Asia’s largest four metre International Liquid Mirror Telescope

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In news- The Union Minister of State (Independent Charge) Science & Technology has recently inaugurated Asia’s largest 4-metre International Liquid Mirror Telescope(ILMT) at Devasthal in Uttarakhand.

About the telescope-

- It is the **first liquid mirror telescope designed exclusively for astronomical observations** and this is the **largest aperture telescope available in the country at present** and is also the **first optical survey telescope in India.**
- Aryabhatta Research Institute of Observational Sciences (ARIES) announced that the world-class 4 metre ILMT is now ready to explore the deep celestial sky. It achieved its first light in the 2nd week of May 2022.
- **The telescope is located at an altitude of 2450 metre at the Devasthal Observatory campus** of ARIES, an autonomous institute under the Department of Science and Technology (DST), Government of India in Nainital district, Uttarakhand.
- **The ILMT collaboration includes researchers from ARIES in India, the University of Liège and the Royal Observatory of Belgium in Belgium, Poznan Observatory in Poland,** the Ulugh Beg Astronomical Institute of the Uzbek Academy of Sciences and National University of Uzbekistan in Uzbekistan, the University of British Columbia, Laval University, the University of Montreal, the University of Toronto, York University and the University of Victoria in Canada.

- **The telescope was designed and built by the Advanced Mechanical and Optical Systems (AMOS) Corporation** and the **Centre Spatial de Liège in Belgium.**
- The ILMT employs a **4-metre-diameter rotating mirror made up of a thin layer of liquid mercury,** to collect and focus light.
- The **metal mercury is in liquid form at room temperature** and at the same time highly reflective. It is ideally suited to form such a mirror.
- The ILMT is **designed to survey the strip of the sky passing overhead each night**, allowing it to **detect transient or variable celestial objects such as supernovae, gravitational lenses,** space debris, and asteroids.
- While scanning the strip of the sky every night, the telescope will generate nearly 10-15 Gigabytes of data and the wealth of ILMT generated data will permit the application of Big Data and Artificial Intelligence/Machine Learning (AI/ML) algorithms that will be implemented for classifying the objects observed with the ILMT.
- The data will be analyzed quickly to discover and discern variable and transient stellar sources.
- The 3.6 metre DOT, with the availability of sophisticated back-end instruments, will allow rapid follow-up observations of the newly-detected transient sources with the adjacent ILMT.
- The data collected from the ILMT, over an operational time of 5 years, will be ideally suited to perform a deep photometric and astrometric variability survey.

- **There are primarily three components in the liquid mirror telescope:**

    1. A bowl containing a reflecting liquid metal (essentially mercury).
    2. An air bearing (or motor) on which the liquid

mirror □sits.

3. A □drive □system.

- Liquid mirror telescopes take advantage of the fact that the surface of a rotating liquid naturally takes on a parabolic shape, which is ideal for focusing light.
- A scientific grade thin transparent film of mylar protects the mercury from wind.
- The reflected light passes through a sophisticated multi-lens optical corrector that produces sharp images over a wide field of view.
- A 4k × 4k CCD camera, located above the mirror at the focus, records 22 arcminute wide strips of the sky.