

Imaging X-ray Polarimetry Explorer (IXPE)

May 7, 2025 • vajiramandravi.com



IXPE (Imaging X-ray Polarimetry Explorer) Latest News

NASA's IXPE Unlocks X-ray Emission Mystery in Black Hole Jets

What is IXPE?

- **IXPE (Imaging X-ray Polarimetry Explorer)** is a joint mission of **NASA and the Italian Space Agency**, launched on **December 9, 2021**.
- It is the **first satellite** capable of **measuring the polarisation of X-ray light**, a key feature for understanding high-energy astrophysical phenomena.

What are Blazars and Why BL Lacertae Matters?

- **Blazars** are a type of **active galactic nuclei (AGN)** where a **supermassive black hole** ejects a **relativistic jet** of particles oriented directly toward Earth.

- **BL Lacertae (BL Lac)** is a **well-known blazar** and among the first discovered. It is located in the **Lacerta constellation**.
- It is distinguished by its **high variability** and **intense electromagnetic emissions**, making it a suitable candidate for polarisation studies.

Scientific Discovery by IXPE - Key Findings

- The mission aimed to solve the **long-standing mystery** of **how X-rays are generated** in black hole jets.
- Two competing theories existed:
 - **Proton-based models** (would result in **high X-ray polarization**).
 - **Electron-based models** (would result in **low X-ray polarization**).
- **IXPE's observations** found that the **X-rays emitted from BL Lac's jets were only weakly polarized** (no more than **7.6%**).
- Simultaneously, the **optical light was highly polarised** (as high as **47.5%**, the highest ever recorded for a blazar).
- This clear contrast confirmed that the **X-rays are not generated by protons**, but rather through **electron-photon interactions**.

Compton Scattering

- The phenomenon responsible is **Compton Scattering**, where **high-speed electrons** scatter **infrared photons**, boosting them to **X-ray energies**.
- This interaction provides a direct link between **relativistic electron activity** and **X-ray generation** in extreme environments.

IXPE (Imaging X-ray Polarimetry Explorer) FAQs

Q1. What is IXPE?

Ans. IXPE is a space-based X-ray telescope launched by NASA to study the polarisation of X-rays emitted by cosmic objects.

Q2. When was IXPE launched?

Ans. IXPE was launched on December 9, 2021, aboard a SpaceX Falcon 9 rocket.

Source: PHY

Source: <https://vajiramandravi.com/current-affairs/imaging-x-ray-polarimetry-explorer-ixpe/>

© Vajiram & Ravi. For personal use only.