

George R. Wallace, Jr. Astrophysical Observatory

Located in Westford, Massachusetts, the George R. Wallace, Jr. Astrophysical Observatory is MIT's local astronomical observatory for both research and teaching. During FY2008, Ms. Crystal LeCrone worked as site manager from August 2007 to October 2007, and Mr. Alan Midkiff (MEng '92) began as site manager in May 2008.

Facilities

The primary research instrument at Wallace Astrophysical Observatory (WAO) is a 24-inch Cassegrain reflecting telescope housed in the main dome. The current instrumentation for this telescope is a Portable Occultation, Transit, and Eclipse System (POETS) camera—a high-speed charge-coupled device (CCD) camera with photon-counting capability built by professor James Elliot's group. This camera is used for occultation work and extrasolar planet transits. A subsidiary dome houses a 16-inch reflecting telescope, and a four-bay shed with a roll-off roof houses three Celestron 14-inch reflecting telescopes and a Celestron 11-inch telescope. One of the Celestrons is equipped with a Sivo NU-VIEW II Spectrograph. Each of the four telescopes in the shed and the 16-inch telescope have a Santa Barbara Instrument Group STL-1001E camera, acquired and installed this year. Several additional portable telescopes are available for special use, including a classic Alvin Clark 5-inch refractor. Further infrastructure on site includes an electronics shop, machine shop, computer facilities for data analysis and storage with high-speed Internet service, an office, and a service area for use by observers.

This year, Folkers Rojas ('08) submitted his senior thesis, which described the design of the WAO Camera (WAOCam). The fabrication of this camera is complete; after some lab tests, the camera will be ready for use on the 24-inch telescope. WAOCam will allow MIT observers to become familiar with operation of the Magellan Instant Camera (MagIC) before observing trips to Las Campanas Observatory in Chile and will also provide WAO with a modern research-grade camera for continuing studies of Pluto, Triton, the Kuiper Belt, and extrasolar planets.

In the four-bay shed, a Software Bisque Paramount ME robotic telescope mount was installed for Telescope 3, and a pointing model for this mount was developed and tested by Virginia Quaney '09 and Danielle Piskorz '11. Now, both Telescope 3 and Telescope 4 can be controlled from campus, and observations were carried out using this capability. This upgrade will allow remote operation of the telescope by students on campus and will facilitate collection of a greater volume of data by students in astronomy classes, using a mix of campus and observatory laboratory sessions.

The drive and control system on the 16-inch telescope was completely refurbished by Mr. Midkiff, and the refurbished telescope will be used in the fall classes.

Research and Academic Work

Rachel Bowens-Rubin '11, Katheryn French '11, Dora Gao '11, and Christina Jaworsky '11 carried out several projects at the observatory. They determined the rotational light curve and period of minor planet 452 Hamiltonia using Telescopes 3 and 4 in the shed

and the new cameras. They also used the same shed telescopes to make astrometric measurements of the Kuiper Belt Objects 2005 FY9 and 2003 EL6. With the shed telescopes, as well as the 24-inch telescope, they recorded several transits of extrasolar planets. Wen-fai Fong ('08) carried out her senior thesis observations of extrasolar planet transits with the shed telescopes. For his senior thesis, Samuel Cole ('08) used the 24-inch telescope and the Apogee camera (since retired) to make precise measurements of the light curves of the Koronis family asteroids 1245 Calvinia 1068 Nofretete.

Graduate student observations at the observatory included the master's thesis work of Matthew Lockhart '01 on the 24-inch telescope using the POETS camera to record extrasolar planet transits. Similar observations were made by Elisabeth Adams for her PhD thesis.

The observatory was used by 19 students in the fall 2007 class Observational Techniques of Optical Astronomy (8.287J/12.410J) under the supervision of professor James Elliot '65, SM '65 and graduate students Phillip Zukin, Benjamin Cain, and Matthew Lockhart. Twenty-two MIT students in the spring 2008 class Hands-on Astronomy: Observing Stars and Planets (12.409) used both the 24-inch and the shed telescopes under Dr. Michael Person '92, SM '01, PhD '06 and Dr. Stephen Slivan '86, SM '86, '89, PhD '95. Several Wellesley College astronomy classes used the observatory as well. In addition, observatory staff offered a tour to MIT students and staff during the Independent Activities Period, attended by 40 people.

James L. Elliot
Director
Professor of Planetary Astronomy

More information about the George R. Wallace, Jr. Astrophysical Observatory can be found at <http://web.mit.edu/wallace/>.