Thirty Meter Telescope

The TMT project is a non-profit collaboration among the University of California, the California Institute of Technology, the National Astronomical Observatories of the Chinese Academy of Sciences, the National Institutes of Natural Sciences of Japan, the National Research Council of Canada and the Department of Science and Technology of India.

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Notes

SCAN ME

tmt.org

UNIVERSITY OF CALIFORNIA Caltech

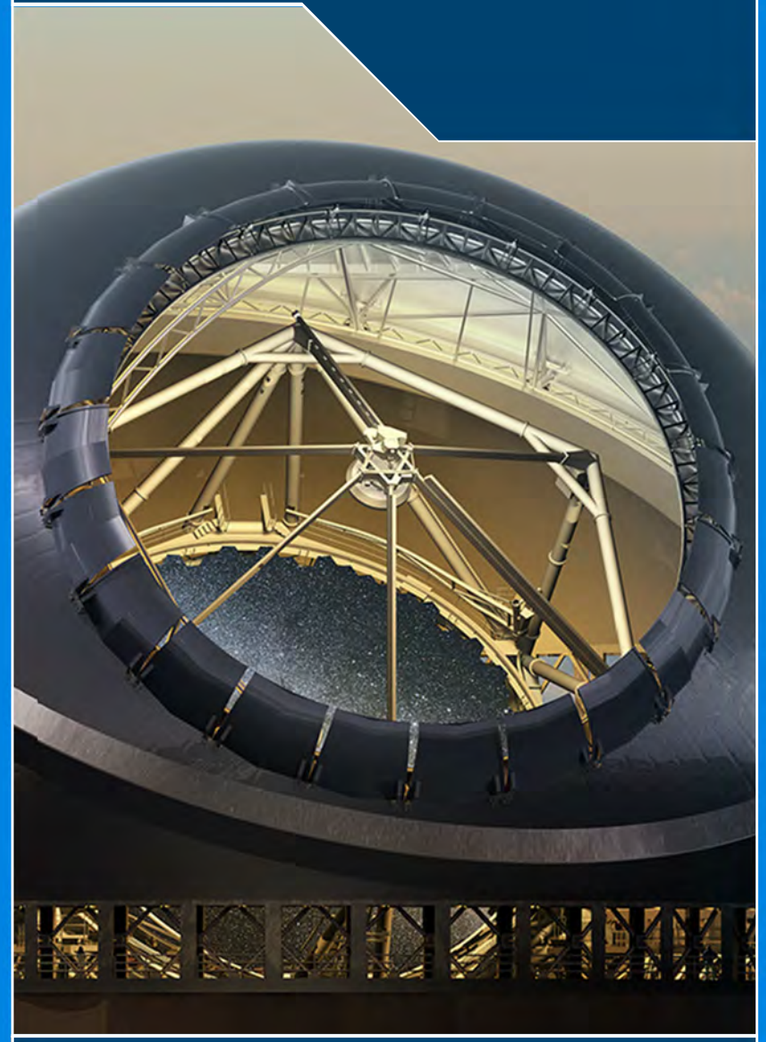
INDIA TMT

NAOC

NRC·CNRC Canada

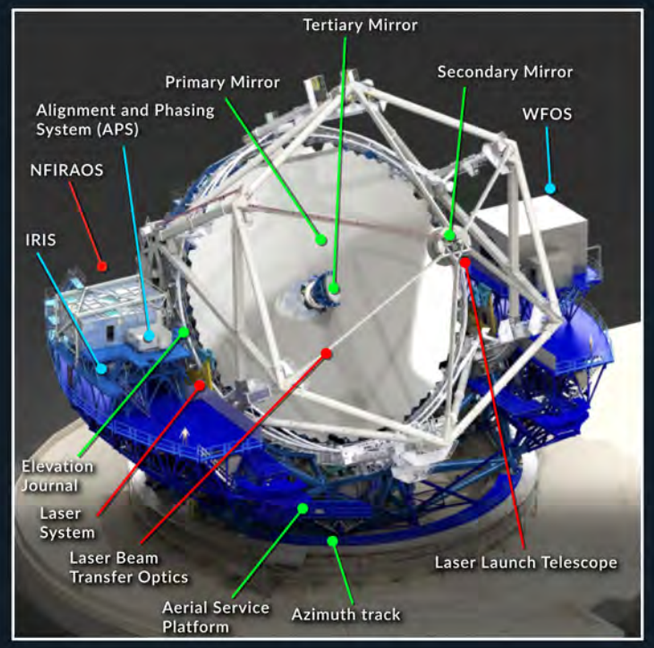
国立天文台 NAOJ National Astronomical Observatory of Japan

