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We report the detailed design of an unprecedented wideband(band7+8) corrugated feed horn in ASTE focal plane array aiming for future ALMA receiver. We have found that such design constraints as return loss, cross-polarization level, beam width and phase curvature can be controlled by optimizing critical corrugation parameters at the throat and flare region of the horn. The success of optimization manifest itself through simulated aperture efficiency over 80 % at the entire frequency range. Physical implications of the resulting corrugation parameters are discussed.

**[구 AT-06] The Performance of Flight Model of the NISS onboard NEXTSat-1**

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The NISS (Near-infrared Imaging Spectrometer for Star formation history) is the near-infrared spectro-photometric instrument optimized to the first Next Generation of small satellite (NEXTSat-1). The off-axis optics was developed to cover a wide field of view with 2 deg. x 2 deg. as well as a wide wavelength range from 0.95 to 2.5 $\mu$ m. Considering the simple alignment scheme, afocal system was adapted in the optical components. The mechanical structures were tested under the space environment. We have obtained the accurate calibration data using our test facilities under the operational condition. After the final integration of flight model into the satellite, the communication with the satellite and the functional test were passed.

The NISS will be launched in early 2018. During around 2-year operation, the spectro-photometric survey covering more than 100 square degree will be performed. To achieve the major scientific objectives for the study of the cosmic star formation in local and distant universe, the main observational targets will be nearby galaxies, galaxy clusters, star-forming regions and low

background regions. Here, we report the final performance of the flight model of the NISS.

**동아시아천문대**

**[구 EAO-01] East Asian Observatory: Current Status and Future Prospect**

Jongsoo Kim  
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The special session of the East Asian Observatory was prepared to let the Korean Astronomical Community know the current status and future prospect of the EAO, and to hear the opinion from the community. The East Asian Observatory (EAO) was formulated on September 5, 2014 by East Asian Core Observatories Associations (EACOA) as a non-profit company registered in the State of Hawaii. As a first mission of the EAO, it has successfully operated the James Clerk Maxwell Telescope (JCMT) since March 2015. The Submillimeter Array (SMA) has been available to the East Asian astronomers from 2017A season through the EAO, and the Subaru and the East Asian VLBI Network (EAVN) are the possible facilities to be available in near future.

**[구 EAO-02] Report on the Current Status of EAO/JCMT**

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The JCMT is now in its third year of operations under EAO management. During this past year, we continued with calls for regular PI programs as well as the second call for Large Programs. The performance of SCUBA-2 has been improved by replacing internal optical filters. The 230GHz Receiver A is in the process of being replaced by a new closed-cycle system. The SCUBA-2 polarimeter, POL-2, commissioned during the past year, has been working very well in measuring the magnetic field structures in molecular clouds. The JCMT successfully participated in the Event Horizon Telescope experiment during April 2017, which utilized the phased-up ALMA for the first time. The first round of Large Programs are nearing completion, with first publications beginning to be published. The JCMT continues to welcome inputs from the community, and the next users meeting will be

held in Seoul in January 2018.

### [구 EAO-03] Subaru-EAO international partnership

Michitoshi Yoshida  
*Subaru Telescope, NAOJ*

The Subaru telescope is a 8.2m optical-infrared telescope operated by National Astronomical Observatory of Japan since 2000. Its wide field

observation capability with good image quality makes the telescope one of the best astronomical facilities. We Subaru Telescope is seeking

for international partners for the telescope operation to share science observations, future strategy and development. In the course of this effort, EAO and us exchanged a letter of intent on the planning of collaboration on the Subaru operation in this June. I introduce the contents of the Subaru-EAO LOI and the basic concepts of the Subaru international partnership in addition to a brief report of the current status of the observatory.

### [구 EAO-04] From SMA to w-SMA

Naomi Hirano and SMA team  
*ASIAA*

The Submillimeter Array (SMA) has provided forefront capabilities for high spatial and spectral resolution observations at submillimeter wavelengths from its excellent site on Mauna Kea, Hawaii since 2004. The SMA has continuously enhanced its capability. It is now equipped with two receivers in the 1.3 mm band (Rx230/Rx240) and two in the 0.85 mm band (Rx345/Rx400). The total bandwidth available is 8+8 GHz (per receiver) in the dual band or polarization mode. To maintain a leading role in the ALMA era, the SMA project is now upgrading its receivers, IF signal transport and correlator system. The new wideband SMA - the wSMA - will provide the instantaneous coverage of 56 GHz. In this presentation, I will introduce the latest status of the SMA, upgrade plan to the w-SMA, the possible science cases with the w-SMA, and the roles of the w-SMA in the ALMA era.

### [구 EAO-05] Activities of East Asian VLBI network

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We will present the activities of East Asian VLBI Network, EAVN, which consists of around 20 radio telescopes in Japan, Korea, and China with 6,500 km extend. It is a most sensitive and highest VLBI array in the world. We have conducted science verification observations at mainly 8 and 22 GHz. And Japanese VLBI array, VERA, and Korean VLBI array, KVN have combined as KaVA, Korean and VERA Array, and started science observations with open use at 22 and 43 GHz. We will presents some commissioning and science results based on it. Moreover Taiwan is constructing the Greenland telescope to be a millimeter and submillimeter VLBI station, which will be a very powerful station in Global millimeter and submillimeter VLBI array. These activities will be introduced as well.

## 태양/우주과학

### [구 SS-01] Quantitative Characterization of Solar Active Regions Based on Their Evolutionary Paths

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We present a way of quantitatively characterizing solar active regions on the basis of their evolutionary paths. To determine characteristic properties of active regions with different sizes and configurations, we use a physics-based model to derive a relation between emerged magnetic flux and injected magnetic helicity (Flux-Helicity relation), the former of which gives scale information while the latter represents the magnetic field configuration of an active region. We demonstrate how this relation provides evolutionary paths of active regions and determines their characteristic properties, through a comparison with modeled active regions obtained from magnetohydrodynamic simulations.

### [구 SS-02] Development of a Daily Solar Major Flare Occurrence Probability Model