특히 2019년 및 2023년에 개최되는 WRC-19, 23회의 의제를 위해, 태양활동의 감시, 원활한 기상위성운영, 80-1,000GHz 대역의 전파천문 보호 등에 대한 연구가 관련 연구그룹(SG7)에서 본격화되고 있으며, 이에 대한 지속적인 동향분석과 국내의 입장정리 또는 관련 ITU 기술문서에 대한 정부차원의 적절한 대응정책이 필요하다.

따라서 본 발표에서는 WRC-19 및 WRC-23의제와 관련하여 2016년 4월 5-8일에 스위스 제네바에서 진행되었던 ITU-R 제7연구반 산하작업반별 회의의 공유연구와 주요 결과를 소개하고, 향후 우리나라의 입장, 대응방안 등에 대해 알아보고자 한다.

[포 AT-04] Software of Slit-Viewing Camera Module for IGRINS (Immersion GRating INfrared Spectrograph)

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We developed an observation control software for the IGRINS (Immersion Grating Infrared Spectrograph) silt-viewing camera module, which points the astronomical target onto the spectroscopy slit and sends tracking feedbacks to the telescope control system. The point spread function (PSF) is not always symmetric. In addition, bright targets are easily saturated and shown as a donut shape. It is not trivial to define and find the center of the asymmetric PSF especially on a slit mask. We made a center balancing algorithm (CBA) following the concept of median. The CBA derives the expected center position along the slit-width axis by referencing the stray flux ratios of both upper and lower sides of the slit. We compared efficiencies of the CBA and those of a two-dimensional Gaussian fitting (2DGA) through simulations from observation images in order to evaluate the center finding algorithms. Both of the algorithms are now applied in observation and users can select the algorithm.

[포 AT-05] Wide band prototype feedhorn design for ASTE focal plane array

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KASI and NAOJ are making collaborating efforts to implement faster mapping capability into the new 275- 500 GHz Atacama Submillimeter Telescope Experiment focal plane array (FPA). Feed horn antenna is one of critical parts of the FPA. Required fractional bandwidth is almost 60 % while that of traditional conical horn is less than 50 %. Therefore, to achieve this wideband performance, we adopted a horn of which the corrugation depths have a longitudinal profile. A profiled horn has features not only of wide bandwidth but also of shorter length compared to a linear-tapered corrugated horn, and lower cost fabrication with less error can be feasible. In our design process the flare region is represented by a cubic splined curve with several parameters. Parameters of the flare region and each dimension of the throat region are optimized by a differential evolution algorithm to keep >20 dB return loss and >30 dB maximum cross-polarization level over the operation bandwidth. To evaluate RF performance of the horn generated by the optimizer, we used a commercial mode matching software, WASP-NET. Also, Gaussian beam (GB) masks to far fields were applied to give better GB behavior over frequencies. The optimized design shows >23 dB return loss and >33 dB maximum cross-polarization level over the whole band. Gaussicity of the horn is over 96.6 %. The length of the horn is 12.5 mm which is just 57 % of the ALMA band 8 feed horn (21.96 mm).

[포 AT-06] Development Plan for the GMT Fast-steering Secondary Mirror

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The Giant Magellan Telescope (GMT) will feature two interchangeable Gregorian secondary mirrors, an adaptive secondary mirror (ASM) and a fast-steering secondary mirror (FSM). The FSM has

an effective diameter of 3.2 m and built as seven 1.1 m diameter circular segments, which are conjugated 1:1 to the seven 8.4m segments of the primary. Each FSM segment contains a tip-tilt capability for fine co-alignment of the telescope subapertures and fast guiding to attenuate telescope wind shake and mount control jitter. This tip-tilt capability thus enhances performance of the telescope in the seeing limited observation mode. As the first stage of the FSM development, KASI conducted a Phase 0 study to develop a program plan detailing the design and manufacturing process for the seven FSM segments. The GMTO-KASI team matured this plan via an internal review in May 2016 and the revised plan was further assessed by an external review in June 2016. In this poster, we present the technical aspects of the FSM development plan.

태양/태양계/우주과학

[포 SS-01] Relation of CME Speed and Magnetic Helicity in the Source Region during Increasing Phase of Solar Cycle 24

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We examined the relations between CME speed and properties of magnetic helicity in the source region such as helicity injection rate and total unsigned magnetic flux, which reflect the magnetic energy in the active region. For this, we selected 22 CMEs occurred during the increasing phase of solar cycle 24, which shows extremely low activities and classified them into two groups according to evolution pattern of helicity injection rate. We then compared the relations with those from previous study based on the events in solar cycle 23. As the results, we found several properties as follows: (1) Both of CME speed and helicity parameters have very small values since we only considered increasing phase; (2) among 22 CMEs, only 6 events (27%) are classified as group B, which show sign reversal of helicity injection and they follow behind of appearance of group A events. This fact is well coincide with the trend of solar cycle 23 that only group A events was observed in the first 3 years of the period; (3) as the solar activity is increasing, the CME speed and helicity parameters are also increasing. Based on the observations of solar cycle 23, the helicity parameters was still increasing in spite of decreasing solar activity after maximum period.

[포 SS-02] The solar cyclic variation of photospheric intensity analyzed from solar images

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The Sun has diverse variations in solar atmosphere's layers due to solar activity. This solar variations can be recognized easily by sunspots which appear on the solar photosphere. Thus the sunspot on the photosphere is utilized by direct index of the solar activity. The other variation of the photosphere is center-to-limb variation (CLV). In this study, we analyze the relative intensity observed by SOHO, SDO. The data of photospheric intensity are from full disk images of SOHO/MDI intensity (6768Å, from May 1994 to March 2011) and of SDO/HMI intensity (6173-6174Å, from May 2010 to June 2016). As the result, we found the latitudinal variation of the intensity. The daily photospheric intensity showed the solar cyclic variation with sunspot number. It has a little difference of phase with sunspot number.

[포 SS-03] Quantitative estimation of the energy ux during an explosive chromospheric evaporation in a white light are kernel observed by Hinode, IRIS, SDO, and RHESSI

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An X1.6 flare occurred in AR 12192 on 2014 October 22 around 14:06 UT and was observed by Hinode, IRIS, SDO and RHESSI. We analyze a bright kernel which produces a white light flare (WLF) with continuum enhancement and a hard X-ray (HXR) peak. Taking advantage of the spectroscopic observations of IRIS and EIS, we measure the