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