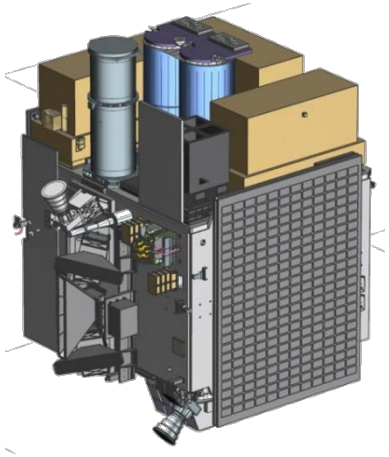


ASTROSAT

- A Multi Wavelength Space Observatoty

Dr. Mylswamy ANNADURAI

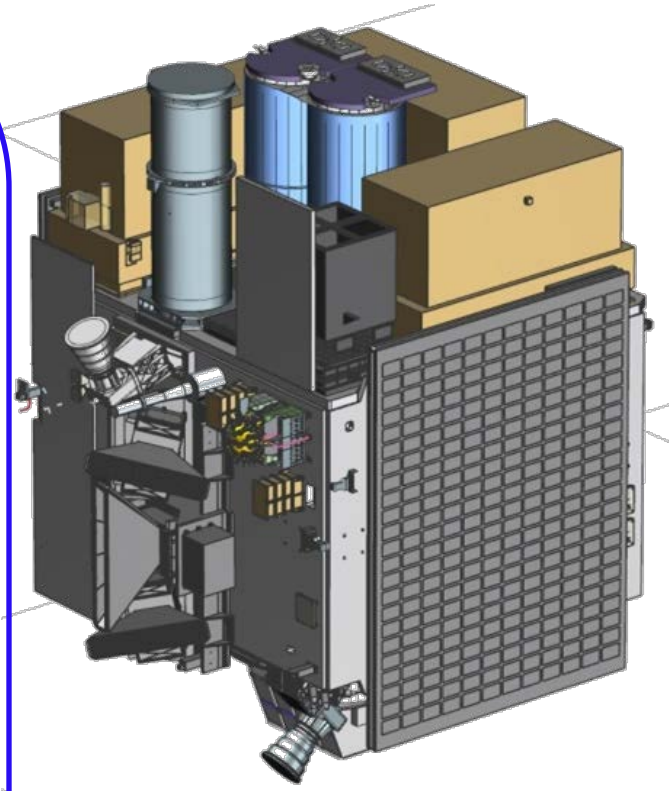
Director, ISRO Satellite Centre, Bengaluru

Indian Space Research Organization, Department of Space

Government of India

Outline

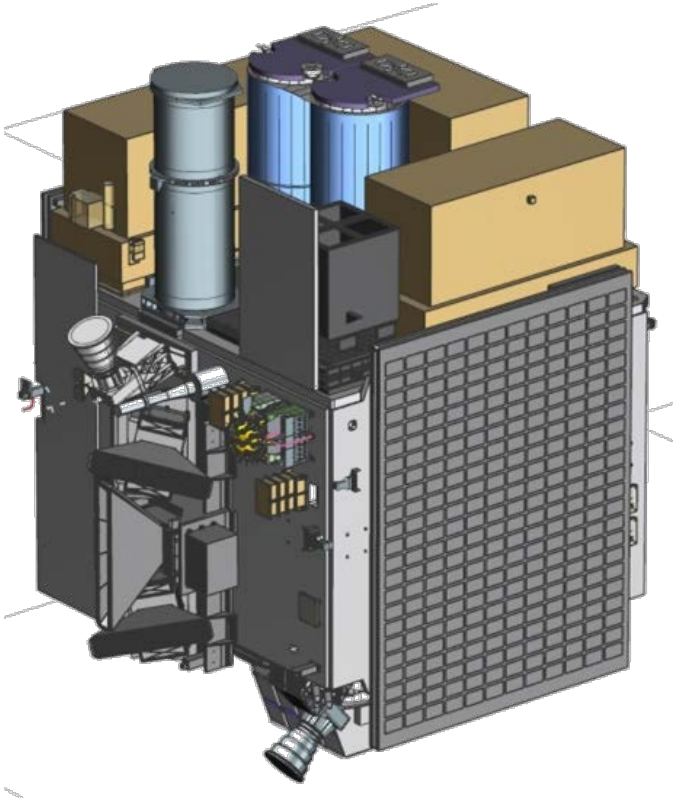
- **Objective**
- **Spacecraft & Science Payloads**
- **Ground Segment**
- **Performance & Road Ahead**
  - **Science**



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**

ASTROSAT- A Multi Wavelength Space Observatoty



Launched from SHAR, India on 28th Sep 2015

ASTROSAT

Mission details

Satellite mass	1515 kg
Instruments (Payloads) mass	855 kg
Spacecraft	Cuboid shaped; 1.96 m x 1.75 m x 1.30 m
S/C Power	1626 W
Launch Vehicle	PSLV C30 (XL)