TMT
THIRTY METER TELESCOPE



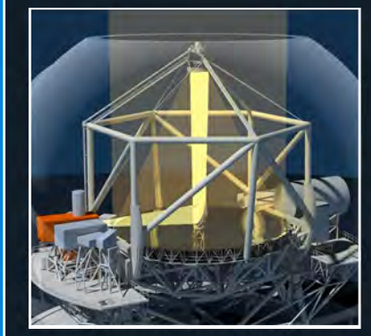
TMT
30 m 望遠鏡
三十米望远镜
तीस मीटर दूरबीन
Thirty Meter Telescope
Télescope de Trente Mètres

TMT International Observatory



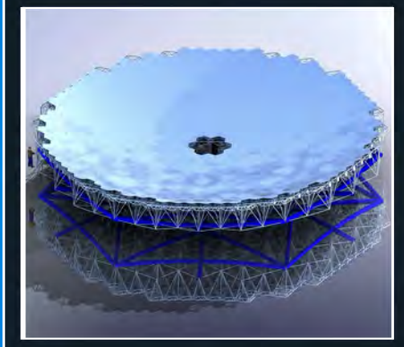
The Thirty Meter Telescope (TMT) will be the largest optical-infrared telescope in the northern hemisphere. At first light, the telescope will be equipped with three powerful science instruments and a laser guide star adaptive optics system that will provide unparalleled imaging and spectroscopic capabilities to scientists worldwide.

- f/15 Ritchey-Chrétien optical design
- Single azimuth track
- Central pintle bearing for lateral resistance
- Elevation axis 3.5 m above M1 vertex
- 21.5 m diameter elevation journals
- On both axes:
  - Hydrostatic bearings
  - Direct drive motors
  - Tape encoders
- Instrument suite located on the Nasmyth platforms.
  - First light configuration includes:
    - InfraRed Imaging Spectrograph (IRIS)
    - Multi-Objective Diffraction-limited High-resolution Infrared Spectrograph (MODHIS)
    - Wide-Field Optical Spectrograph (WFOS)
    - Narrow Field InfraRed Adaptive Optics System (NFIRAOS)
- Maintenance features:
  - Aerial service platform in azimuth assembly
  - M1 segment handling system in elevation assembly
  - Cleaning wands for primary mirror



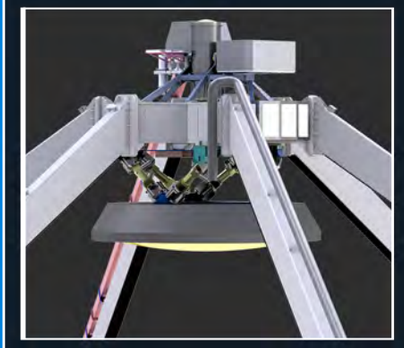
TMT will be a f/15 Ritchey-Chrétien optical system that delivers a well-corrected 20-arcminute field to its scientific instruments. The light will be focused by reflecting on a concave primary mirror (M1), followed by a convex secondary mirror (M2) and finally a flat tertiary mirror (M3). This last optic will be articulated to enable quick re-direction of the beam of light towards any science instruments on the Nasmyth platforms.

Telescope Optical Parameters



Primary Mirror (M1)

- 30 m diameter hyperboloid, f/1
- 492 phased segments (574 including spares)
- 82 different types of curvature
- 1.44 m point-to-point hexagons
- 45 mm thick Clearceram-z ultra low thermal expansion glass-ceramic



Secondary Mirror (M2)

