

Science Goals

- ❖ Statistical determination of the cosmological parameters H_0 , Ω_M , and Ω_Λ by surveying quasars and supernovae.
- ❖ Search for quasars and observational studies of large scale structures.
- ❖ Determining the parallaxes and proper motions of faint nearby objects.
- ❖ Detection of near earth objects and space debris.
- ❖ Photometric variability studies of stars, RR Lyrae, transiting extra-solar planets, novae, supernovae, AGN, micro-lensing and other transient events.
- ❖ Detection of faint extended objects like low surface brightness and star-forming galaxies, galactic nebulae, supernova remnants etc.
- ❖ Creating a unique database that can be datamined for various science outputs, Machine Learning and Artificial Intelligence applications, testing the next generation of image processing algorithms.

Collaborating Institutes



A colour-composite picture of a small portion of the Devasthal zenith sky observed by the ILMT in May 2022 following its first light observations. The open cluster NGC6834 can be seen at the top left.

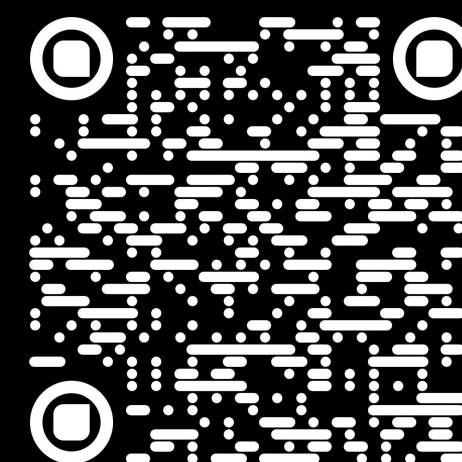


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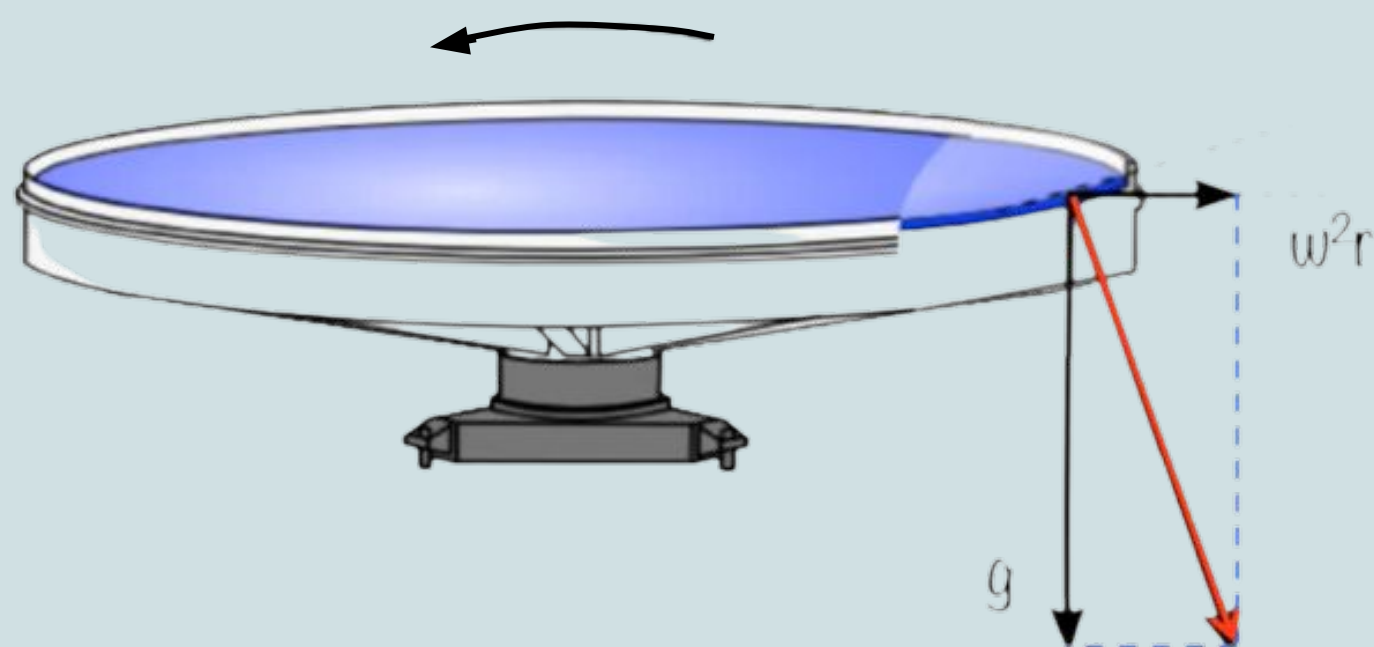