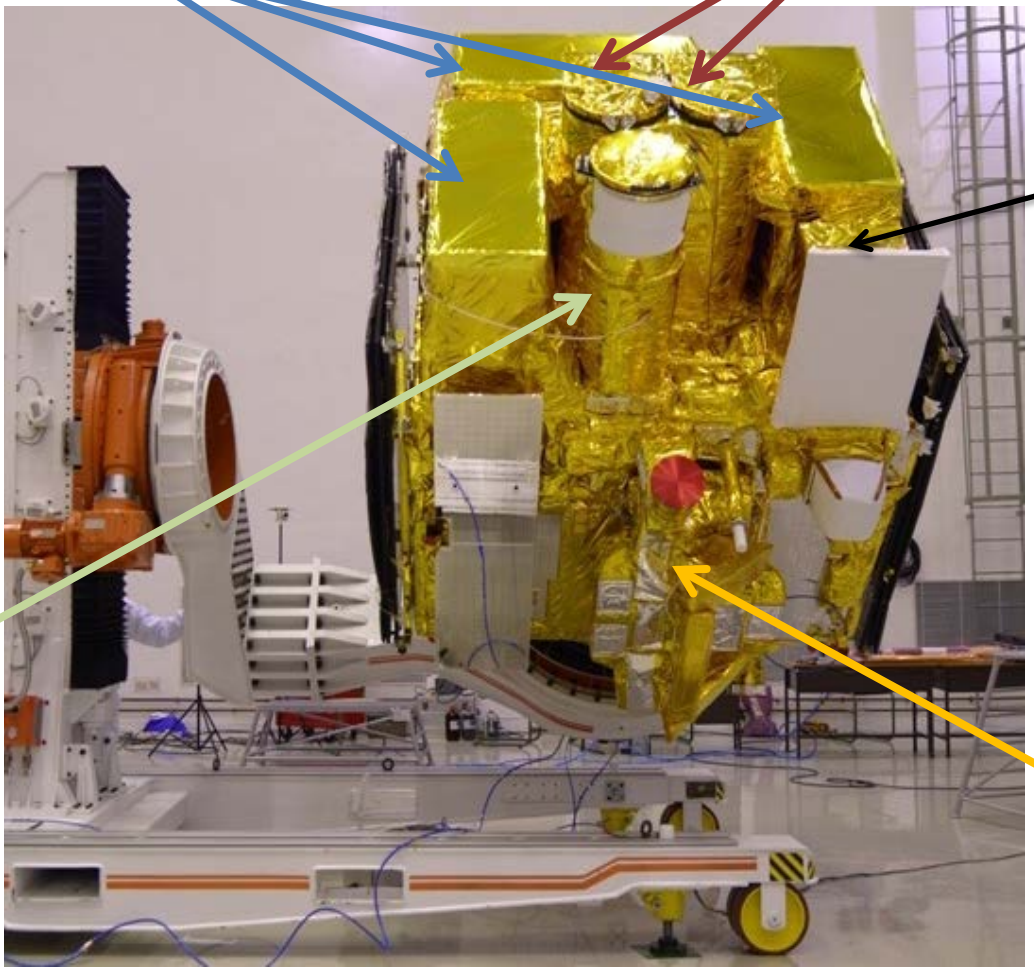
Payload	Mass (kg)	Power (W)
UVIT	231.8	87.0
SXT	73.6	26.0
LAXPC	415.6	62.5
CZTI	56.5	73.5
SSM	75.5	41.0
CPM	2.0	4.0
Total	855.0	294.0

First ever Full fledged Indian Satellite on Science

Spacecraft and five science payloads

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

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

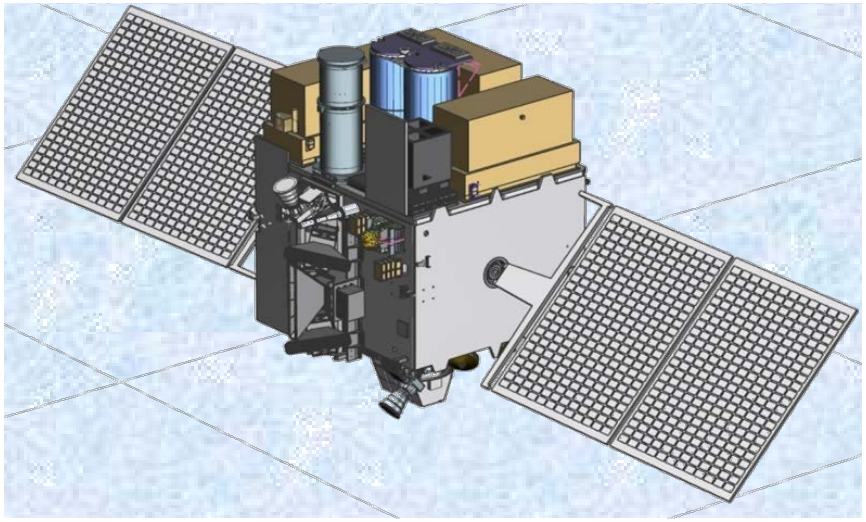


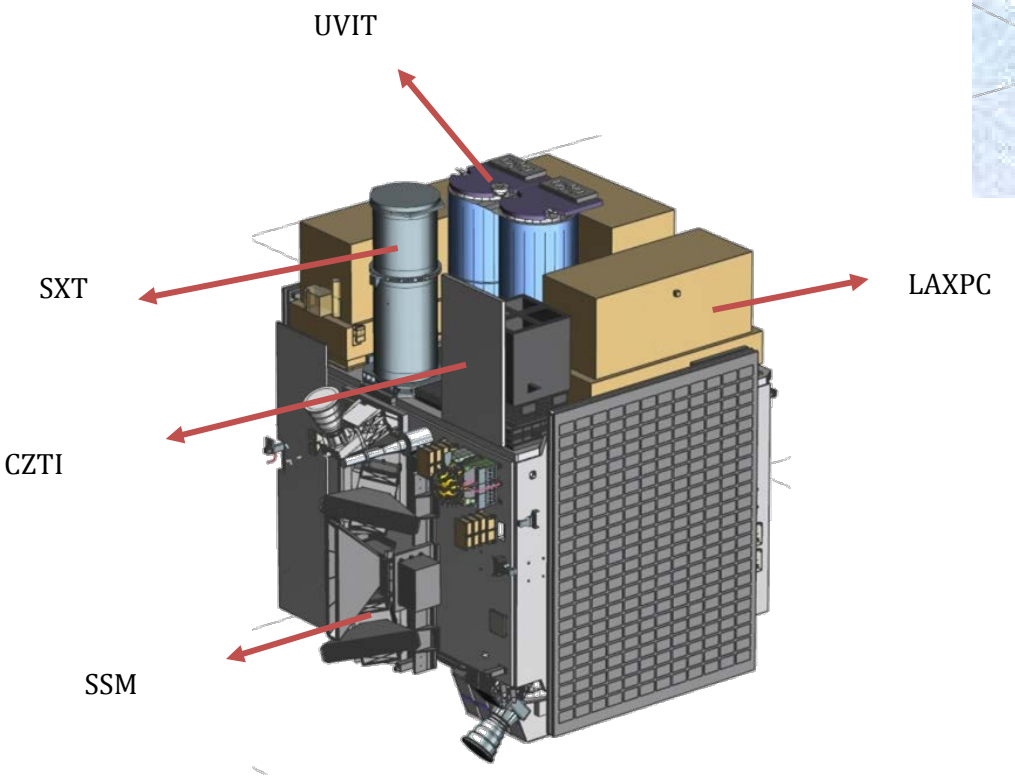
Cadmium Zinc Telluride Imager (CZTI - TIFR)

