



# X-ray Polarimeter Satellite: ISRO

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## Why in News?

Recently, the [Indian Space Research Organisation \(ISRO\)](#) has launched its **first X-ray Polarimeter Satellite (XpoSat)** to study **X-ray polarisation and its cosmic sources**, like [Black holes](#), [Neutron stars](#), and [Magnetars](#).

- The mission is propelled by the PSLV-C58 rocket in **Low Earth Orbit**.

## What is an X-ray Polarimeter Satellite (XpoSat)?

- **Purpose:**
  - XPoSat is designed to study X-ray polarization in the medium X-ray band, offering insights into celestial sources' radiation mechanisms and geometry.
  - This study is crucial for **understanding the physics behind these celestial bodies**.
- **Payloads:**
  - The satellite carries two main payloads, **POLIX (Polarimeter Instrument in X-rays)** and XSPECT (X-ray Spectroscopy and Timing).
  - POLIX will observe **about 40 bright astronomical sources**, while XSPECT will study the electromagnetic spectrum generated by different matter.
- **Development:**
  - Entirely **built by two Bengaluru-based institutes**—ISRO's UR Rao Satellite Centre and Raman Research Institute—XPoSat's development began in 2008, with a formal agreement signed with ISRO in 2015.
- **Global Context:**
  - XPoSat is **only the world's second mission dedicated to X-ray polarization** in the medium X-ray band. [NASA's Imaging X-ray Polarimetry Explorer \(IXPE\)](#), launched in 2021, was the first such mission by a space agency.
- **National Contribution:**
  - XPoSat will be India's third space-based observatory, following the recently launched solar mission [Aditya-L1](#) and [AstroSat](#), which was launched in 2015. Its launch is seen as a significant stride for Indian astronomy and space research.

## What is X Ray and How will it Study the Celestial Objects?

- X-rays are **electromagnetic radiation** whose wavelength is 0.01-10 nanometres.
  - Electromagnetic radiation is characterised by **an electric field and a magnetic field vibrating perpendicular to each other**.
    - The **polarisation of electromagnetic radiation** refers to the orientation of these two fields as the radiation moves through space.
- X-rays can be polarised when they get scattered. Polarised X-rays are also produced when the path of a fast-moving charged particle is bent by a magnetic field.
- Measuring the polarization of X-rays using instruments like POLIX enables astronomers to understand the **orientation and strength of magnetic fields in celestial objects**. This, in turn, provides crucial **insights into the nature and behavior of pulsars**, regions around black

holes, and other cosmic phenomena emitting X-rays.

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