observing system with KAOS76.

[포AT-02] Introduction to Development of KaVA Digital Filter using GPU

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KaVA(KVN and VERA Array)는 KVN 3기, 일본 VERA 4기로 구성되어 있다. 더 나아가 일본의 JVN, 중국의 CVN으로 확장한다면 동아시아에 더 많은 기선들이 존재한다. 각 전파망원경은 천문학자의 연구수요, 디지털 백엔드(Back-end) 시스템 기술수준에 의해 각기 다른 다양한 자료구조를 이용한다. 이와 함께, 현재 전파천문관측은 디지털 백엔드 시스템의 발달로 2Gbps 관측이 주를 이루고 있으며 32Gbps 시험 관측이 이루어지고 있다. 이에 한일상관센터는 이런 다양한 자료구조와 관측 대역폭을 지원하기 위해 KaVA용 디지털필터를 개발하고 있다. 기존에 개발된 CPU기반의 디지털필터를 연산속도와 자료 입출력 대역폭을 상당히 높인 GPU 기반 디지털필터로 업그레이드하고 있다. 본 발표는 GPU를 활용한 KaVA용 디지털 필터 개발에 관하여 소개하고자 한다.

[포AT-03] Wavelength Calibration Solution of VPH Grating Slitless Spectroscopy Image

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Spectroscopic observations commonly use a slit or fiber; however, non-slit spectroscopy enables us to observe a larger number of targets in one frame of image. Hence, it has been adopted as an observational mode for observatories like HST and JWST. Slitless spectroscopy requires wavelength calibration solutions in order to distinguish and measure the absorption / emission lines from the spectra with high accuracy. We installed the Volume Phase Holographic (VPH) grating to SQUEAN camera on the McDonald 2.1m telescope and obtained images with spectral resolutions of ~ 100 and 200. In order to derive the wavelength calibration, we measured the distances between the 0th order images and spectral features of various quasars. The distances are converted to wavelengths using the known wavelengths of the emission lines. We tested several different methods of spectral extraction and peak estimation of emission lines. We will present the results for the wavelength calibration and suggest the reliable methods to find the solution.

[포AT-04] Optical Setup for Full-Field Imaging Test of MATS Limb Telescope

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The MATS (Mesosphere Airglow / Aerosol Tomography Spectroscopy) satellite is a Swedish scientific microsatellite which Kyung Hee University participates in developing. The limb telescope of the MATS satellite is designed with linear astigmatism-free off axis optical configuration which allows wide field of view (5.67º × 0.91º). Here we present the full-field optical performance test setup that consists of a point source, a collimator, the limb telescope and a CCD (Charged Coupled Device). The incidence angle of the collimator was carefully controlled by the rotary stage under the limb telescope. The imaging tests represent expected results without dominant aberrations.

[포AT-05] Development Process for Slit Mask Exchanger Mechanism Prototype (SMEM-P) of the Giant Magellan Telescope Multi-object Astronomical and cosmological Spectrograph (GMACS)

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GMACS is one of the instruments for the Giant Magellan Telescope (GMT) which will provide wide field, multi-object, moderate resolution spectroscopy of faint targets. KHU (Kyung Hee University) is in charge of control software of GMACS. As a first step, the Slit Mask Exchange Mechanism Prototype (SMEM-P) will be used as a preliminary example to make development process between electronics and high level software. Recently, we have developed a sample program to communicate with low level devices via EtherCAT. It is expected to be a mockup design for software

and control system of GMACS. In this poster, we show the development process and test operation results of control software for SMEM-P.

[포AT-06] SNU Astronomical Observatory 1-m Telescope

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Astronomy education and research can benefit from a high performance telescope that is easily accessible in campus. Such a facility allows hands-on education of observations, small research projects, test of new instruments, and time-domian study of astronomical phenomena. Recently, SNU reconstructed a 40-year old observatory (also known as 구천문대), and established the new SNU Astronomical Observatory (SAO) on that site. On 2018 March 27, the 1-m optical telescope was successfully installed at SAO. Since then, this telescope has been producing wonderful images. This poster will give an overview of the 1-m telescope, and its performance.

[포AT-07] First Light of the Newly-installed 1-m Telescope in SNU Astronomical Observatory (SAO)

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On 2018 March 27, a 1-m telescope was installed at the SNU Astronomical Observatory (SAO) which is a newly constructed building at the site where the previous Kwanak Observatory (Old observatory ; 구천문대) stood. A series of test observations have been performed on this telescope, and we report the first results from the test observations in this poster. In particular, we present seeing values, limiting magnitudes and sample images taken with a 4k×4k CCD camera (21′×21′).

[포AT-08] KVN W-band Receiver Upgrade for 84-116 GHz bandwidth

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한국우주전파관측망(KVN, Korean VLBI Network)의 86 GHz 대역 수신기는 VLBI에서 주로 관측하는 85-95 GHz 주파수 대역에서 동작하도록 설계, 제작되었다. UMASS(University of Massachusetts) 대학으로부터 도입된 수신기의 대역폭을 84-116 GHz로 확장하기 위해 2017년도부터 수신기 설계, 부품 구입 등을 진행하고 있다.

기존 수신기의 대역폭을 확장하기 위해, 협대역 주파수 변환기의 설계를 변경해야 한다. 주파수 변환기는 일반적으로 사용되는 SSB(Single Side Band) Mixer를 사용하지 않았다. 그 대신에 20 dB 이상의 높은 이미지 제거율을 갖도록 HPF(High Pass Filter)와 LPF(Low Pass Filter)를 사용하여 RF 주파수를 84-100 GHz와 100-116 GHz로 나눈 후 주파수 변환토록 하였다. 사용된 Filter의 특성을 이용, 이미지 대역 신호를 수 십 dB 이상 제거할 수 있다. RF 단에서의 신호 분리로 인해 수신기 등가잡음 온도는 수 K 정도 증가한다.

2017년에 제안된 주파수 변환기를 상온에서 구성하여 그 가능성을 검증하였고, 2018년 9월 까지 KVN W-band 수신기 1 대의 업그레이드를 진행할 것이다. 2019년까지 KVN 3 사이트의 W-band 수신기 주파수 확장을 완료할 계획이다.

[포AT-09] Software Architecture of KHU Automatic Observing Software for McDonald 30-inch telescope (KAOS30)

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KAOS30 is an automatic observing software for the wide-field 10-inch telescope as a piggyback system on the 30-inch telescope at the McDonald Observatory in Texas, US. The software has four packages in terms of functionality and is divided into communication with Telescope Control System (TCS), controlling of CCD camera and filter wheel, controlling of focuser, and script for automation observing. Each interconnect of those are based on exe-exe communication. The advantage of this distinction is that each package can be independently maintained for further updates. KAOS30 has an integrated control library that combines function library connecting each device and package. This ensures that the software can extensible interface because all packages are access to the control devices independently. Also, the library includes the ASCOM driver platform.