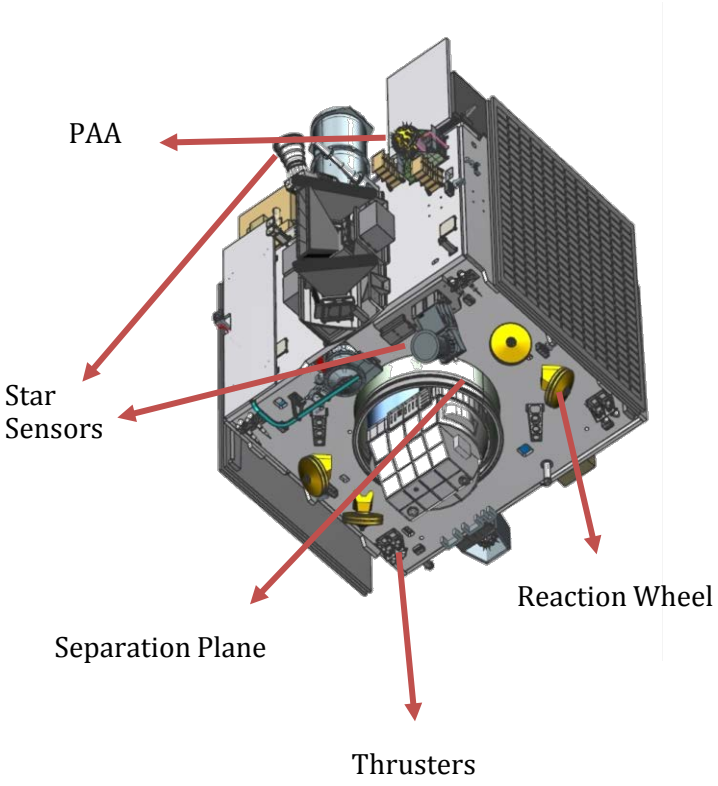
Soft X-rayTelescope (SXT-TIFR,Univ Leisester, UK)

Scanning Sky Monitor (SSM-ISAC)

