ASTROSAT
- A Multi Wavelength Space Observatory

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Outline

• Objective

• Spacecraft & Science Payloads

• Ground Segment

• Performance & Road Ahead
  - Science
Objective

• Build and operate a Multi Wave Length Space Observatory

• Provide opportunity to Academia to Build instruments

• Nurture Space Astronomy in the Country

• Inculcate Science Temper

• International Co-operation
Launched from SHAR, India on 28\textsuperscript{th} Sep 2015
### Mission details

<table>
<thead>
<tr>
<th>Satellite mass</th>
<th>1515 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruments (Payloads) mass</td>
<td>855 kg</td>
</tr>
<tr>
<td>Spacecraft</td>
<td>Cuboid shaped; 1.96 m x 1.75 m x 1.30 m</td>
</tr>
<tr>
<td>S/C Power</td>
<td>1626 W</td>
</tr>
<tr>
<td>Launch Vehicle</td>
<td>PSLV C30 (XL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Payload</th>
<th>Mass (kg)</th>
<th>Power (W)</th>
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</thead>
<tbody>
<tr>
<td>UVIT</td>
<td>231.8</td>
<td>87.0</td>
</tr>
<tr>
<td>SXT</td>
<td>73.6</td>
<td>26.0</td>
</tr>
<tr>
<td>LAXPC</td>
<td>415.6</td>
<td>62.5</td>
</tr>
<tr>
<td>CZTI</td>
<td>56.5</td>
<td>73.5</td>
</tr>
<tr>
<td>SSM</td>
<td>75.5</td>
<td>41.0</td>
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<tr>
<td>CPM</td>
<td>2.0</td>
<td>4.0</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>855.0</strong></td>
<td><strong>294.0</strong></td>
</tr>
</tbody>
</table>

First ever Full fledged Indian Satellite on Science
Spacecraft and five science payloads

Ultra Violet Imaging Telescope (UVIT-IAA, CSA, Mullard Space Science Lab, University College, London, University of Calgary, Canada)

Cadmium Zinc Telluride Imager (CZTI - TIFR)

Scanning Sky Monitor (SSM-ISAC)

Soft X-ray Telescope (SXT-TIFR, University of Leisester, UK)

Large Area X-Ray Proportional Counter (LAXPC - TIFR)
PAYLOAD INSTRUMENTS

LAXPC Payload undergoing Vibration Test

UVIT Payload Undergoing Vibration Test

SXT Payload

CZTI Payload undergoing Vibration Test

SSM Payload

16-06-2016
Broadband coverage in a single mission

X-ray, Ultraviolet and limited optical

Typical Electromagnetic Spectrum
Large effective area in X-ray band

Effective area of Large Area X-ray Proportional Counter (LAXPC) payload is $\geq$ five times that of RXTE above 25 keV.
ASTROSAT MISSION

Launched on 28th Sep 2015

- The science instruments were switched ON in a sequence and are operationalised.

- The first six months was dedicated for performance verification and on-board calibration of payloads. The observations and preliminary results during this phase have been excellent.

- Science observations commenced in April 2016.
Crab Nebula is a bright X-ray source in the sky often used as an X-ray standard source for instrument calibration. It is a point-like source in X-ray.
Detection of Gamma ray burst GRB 151006A by CZTI

CZTI detected the GRB and has seen significant and sharp jump in the counts above 100 keV (the FOV becomes large above this energy) during the GRB time.

Flashed to the scientific community through GCN circular 18422.
The brightest source with an X-ray intensity of ~2 Crab. Displays different types of light curves which changes within few days.

Observation is reported as a "Astronomers' Telegram" ATel #8185.
Faint galaxy (red box) and the bright star (yellow box) are clearly visible in near UV. In FUV, only the hotter stars/objects get detected. Though the galaxy is faint (red box) it has hot stars and detected in FUV image. The bright star (yellow box) is hardly visible since it is a cool star.
Tycho A: Supernova remnant (1572 AD) 8000 ly away observed on Nov 6, 2015

The energy spectrum of Tycho Supernova remnant. Emission lines from fully ionized Mg, Si, S, Ar, Ca are seen.
LAXPC observed Cyg X-1

Intensity variations observed at few seconds level from Cyg X-1, a black hole binary source.
ASTROSAT/SSM pointings on the sky
Hammer–Aitoff Projection (Galactic Coordinates)
- SSM has observed large part of the sky

- Light curves of all the observed sources are being processed and will be made available at the ISSDC website shortly

- Hardness Intensity diagrams of all observed sources will also be made available

- SSM with its interesting observations is towards bringing out its objectives of providing long term monitoring light curves of all sources observed and also search for transient sources.
Further……

- Performance Verification phase successfully completed. The performance of payloads conforms to the parameters for which they were designed.

- Initial calibration done and payloads’ capabilities have been finalised.

- The first light observations and preliminary results are made available in the [www.isro.gov.in](http://www.isro.gov.in) website.

- Science observations ongoing.

- Astrosat Support Cell: [http://astrosat-ssc.iucaa.in](http://astrosat-ssc.iucaa.in)
  - a portal to the AstroSat Proposal Processing System (APPS)
    - Exposure Time and Visibility calculators.
    - downloadable proposal assistance tools, instrument response functions, sample data of AstroSat instruments and analysis software.

**Announcement of opportunity in October 2016**
PSLV-34 is being readied for Launch on 22\textsuperscript{nd} Jun 2016 9:25 IST

Carries 20 S/C:
- 3 from India
- 13 from USA
- 2 from CANADA
- 1 from Germany
- 1 from Indonesia
Creating a better world requires teamwork, partnerships & collaborations. Let this sense of team spirit prevail in our journey.
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THANK YOU