

Scientists Spot Fast Radio Burst From Space Dating Back 8 Billion Years

Why In News

- Record-breaking radio burst could help us find the universe's missing matter. Astronomers have detected a **mysterious blast of radio waves** that have taken 8 billion years to reach Earth. The fast radio burst is one of the most distant and energetic ever observed.



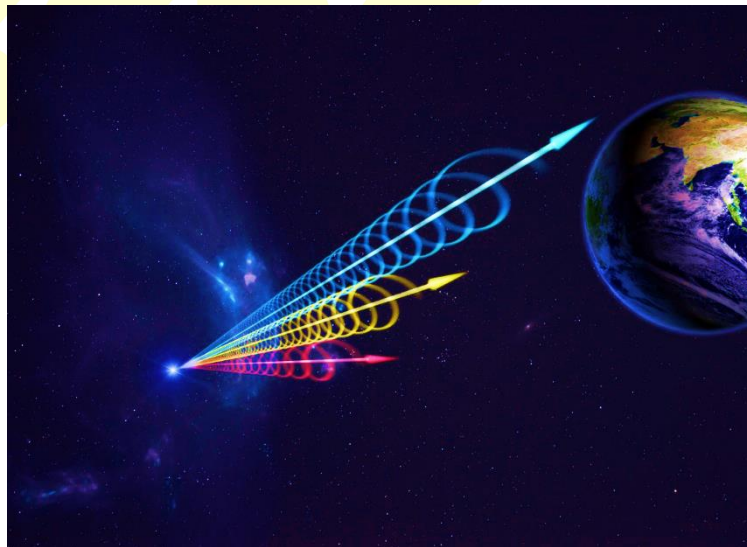
Who Detected

- The burst, designated FRB 20220610A, was spotted by the **Australian Square Kilometre Array Pathfinder (ASKAP)**, an array of radio telescopes located in Western Australia.
- European Southern Observatory Very Large Telescope Used in Chile to search for the source galaxy, finding it to be older and further away than any other FRB source found to date, and likely within a small group of merging galaxies.”



Fast Radio Bursts

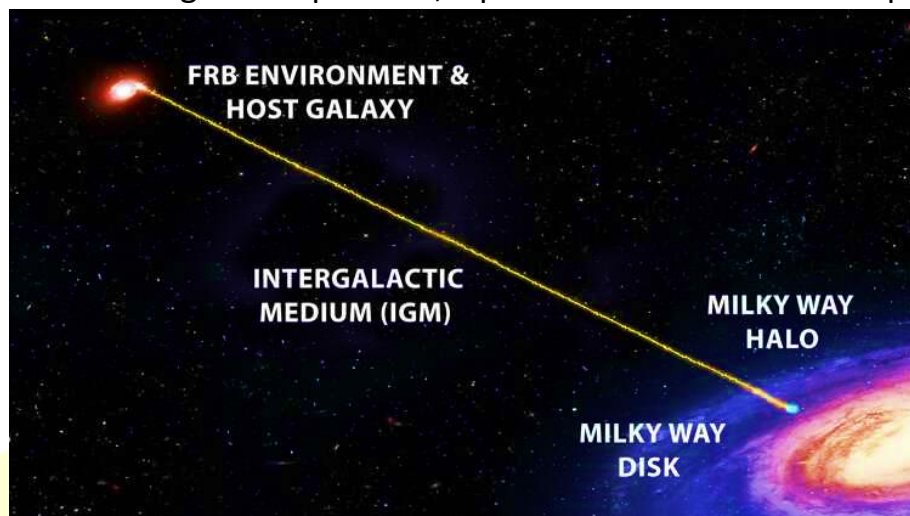
- Fast radio bursts, or FRBs, are **intense, millisecond-long bursts** of radio waves with unknown origins.
- This “fast radio burst” is the most distant ever detected and its source is in a galaxy so far away that it took eight billion years to reach us.
- It is also one of the most energetic ones ever observed.
- The **first FRB was discovered in 2007**, and since then, hundreds of these quick, cosmic flashes have been detected coming from distant points across the universe.
- The burst, named FRB 20220610A, lasted **less than a millisecond**, but in that fraction of a moment, it released the equivalent of our **sun’s energetic emissions over the course of 30 years** according to a study published Thursday in the journal Science.
- Many FRBs release super bright radio waves lasting only a few milliseconds at most before disappearing, which makes fast radio bursts difficult to observe.



How It Will Help To Detect Missing Matter

- Scientists count up the amount of normal matter in the Universe — the atoms that we are all made of & find that more than half of what should be there today is missing.
- They think that the missing matter is **hiding in the space between galaxies**, but it may just be so hot and diffuse that it’s impossible to see using normal techniques,”.

- It confirms that fast radio bursts (FRBs) can be **used to measure the “missing” matter between galaxies**. Fast radio bursts sense this ionised material, .
- “Even in space that is nearly perfectly empty **they can ‘see’ all the electrons**, and that allows us to measure how much stuff is between the galaxies.”
- As fast radio bursts **travel through galaxies and in between them**, they pass through hot gas, which causes their low-frequency radio waves to slow down more than those at higher frequencies, a phenomenon known as dispersion.



- This means that **radio waves with distinct frequencies** reach telescopes on Earth at slightly different times, enabling scientists to infer the presence of material that is too hot and spread out for other types of telescopes to detect directly
- Still don't know **what causes these massive bursts** of energy, the paper confirms that fast radio bursts are common events in the cosmos and that we will be able to use them to detect matter between galaxies, and better understand the structure of the Universe.



Macquart Relation

- This method of using fast radio bursts to detect missing matter was demonstrated by the late Australian astronomer **Jean-Pierre Macquart in 2020**.
- “J-P showed that the (farther) away a fast radio burst is, the more diffuse gas it reveals between the galaxies. This is now known as the Macquart relation,”

