

<sup>2</sup>*Center for the Exploration of the Origin of the Universe (CEOU), Astronomy Program, Dept. of Physics & Astronomy, Seoul National University,*  
<sup>3</sup>*Dept. of Astronomy & Space Science, Kyung Hee University*

For slitless spectroscopy, we have installed the Volume Phase Holographic (VPH) gratings in the filter wheel of the SQUEAN on the 2.1m telescope at McDonald Observatory in Texas, United States. This system can effectively take spectra and monitor the variabilities of many sources, such as quasi-stellar objects, supernovae, and active galactic nuclei. On the single image frame, there are many spectra of the point sources. Therefore, a target extraction needs to trace along the tilted dispersion and to minimize the confusions by other sources. We present a real-time reduction software that has the functions with spectra extraction and wavelength calibration.

#### [포 AT-03] Demonstration of Modeling Process using Giant Magellan Telescope Software Development Kit

Jimin Han<sup>1</sup>, Martí Pi<sup>2</sup>, Josema Filgueira<sup>2</sup>, Marianne Cox<sup>2</sup>, Jordi Molgó<sup>2</sup>, Hector Swett<sup>2</sup>, Pierre Kurkdjian<sup>2</sup>, Hye-In Lee<sup>1</sup>, Tae-Geun Ji<sup>1</sup>, Soojong Pak<sup>1</sup>

<sup>1</sup>*Kyung Hee University,* <sup>2</sup>*Giant Magellan Telescope Organization.*

The Giant Magellan Telescope Organization (GMTO) is developing the GMT Software Development Kit (SDK) for the Observatory Control System (OCS). The SDK models a subsystem of the GMT using a Domain Specific Language (DSL) which can generate a skeleton code and validates the availability of the model automatically. The OCS includes a Device Control System (DCS) and all the devices are connected with the DCS via EtherCAT. The DCS has a component (Hardware Adapter) to communicate with EtherCAT slaves. In this presentation, we demonstrate the modeling process and describe the importance and usage plan of the SDK.

#### [포 AT-04] Identification of OH emission lines from IGRINS sky spectra and improved sky subtraction method

Jae-Joon Lee(이재준)  
KASI

The hydroxyl radical (OH) sky emission lines arise from the Earth's mesosphere, and they serve as a major source of the sky background in the infrared. With IGRINS, the observed line strength

show non-negligible variation even within a few minutes of time scale, making its subtraction difficult. Toward the aim better sky subtraction in the IGRINS pipeline, we present 1) improved identification of sky lines in H and K band and 2) improved method of subtracting sky background. Using the recent line list of Brooke et al. (2015), we have detected ~500 OH doublets from upper vibrational level between 2 and 9 and maximum upper J level of 25. In particular, we found that a significant fraction of unidentified lines reported by Oliva et al. (2015) are indeed OH lines resulting from transitions between different F levels. With the extended line identification, we present an improved method of sky subtraction. The method, based on the method of Noll et al. (2014), empirically accounts non-LTE level population of OH molecules.

#### [포 AT-05] Kyung Hee University Automatic Observing Software for 10 cm Telescope (KAOS10)

Changgon Kim<sup>1</sup>, Jimin Han<sup>1</sup>, Tae-Geun Ji<sup>2</sup>, Hye-In Lee<sup>2</sup>, Soojong Pak<sup>2</sup>, Myungshim Im<sup>3</sup>

<sup>1</sup>*Dept. of Astronomy and Space Science, Kyung Hee University,* <sup>2</sup>*School of Space Research, Kyung Hee University,* <sup>3</sup>*Center for the Exploration of the Origin of the Universe (CEOU), Astronomy program, Dept. of Physics & Astronomy, Seoul National University.*

The observation of transient objects such as supernovae or variable stars requires a survey of the wide sky and quickly extracting the results. In accordance with this purpose, we have been developing an automatic observing software, KAOS (Kyung Hee University Automatic Observing Software) as a series. KAOS30 was the first series of KAOS and it was applied to the 30-inch platform at the McDonald Observatory in the United States of America. KAOS76 controls the 76-cm telescope at Kyung Hee Astronomical Observatory. In this poster, we introduce KAOS10 for controlling a portable telescope with a small aperture size attaching a guiding camera as QHY-5L II. Kyung Hee University auto-guiding package which includes the auto-guiding function for small aperture size telescope was also developed. Additionally, the Telescope Control Package(TCP) can communicate with the main server to do astrometry for pointing and identifying targets efficiently. KAOS10 has a universal interface that will be useful for the research of both amateurs and professionals.