



GMRT Reveals Fast Radio Bursts

Why in News?

Recently, the Astronomers of National Center of Radio Astrophysics (NCRA-TIFR) in Pune and the University of California in the US have used the [Giant Metrewave Radio Telescope \(GMRT\)](#) to map the distribution of atomic hydrogen gas from the host galaxy of a **Fast Radio Burst (FRB)** for the first time.

What are Fast Radio Bursts?

- The **first FRB was discovered in 2007**, since when scientists have been **working towards finding the source of their origin**.
- Essentially, FRBs are **bright bursts of radio waves** (radio waves can be produced by astronomical objects with changing magnetic fields) **whose durations lie in the millisecond-scale**, because of which it is difficult to detect them and determine their position in the sky.
- These extraordinary events **generate as much energy in a thousandth of a second as the Sun does in a year**.
- Locating where these blasts are coming from, and in particular, what galaxies they originate from, is important in determining what kinds of astronomical events trigger such intense flashes of energy.
- **One of the best-known fast radio bursts is FRB20180916B.**
 - This FRB was discovered in 2018 and is only 500 million light-years away from us in another galaxy.
 - The FRB is the closest so far and has a burst pattern that repeats every 16 days: four days of bursts, 12 days of relative quiet. That predictability makes it an ideal object for researchers to study.

What does the Study Suggest?

- The **FRB (FRB20180916B) host galaxy has undergone a recent merger and that the FRB progenitor is most likely a massive star** formed due to this merger event.
- The **atomic hydrogen gas contained by the host galaxy was found to be ten times more than the nearby galaxies**. But despite such large atomic hydrogen gas, **the number of stars were relatively fewer**. It thus indicates that the **surplus hydrogen gas was recently acquired after a possible merger between two galaxies**.

What is GMRT?

- GMRT is **an array of thirty fully steerable parabolic radio telescopes** of 45 meter diameter. It is operated by the National Center for Radio Astrophysics of the Tata Institute of Fundamental Research (NCRA-TIFR).
- GMRT is **an indigenous project. Its design is based on the `SMART' concept** - for Stretch Mesh Attached to Rope Trusses.
- It functions at the meter wavelength part of the radio spectrum because man-made radio interference is considerably lower in this part of the spectrum in India and there are many outstanding astrophysics problems which are best studied at metre wavelengths.
- The **location for GMRT, Pune meets several important criteria** such as low man-made radio

noise, availability of good communication, vicinity of industrial, educational and other infrastructure and, a geographical latitude sufficiently north of the geomagnetic equator in order to have a reasonably quiet ionosphere and yet be able to observe a good part of the southern sky as well.

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