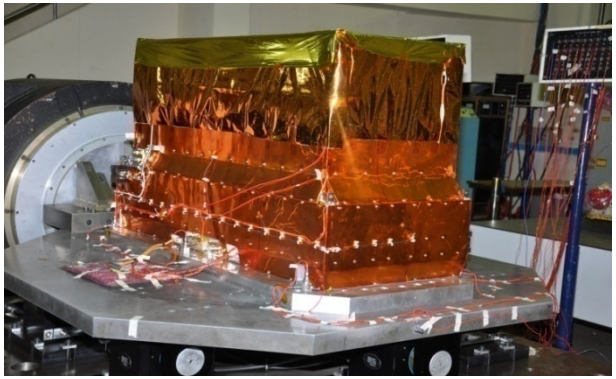
ASTROSAT VIEWS







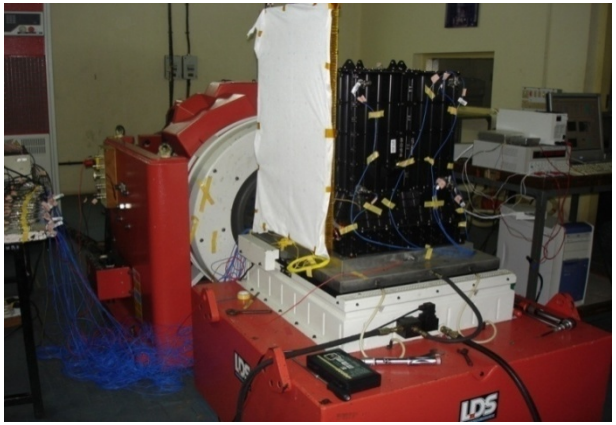
PAYLOAD INSTRUMENTS



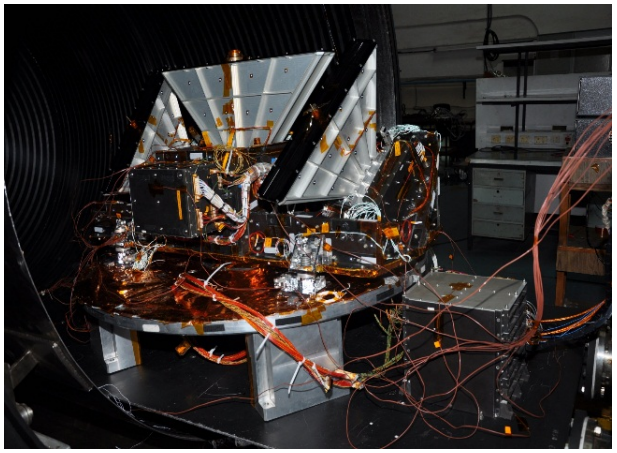
LAXPC Payload undergoing Vibration Test

SXT Payload

UVIT Payload Undergoing Vibration Test



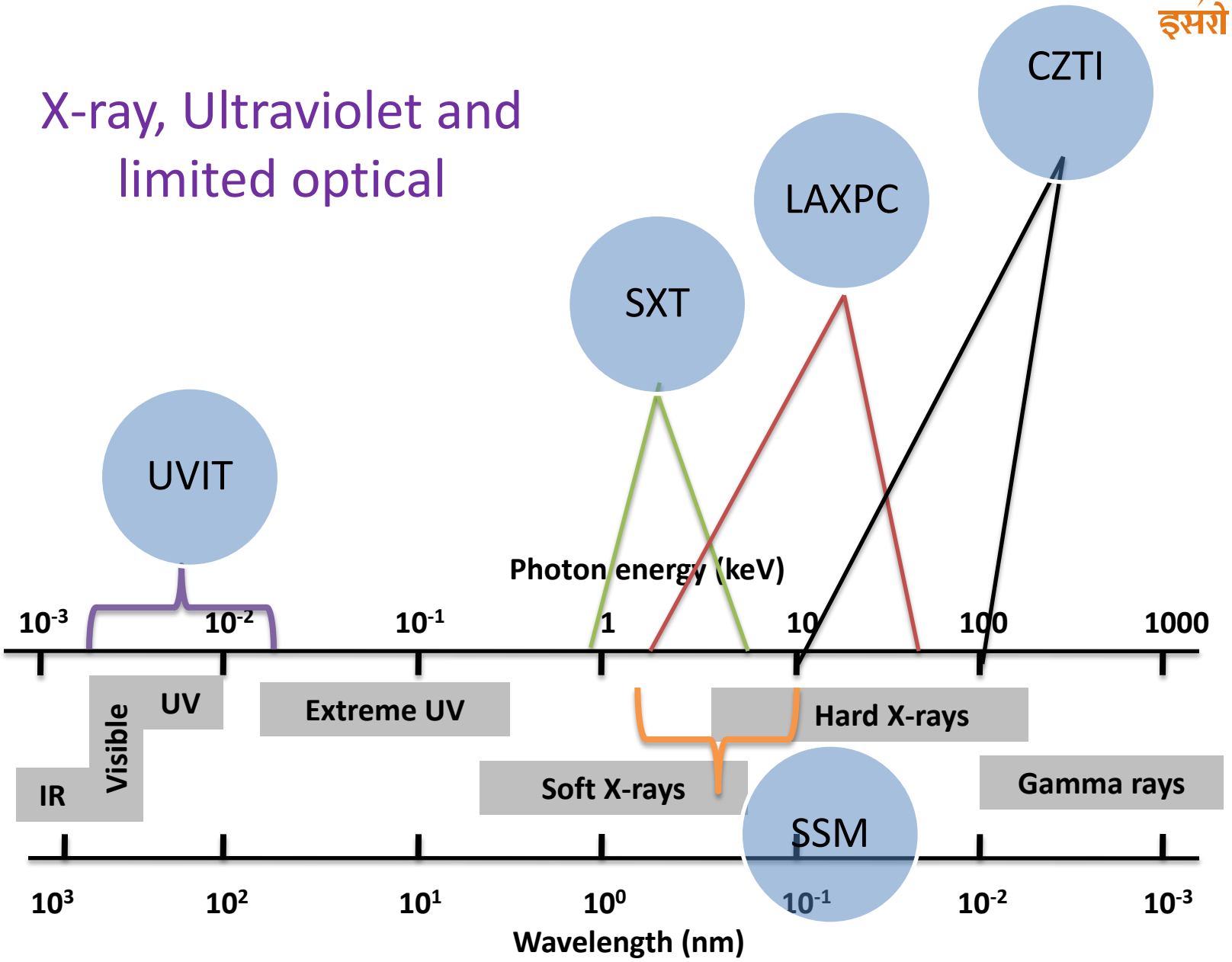
CZTI Payload undergoing Vibration Test



SSM Payload

