



ASTROSAT

ASTROSAT is a large scientific satellite of India for observing our universe in detail to understand it better. Built and launched by Indian Space Research Organisation (ISRO), ASTROSAT took its final shape at ISRO Satellite, Bangalore.

The satellite is capable of simultaneously sensing the visible light, Ultra violet rays and X-rays emitted by heavenly bodies. Because of this, it is known as a multi wavelength space observatory. Major astronomical institutions of India have made important contributions to ASTROSAT. Thus, ASTROSAT is a major national effort in the field of scientific research.



ISRO Scientists building ASTROSAT in ultra clean environment

ASTROSAT DETAILS

The **structural skeleton** of ASTROSAT is made up of various alloys and tough plastic like materials called composites. Keeping the temperature of different portions of ASTROSAT is very much essential for its trouble free working. This is taken care of by its **thermal subsystem**. The two large solar panel 'wings' of ASTROSAT folded during the launch later spread out. They generate about 2100 Watts of electric power which is essential for the satellite to function.

After its launch, radio waves became the only link between ASTROSAT and the ISRO scientists who built it. Through this link ASTROSAT not only sends information about its health but the precious scientific information collected by its five payloads (scientific instruments) as well.

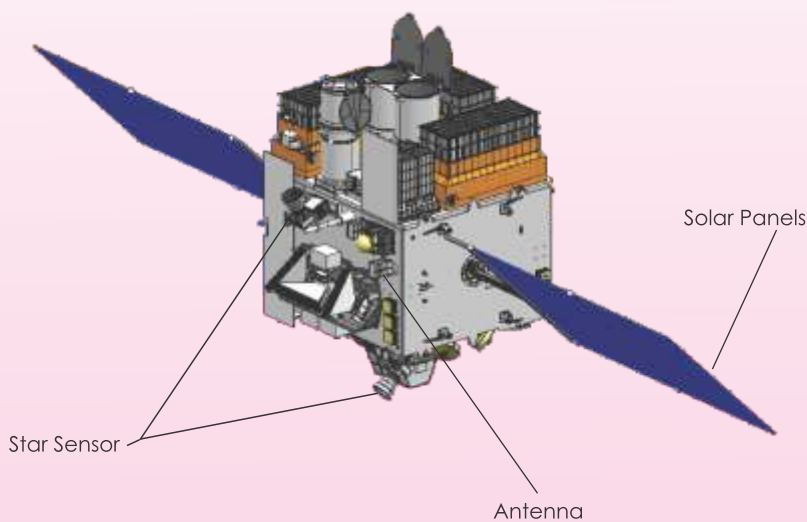
ASTROSAT is mainly intended to study such interesting astronomical objects like very hot stars, neutron stars and black holes. With its help, scientists also wish to study the star formation in other galaxies.

ASTROSAT is now revolving round the earth in a circular orbit which is 650 km high. At that height, it takes about 98 minutes for ASTROSAT to complete one revolution of the earth.

The 1513 kg ASTROSAT was successfully launched into orbit by India's workhorse satellite launch vehicle PSLV in its 31st flight on September 28, 2015. Interestingly, that flight was the 30th successful flight of PSLV in a row. Along with ASTROSAT, six smaller satellites from Canada, Indonesia and the USA also went to orbit. In this way, PSLV launched a total of seven satellites in its 31st flight.

This clearly indicates that India is not only capable of building a sophisticated satellite but has the ability to precisely launch it as well! At the same time, it shows the confidence of the outside world in Indian rockets.

When you take a first look at ASTROSAT, it appears like a box wrapped mostly in golden coloured blanket with many features projecting from its different faces, but most prominently from its top.



And, scientists also use the radio link to instruct ASTROSAT to perform its assigned task of observing heavenly bodies. An electronic device on ASTROSAT called '**transponder**' helps scientists to accurately know the position and movement of ASTROSAT as it revolves round the earth.

Highly advanced sensors that take Sun and the stars as reference, as well as very accurate gyroscopes of ASTROSAT help in finding out the direction in which the satellite is precisely pointing. Based on this, the '**electronic brain**' (control system) of ASTROSAT slowly turns the

satellite in the required direction or makes it possible for ASTROSAT to continuously point towards a small region of the sky. Fast spinning wheels attached to the satellite and small rocket engines called **thrusters** actually perform this work as instructed by ASTROSAT's brain.