The 4m International Liquid Mirror Telescope



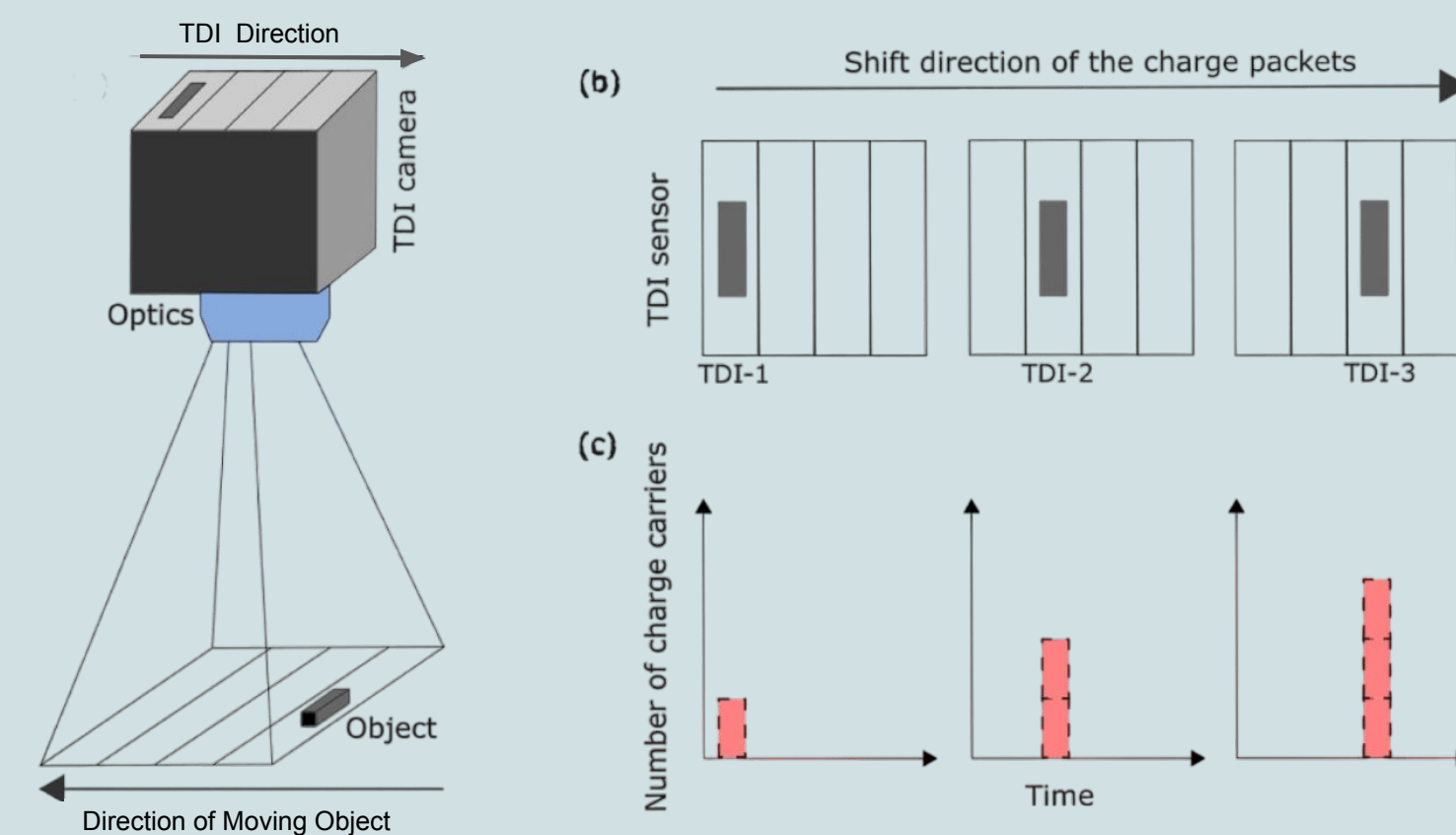
The ILMT is located at the Devasthal Observatory of Aryabhata Research Institute of observational sciences (ARIES), Nainital, Uttarakhand, India. The ILMT is a joint effort of ARIES (India), University of Liège (Belgium), and University of British Columbia (Canada).