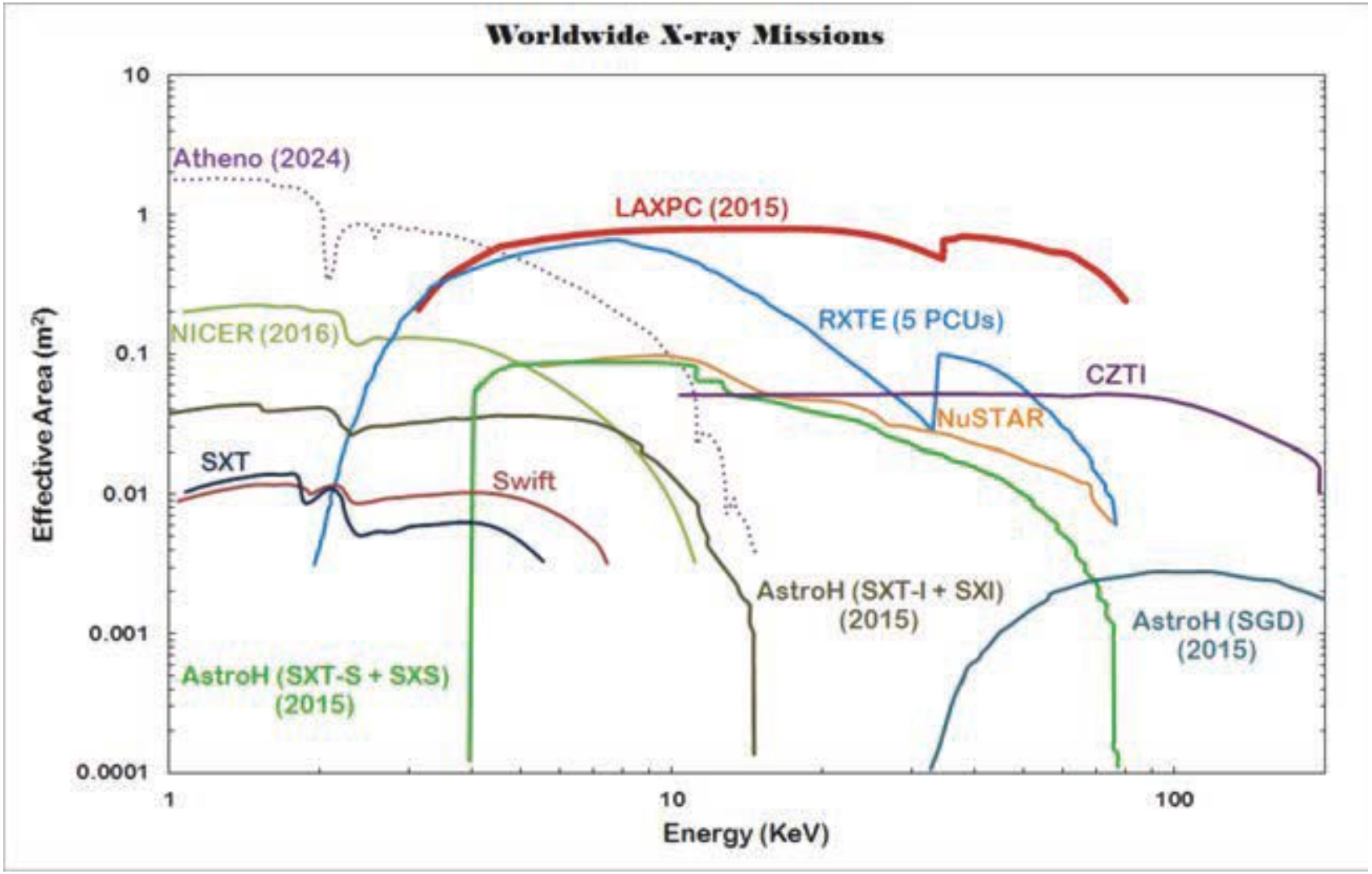
Broadband coverage in a single mission

X-ray, Ultraviolet and limited optical



Typical Electromagnetic Spectrum

Large effective area in X-ray band



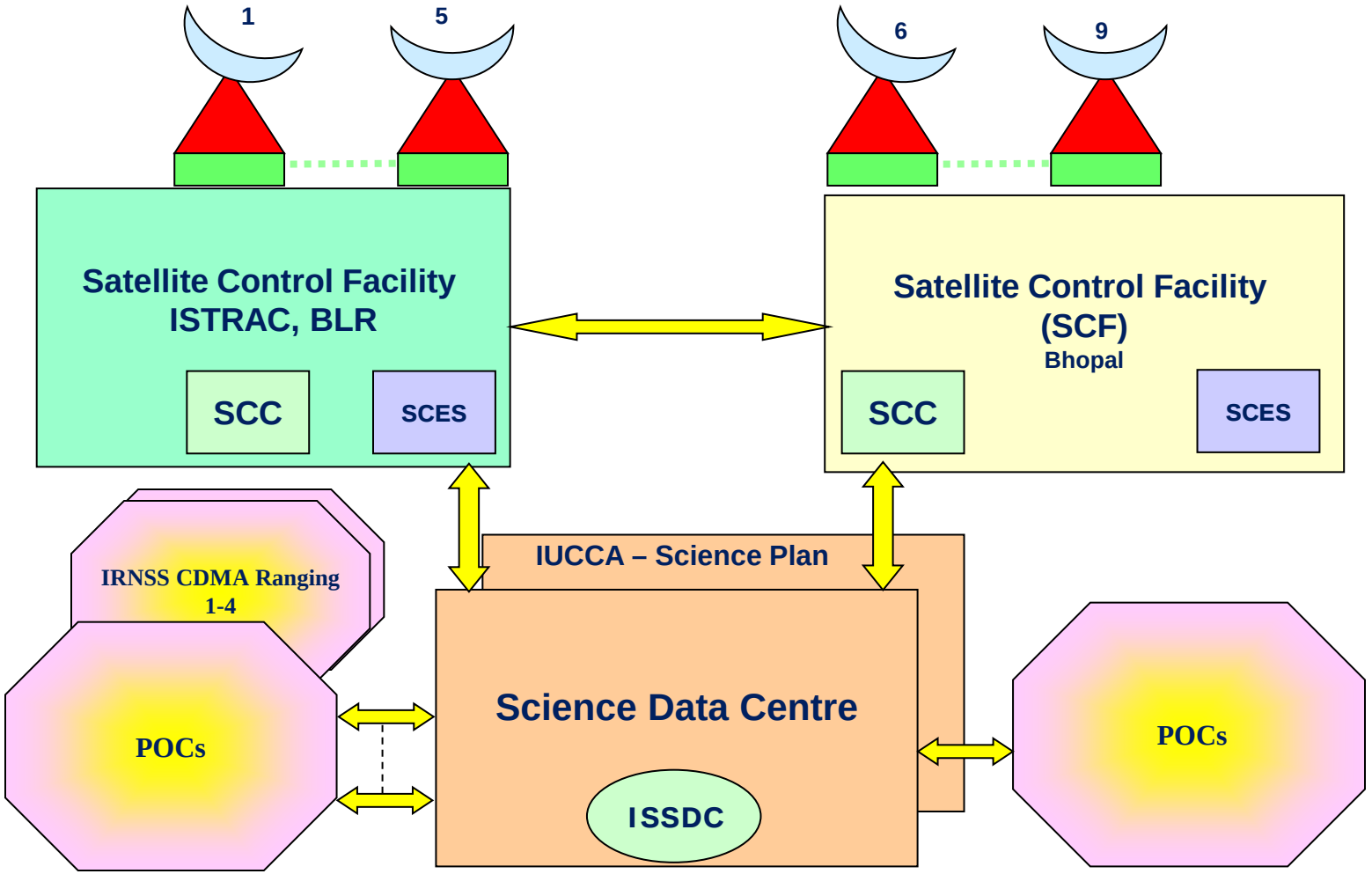
Effective area of Large Area X-ray Proportional Counter (LAXPC) payload is ≥ five times that of RXTE above 25 keV.