All these features make us to feel like comparing ASTROSAT with human body, which, of course has skeleton, a body temperature regulating system, nervous and muscular systems moving its arms and legs, its food requirement to survive, perform various tasks and a brain to coordinate various body functions, etc!

SCIENTIFIC INSTRUMENTS OF ASTROSAT

The five payloads or scientific instruments of ASTROSAT which help us understand various types of interesting heavenly bodies in detail are:

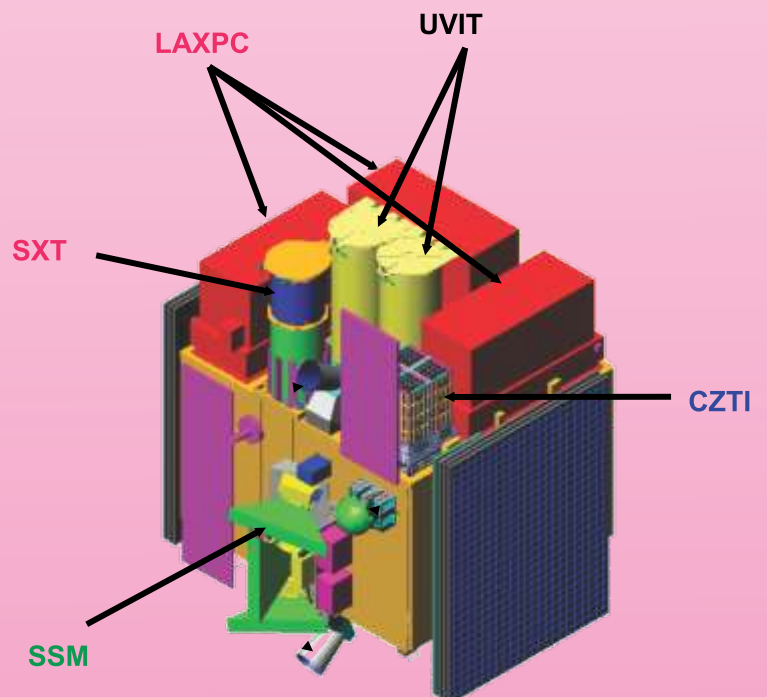
Ultraviolet Imaging Telescope (UVIT): This instrument is capable of recording the visible light and ultraviolet rays emitted by distant heavenly bodies. It helps us to study young hot stars. Actually ASTROSAT has two such telescopes.

Soft X-ray telescope (SXT): This is a telescope capable of detecting low energy X-rays coming from distant heavenly bodies. This helps us to study the way a X-rays of a particular energy coming from such bodies varies with time.

Large Area X-ray Proportional Counter (LAXPC): Though with a difficult name to pronounce and remember, this scientific instrument comes to our help in understanding binary stars (two stars revolving around one another) and the central portion of galaxies.

Cadmium Zink Telluride Imager (CZTI): Yet another payload of ASTROSAT with a difficult name, this X-ray instrument assists us to study X-rays of higher energy, and may be even gamma rays, which have much higher energies.

X-ray Sky Monitor (XSM): This instrument of ASTROSAT keeps a watchful eye on the short flashes of X-rays in the sky and alerts us about the position of interesting objects emitting such bright flash of X-rays. With its help, other scientific instruments of ASTROSAT can be accurately pointed in the direction of such objects for a detailed observation.



Astrosat Payload Locations

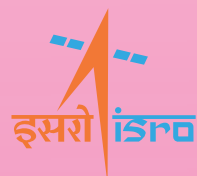
Because of the highly sensitive nature of its scientific instruments, ASTROSAT was built in an **ultra clean environment**. India's famous scientific/astronomical institutions like Inter University Centre for Astronomy and Astrophysics (IUCAA) of Pune, Tata Institute of Fundamental Research (TIFR) of Mumbai, Indian Institute of Astrophysics (IIAP) and Raman Research Institute (RRI) of Bangalore, have contributed to the building of scientific instruments of ASTROSAT.

It took ASTROSAT 22 minutes to reach its intended orbit in PSLV. After its successful entry into orbit, the satellite was thoroughly tested for many weeks. Then the regular observations began and ASTROSAT has already sent interesting information collected by its scientific instruments. This has excited our scientific community and made them to expect more such valuable information from ASTROSAT.



Magnificent!

PSLV-C30 Lifts off carrying ASTROSAT and six smaller satellites



Indian Space Research Organisation

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