

George R. Wallace, Jr., Astrophysical Observatory

Located in Westford, Massachusetts, the George R. Wallace, Jr., Astrophysical Observatory (WAO) is MIT's local teaching and research optical observatory. No staff changes occurred this year, with Dr. Stephen Slivan '84 continuing as observatory specialist and engineer. Undergraduates working on the various projects are funded by the Undergraduate Research Opportunities Program, the National Science Foundation (NSF) Research Experiences for Undergraduates program, and by NASA and NSF research grants to Professor James Elliot '65.

Facilities

The site observing facilities consist of a 24-inch reflecting telescope and a 16-inch reflecting telescope, each in their own domes, and a four-bay shed with roll-off roof that houses three Celestron 14-inch Cassegrain telescopes and a computer-controlled Celestron 11-inch telescope. Several portable telescopes, including an Alvin Clark 5-inch refractor, are available for visual observations. Further infrastructure includes a building with an electronics workshop, data-analysis computer facilities, and an office for the observatory specialist. Upgrades to the 24-inch by Dr. Slivan and Mr. John Tappan are nearly complete, with the final construction phase being a rebuilding of the declination drive. Upon completion of this work, the telescope will be capable of automated, robotic operation (except for operation of the dome). Work continued on a new camera for the observatory, which will be an operational clone of the Raymond and Beverly Sackler Magellan Instant Camera (MagIC), with the initiation of a software upgrade carried out by Julia Kane '04, Tucker Jones '07, and Shaye Storm '08. The new camera will allow students and others to become familiar with the operation of MagIC for astronomical observations prior to using it at Las Campanas Observatory in Chile. The 16-inch dome motion was repaired, and several improvements were made to the small telescopes in the shed to make them more useful for class instruction.

Research and Student Work

A highlight this year was the construction of Portable Occultation, Eclipse, and Transit Systems (POETS) by Dr. Amanda Gulbis and Professor Elliot, in collaboration with colleagues at Williams College. POETS is a set of four frame-transfer, high-speed CCD cameras, one of which was mounted on the 24-inch telescope at WAO for testing prior to its successful debut on the Clay Telescope at Las Campanas for observation of a stellar occultation by Pluto's moon, Charon. Goals of these occultation observations are to determine an accurate radius for Charon and to probe for a possible atmosphere. The Kuiper belt object occultation program continued, with observations to search for candidate stars by Tucker Jones and Sam Cole '07. Once the candidate stars have been identified, observations of these occultations can be carried out with SOFIA, NASA's new airborne observatory, which will become operational in 2006. Also, several eclipsing binary stars were observed, with the goal of accurately timing their eclipses to see if perturbations by unseen members of the systems (e.g., large planets) could be detected.

Twenty-eight students in Professor Elliot's fall laboratory course, 8.287J/12.410J Observational Techniques of Optical Astronomy, used the WAO facilities for a variety

of astronomical projects, including the measurement of variable stars and the orbits of minor planets. During the Independent Activities Period, an open observing night was held for the MIT community, and several groups visited the observatory facilities at other times. Subject 12.409 Hands-On Astronomy: Observing the Stars and Planets was taught in the spring semester by graduate students Susan Kern and Angela Zalucha; 24 students used the shed telescopes for their laboratory work.

James L. Elliot

Director

Professor of Planetary Astronomy

More information about the George R. Wallace, Jr., Astrophysical Observatory can be found on the web at <http://web.mit.edu/wallace/>, and more information about the Charon occultation can be found at <http://occult.mit.edu/research/occultations/Charon/C313.2/C313OccMovie.html>.