ASTROSAT MISSION

Launched on 28th Sep 2015

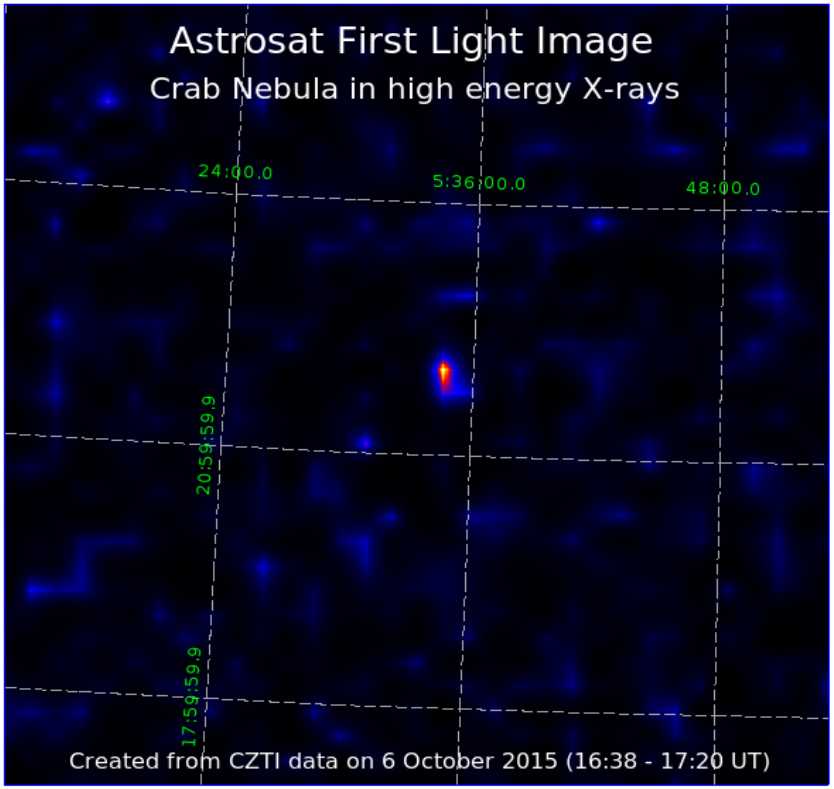
- The science instruments were switched ON in a sequence and are operationalised.
- The first six months was dedicated for performance verification and on-board calibration of payloads. The observations and preliminary results during this phase have been excellent.
- Science observations commenced in April 2016.

