The Large Binocular Telescope Observatory is located in southeastern Arizona, in the Pinaleno Mountains (Emerald Peak), at an altitude of 3,191 meters (10,470 feet). The binocular design of the LBT has two identical 8.4 m telescopes mounted side-by-side on a common altitude-azimuth mounting for a combined collecting area of a single 11.8-meter telescope.

A unique feature of LBT is that the light from the two primary mirrors can be combined to produce phased-array imaging of an extended field. This coherent imaging extends over an area of a single 11.8-meter telescope.

Detector Systems at the Large Binocular Telescope Observatory

**SCIENCE INSTRUMENTS**

- **NEAR-INFRARED IMAGER AND SPECTROGRAPH (LUCI)**
  - LBTB: LSW, MPIA, MPE.
  - 2 cryogenic NIR imagers and spectrographs.
  - Observing modes: seeing-limited imaging, long-slit and multi-object, diffraction-limited imaging and long-slit.
  - f/15 Front-bent Gregorian focal station.
  - Full cryogenic mask handling unit.
  - NIR detectors: Hawaii-2 and H2RG.

- **LARGE BINOCULAR CAMERA (LBC)**
  - INAF: Rome, Padua, Trieste.
  - 2 PF imaging cameras: Blue and Red.
  - Blue: UB bands: Red: VRIz bands.
  - Wide field: 27 x 27.
  - 4 CCD mosaic + 2 aux CCDs.

- **MULTI-OBJECT DOUBLE SPECTROGRAPH (MODS)**
  - OSU Imaging Sciences Lab.
  - 2 double-beam optical spectrographs.
  - f/16 Direct Gregorian foci.
  - Three observing modes: long-slit, multi-slit with curved masks and direct imaging.
  - Blue channel: CCD 15 µm thick.
  - Red channel: CCD 40 µm thick deep-depletion.

**ACQUISITION, GUIDING AND WAVEFRONT SENSING UNITS (AGW)**

- AIP (Potsdam).
  - Units are located at each focal station.
  - Each unit consists of an off-axis probe with a guide camera and a wavefront sensor (Shack-Hartmann).
  - 2 CCD cameras per unit.

**FIRST LIGHT AO SYSTEM (FLAO)**

- Arcetri Observatory.
  - Modules located inside the AGW unit at each LUCI station.
  - 2 CCD cameras per unit (acquisition and wavefront sensing).
  - Pyramid wavefront sensor with adjustable pupil sampling.

**LBT INTERFEROMETER (LBTI)**

- U Arizona and Research Corporation.
  - Cryogenic all-reflective Universal Beam Combiner.
  - Center-bent Gregorian focal station.
  - Nulling IR Camera (NIC) with 2 science channels:
    - NOMIC (7-25 µm).
    - LMIRcam (2-5 µm).
  - Back-bent Gregorian focal station.
  - MCAO with up to 12 NGS (Pyramid WFS).
  - NIR science channel (Hawaii-2).
  - NIR Fringe/Flexure Tracker.
  - CCDs for AO WFS (MHWS: Mid-High Layer and GWS: Ground Layer) and Patrol Cameras.

**LINC-NIRVANA**

- MPIA, INAF, Köln, MPIfR.
  - NIR Fizeau-mode imaging interferometer.
  - Back-bent Gregorian focal station.
  - LBT’s largest instrument.
  - MCAO with up to 12 NGS (Pyramid WFS).
  - NIR science channel (Hawaii-2).
  - Maximum 12 NGS.
  - LMIRcam (2-5 µm).

**POTSdam Echelle POLARIMetRic SPIctroscopy oN AGW (PEPSI)**

- Fiber-fed echelle spectro-polarimeter.
  - Extremely high spectral resolution (up to 130,000).
  - Spectrograph is housed at the base of the telescope pier.
  - Two focal stations.
  - Polarmeters at the f/15 direct Gregorian.
  - Fiber focus next to LINC-NIRVANA.
  - 2 10.6x10.6K for science.
  - 18 CCD cameras for AGW.

**GLAO LASER GUIDE STAR SYSTEM (ARGOS)**

- MPE, MPIA, AIP, Arcetri, U Arizona.
  - 3 “Rayleigh beacons” at 12 Km (above each mirror).
  - Each laser: N6-YAG, 18 W, pulsed @10KHz, 532 nm.
  - On-axis launch behind secondary mirrors.
  - For use with LUCI as science instrument.
  - Shack-Hartmann wavefront sensor.
  - LGS pulse gating with Pocklets cell shutters.
  - WFS cameras by PNIsensor GmbH.

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