We have been monitoring Sgr A*, the radio source at the center of our galaxy, continuously since G2 encounter was predicted. KaVA is a powerful High resolution imaging array at K and Q band, and it has a excellent uv-coverage for Sgr A*. Together with 1-Gbps recording, our observations have provided high-quality images of Sgr A* at Q-band. Our images reveal a scatter-broadened, elliptical Gaussian structure of the source. We found no significant flux or structural variation of Sgr A* in 2013-2014, which is consistent with recent simulations by Kawashima et al. Continuous monitoring in the coming few years would be able to capture the possible flux increase in the source caused by G2, which will lead to better understanding of the accretion process around supermassive black holes.

[구 HA-05] Variation of solar activity and atmospheric change recorded in Korean chronicles during the last millennium

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Korea has a long history in astronomy, which is proved by many observational records written in Korean chronicles. There are 43 sunspot records in Goryeo dynasty (高麗 918-1392) and 13 records in Joseon dynasty (朝鮮 1392-1910). According to analysis of Korean historical records, it is known that sunspot records in Goryeo dynasty show well in match with the well-known solar activity of 11.3 years. It means that Korean historical sunspot records show real solar phenomena. Korean sunspot records also show that solar activity decrease in Joseon dynasty compared with the previous ~500 years. In order to know the change of solar activity in detail, we examine Korean historical atmospheric records which can indicate climate change. We first analyze historical frost records. Korean chronicles have around 600 frost records during the last millennium. We find that the climate change shows sign of cooling down when check the variation of epoch that the first and last frost events in each year are written. This result is well in accord with that of historical sunspot records. Therefore, we claim that solar activity decrease during the last thousand years.

우주망원경

[초 SO-01] WSO-UV progress and SODA project

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The World Space Observatory Ultraviolet (WSO-UV) is the space mission that will grant access to the UV range in the post Hubble epoch.

WSO-UV is equipped with instrumentation for imaging and spectroscopy and it is fully devoted to UV astronomy.

In this talk, we outline the WSO-UV mission model and present the current status of the project.

Also, the NEO observing mission SODA (System of Observation of Day-time Asteroids) is also presented.

[구 SO-02] The Detailed Design of the NISS onboard NEXTSat-1

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The NISS (Near-infrared Imaging Spectrometer for Star formation history) onboard NEXTSat-1 is the near-infrared instrument optimized to the first small satellite of NEXTSat series. The capability of both imaging and low spectral resolution spectroscopy in the near-infrared range is a unique function of the NISS. The major scientific mission is to study the cosmic star formation history in local and distant universe. For those purposes, the main targets are nearby galaxies, galaxy clusters, star-forming regions and low background regions.

The off-axis optical design of the NISS with two linear variable filters is optimized to have a wide field of view (2 deg. x 2 deg.) as well as the wide wavelength range from 0.95 to 3.8μm. The mechanical structure is considered to endure the launching condition as well as the space

environment. The dewar inside the telescope is designed to operate the infrared detector at 80K stage. From the thermal analysis, we confirmed that the telescope and the dewar can be cooled down to around 200K and 80K, respectively in order to reduce the large amount of thermal noise. The stray light analysis is shown that a light outside a field of view can be reduced below 1%.

After the fabrications of the parts of engineering qualification model (EQM), the NSS EQM was successfully assembled and integrated into the satellite. To verify operations of the satellite in space, the space environment tests such as the vibration, shock and thermal-vacuum test were performed. Here, we report the results of the critical design review for the NISS.

[구 SO-03] Error Compensation Algorithm for Higher Surface Accuracy of Freeform Mirrors Based On the Method of Least Squares

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Off-axis reflective optical systems have attractive advantages relative to their on-axis or refractive counterparts, for example, zero chromatic aberration, no obstruction, and a wide field of view. For the efficient operation of off-axis reflective system, the surface accuracy of freeform mirrors should be higher than the order of wavelengths at which the reflective optical systems operate. Especially for applications in shorter wavelength regions, such as visible and ultraviolet, higher surface accuracy of freeform mirrors is required to minimize the light scattering. In this work, we propose the error compensation algorithm (ECA) for the correction of wavefront errors on freeform mirrors. The ECA converts a form error pattern into polynomial expression by fitting a least square method. The error pattern is measured by using an ultra-high accurate 3-D profilometer (UA3P, Panasonic Corp.). The measured data are fitted by two fitting models: Sag (Delta Z) data model and form (Z) data model. To evaluate fitting accuracy of these models, we compared the fitted error patterns with the measured error pattern.

항성 및 항성계

[구 ST-01] The Globular Cluster NGC 6273: Another Candidate for the Milky Way Building Blocks

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In our recent investigation (Lim et al. 2015), we have shown that the combination of narrow-band Ca photometry and low-resolution spectroscopy can effectively search for globular clusters (GCs) with supernovae (SNe) enrichments. We apply this technique to the metal-poor bulge GC NGC 6273 and find two distinct subpopulations having different light and heavy element abundances. Our result suggests that NGC 6273 was massive enough to retain SNe ejecta, which would place this cluster in the growing group of GCs with Galactic building block characteristics, such as ω Centauri and M22.

[구 ST-02] Simultaneous source frequency phase referencing observations of H_2O and SiO masers toward VX Sgr

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We performed simultaneous observations of H2O and SiO masers toward VX Sgr using the Korean VLBI Network (KVN) and Source Frequency Phase Referencing (SFPR) method. The observations were carried out at 5 epochs from 2014 February to 2015 June. The relative locations of the SiO with respect to the H2O maser emission were determined at two epochs by SFPR for the first time. The H2O masers show well developed asymmetric outflow features which are spread up to ~300 mas in diameter. On the other hand, the SiO masers show a ring-like structure close to the central star with ~ 30 mas diameter. The SFPR observational results at two epochs (φ=0.83 and 0.99) provide similar relative locations of H2O and SiO maser features. These superposed maps of H2O and SiO masers lead us to investigate the