GROUND SEGMENT

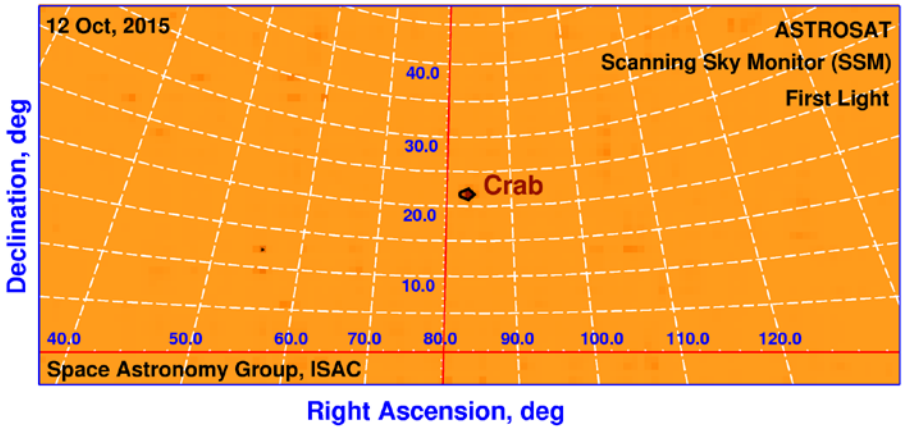


Crab observations

Crab nebula in hard X-ray above 25 keV by CZTI

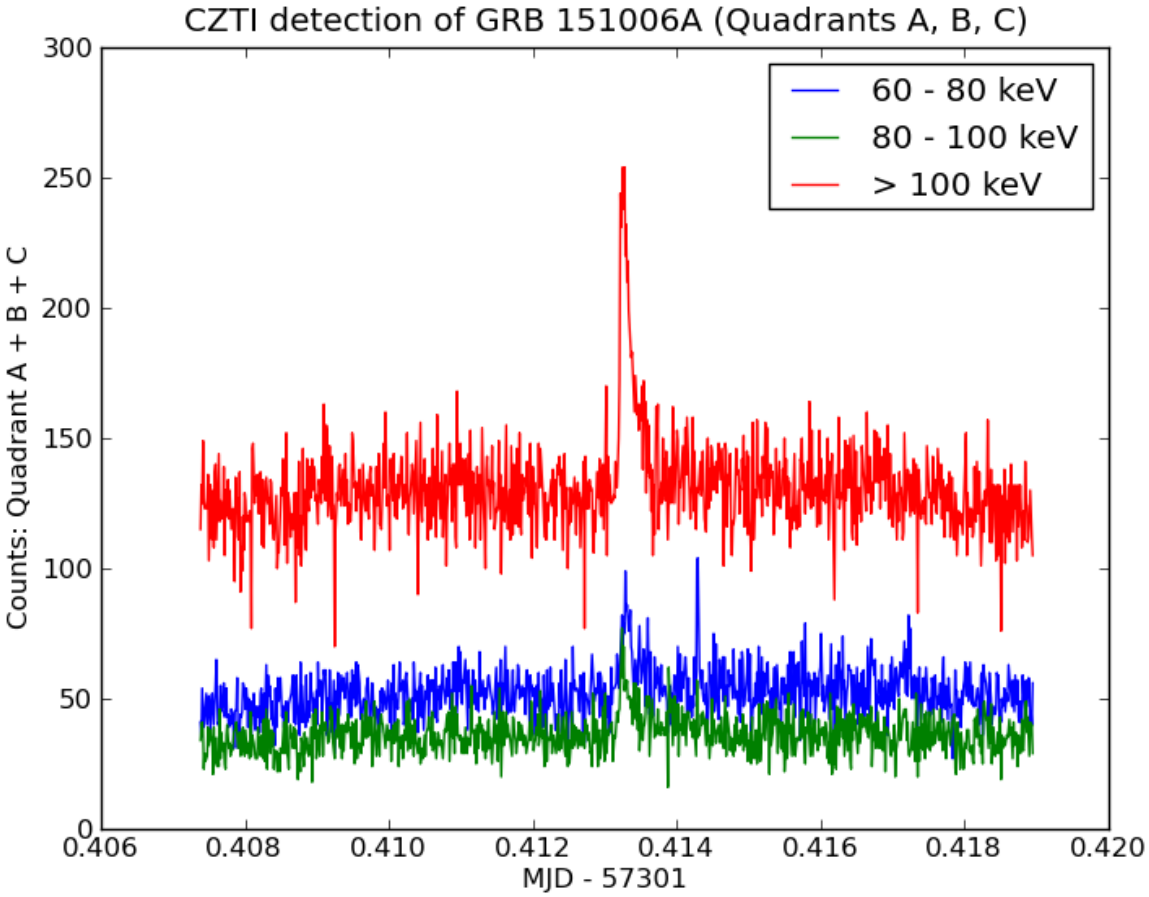


Crab nebula by SSM



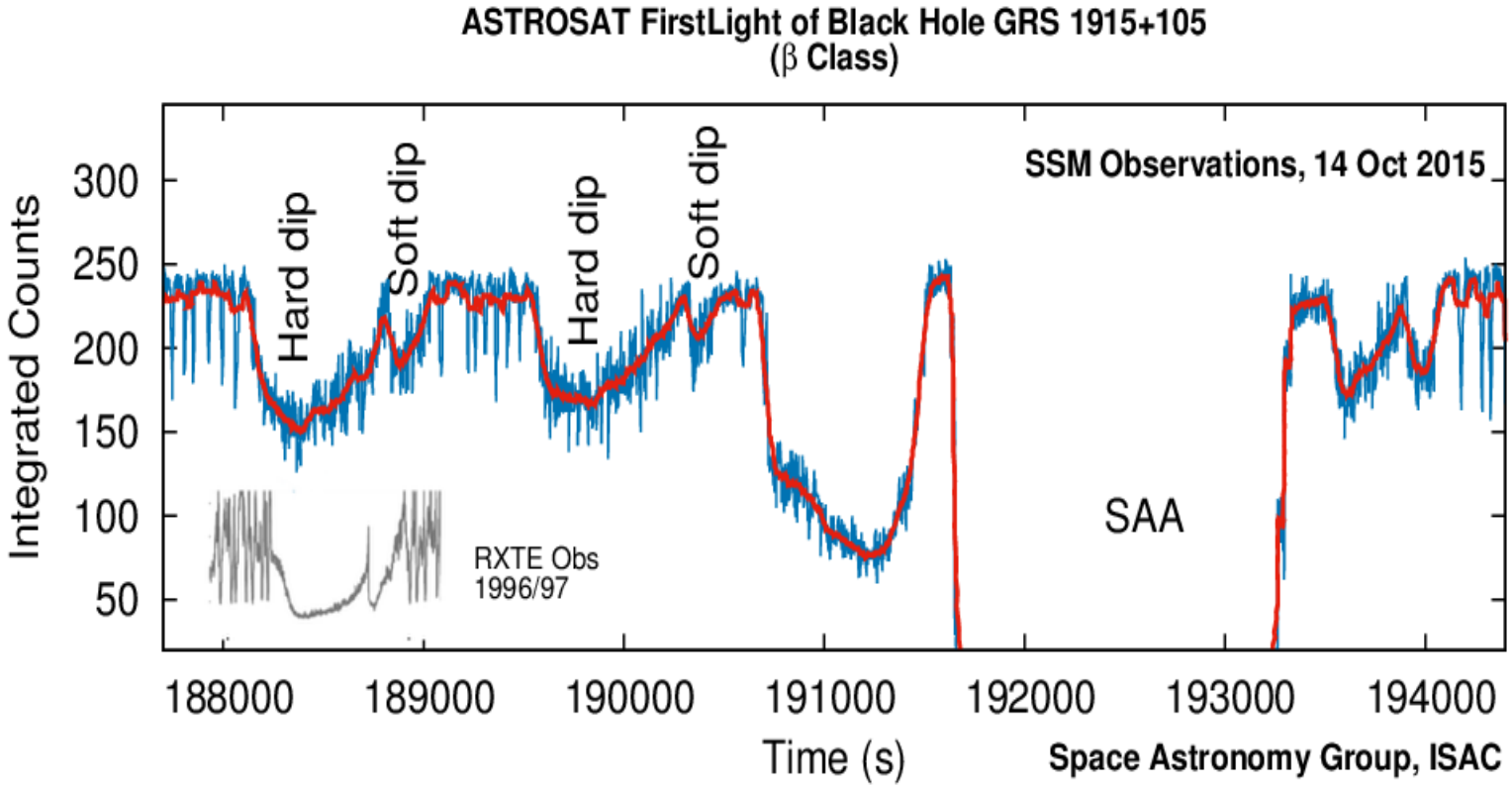
Crab Nebula is a bright X-ray source in the sky often used as an X-ray standard source for instrument calibration. It is a point like source in X-ray.

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**.

