

George R. Wallace, Jr., Astrophysical Observatory

Located in Westford, MA, the George R. Wallace, Jr., Astrophysical Observatory is MIT's local astronomical observatory for research and teaching. During FY2006, the staff consisted of the director, Professor James L. Elliot (1965), observatory specialist and engineer Stephen Slivan (1984), and postdoctoral associate Susan D. Kern (PhD 2006). Undergraduate students working on projects for classes, and others funded by the Undergraduate Research Opportunities Program (UROP), the National Science Foundation's (NSF) Research Experiences for Undergraduates program, and NASA and NSF research grants performed additional observing.

Facilities

The primary research instrument at the Wallace Astrophysical Observatory (WAO) is a 24-inch Cassegrain reflecting telescope housed in the main dome. 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 computer-controlled Celestron 11-inch telescope. Several additional portable telescopes are available, including a classic Alvin Clark 5-inch refractor. Further infrastructure on site includes an electronics shop, a 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 saw the completion of extensive upgrades to the 24-inch telescope, supervised by Stephen Slivan and John Tappan, a mechanical designer under contract to WAO. The refurbished telescope has more reliable and durable computer-controlled drives, which are suitable for planned automated operations. In addition, a video finder scope was added to the system and the telescope dome drive system was improved to increase the reasonable reliability of dome operations.

In the observing shed, Slivan supervised numerous upgrades to improve the reliability and suitability of the telescopes for use with academic classes, including stabilization of WAO's optical spectrograph, replacement of the computers controlling the astronomical charge-coupled device (CCD) cameras, and more accurate alignment of the Celestron telescopes.

Work continues on the design and implementation of an operational clone of the Raymond and Beverly Sackler Magellan Instant Camera (MagIC) to replace the current Apogee CCD camera on the 24-inch telescope. Graduate student Julia Kane (2004) completed the necessary software upgrades and postdoctoral associates Susan Kern and Michael Person (1994, SM 2001, PhD 2006) with the assistance of MIT's Folkers Rojas (2007) and Amy Moore (2008) are carrying out structural design and development. When complete, this camera will allow MIT observers to become familiar with the operation of the MagIC camera before observing trips to Las Campanas Observatory in Chile and provide WAO with a modern research-grade camera for continuing studies of Pluto, Triton, the Kuiper Belt, and extrasolar planets. Finally, the WAO fire and security alarm systems were completely overhauled in the last year.

Research and Academic Work

This year, MIT undergraduates Elizabeth George (2008), Tucker Jones (2007), and Shaye Storm (2008) used the newly refurbished 24-inch telescope to gather data on transiting extrasolar planets. Additionally, astronomical test data used to characterize the response of the upgraded telescope were taken by Matthew Abernathy (2006). Finally, undergraduates Elizabeth George and Tucker Jones carried out a program of gathering data on candidate stars to prepare for the use of the 24-inch telescope with Professor Elliot's Kuiper belt object stellar occultation search. These programs are expected to continue into next year.

Twelve MIT students used the observatory in the fall 2005 class 8.287J-12.410J Observational Techniques of Optical Astronomy under the supervision of associate professor Scott Burles, Susan Kern, and graduate student Edward Boyce. Thirty MIT students in the spring 2006 class 12.409 Hands-on Astronomy: Observing Stars and Planets used both the 24-inch and the shed telescope under Kern, Professor Maria Zuber, and Matthew Muterspaugh (PhD 2006). In addition, observatory staff offered astronomical tours to approximately 65 MIT students and alumni in the Independent Activities Period and spring term with the assistance of the Amateur Telescope Makers of Boston. Finally, 18 Wellesley students used the observatory in Wellesley classes ASTR 206, ASTR 109, and winter session astrophotography courses under the supervision of Stephen Slivan, who also serves as a visiting assistant professor of astronomy at Wellesley College.

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/>.