Korea Research Institute of Standards and Science (KRISS) and University of Arizona (UA) has signed a contract that they will cooperate to develop the first set of off-axis reference body for GMT ASM. This project started August 2021 and will be finished in Dec. 2022.

The reference body has total 675 holes to accommodate actuators and 144 pockets for lightweighting. The rear surface has a curved rib shape with radius of curvature of 4387 mm with offset of 128.32mm. Since this reference body is placed just above the thin shell so that the front surface shape needs to be close to that of thin shell. The front surface has a concave off-axis asphere, of which radius of curvature is 4165.99 mm and off-axis distance is about 1088 mm. The material is Zerodur CTE class 1 (CTE=0.05 ppm/oC) from SCHOTT. All the actuator holes and pockets are machined normal to the front surface. It is a very complex challenging optical elements that involves sophisticated machining process as well as accurate metrology. After finishing the fabrication of reference body in KRISS, it will be shipped to UA for final touches and finally sent to Adoptica in Italy, in early 2023. This paper presets the development plan for the GMT ASM Reference Body and relevant fabrication and metrology plans.

[포 AT-07] Space Telescope Pre-study of KASI for the Next Decades (2030년대 우주망원경 운영을 대비한 한국천문연구원의 우주망원경 사전 연구)

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한국천문연구원은 천문우주분야의 과학임무 탑재체 개발을 주도적으로 수행해오고 있다. 과학기술위성1호 주탑재체 원자외선영상분광기 FIMS 개발, 과학기술위성3호 주탑재체 다목적적외선영상시스템 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 2021년 말까지 2년 동안 수행하고 있으며, 이 기획연구를 통해서 학계의 과학임무 요구사항을 종합 수렴하였고, 관련 컨설팅 업체와 협업하여 사전 기획연구 활동들을 수행하였으며, 향후 우주망원경 개발에 대한 전략을 제안하고 보고서를 마무리하는 단계에 와 있다. 이 발표에서는 이러한 기획연구의 세부 활동을 공유하고 보고하고자 한다.

[포 AT-08] Development Plan of Package-type Instruments for Next-Generation Space Weather Observation Network

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Korea Astronomy and Space Science Institute

Starting with the observation of sunspots in 1987, Korea Astronomy and Space Science Institute (KASI) has developed and installed various ground-based instruments for space weather research in Korea. Recently, SNIPE and CODEX are also being developed as space-based instruments. Expansion of the observation area and simultaneous observation have become important in the study of space weather. We have started Next-Generation Space Weather Observation Network Project this year. In order to establish a solar observation network, we planned to develop the Next Solar Telescope (NxST) which is a solar imaging spectrograph, and to install three NxST in the northern hemisphere. And we also planned to develop the Thermosphere-Ionosphere-Mesosphere Observation System (TIMOS), Global Navigation Satellite System (GNSS), and Geomagnetic packages, and install them in about ten sites over the world, for the purpose of establishing a global observation network for the near-earth space weather. We can take simultaneously observed space weather data in the global area, and are expecting it will play an important role in the international community for space weather research. We also have a strategy to secure observational technologies necessary for big space missions in the future, through this project.

태양/태양계

[포 SS-01] Measurement of Radiative Loss from the Multi-layer Spectral Inversion of

the Ha line and Ca II 8542 line taken by the FISS

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Measuring radiative loss from the solar chromospheric lines like Ha line, Ca II 8542 line helps to infer the exact amount of non-thermal heating in the solar atmosphere. By courtesy of the multi-layer spectral inversion, it is able to determine the radiative loss in the upper and lower chromosphere. Consequently, we found that the radiative loss is around 10 kW/m^2, which is consistent with previous studies. Comparing the radiative loss at the upper and lower chromosphere, the loss at the lower chromosphere is larger than that of upper chromosphere and tends to spread all over the field of view while the loss in the upper chromosphere tends to be localized. We hope to find a hint for specific non-thermal heating process to explain the chromospheric radiative loss.

[포 SS-02] Optical telescope with spectro-polarimetric camera on the moon

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A Lunar observatory not only provides ideas and experiences for space settlements from the Moon to Mars, but also puts the telescope in an optimal position to compete with space telescopes. Earth observation on the Moon's surface has the advantage of no atmospheric scattering or light pollution and is a stable fuel-free observation platform, allowing all longitude and latitude of the Earth to be observed for a month. Observing the entire globe with a single observation instrument, which has never been attempted before, and calculating the global albedo will significantly help predict the weather and climate change. Spectropolarimetric observations can reveal the physical and chemical properties of the Earth's atmosphere, track the global distribution and migration path of aerosols and air pollutants, and can also help detect very small space debris of which the risk has increased recently. In addition, the zodiacal light, which is difficult to observe from Earth, is very easy to observe from the lunar observatory, so it will be an opportunity to reveal the origin of the solar system and take a step closer to understanding the exoplanet system. In conclusion, building and developing a lunar observatory will be a groundbreaking study to become the world's leader that we have never tried before as a first step in expanding human experience and intelligence.

[포 SS-03] Spectroscopic Detection of Alfvénic Waves in Chromospheric Mottles of a Solar Quiet Region

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We present high resolution spectroscopic observations of transverse magnetohydrodynamic (MHD) waves in mottles located near the solar disk center. Different from previous studies that used transversal displacements of the mottles in the imaging data, we investigated the line-of-sight (LOS) velocity oscillations of the mottles in the spectral data. The observations were carried out by using the Fast Imaging Solar Spectrograph of the 1.6 meter Goode Solar Telescope of Big Bear Solar Observatory. Utilizing the spectral data of the Hα and Ca II 8542 Å lines, we measure the LOS velocity of a quiet region including the mottles and rosettes that correspond to the footpoints of the mottles. Our major findings are as follows: (1) Alfvénic waves are pervasive in the mottles. (2) The dominant period of the waves is 2 to 4 minutes. (3) From the time-distance maps of the three-minute filtered LOS velocity constructed along the mottles, it is revealed that the transverse waves in the mottles are closely related to the longitudinal waves in the rosettes. Our findings support the notion that Alfvénic waves can be generated by mode conversion of the slow magnetoacoustic waves as was shown in sunspot regions by Chae et al. (2021).

[포 SS-04] CODEX Filter Configuration

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Coronal Diagnostic Experiment (CODEX) is a diagnostic coronagraph developed by the Korea Astronomy and Space Science Institute and the NASA Goddard Space Flight Center (GSFC) to be