Principle



When any liquid is poured in a container and spun, it takes a parabolic shape. In the ILMT, this principle is used to form a primary mirror using liquid mercury. The focal point of this mirror depends on the rotation speed of the container.

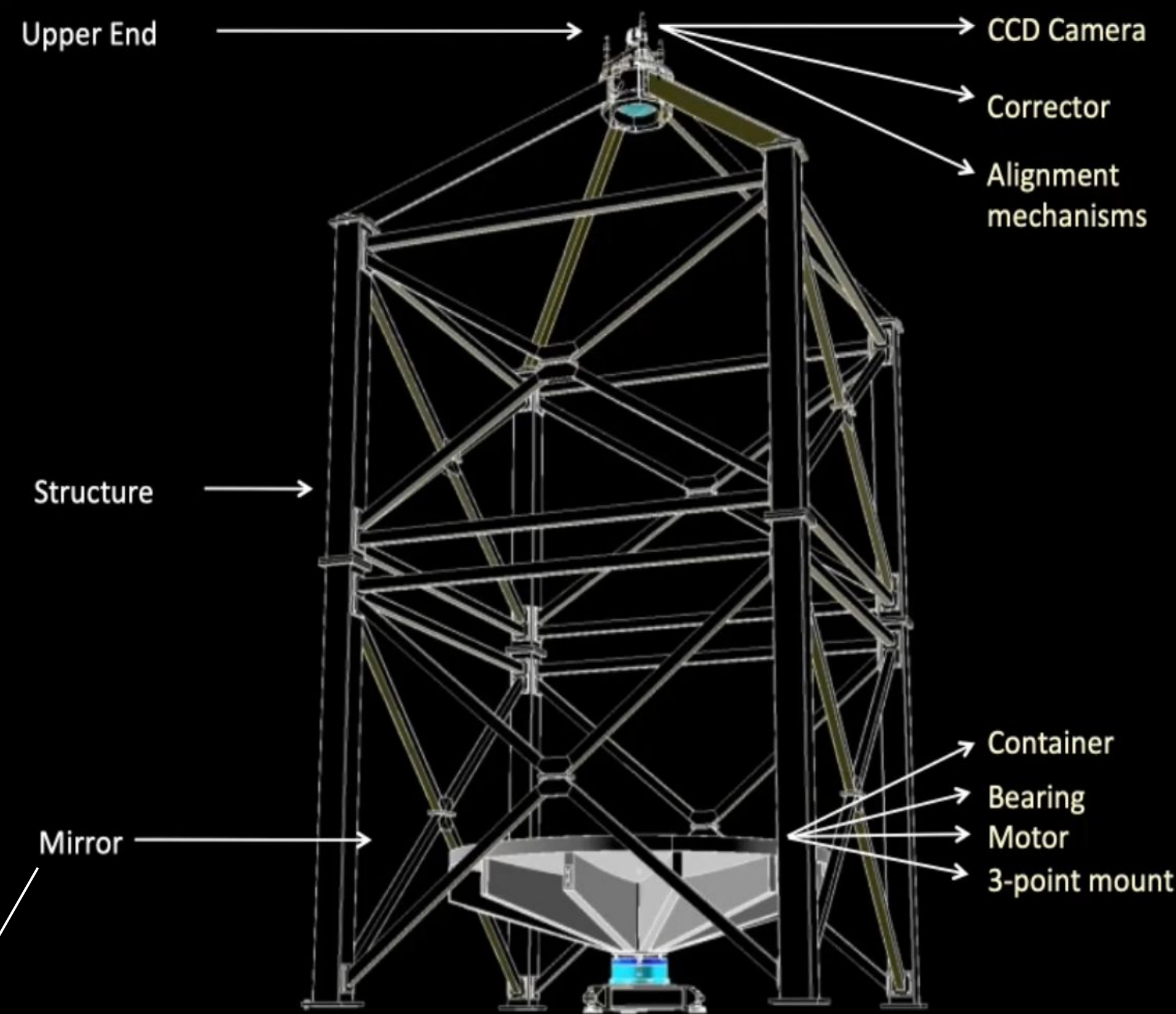
Time Delay Integration (TDI)



By matching the parallel charge transfer rate of the CCD camera to the rotation of the earth, clear images can be formed.

