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{ GIANT LEAP IN SPACE RACE }

XPoSat to take off in new year

On January 1, the Indian Space Research Organisation (Isro) will launch its first X-ray Polarimeter Satellite (XPoSat) into the Low Earth Orbit to investigate the polarization of intense X-ray sources. A look at how the mission seeks to cement India's stature amongst space-faring nations

Launch vehicle

Isro chief S Somanath on Thursday said that the January 1 launch from the agency's Sriharikota spaceport was confirmed, and expressed confidence that the coming year will be as successful as 2023. "The launch has been confirmed. We had a good year and we will be aiming at an even more fruitful 2024," he told HT

9.10am
Time of launch
PSLV, Isro's workhorse rocket, will carry the satellite to space. A version of the rocket launched Aditya-L1 in September

44.4 m
Vehicle height

260 tonnes
Lift-off mass

5 years
Duration of the mission

Payload

Mission objectives

The overall objective of the mission is the measurement of X-ray polarization and long-term spectral and temporal studies of cosmic X-ray sources

1 To study the distribution of magnetic field, geometric anisotropies, nature of accelerator in galactic cosmic X-ray sources

2 Structure and geometry of magnetic field of neutron stars, mechanism of X-ray beaming

3 To study production of X-rays

4 Understanding of galactic black hole binary sources

5 To distinguish the synchrotron mechanism as dominant over thermal emission in Supernova remnants

Two scientific payloads on board

The mission will carry two payloads POLIX (Polarimeter Instrument in X-rays) and XSPECT (X-ray Spectroscopy and Timing).

POLIX

1 will measure the polarimetry parameters including the degree and angle of polarization, in med um X-ray energy range of 8-30 keV photons of astronomical origi n. It is developed by the Bengaluru's Raman Research Institute in collaboration with the UR Rao Satellite Centre (URSC).

XSPECT

2 will give spectroscopic information in the energy range of 0.8-15 keV. It has been designed to provide fast timing and good spectroscopic resolution in soft X-rays. It was developed by UR Rao Satellite Centre, Isro

The science of the mission

Polarimetry allows astronomers to infer information about celestial objects, from passing comets to distant galaxies. The mission will help scientists measure emissions from various astronomical sources —black holes, neutron stars, active galactic nuclei, pulsar wind nebulae — that are otherwise challenging to study. Such emissions are mostly tracked by studying the chemical make-up (using a spectroscope) and the time it takes them to travel a distance

Only the second such mission

National Aeronautics and Space Administration's Imaging X-ray Polarimetry Explorer, or IXPE, which was built to "discover the secrets of some of the most extreme objects in the universe, the remnants of supernova explosions, powerful particle streams spit out by feeding black holes, and more", was launched in December 2021