문가의 견들을 종합 수렴하여 선도적인 과학 연구를 수행할 수 있는 우주망원경의 기본 제원을 확정할 예정이다. 이 발표에서는 이러한 기획연구의 세부 활동을 공유하고 보고하고자 한다.

[구 AT-06] Ebert-Fastie spectrograph using the Transformable Reflective Telescope kit

Hojae Ahn¹, Gyuchan Mo², Hyeonwoo Jung²,
Junwhan Choi², Dou Yoon Kwon², Minseon Lee³,
Dohoon Kim³, Sumin Lee³, Woojin Park¹, Ho Lee²,
Kiehyun Park², Hyunjong Kim², Soojong Pak^{1,3}

¹*School of Space Research, Kyung Hee University,*

²*Gyeonggi Science Highschool*

³*Department of Astronomy and Space Science, Kyung Hee University*

Kyung Hee university invented the Transformable Reflective Telescope (TRT) for optical experiment and education. The TRT kit can transform into three optical configurations from Newtonian to Cassegrain to Gregorian by exchanging the secondary mirror. We designed the Ebert-Fastie spectrograph as an extension of the TRT kit. The primary mirror of the TRT kit serves as both collimator and camera lens, and the reflective grating as the dispersing element is placed along the optical axis of the primary mirror. We designed and fabricated the grating holder and the source units using 3D printer. Baffle was also fabricated to suppress the stray light, which was reduced by 83%. The spectrograph can observe the optical wavelength range (4000 Å~7000 Å). Measured resolving power ($R=\lambda/\Delta\lambda$) was ~700 with slit width of 0.18mm. The spectrograph is optimized for f/24, and the spectral pixel scale is 0.49 Å/pixel with Canon 550D detector. We present the sample spectra of discharged Ne, Ar and Kr gases. The flexible setting and high performance make this spectrograph a useful tool for education and experiment.

성간물질

[구 IM-01] Characteristic Chemical Correlations in Nearby Star-forming Molecular Clouds

Hyeong-Sik Yun¹, Jeong-Eun Lee¹, Neal J. Evans II^{2,3}, Stella Offner³, Mark H. Heyer⁴, Yunhee Choi², Yong-Hee Lee¹, Giseon Baek¹, Minho Choi², Hyunwoo Kang², Ken'ichi Tatematsu⁵, Seokho Lee⁵, Yao-Lun Yang⁶, Brandt Gaches⁴, How-Huan Chen³
¹*School of Space Research, Kyung Hee University, Republic of Korea,* ²*Korea Astronomy and Space Science Institute, Republic of Korea,* ³*Department of Astronomy University of Texas, Austin, USA,* ⁴*Department of Astronomy, University of Massachusetts, Amherst, USA,* ⁵*National Astronomical Observatory of Japan, Japan,* ⁶*RIKEN Cluster for Pioneering Research, Japan,*

Different molecular lines trace different physical environments (with various densities and temperatures) within molecular clouds (MCs). Therefore, multimolecular line observations are crucial to study the physical and chemical

structures of MCs. We observed the Orion A and Ophiuchus clouds in six different molecular lines as a Taeduk Radio Astronomy Observatory Key Science Program (TRAO-KSP), "mapping Turbulent properties In star-forming MolEcular clouds down to the Sonic scale" (TIMES: PI: Jeong-Eun Lee). Here, we investigate the characteristic relations between the observed lines by performing the Principal Component Analysis (PCA). We also investigate the correlation between the line intensity distributions and the physical parameters, such as the gas column density and dust temperature. Finally, we will discuss how the correlations among different chemical tracers vary with the star formation environments

[구 IM-02] How do dense cores embedded in a pc scale filamentary clouds form, by gas flow motions along filamentary clouds and/or contracting motions by themselves?

Shinyoung Kim^{1,2}, Chang Won Lee^{1,2}, Philip C. Myers³, Paola Caselli⁴, Mi-Ryang Kim¹
¹*Korea Astronomy and Space science Institute,* ²*University of Science and Technology, Korea,* ³*Center for Astrophysics, Harvard-Smithsonian, USA,* ⁴*Max-Planck-Institut für Extraterrestrische Physik, Germany*

Understanding how the filamentary structure plays a role in the formation of the prestellar cores and stars is a key issue to challenge. We have observed two prestellar cores in surrounding filamentary environments in ¹³CO, C¹⁸O (3-2) and HCO⁺ (4-3) molecular lines with the Heterodyne Array Receiver Program (HARP) of the James Clerk Maxwell Telescope (JCMT), in order to search for the evidence related to the possible flow motions along the filament and/or the radial accretion (or infalling motions) of gas material toward the dense cores from their surrounding filamentary cloud. In L1544, the velocity gradient of 1.6 km s⁻¹ pc⁻¹ toward the core was measured in a small branch of filament lying on a radial direction of main filament while no velocity gradient along the main axis of filament in both ¹³CO and C¹⁸O lines. In L694-2, we found the velocity gradient of 0.6 km s⁻¹ pc⁻¹ along the filament in only ¹³CO lines. The projected accretion rate of ~6 M_⊙ Myr⁻¹ was estimated in both cases. The infall (or radially contracting) velocity of gas material was measured ~0.16 km s⁻¹ in both ¹³CO and HCO⁺ lines and in both L1544 and L694-2, which leads to estimate a mass infall rate of ~20 M_⊙ Myr⁻¹. Our analysis suggests that our targets are at a stage where the gravitational contraction dominates the mass accretion through the surrounding filamentary