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

deployed in 2023 on the International Space Station (ISS). It is designed to obtain simultaneous measurements of electron density, temperature, and velocity in the 2.5 – 10 solar radius range using multiple filters. The filters are mounted in two filter wheel assemblies (FWAs), which have five filter positions each. One position of each FWA is occupied by windows, and remaining eight positions are occupied by three bandpass filters for temperature, two bandpass filters for velocity, one Ca II H filter for F-corona, one broadband filter for fast imaging and density, and one neutral density (ND) filter for direct Sun viewing and safety.

[포 SS-05] Next Generation Solar Telescope Global Network: Three Eyes for the Studies on the Space Weather Prediction and the Solar Chromospheric Activities (차세대 태양영상분광망원경 글로벌 네트워크: 세 개의 눈을 통한 우주환경예보과 채층활동 연구)

Heesu Yang, Seounghwan Choi, Jihun Kim, Sujin Kim, Eun-Kyung Lim, Juhyung Kang, Dong-Uk Song, Ji-Hye Baek, Jongyeob Park
Korea Astronomy and Space Science Institute

NxST는 현재 천문연에서 개발중인 30cm 구경의 태양 망원경으로 태양 채층의 모습을 약 1각초의 적정한 영상 해상도로 고분광분해능의 채층선 스펙트럼 자료를 고속으로 얻어낼 수 있다. NxST는 미국과 유럽, 그리고 국내 1대를 건설하여 전지구적으로 연속적인 데이터를 획득할 수 있다. NxST의 관측자료는 1) 우주환경예보의 최초이며 유일인자인 태양을 실시간으로 감시할 수 있고 2) 태양 채층의 파동과 관련된 연구를 수행하는데 활용될 수 있다. 본 발표에서는 NxST의 연구주제들을 살펴보고 이로부터 도출된 시스템의 개념 설계를 제시한다.

[포 SS-06] Simple modeling to explore temperatures, heated temperature, and Kappa values of a current sheet observation

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We explore the range of possibilities of temperatures, heated temperature, and Kappa values of a current sheet observation on 2017 September 10. First, we construct a grid model with rapid heating (T_{heat}) and various Kappa (κ) values. We assume a simple density model and use adiabatic cooling to set the temperature during expansion. Next, we calculate the ion fractions using a time-dependent ionization model with adiabatic cooling and various Kappa values. The calculated ion fractions are used to simulate the DNs of the Atmospheric Imaging Assembly on board the Solar Dynamic Observatory. Then, we explore the possible range of the temperatures and Kappa values, comparing the simulated images with the observations. Finally, we discuss the range of the heated temperature and Kappa values and whether the result of this study suggests continuous heating of the current sheet plasma during the expansion.

[포 SS-07] Development of a diagnostic coronagraph on the ISS: CODEX progress report

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The Korea Astronomy and Space Science Institute (KASI) has been developing a diagnostic coronagraph to be deployed in 2023 on the International Space Station (ISS) in collaboration with the NASA Goddard Space Flight Center (GSFC). The mission is known as “Coronal Diagnostic Experiment (CODEX)”, which is designed to obtain simultaneous measurements of the electron density, temperature, and velocity using multiple filters in the 2.5-10 Rs range. The coronagraph will be installed and operated on the ISS to understand the physical conditions in the solar wind acceleration region, and to enable and validate the next generation space weather models. In this presentation, we will introduce recent progress and future plan.

[포 SS-08] Subsurface structure of a sunspot inferred from umbral flashes

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Sunspots' subsurface structure is an important subject to explain their stability and energy transport. Previous studies suggested two models for the subsurface structure of sunspots: monolithic model and cluster model. However, it is not revealed which model is more plausible so far. We obtain clues about the subsurface structure of