PM SHRI KENDRIYA VIDYALAYA SIVAGANGA

Reading comprehension: **Prepared by: - Mohanadevi.R, TGT English**

Read the following newspaper article and answer the questions that follow:

IIA researchers develop online tool to create star catalogue

Indian researchers at the Indian Institute of Astrophysics (IIA) in Bengaluru and their collaborators 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).

TMT is an international scientific endeavor which would come up at Maunakea in Hawaii.

According to the Department of Science and Technology, the TMT, the Giant Magellan Telescope, and the European Southern Observatory's Extremely Large Telescope represent the future of ground-based astronomy.

India is a key partner in the TMT project, with India TMT Center at IIA leading the national collaboration.

The new tool can enable this ground-based telescope, which is one of the largest to be operational in the next decade, to generate sharper astronomical images.

"The AOS on TMT, known as the Narrow Field Infrared Adaptive Optics System (NFIRAOS), will be enhanced by a Laser Guide Star (LGS) facility. 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)," said Dr. Sarang Shah from IIA.

Researchers at the IIA and their collaborators 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," said Dr. Smitha Subramanian, co-author and faculty at IIA.

Using multi-band optical photometry from the PAN-STARRS telescope, the researchers filtered and identified stars, predicting their near-infrared magnitudes through innovative methods. They validated their approach using data from the UKIDSS survey of the United Kingdom Infrared Telescope, achieving over 85% accuracy in their NIR magnitude predictions.

India's participation in the TMT collaboration involves the IIA, the Inter-University Center for Astronomy and Astrophysics (IUCAA), Pune, and the Aryabhatta Research Institute for Observational Sciences (ARIES), Nainital.

Credit to: THE HINDU

Now answer the questions that follow:

1. What is the purpose of the new online tool developed by Indian researchers?

☐ A) To create a comprehensive star catalog for the Adaptive Optics System (AOS) of the TMT.

☐ B) To enhance the Giant Magellan Telescope's imaging capabilities.

☐ C) To study atmospheric turbulence in the Maunakea region.

2. Where will the Thirty Meter Telescope (TMT) be located?

☐ A) Bengaluru, India

☐ B) Maunakea, Hawaii

☐ C) Nainital, India

3. Which telescopes are considered the future of ground-based astronomy, according to the Department of Science and Technology?

☐ A) TMT, Giant Magellan Telescope, and European Southern Observatory's Extremely Large Telescope

☐ B) Hubble Space Telescope, James Webb Space Telescope, and Chandra X-ray Observatory

☐ C) Kepler Space Telescope, Spitzer Space Telescope, and ALMA Observatory

4. What role does India play in the TMT project?

☐ A) India is the primary funding source for the TMT.

☐ B) India leads the national collaboration through the India TMT Center at IIA.

☐ C) India provides technical support for the European Southern Observatory.

5. What is the primary function of the Adaptive Optics System (AOS) on the TMT?

☐ A) To create artificial guide stars using lasers.

☐ B) To correct atmospheric turbulence effects for sharper astronomical images.

☐ C) To measure natural guide stars' brightness.

6. Why does the AOS require feedback from Natural Guide Stars (NGS)?

☐ A) To calibrate the laser guide star facility.

☐ B) To compensate for atmospheric tip-tilt effects.

☐ C) To validate the automated code's predictions.

7. What type of stars does the automated code aim to catalog?

☐ A) Near Infrared (NIR) stars

☐ B) Optical stars

☐ C) Radio stars

8. How does the automated code compute near-infrared magnitudes for stellar sources?

☐ A) By directly measuring their brightness in the NIR spectrum.

☐ B) By using optical magnitudes from various sky surveys.

☐ C) By analyzing X-ray emissions.

9. Which telescope's data was used to validate the approach in predicting near-infrared magnitudes?

☐ A) PAN-STARRS telescope

☐ B) Hubble Space Telescope

☐ C) UKIDSS survey of the United Kingdom Infrared Telescope

10. Name at least two Indian institutions involved in the TMT collaboration.

☐ A) Indian Institute of Astrophysics (IIA) and Inter-University Center for Astronomy and Astrophysics (IUCAA)

☐ B) Tata Institute of Fundamental Research (TIFR) and Bhabha Atomic Research Centre (BARC)

☐ C) Indian Space Research Organisation (ISRO) and National Centre for Radio Astrophysics (NCRA)

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