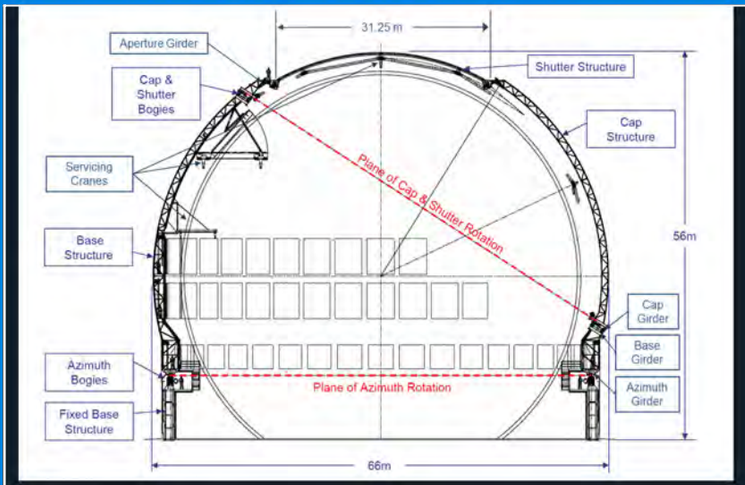
- 3.1 m diameter convex hyperboloid
- 100 mm thick low expansion glass-ceramic
- Position controlled by hexapod to correct optical focus and coma

Tertiary Mirror (M3)

- 2.5 x 3.5 m flat
- 100 mm thick low expansion glass-ceramic
- Two-axis gimbal positioner maintains precise pointing of optical beam towards science instrument

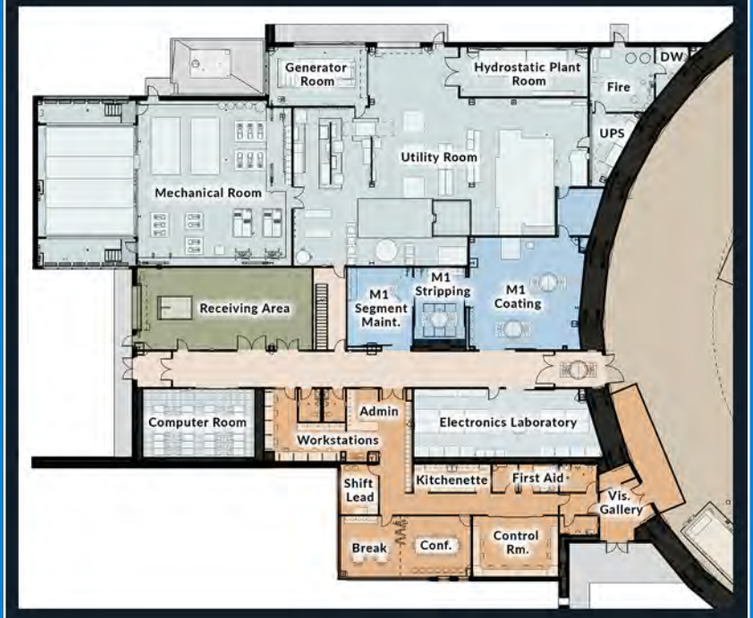
To maintain optimal optical quality, the surface of TMT primary mirror segments needs to be recoated every 18 months. For that purpose, a Segment Handling System (SHS) and its precision robotic hand, mounted on the telescope structure and deployed under a mechanical bridge, will safely replace mirror segments with freshly coated units. This complex operation, repeated every two weeks, will allow an exchange of 10 primary mirror segments in a single day. The SHS will be placed in a stowed position when the telescope is used for observing.

Optics



TMT's enclosure is unique among the Extremely Large Telescopes. Its spherical design will provide maximum protection of the telescope and instruments from weather conditions that could produce wind-induced vibrations and dome-seeing degradation. The TMT enclosure will ensure optimal performance and image quality of the telescope and will be key to the scientific success of TMT. Its main features are:

- Minimal size and aperture, providing maximum protection
- Low mass structure to enable fast repositioning
- 88 individually controlled vents generate non turbulent airflow
- Aerodynamically designed flaps direct airflow over aperture
- Azimuth rotation of enclosure base; tilted rotation axis for cap and shutter



The facilities have been designed to minimize footprint and include all utilities needed for on-site operations: pumps, compressors, refrigeration systems, power conditioning, control room, computer facilities, offices, workshops, optical labs, re-coating chambers, kitchen, restrooms, etc. A viewing gallery located near the main entrance will provide visitors with a unique opportunity to see the inside of the observatory, the science instruments, telescope structure and main optics. The TMT facility has been designed to be zero-discharge. All fluids and waste will be stored in double-wall containers and properly processed at sea-level.

Enclosure - Facilities