

Isro heralds 2024 with satellite to study black holes in space

PRESS TRUST OF INDIA

Sriharikota, 1 January

The Indian Space Research Organisation (Isro) on Monday ushered in 2024 with the successful launch of its first X-Ray polarimeter satellite that would offer insights into black holes in space, making the country only the second to experiment with such celestial objects.

Among the payloads that piggy-backed the space agency's ever reliable Polar Satellite Launch Vehicle (PSLV) was one made by women, prompting Isro to call it an inspiration for the country.

The PSLV-C58 rocket, in its 60th mission, carried the primary payload, XPoSat, and deployed it in an intended 650 km low earth orbit. Later, scientists performed the orbit lowering manoeuvre by reducing the altitude to 350 km for conducting the PSLV Orbital Experimental Module (POEM) experiment.

Speaking at the Mission Control Centre, Isro Chairman S Somanath wished "happy new year to all of you" and said: "So on 1 January, 2024, yet another successful mission of PSLV has been accomplished. PSLV-C58 has placed the primary satellite XPoSat in the desired orbit." The main XPoSat is intended to probe the polarisation of intense X-ray sources in space. It is the first dedicated scientific satellite from the Isro stable to carry out such research.

The National Aeronautics and Space Administration (Nasa) in the US had conducted a similar study — the Imaging X-Ray Polarimetry Explorer mission — in December 2021 on the remnants of supernova explosions, the particle streams emitted by black holes and other cosmic events.

"Let me also announce the orbit that has been accomplished, which is available through various routes — it shows excellent orbit and the deviations from the targeted orbit is hardly 3 km in circular orbit of 650 km and inclination is 001 degree, which is one of the very excellent orbital conditions," Somanath said.

"And yet another announcement is that the solar panel of the satellite has been deployed successfully," he added.

While space-based X-ray astronomy has been established in India, focusing on imaging and time domain studies, Monday's mission marks a major value-addition to the scientific fraternity, Isro said. The mission objective includes measuring polarisation of X-rays in the energy band of 8-30 keV (kilo electron volts) emanating from about 50 potential cosmic sources, to carry out long-term spectral and temporal studies.

The X-Ray polarisation serves as a crucial diagnostic tool for examining the



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- The mission could play a pivotal role in building expertise in X-Ray polarimetry in India

radiation mechanism and geometry of celestial sources.

XPoSat is POLIX (Polarimeter Instrument in X-Rays), which is designed to measure polarimetry parameters by Raman Research Institute and XSPECT (X-ray Spectroscopy and Timing) built by the U R Rao Satellite Centre in Bengaluru. The mission's life is about five years.

XPoSat is expected to bring substantial benefits to the astronomy community globally. Apart from its capability of timing and spectroscopy-based observations, the insights derived from X-ray polarisation measurements on celestial objects like black holes, neutron stars and active galactic nuclei hold the potential to significantly improve the understanding of their physics.

The mission is poised to play a pivotal role in building expertise in X-Ray polarimetry in India, providing a foundation for advancements and fostering a col-

Isro's PSLV-C58 carrying an X-ray polarimeter satellite and 10 other satellites lifts off from Sriharikota on Monday

PHOTO: PTI

laborative network among astronomers.

Earlier, soaring majestically from the spaceport here, located about 135 km from Chennai, the PSLV rocket deployed the primary satellite into a 650 km low earth orbit, about 21 minutes after lift-off.

Later, scientists reduced the altitude of the satellite to about 350 km by restarting the fourth stage of the vehicle, for conducting the POEM-3 experiment.

Isro conducted a similar scientific experiment using POEM-2 in April 2023.

Jayakumar M, the mission's director, said: "What makes this mission more interesting is the new technologies that are getting demonstrated in the POEM 3 experiment, we have the fuel cell, we have the silicon-based high energy battery, amateur radio satellite service..."

"More importantly, one of the payloads is a totally women-engineered satellite (WESAT). This, I think, showcases women empowerment in of science and technology and all the payloads in fact demonstrate the ongoing reforms in India's space sector," he said, referring to the satellite designed by members of the LBS Institute of Technology for Women in Thiruvananthapuram, Kerala.

Added Somanath: "The WESAT team has built a satellite by collaborating with Isro and we were happy to host it on board PSLV POEM. When girl children are spending their time studying science and when they excel in their domain, we must all appreciate it. So, congratulations to the WESAT team."

POEM-3 was executed to meet the objective of 10 payloads, supplied by Isro and its subsidiary IN-SPACE.

