



India to Join SKAO as a Full Member

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Why in News?

India will also be part of the **world's largest radio telescope project** called the [Square Kilometre Array Observatory \(SKAO\)](#).

- Countries have to **sign, and ratify, the SKAO convention** to formally become members. The **Government of India's** approval for joining the project, with a financial sanction of Rs **1,250 crore**, is the first step towards the ratification.

What is the SKAO?

- **About:** SKAO is an intergovernmental organization that aims to build and operate **cutting-edge radio telescopes**. Its global headquarters is located in the **Jodrell Bank Observatory, United Kingdom**.
 - The project will not have a single telescope but an **array of thousands of antennas**, to be installed in **remote radio-quiet locations in South Africa and Australia**, that will operate as one large unit meant to observe and study celestial phenomena.
 - SKAO objectives also include study of [gravitational waves](#).
 - Some of the countries taking part in building the SKA include the **UK, Australia, South Africa, Canada, China, France, India, Italy and Germany**.
- **India's Role in SKAO:**
 - India, through the Pune-based **National Centre for Radio Astrophysics (NCRA)** and other institutions, has played a key role in the development of the ambitious SKAO project since its inception in the **1990s**.
 - India's primary contribution to SKAO lies in the development and operation of the **Telescope Manager element**, essentially the "**neural network**" or software that controls the entire telescope's operation.

Note

NCRA is a research institution in India that specializes in radio astronomy. It is located on the **Pune University Campus** and is part of the **Tata Institute of Fundamental Research (TIFR)** in Mumbai.

What is a Radio Telescope?

- **About:** A **radio telescope** is a specialized type of **antenna and receiver system** used to detect and collect radio waves emitted by celestial objects.

- Radio waves are **EM (Electromagnetic)** waves that have wavelengths between **1 millimeter and 100 kilometers**.
- Unlike optical telescopes, **radio telescopes can be used in the daytime as well as at night**.
- **Applications:** Radio telescopes are used to study a wide range of astronomical phenomena, including:
 - The formation and evolution of stars and galaxies
 - Black holes and other active galactic nuclei
 - The interstellar medium
 - Planets and moons in our solar system
 - The search for extraterrestrial life
- **Major Radio Telescopes:**
 - **Giant Metrewave Radio Telescope (India)**
 - In **June 2023**, GMRT (near Pune) played a crucial role in the **first-ever detection of nano-hertz gravitational waves**, showcasing its vital role in cutting-edge astronomical research.
 - **SARAS 3 (India)**
 - **Atacama Large Millimetre/submillimetre Array (ALMA) (Atacama Desert, Chile)**
 - **Five-hundred-metre Aperture Spherical Telescope (FAST) (China)**

What are Gravitational Waves?

- **About: Gravitational waves** are ripples or vibrations in the very fabric of spacetime. For instance, when a pebble is dropped in a pond, the resulting ripples are analogous to gravitational waves, but instead of water, **they propagate through the fundamental structure of the universe**.
 - In 1916, Albert Einstein forecasted the presence of gravitational waves within his theory of general relativity.
- **Prominence:** Gravitational wave research, **as evidenced by the 2017 Nobel Prize awarded for the first detection using Laser Interferometer Gravitational Wave Observatory (LIGO)**, holds immense potential for scientific breakthroughs. Recently, India gave its go-ahead to construct the third node of the LIGO in **Hingoli district of Maharashtra**.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q. Consider the following (2008):

Assertion (A): Radio waves bend in a magnetic field.

Reason (R): Radio waves are electromagnetic in nature.

Which of the following is correct?

- (a) Both A and R are individually true, and R is the correct explanation of A
- (b) Both A and R are individually true, but R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true

Ans: (a)

Q. A layer in the Earth's atmosphere called Ionosphere facilitates radio communication. Why? (2011)

1. The presence of ozone cause the reflection of radio waves to Earth.
2. Radio waves have a very long wavelength.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (d)

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