SARAS 3 Telescope and Clues to First Stars

Why in News?

Recently, by using the **SARAS-3 Radio Telescope**, scientists have determined the properties of a radio luminous galaxy that was formed just 200 million years after the Big Bang, a period known as the Cosmic Dawn.

- Researchers have used **data from SARAS 3 to throw light on the energy output, luminosity, and masses of the first generation of galaxies** that are bright in radio wavelengths.

What are the Findings?

- The new information **on the period Cosmic Dawn** gave an insight into the properties of the **earliest radio loud galaxies** that are usually powered by **supermassive black holes.**
- SARAS 3 had improved the understanding of **astrophysics of Cosmic Dawn by telling astronomers that less than 3% of the gaseous matter within early galaxies was converted** into stars, and that the earliest galaxies that were bright in radio emission were also strong in X-rays, which heated the cosmic gas in and around the early galaxies.

What is SARAS-3 Radio Telescope?

- SARAS is a niche high-risk high-gain experimental effort of RRI (Raman Research Institute).
  - SARAS-3 was deployed over Dandiganahalli Lake and Sharavathi backwaters, located in Karnataka, in early 2020.
- SARAS aims to design, build and deploy in India a precision radio telescope to detect extremely faint radio wave signals from the depths of time, from our “Cosmic Dawn” when the first stars and galaxies formed in the early Universe.

What are Radio Waves and Radio Telescopes?

- **Radio Waves:**
  - Radio waves have the longest wavelengths in the electromagnetic spectrum. They range from the **length of a football to larger than our planet.** Heinrich Hertz proved the existence of radio waves in the late 1880s.
  - The range of the radio spectrum is considered to be **3 kilohertz up to 300 gigahertz.**
- **Radio Telescope:**
  - Radio telescopes collect weak radio light waves, bring it to a focus, amplify it and make it available for analysis.
  - They help study naturally occurring radio light from **stars, galaxies, black holes, and other astronomical objects.**
  - These specially-designed **telescopes observe the longest wavelengths of light, ranging from 1 millimetre to over 10 metres long.** For comparison, visible light waves are only a few hundred nanometers long, and a nanometer is only 1/10,000th the thickness of a piece of paper. In fact, we don’t usually refer to radio light by its wavelength, but by its frequency.

Source: TH