Facility Overview

Site Overview

The Lowell Discovery Telescope (LDT) is Lowell Observatory's flagship facility at a dark-sky site approximately 40 miles southeast of Flagstaff on the Coconino National Forest. We support both in-person and remote observing, with the latter growing significantly in popularity following the COVID-19 pandemic.

Telescope Overview

The LDT sports a 4.3-m thin-meniscus primary mirror supported laterally and axially by an active optics system (AOS). The telescope rides on an elevation over azimuth mount. The LDT's pointing model provides ~2" accuracy over the entire sky down to 6º elevation, but the mount is capable of pointing to horizon.

Presently, the telescope is configured for the Ritchey–Chrétien (RC) focus, with an effective focal ratio of f/6.1. The mount is also configured with two large Nasmyth and 6 bent-cassegrain ports; development of instruments for these would additionally require development of a tertiary mirror.

At the RC focus, a 5-port instrument cube is installed to allow for rapid intranight swapping between instruments (~5 mins). The through-port on the cube has a 0.5º diameter flattened field of view.

Scheduling Overview

LDT is classically scheduled by semester and does not support queue observing at this time. The typical scheduling unit is half-nights, but other units may be requested depending on the needs of the science program. Additionally, a given observing program may be spread across non-consecutive nights (or even the entire semester) for scientific or weather concerns.

A Target of Opportunity (ToO) program is available for request to take advantage of both time-sensitive targets and the rapid reconfigurability of the LDT's instruments.

Instrument Overview

LDT hosts three facility instruments and a suite of visitor / PI instruments. The facility instruments are available full-time, and the others have variable availability depending on port competition and PI projects.

Facility Instruments:

Large Monolithic Imager (LMI) – A 6k x 6k optical imager (field of view is 12.3' square) whose CCD is the largest that can be made using current manufacturing techniques. LMI is typically operated binned 2x2 for 0.24" square pixels. A complete set of broadband photometric filters (Johnson-Cousins and SDSS), an astrometric V+R filter, and various stellar and cometary narrow-band filters are available.

DeVeny Optical Spectrograph – This low- to medium-resolution spectrograph is on indefinite loan from Kitt Peak National Observatory (it was known there as the White Spectrograph). DeVeny has a complement of 9 gratings that provide R ~ 500-4000, and includes various order-blocking filters. The instrument sports a 512 x 2048 CCD camera and is supported by the PypeIt spectroscopic data reduction pipeline.

Near Infrared High Throughput Spectrograph (NIHTS) – A low-resolution (R ~ 100-200) NIR spectrograph capable of covering wavelengths 0.86-2.4 microns in a single setup. NIHTS contains no moving parts and employs a single slit mask that offers 7 different width slits. This instrument may be operated simultaneously with LMI imaging via a dichroic fold flat.

Visitor / PI Instruments:

EXtreme PREcision Spectrometer (EXPRES) – This high-resolution (R~150,000) spectrograph was built at the Yale Exoplanet Laboratory (PI: D. Fischer) for the purpose of hunting earth-sized exoplanets. It uses both a ThAr lamp and laser-frequency comb for high-precision wavelength calibrations. In addition to its key program, this instrument is available for other science.

Quad-camera, Wave-front-sensing, Six-wavelength-channel Speckle Interferometer (QWSSI) – This speckle imager was built at Lowell Observatory (PI: G. van Belle) and is an evolved from of the DSSI camera. QWSSI is capable of diffraction-limited observations of closely spaced objects.

Portable Occultation, Eclipse, and Transit System (POETS) – One of the POETS systems is generally available (contact: S. Levine) for high-speed imaging of transient events.

Rapid infrared IMAger Spectrometer (RIMAS) – This near-infrared imager / spectrograph is under development by GSFC and UMd and is scheduled to arrive in 2024. There is expected to be both low- and medium-resolution spectroscopic modes in addition to an imaging mode.