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| **Session:** | **[B3A-6] S6 : Observing Facilities and International Collaborations** |
| **Date:** | August 20, 2014 (Wednesday) |
| **Time:** | 11:00~12:30 |
| **Room:** | Room F (Room 108) |
| **Chair:** | Michael Burton (University of New South Wales) |

**[B3A-6-1]** **11:00~11:20**

**[Invited] Paper Title Chinese Antarctic Observatory at Dome A**

Ji Yang (Purple Mountain Observatory, Chinese Academy of Sciences, China)

The exceptionally good observing conditions at Dome A have attracted extensive attention to astronomical community. After the successful traverse to Dome A, site surveys have been conducted at Dome A and demonstrated its excellent observing conditions for ground-based astronomy from optical to THz. A brief review will be made on the results from the site surveys. Small- to mid-size instruments have been used at Dome A for continuing site survey and astronomical observations through the solid supports from Polar Research Institute. A number of discoveries have been achieved by these instruments.
Dome A has been selected as one of the goals of development for Chinese astronomy for the next decade. Major Instruments, including a 2.5m opt/NIR telescope and a 5m THz telescope, are proposed as National Mega-Science Facility. Conceptual designs have been carried out during the past two years. Significant progress has been achieved in R&D for the two telescopes and some details on the THz telescope will be explained.

**[B3A-6-2]** **11:20~11:40**

**[Invited] Astronomy at Dome Fuji in Antarctica**

Takashi Ichikawa (Tohoku University, Japan)

Antarctica is the last window open to space for ground-based astronomical observations. The highest peaks of the Antarctic plateau above 3,000 m elevation are expected to be the best places for observational astronomy. Due to low temperature, thermal noise at infra-red wavelengths is much lower in Antarctica than other temperate sites. Dry atmosphere with extremely low water vapor is much more transparent in infra-red to sub-millimeter. The wind is weak and stable. No violent storms and blizzards come. Since the surface inversion layer is thin, we can expect good seeing. To enjoy such advantages in inland Antarctica and to promote the astronomy at one of highest peaks, Dome Fuji (3810m height), Japanese group has organized a consortium consisting of universities and institutes. The activities for astronomy at Dome Fuji station of National Institute of Polar Research Japan were started in 2010. During the six-year program, the instruments and facilities for the site testing have been deployed in 2011 and 2013. For that purpose, PLATO-F, which is a self-contained automated platform for conducting year-round experiments completely robotically from the Antarctic plateau, was constructed under the collaboration with UNSW. The result of the seeing measurement with Tohoku-DIMM was published in Okita et al. (2013), in which the best seeing 0.2" at optical wavelength was reported. The study of the atmospheric turbulence shows the boundary layer profiles (Okita et al. in preparation), which would be very helpful for future adaptive-optics applications. Near-infrared and THz telescopes, which are now under budget request, will be main facilities for astronomy. Thanks to low background and high transmittance, a 2m-class telescope has a capability of 8m-class telescopes located at Mounakea in near-/mid-infrared. An infrared survey observation in K-dark band at 2.4 micron will give the deepest and widest dataset for the high-z universe with reasonable cost and observation time. It will reach deeper than those of VISTA and UKIDSS by 1-2 mag. The THz telescope will target dusty galaxies at the high-z universe to study galaxy evolution in its early phase of star formation enshrouded in dust. The long polar night in winter is favorable for searching variable objects with a long period such like extra-solar planets

in orbit of habitable zone. The observation with molecules (e.g., CO, H2O, CH4) at the second eclipse will give us the information of the atmosphere.

**[B3A-6-3]** **11:40~11:55**

**HEAT @ Ridge A – the High Elevation Antarctic Terahertz Telescope**

Michael Burton (University of New South Wales, Australia), Catherine Braiding, Michael Ashley, and John Storey

HEAT is a 62cm THz frequency telescope operating at the driest location known on the Earth's surface – the 4,000m elevation Ridge A near to the summit of the Antarctic plateau at Dome A. Here the atmospheric precipitable water vapour content is virtually always no more than 250µm ppt H2O, and falls to below 100µm at times in the middle of winter, so opening the THz windows to ground-based observations. In particular, this permits measurement of key diagnostic spectral emission lines arising from the transition from diffuse-to-dense gas clouds in the interstellar medium – i.e. of [CI], [CII] and [NII]. HEAT was built by the University of Arizona and is now in its third season of operations at Ridge A. It is a robotic facility, controlled by the PLATO autonomous laboratory built by the University of New South Wales, one of 4 such modules now operating on the Antarctic plateau. Its installation, via a remote field deployment, represents a new way of conducting frontline science in Antarctica at low cost. HEAT runs off just 150W of power, with closed-cycle coolers bringing the detectors to 50K. A tiltable mirror is used to direct the beam into a fixed, off-axis instrument, making use of Earth rotation to provide imaging capability through drift scanning. A mapping survey of the Galactic plane is now underway in the [CI] 0.8 THz line, providing ~2 arcminute and 1 km/s resolution. A [NII] 1.5 THz mapping survey is about to begin. For further information, please see the project website at http://soral.as.arizona.edu/heat/.

**Poster Session** **11:55~12:30**

**Chair:** **Michael Burton (University of New South Wales)**