

# Giant Metrewave Radio Telescope (GMRT)

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**In news-** Recently, the Astronomers from the National Centre of Radio Astrophysics (NCRA-TIFR) in Pune, and the University of California, Santa Cruz, using GMRT have discovered the first direct evidence of a recent merger in a fast radio burst (FRB) galaxy.

## **Key findings**

- The discovery showcases the ability of the GMRT to identify such mergers.
- They used the GMRT to map the distribution of atomic hydrogen gas from the galaxy where the FRB was located, revealing exciting clues about the origin of the burst.
- The study signified the importance of the original GMRT because scientists could use different combinations of the 30 GMRT antennas to both map the atomic hydrogen within the fast radio burst (FRB) host galaxy in detail, and also search for hydrogen in nearby companion galaxies.
- The collision is likely to have also compressed the gas in the galaxy outskirts, giving rise to a burst of star formation near the FRB position.
- Overall, the GMRT images suggest that the FRB progenitor is likely to be a massive star, formed due to the merger event.
- This is the first case of direct evidence for a recent merger in an FRB host, a major step towards understanding the progenitors of FRBs.
- FRBs are transient, bright pulses of emission from distant galaxies at radio wavelengths (seen mostly at wavelengths of tens of centimeters) whose bursts last at most for a few milliseconds.

- FRB20180916B is one of the closest known, an ideal candidate to study the local burst environment.
- It emitted radio pulses once every 16 days and was located on the outskirts of a galaxy located about half a billion light years away.
- The Canadian Hydrogen Intensity Mapping experiment (CHIME), responsible for detecting nearly 800 FRBs, traced FRB20180916B.
- The surprise was the amount of atomic hydrogen in the FRB galaxy, around ten times more than that found in similar nearby galaxies.

### **About GMRT-**

- It is an array of thirty fully steerable parabolic radio telescopes of 45 metre diameter, observing at metre wavelengths.
- It is located near Pune, Junnar, near Narayangaon at Khodad in India.
- GMRT is designed, built and operated by Indian scientists and engineers.
- It is used by radio astronomers from across the world to study our Universe.
- GMRT was set up by National Centre for Radio Astrophysics (NCRA) for radio astronomical research using the metre wavelength range of the radio spectrum.
- NCRA is a part of the Tata Institute of Fundamental Research, Mumbai.
- It was conceived and built under the direction of Late Prof. Govind Swarup during 1984 to 1996.
- It is an interferometric array with baselines of up to 25 kilometres.
- It was recently upgraded with new receivers, after which it is also known as the Upgraded Giant Metrewave Radio Telescope (uGMRT).
- In 2021, GMR was bestowed with the Institute of Electrical and Electronics Engineers (IEEE) milestone

recognition.

- This is only the third time an Indian facility has received this milestone, after J C Bose's demonstration of generation and reception of radio waves in 1895 and the discovery of the Raman Effect by C V Raman in 1928.
- However, IEEE recognitions to these had come in 2012.
- The IEEE is the world's largest technical body publishing research in engineering and computing in addition to awarding standards to institutions and organizations involved in these fields.