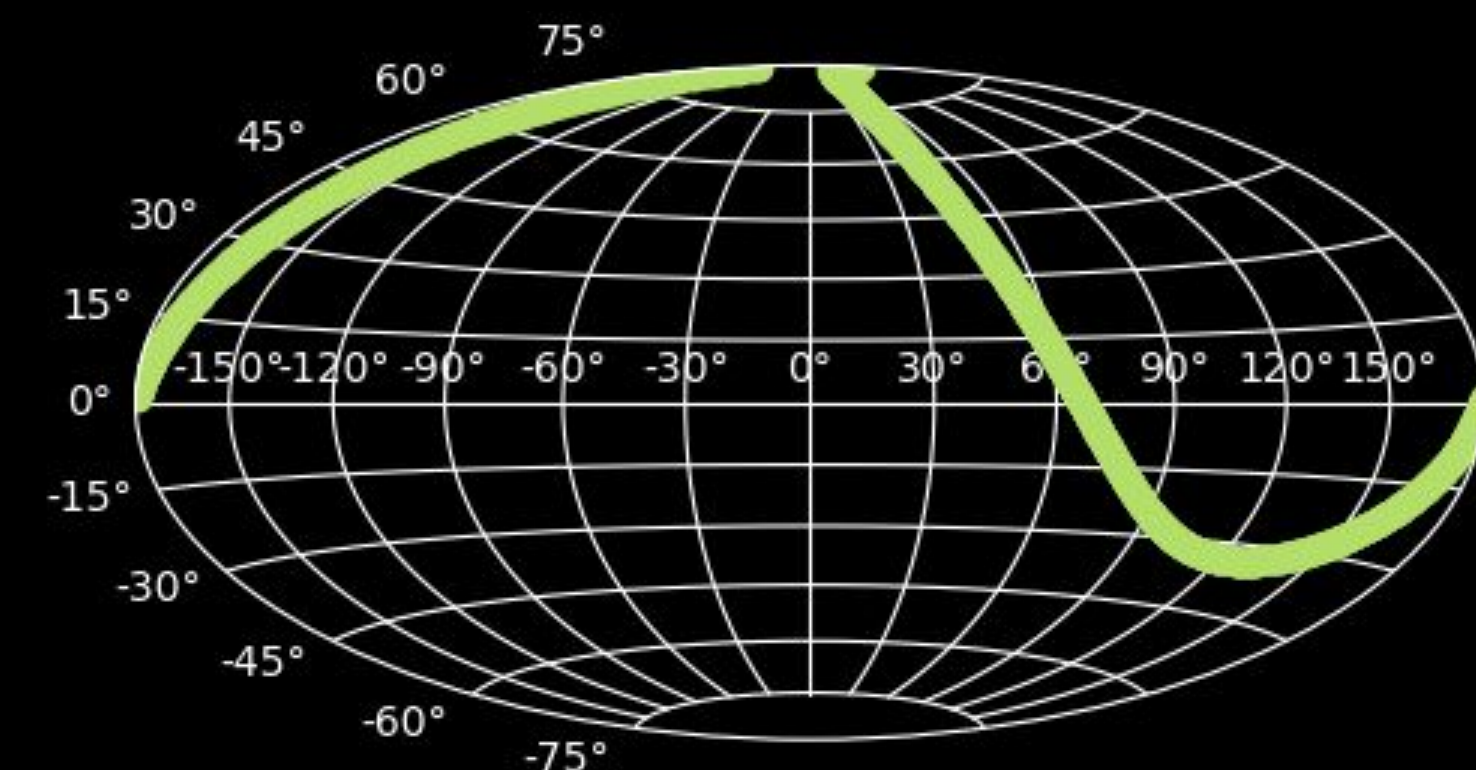
The ILMT

- ❖ The upper end assembly has 3 parts -
 - i) The $4k \times 4k$ CCD camera that works in TDI mode using the Sloan g' , r' and i' filters.
 - ii) A 5-lens optical corrector lens that corrects for the hyperbolic trajectories of objects in the sky.
 - iii) Alignment mechanics to perform minor x and y direction alignments.
- ❖ The state-of-the-art 3-point mount and air bearings facilitate steady rotation minimizing mechanical losses and ripples.



Top view of the liquid mercury mirror covered with a mylar sheet.

- ❖ The telescope scans a strip of width 22 arcmin in the sky at zenith. For comparison the size of the full moon is 31 arcmin. Per night, the telescope has access to around 47 sq. degree of the sky.



The ILMT FoV in Galactic Coordinates