Radio Burst in Milky Way

Why in News

Recently, the **National Aeronautics and Space Administration** (NASA) has spotted **fast Radio Burst** for the first time in the **Milky Way.**

Key Points

- **Fast Radio Burst:**
    - FRB 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.
    - It was **first discovered in 2007.**
- **Discovery of FRB in Milky Way:**
    - **NASA** observed **a mix of X-ray and radio signals** never observed before in the Milky Way.
    - The X-ray portion of the simultaneous bursts was detected by several satellites, including **NASA's Wind mission.**
        - **NASA's Wind** is a spin stabilized spacecraft launched on 1st November, 1994. After several orbits through the magnetosphere, Wind was placed in a halo orbit around the **L1 Lagrange point** in early 2004 to observe the unperturbed solar wind that is about to impact the magnetosphere of Earth.
    - The **radio component** was discovered by the **Canadian Hydrogen Intensity Mapping Experiment (CHIME),** a radio telescope located at Dominion Radio Astrophysical Observatory in British Columbia, which is led by McGill University in Montreal, the University of British Columbia, and the University of Toronto.
        - **CHIME** is a novel radio telescope that has no moving parts. Originally conceived to map the most abundant element in the universe - hydrogen - over a good fraction of the observable universe, this unusual telescope is optimized to have a high "mapping speed".
- **Source of FRB in Milky Way:**
    - The source of the FRB detected recently in the Milky Way is a very powerful **magnetic** neutron star referred to as a **magnetar,** called **SGR 1935+2154 or SGR 1935,** which is located in the **constellation Vulpecula** and is estimated to be between 14,000-41,000 light-years away.
    - The FRB was part of one of the magnetar's most prolific flare-ups, with the X-ray bursts lasting less than a second.
    - The radio burst, on the other hand, lasted for a thousandth of a second and was thousands of times brighter than any other radio emissions from magnetars seen in the Milky Way previously.
        - It is possible that the FRB-associated burst was exceptional because it likely

occurred at or close to the magnetar's magnetic pole.

- This flare-up, which lasted for hours, was picked up by **NASA's Fermi Gamma-ray Space telescope and NASA's Neutron star Interior Composition Explorer (NICER).**

    - **The Fermi Gamma-ray Space Telescope,** formerly called the Gamma-ray Large Area Space Telescope (GLAST), is a space observatory being used to perform gamma-ray astronomy observations from low Earth orbit.
    - **NASA's Neutron star Interior Composition Explorer** is an **International Space Station (ISS)** payload devoted to the study of neutron stars through soft X-ray timing.

Magnetar

- As per NASA, a **magnetar** is a neutron star, "the crushed, city-size remains of a star many times more massive than the Sun."
- The **magnetic field of such a star is very powerful,** which can be over 10 trillion times stronger than a refrigerator magnet and up to a thousand times stronger than a typical **neutron star's.**

    - **Neutron stars** are formed when the core of a massive star undergoes gravitational collapse when it reaches the end of its life. This results in the matter being so tightly packed that even a sugar-cube sized amount of material taken from such a star weighs more than 1 billion tons, which is about the same as the weight of Mount Everest, according to NASA.
- Magnetars are a subclass of these neutrons and occasionally release flares with more energy in a fraction of a second than the Sun is capable of emitting in tens of thousands of years.
- In the case of **SGR 1935,** for instance, the X-ray portion of the simultaneous bursts it released recently carried as much energy as the Sun produces in a month, assuming that the magnetar lies towards the nearer end of its distance range.

Source:IE