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ハワイ・ハレアカラ山頂の惑星／系外惑星専用望遠鏡
Telescopes Dedicated to the Observations of Planets and Exoplanets at Haleakala, Hawaii

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In this paper, we introduce the University-sized small but unique telescope project at the summit of Mt. Haleakala of Maui Island, Hawaii.

Clear sky and good seeing condition are definitely important for any ground-based observations. The Haleakala High Altitude Observatories at the summit of Mt. Haleakala is not the highest place (3050m), but one of the best sites with clear sky, good seeing, and low humidity conditions. Operation is relatively easy because we can access to the airport, major towns, and a good engineering facility, ATRC (Advanced Technology Research Center) of IfA/UH within 1-2 hour drive from summit.

On the summit, our group has been operating a 40 cm Schmidt-Cassegrain telescope (T40), observing faint atmospheric features such as Io torus, Mercury, Lunar sodium tail, and so on. From fall 2013, ISAS Hisaki/Exceed EUV space telescope run on the orbit. The T40 telescope has uniquely provided long-term Io torus activities for this project. T40 will also link to Juno mission that will start Jovian observation from 2016.

Atmospheres and its escapes from planets and exoplanets are next extensions. From the late 2000s, we started the project to develop the telescope dedicated to planets and exoplanets, under the international consortium formed with IfA/UH and several groups in USA, Mexico, Canada, and Europe. This telescope project consists of several parts: The main is the new construction of the 1.8m off-axis telescope named PLANETS.

Associated with this project, we also moved our 60 cm telescope (T60) from Tohoku Univ. Iitate Observatory, and started the operation from Sep. 2014. T60 is equatorial-mount Cassegrain telescope. By the acceptance of this move by IfA, we adjusted its mount angle to the Hawaiian latitude, and moved to Haleakala in spring of 2014. This telescope can observe infrared light covering many molecular lines in planetary atmospheres. This telescope has Coude focus that can allow relatively large-sized instruments. Using this feature, our telescope is now providing the first capability of long-term operation of Infrared heterodyne spectrometer (MIRAHI) developed by us. It can achieve the spectral resolution of ˜107, and resolve the atmospheric lines behind the terrestrial absorption lines and atmospheric velocity field in several 10 m/s resolutions. With other instruments, Venus, Mars, and Jupiter observations are planned in 2015. They will be linked to the observations of orbiter projects like Mars Express, MAVEN, Mars Trace Gas orbiter for Mars and Akatsuki for Venus, like T40 linked to Jupiter.

The 1.8m PLANETS (Polarized Light from Atmospheres of Nearby Extra Terrestrial Planets) telescope will have the first light in 2016 in the earliest case. It has an off-axis primary mirror (provided from Tohoku Univ.) with a diameter of 1.8 m. By the telescope structure optimization, we can avoid diffraction due to a spider structure that holds a secondary mirror and to minimize the scattered light from mirror surfaces as far as possible. With the instruments set to Gregorian focus on an equatorial mount, it can provide us a unique facility for spectroscopic and polarimetric observations of faint environments around the bright bodies, like planetary environments, stellar disks, etc.

T60 has also equatorial mount, and provides a test bench of instruments for PLANETS. One of examples is the exoplanet polarimetric instrument 'DiPol2', which tries to detect the reflected polarized light from exoplanet in the non-polarized mother star continuum. This test run was also from Jan 2015.

It is welcomed to any planet and exoplanet observation scientists who have interest to use our facility or expect to attach their own instruments for specific objectives. For promoting such activities, M. Kagitani, H. Nakagawa, and M. Yoneda stay in or visit frequently to Maui, and are contributing to the telescope/instrumental operations and developments.