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**News: Thirty Meter Telescope (TMT)**

- Recently, Indian researchers at the Indian Institute of Astrophysics (IIA) in Bengaluru have developed a new online tool to create a comprehensive star catalogue for the Adaptive Optics System (AOS) of the upcoming Thirty Meter Telescope (TMT).

**Thirty Meter Telescope (TMT)**

- Thirty Meter Telescope (TMT) is an under-construction astronomical observatory with an extremely large telescope.
- It is an international project being funded by scientific organisations of Canada, China, India, Japan and USA.
- It is being constructed in Mauna Kea island of Hawaii Islands in USA. India demands to change the location citing ecological problems.
- TMT is 12 times sharper than Hubble Space Telescope.
- The TMT is a next-generation astronomical observatory designed to provide unprecedented resolution and sensitivity with its massive 30-meter primary mirror, advanced adaptive optics system, and state-of-the-art instruments.

- The TMT, the Giant Magellan Telescope, and the European Southern Observatory's Extremely Large Telescope represent the future of ground-based astronomy.

### **Primary Goals**

- Study the early universe and the formation and evolution of the first galaxies and stars after the Big Bang.
- Investigate the formation, structure, and evolution of galaxies across cosmic time.
- Study the relationship between supermassive black holes and their host galaxies.
- Investigate the formation of stars and planetary systems.
- Characterise exoplanets and study their atmospheres.

### **Adaptive Optics System (AOS) and New Online Tool**

- The TMT's AOS, known as the Narrow Field Infrared Adaptive Optics System (NFIRAOS), uses deformable mirrors and laser guide stars (LGS) to correct atmospheric turbulence, enhancing image resolution.

- This facility will project up to nine lasers into the sky to create artificial guide stars. However, atmospheric turbulence affects these laser beams, so measuring atmospheric tip-tilt is uncertain.
- To correct these effects, the AO system requires feedback from three real stars, known as Natural Guide Stars (NGS).
- Researchers have developed an automated code that can be used as an online tool to create a catalogue of Near Infrared (NIR) stars.
- The automated code can compute the expected near-infrared magnitudes of stellar sources identified in various optical sky surveys using their optical magnitudes.

