

## Status of the Transneptunian Automated Occultation Survey (TAOS II)

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### Abstract

The Transneptunian Automated Occultation Survey (TAOS II) will aim to detect occultations of stars by small ( $\sim 1$  km diameter) objects in the Kuiper Belt and beyond. Such events are very rare ( $< 10^{-3}$  events per star per year) and short in duration ( $\sim 200$  ms), so many stars must be monitored at a high readout cadence in order to detect events. TAOS II will operate three 1.3 meter telescopes at the Observatorio Astronómico Nacional at San Pedro Mártir in Baja California, México. With a 2.3 square degree field of view and high speed cameras comprising CMOS imagers, the survey will monitor 10,000 stars simultaneously with all three telescopes at a readout cadence of 20 Hz. Construction of the site began in the fall of 2013 and is nearing completion. This poster describes the observing system and provides an update on the status of the survey infrastructure.

### 1. Introduction

TAOS II is being built at the Observatorio Astronómico Nacional at San Pedro Mártir (SPM) in Baja California, México. The survey will operate three 1.3 m F/4 telescopes, with separations ranging from 130 m to 323 m. The field of view of each telescope is a circle of diameter  $1.7^\circ$ , which is projected onto a focal plane of diameter 15.4 mm.

Each telescope is equipped with a custom CMOS camera, which will be capable of simultaneous 20 Hz imaging on more than 10,000 stars by reading out small ( $< 10 \times 10$  pixel) windows around each of the target stars. The imagers are back illuminated, with 100% of the pixel surface photosensitive. The pix-

els are designed with on-board correlated double sampling, which reduces the read noise to an average of about  $2.7 e^-$ .

Multiple telescopes are used in order to reduce the false positive rate. The three telescopes will image the same stars simultaneously, and any candidate events will need to be detected coincidentally in all three telescopes. The wide separations of the telescopes ensure that any false positive event signatures due to scintillation in the upper atmosphere will not affect all three telescopes simultaneously.

See Ref. [1] for a more detailed description of the survey



Figure 1: The three TAOS II telescope enclosures at SPM.

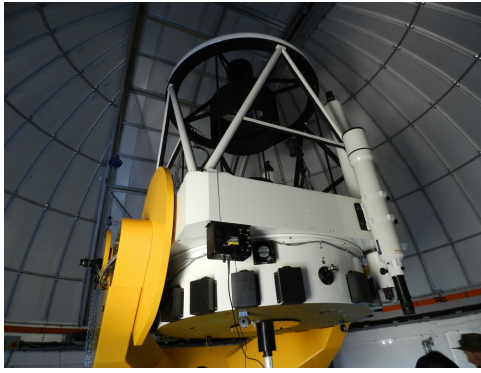


Figure 2: One of the three TAOS II telescopes after installation at SPM.

## 2. Current Status

All three telescopes are installed and operational (see Figures 1 and 2). The telescopes will operate robotically, and the control software is nearly finished, and is scheduled for completion in the summer of 2019.

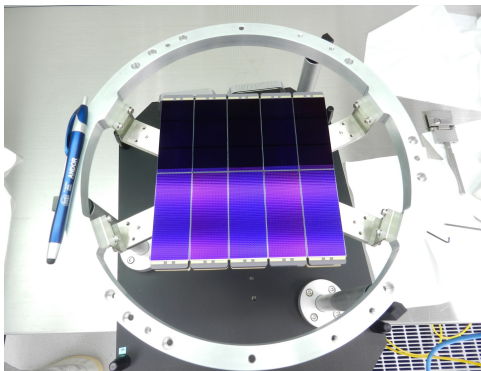


Figure 3: One of the three TAOS II focal planes under assembly at ASIAA.

The cameras are currently being assembled in the laboratory at ASIAA (see Figure 3). The final step in the completion of the cameras is finalizing the design and fabrication of the circuit boards. We expect this to be completed in the summer of 2019, and the cameras are scheduled to be delivered in 2019 October.

## References

- [1] Lehner, M. J. et al., Status of the Transneptunian Automated Occultation Survey (TAOS II), Ground-based and Airborne Telescopes V, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series 9145, pp. 914513, 2014.