

International Liquid-Mirror Telescope (ILMT)

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In news– The Four-metre International Liquid Mirror Telescope (ILMT) saw the first light recently on **Devasthal, a hill in Uttarakhand**.

About International Liquid-Mirror Telescope (ILMT)-

- The ILMT has been **set up at the Devasthal Observatory campus owned by Aryabhata Research Institute of Observational Sciences (ARIES)**, Nainital in Uttarakhand.
- Having entered the commissioning phase, **it became the world's first liquid-mirror telescope to be commissioned for astronomy**.
- It is the **only one to have been developed for astronomy research and is also the only one of its kind to be operational anywhere in the world**.
- It **will observe asteroids, supernovae, space debris and all other celestial objects** from an altitude of 2,450 metres in the Himalayas.
- The handful of liquid-telescopes that were previously built either tracked satellites or were deployed for military purposes.
- **ILMT will be the third telescope facility to come up at Devasthal** – one of the world's pristine sites for obtaining astronomical observations.
- It will work along with the **3.6-metre Devasthal Optical Telescope (DOT)**, the **largest telescopes operating in India** (of the 4-metre class).
- Also operating at the location is the 1.3-metre **Devasthal Fast Optical Telescope (DFOT)** inaugurated in 2010.
- **India, Belgium, Canada, Poland and Uzbekistan** are the main countries who have **collaborated** to set up the

ILMT.

- The telescope was designed and built at the Advanced Mechanical and Optical Systems Corporation and the Centre Spatial de Liège in Belgium.
- The funding, estimated to range between Rs 30 to Rs 40 crore, was jointly provided by Canada and Belgium and **the operations and up-keep of this telescope is to be done by India.**
- Along with ARIES, the other international institutes involved in the development process include the Institute of Astrophysics and Geophysics, Liège University, Belgium; the Canadian Astronomical Institutes from Vancouver, University of British Columbia; University of Montreal, University of Toronto, University of Victoria, York University, Laval University, Poznan Observatory, Poland; Ulugh Beg Astronomical Institute of Uzbek Academy of Sciences and the National University of Uzbekistan.
- It is estimated that the **ILMT is capable of generating 10-15 GB/night. With ILMT set for operations every night during nine months a year** for the next five years starting October 2022, there will be data generated in gigantic volumes.
- According to international norms, **the data generated by a new telescope facility will be cleaned, maintained and archived at either of the host/participating institutes, in this case, the ARIES.**
- The norms also mandate that for an initial stipulated period, the data will be open only for researchers from these participating institutes.
- At a later stage, the data will be accessible to all global scientific communities.

How does the Liquid mirror telescope work?

- About **50L of mercury-filled into a container** which is rotated at a fixed constant speed along the vertical

axis of the ILMT.

- Following the circular motions, the mercury in the container spreads and forms a thin layer in the container forming a paraboloid-shaped reflecting surface which then acts as the mirror.
- **With a diameter of 4 metre, the surface is ideal to collect and focus light.**

Difference between conventional telescope & liquid-mirror telescope-

- **A conventional telescope is steered to point towards the celestial source of interest** in the sky for observations.
- **The liquid-mirror telescopes, on the other hand, are stationary telescopes that image a strip of the sky** which is at the zenith at a given point of time in the night.
- **It will survey and capture any and all possible celestial objects** – from stars, galaxies, supernovae explosions, asteroids to space debris.
- **Conventional telescopes have highly polished glass mirrors** – either single or a combination of curved ones – that are steered in a controlled fashion to focus onto the targeted celestial object on specific nights. The light is then reflected to create images.
- **The liquid-telescope is made up of mirrors with a reflective liquid**, in this case, mercury – a metal which has a high light-reflecting capacity.
- **Another difference between the two is their operational time.**
- While conventional telescopes observe specific stellar sources for fixed hours as per the study requirement and time allotted by the respective telescope time allotment committee, ILMT will capture the sky's images on all nights – between two successive twilights – for the next

five years starting October 2022.

- To protect it from moisture during monsoon, the ILMT will remain shut for operations between June and August.