On 2016 April 13th the Jovian satellite Ganymede occulted a 7th magnitude star. The predicted occultation track (occultation shadow) crossed the Northern Pacific Ocean, Japan, and South Korea. Hence, it was a very favorable event due to the star brightness in order to be accessible for small-aperture telescopes as well.

While no other similar event is expected for the next 10 years, only two occultation events are reported in the literature in the past, from Earth in 1972 and from Voyager, in large disagreement in respect to the atmospheric detection. However, evidence of an exosphere around Ganymede was inferred through H Lyman alpha emission detected by Galileo UVS, through HST/GHRS detection of far-UV atomic O airglow emissions, signature of dissociated molecular oxygen.

We organized a short-notice international coordinated occultation monitoring network with the aim to search for a signature of Ganymede's exosphere in the occultation light-curve by using facilities on Mauna Kea (NASA-IRTF) and Sobaeksan Optical Astronomy Observatory (SOAO) in South Korea. Scientific

New Frontier of Gravitational Wave Research

[포 GW-01] Structural Analysis of SLGT Platform

Gungwon Kang[1], Sang-Hyeon Ahn[2], Yeong-Bok Bae[2], Chunglee Kim[2], Whansun Kim[3], John J. Oh[3], Sang Hoon Oh[3], Chan Park[1], Edwin J. Son[3], Minjoong Jeong[1], Ronald S. Norton[4], Ho Jung Paik[4]
[1]Korea Institute of Science and Technology Information, [2]Korea Astronomy & Space Science Institute, [3]National Institute for Mathematical Sciences, [4]University of Maryland

SLGT (Superconducting Low-frequency Gravitational-wave Telescope) platform has three arms whose ends support six superconducting test masses. Therefore, any motion of the platform could cause noises on measuring the displacements of test masses which contain the effect of gravitational waves passing by. Thermal motions of the platform are the main noise source, and are related to resonant motions of the platform structure. We briefly report preliminary results of nodal analysis in finite element method performed for various platform configurations including 2-m, 30-m, 50-m and 100-m arm lengths. Platform designs giving resonant frequencies outside of the signal bandwidth (e.g., 0.1~10 Hz) have been identified.

[포 GW-02] Newtonian Noise and Mitigation for SLGT

John J. Oh[3], Sang-Hyeon Ahn[1], Yeong-Bok Bae[1], Gungwon Kang[2], Chunglee Kim[1], Whansun Kim[3], Sang Hoon Oh[3], Chan Park[2], Edwin J. Son[3], Jan Harms[5], Ho Jung Paik[6], Yong Ho Lee[4]
[1]Korea Astronomy & Space Science Institute, [2]Korea Institute of Science and Technology Information, [3]National Institute for Mathematical Sciences, [4]Korea Research Institute of Standards and Science, [5]Gran Sasso Science Institute, Italy, [6]University of Maryland, U.S.A.

The pilot study of SLGT (Superconducting Low-frequency Gravitational-wave Telescope) is being performed by KKN (KASI-KISTI-NIMS) collaboration. Among environmental noise sources, Newtonian noise (NN) is one of the most challenging obstacles in order to achieve a good sensitivity in low frequency below 10Hz for terrestrial gravitational wave (GW) detectors. So we should mitigate them for operating the SLGT to detect GWs on the ground. In this poster, we discuss the NNs and its mitigation for SLGT.

TOWARD NEXT GENERATION CORONAGRAPH

[포 TG-01] Development of the Camera System for Total Solar Eclipse

Jihun Kim, Seonghwan Choi, Ji-Hye Baek, Jongyeob Park, Su-Chan Bong, Bi-Ho Jang, Sung-Joon Park, Heesu Yang, Young-Deuk Park, Kyungsuk Cho
Korea Astronomy and Space science Institute

Korea Astronomy and Space Science Institute (KASI) has been developing the Camera System for the Total Solar Eclipse (TSE) observation. In 2016 we have assembled a simple camera system consisting of a commercial camera lens, a polarizer, bandpass filters, and a Canon camera to observe the solar corona during the Total Solar Eclipse in Indonesia. For 2017 TSE observation, we have studied and adapted the compact coronagraph design proposed by NASA. The compact coronagraph design dramatically reduces

the volume and weight, and used for TSE observation. The camera is used to test and verify key components including function of bandpass filter, polarizer, and CCD during observing the Total Solar Eclipse. In this poster we focus on optical engineering works including designing, analyzing, testing, and building for the TSE observation.

