



India's First Liquid Mirror Telescope

Why in News?

Recently, **Devasthal Observatory campus** owned by **Aryabhata Research Institute of Observational Sciences (ARIES)**, Nainital in Uttarakhand has set-up the **International Liquid-Mirror Telescope (ILMT)**.

What are the Key Highlights about ILMT?

- It has become the **world's first Liquid-Mirror Telescope (LMT) to be commissioned for [astronomy](#)** and also one of its kind to be operational anywhere in the world.
- **Asteroids, supernovae, space debris and all other celestial objects** will be observed using ILMT from an altitude of **2,450 metres in the Himalayas**.
- Previously built telescopes either tracked [satellites](#) or were deployed for military purposes.
- ILMT will be the **third [telescope](#) facility to come up at Devasthal**.
 - Devasthal is **one of the world's original sites** for obtaining astronomical observations.
 - **Devasthal Optical Telescope (DOT)** and **Devasthal Fast Optical Telescope (DFOT)** are the other two telescope facilities at Devasthal.
- In **October 2022, full-scale scientific operations** of ILMT will be started.
- It will be working along with **India's largest operating Devasthal Optical Telescope (DOT)**.
- The countries involved in ILMT's development are **India, Belgium, Canada, Poland and Uzbekistan**.

How is LMT Different from Conventional Telescope?

- A LMT is a **stationary** telescope whereas a conventional telescope **moves along the direction of the object** of interest in the sky.
- A LMT will survey and capture **any and all possible celestial objects** such as stars, galaxies, supernovae explosions, asteroids and even space debris. However, a conventional captures **just a piece of sky at a given point of time**.
- LMT comprises mirrors with a **reflective liquid (ILMT has mercury as reflective liquid)**. On the other hand, a conventional telescope uses **highly-polished glass mirrors**.
- While ILMT will be capturing **images of the sky on all nights**, conventional telescopes observe specific objects in the sky for fixed hours only.

What is the Significance of ILMT?

- **Enormous amount of data** (10-15 GB/night) will be generated. This will be significant for the global scientific communities.
- Latest computational tools, like [Artificial Intelligence](#), **Machine Learning and big data analytics** will be deployed for screening, processing and analyzing the data.
- Selected data can be used as a base data for carrying out **further focused research using spectrographs, near-Infrared spectrograph mounted on the in-house DOT**.

UPSC Civil Services Examination, Previous Year Question

Q. In the context of modern scientific research, consider the following statements about 'IceCube', a particle detector located at South Pole, which was recently in the news: (2015)

1. It is the world's largest neutrino detector, encompassing a cubic kilometre of ice.
2. It is a powerful telescope to search for dark matter.
3. It is buried deep in the ice.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (d)

Exp:

- IceCube Neutrino Observatory is buried deep inside Antarctic ice and is spread over a cubic kilometre. **Hence, statements 1 and 3 are correct.**
- Weakly Interacting Massive Particle (WIMP) dark matter could be gravitationally captured by massive objects like the Sun and accumulate in the core of the Sun.
- With such high density of these particles, they annihilate each other at a significant rate. The products of this annihilation decay into neutrinos, which could be observed by IceCube as an excess of neutrinos from the direction of the Sun.
- IceCube was built specifically to identify and track high-energy neutrinos. **Hence, statement 2 is correct.**
- The National Science Foundation (a US agency that supports fundamental research) provided the primary funding for the IceCube Neutrino Observatory, with assistance from partner funding agencies around the world.
- **Therefore, option (d) is the correct answer.**

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