[포 TG-02] An Operating Software Development of A Prototype Coronagraph for The Total Solar Eclipse in 2017

Jongyeob Park, Seonghwan Choi, Jihun Kim, Be-ho Jang, Su-Chan Bong, Ji-Hye Baek, Heesu Yang, Young-Deuk Park, and Kyung-Suk Cho
Korea Astronomy and Space Science Institute

We develop a coronagraph to measure the coronal electron density, temperature, and speed by observing the linearly polarized brightness of solar corona with 4 different wavelengths. Through the total solar eclipse on 21 August 2017, we test an operating software of a prototype coronagraph working with two sub-systems of two motorized filter wheels and a CCD camera that are controlled by a portable embedded computer. A Core Flight System (CFS) is a reusable software framework and set of reusable software applications which take advantage of a rich heritage of successful space mission of NASA. We use the CFS software framework to develop the operating software that can control the two sub-systems asynchronously in an observation scenario and communicate with a remote computer about commands, housekeeping data through Ethernet. The software works successfully and obtains about 160 images of 12 filter sets (4 bandpass filters and 3 polarization angles) during the total phase of the total solar eclipse. For the future, we can improve the software reliability by testing the software with a sufficient number of test cases using a testing framework COSMOS. The software will be integrated into the coronagraph for balloon-borne experiments in 2019.

[포 TG-03] Comparison of Coronal Electron Density Distributions from MLSO/MK4 and SOHO/UVCS

Jae-Ok Lee[1], Kyung-Sun Lee[2], Jin-Yi Lee[3], Soojeong Jang[1,4], Rok-Soon Kim[1], Kyung-Suk Cho[1], and Yong-Jae Moon[3,4]
[1]Korea Astronomy and Space Science Institute, [2]Hinode Science Center, National Astronomical Observatory of Japan, [3]Department of Astronomy & Space Science, Kyung Hee University, [4]School of Space Research, Kyung Hee University

The coronal electron density is a fundamental and important physical quantity in solar physics for estimating coronal magnetic fields and analyzing solar radio bursts. To check a validation of coronal electron density distributions (CEDDs) from polarized brightness (pB) measurements with Van de Hulst inversions, we compare CEDDs derived from a polarized brightness (pB) observation [MLSO/MK4 coronameter] and one spectroscopic observation [SOHO/UVCS]. For this, we consider data observed in 2005 with the following conditions: (1) the observation time differences from each other are less than 1 minutes; and (2) O VI doublet (O VI 1031.9 Å and 1037.6 Å) is well identified. In the pB observation, the CEDDs can be estimated by using Van de Hulst inversion methods. In the spectroscopic observation, we use the ratio of radiative and collisional components of the O VI doublet to estimate the CEDDs. We find that the CEDDs obtained from pB measurements are higher than those based on UVCS observations at the heights between 1.6 and 1.8 Rs (× 1.9 for coronal streamer, 1.2 ~ 1.8 for background corona, and 1.5 for coronal hole), while they are lower than those based on UVCS at the heights between 1.9 and 2.6 Rs (× 0.1 ~ 0.6 for coronal streamer, 0.5 ~ 0.7 for background corona, and 0.6 for coronal hole). The CEDDs of coronal streamers are higher than those of background corona at the between 1.6 and 2.0 Rs: × 1.2 ~ 2.4 for MK4 and 1.5 ~ 1.9 for UVCS.

[포 TG-04] Improvement of Corona Temperature and Velocity Determination Method Using a Coronagraph Filter System

Kyuhyoun Cho[1], Jongchul Chae[1], Eun-Kyung Lim[2]
[1]Seoul National University
[2]Korea Astronomy and Space Science Institute

We have developed a methodology to determine the coronal electron temperature and solar wind speed using a four filter coronagraph system. The method developed so far have been applied to total eclipse observation and have yielded plausible results. The current methodology starts from the assumption that 1) coronal free electrons are isothermal and 2) coronal free electrons have spherically symmetric distrubution. However, the actual solar corona differs significantly from the two assumptions above. The coronal electron density is not spherically symmetric due to