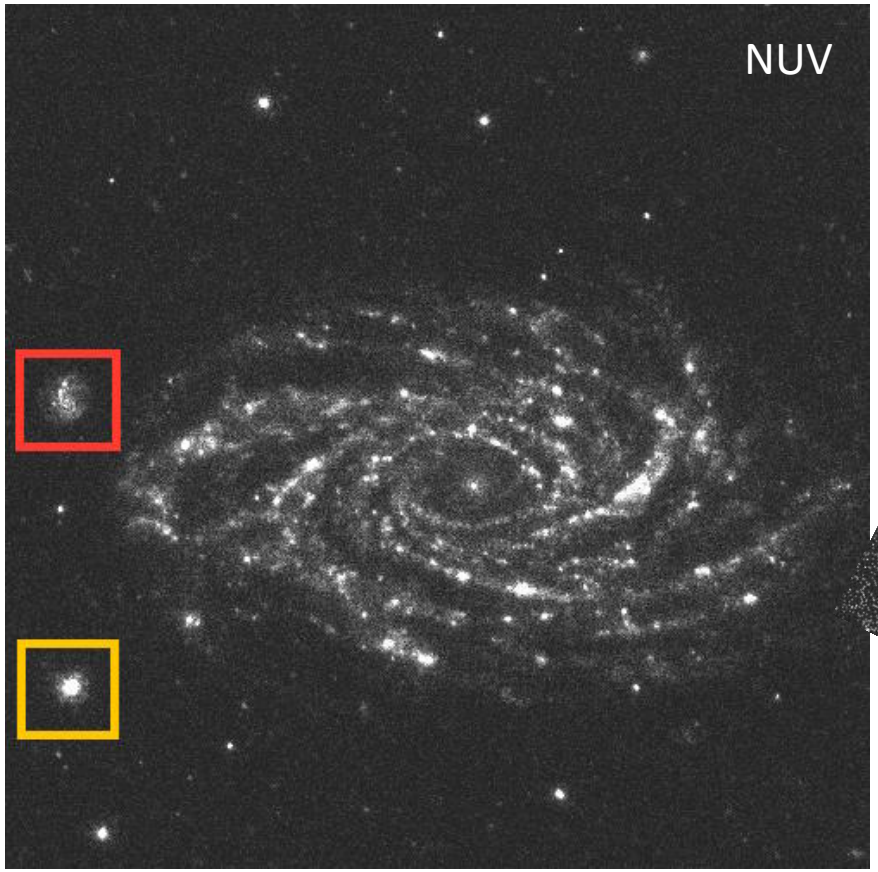
Black hole source GRS 1915+105 observations by SSM



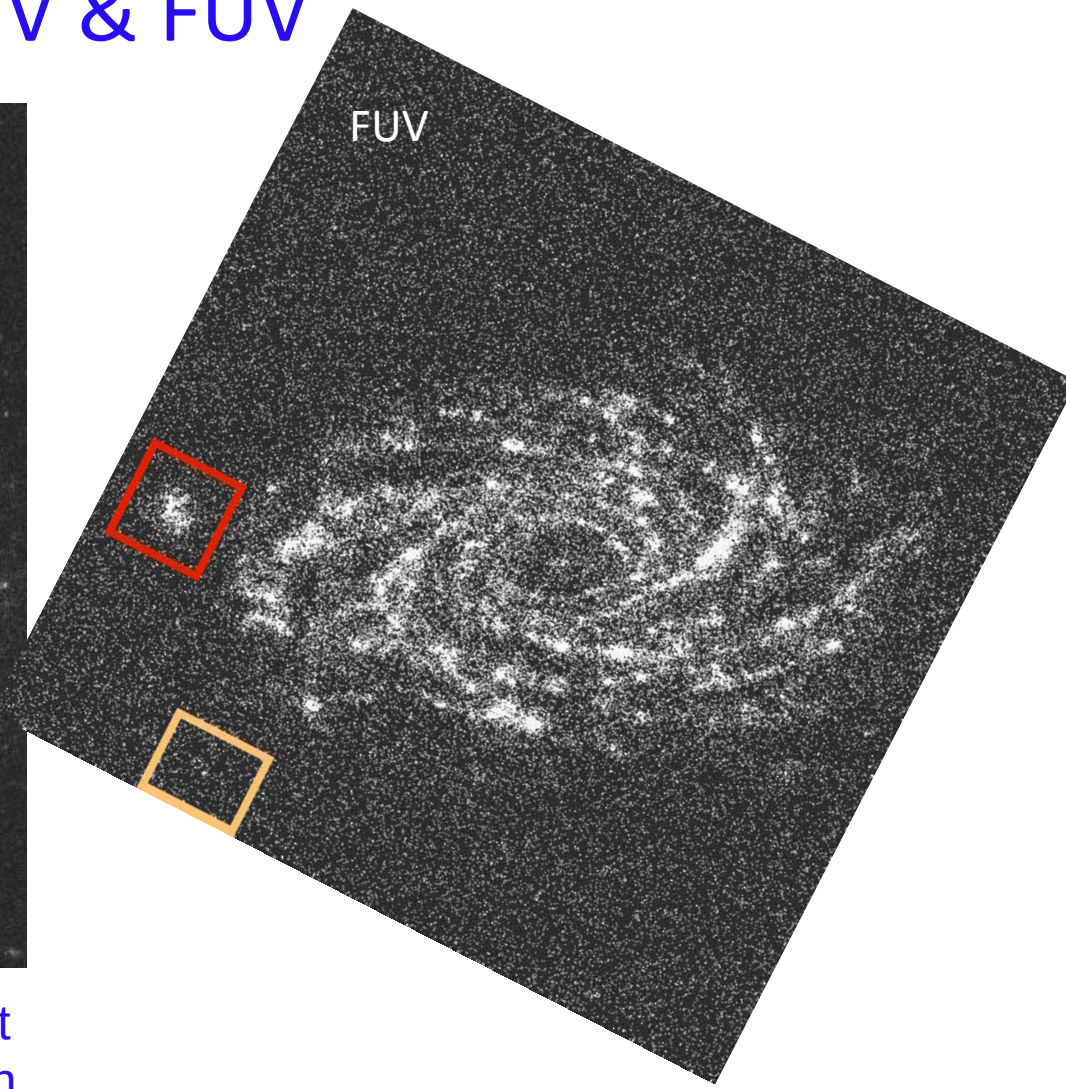
The brightest source with an X-ray intensity of ~2 Crab. Displays different types of light curves which changes within few days.

Observation is reported as a ***"Astronomers' Telegram" ATel #8185.***

UVIT - NGC 2336 in NUV & FUV

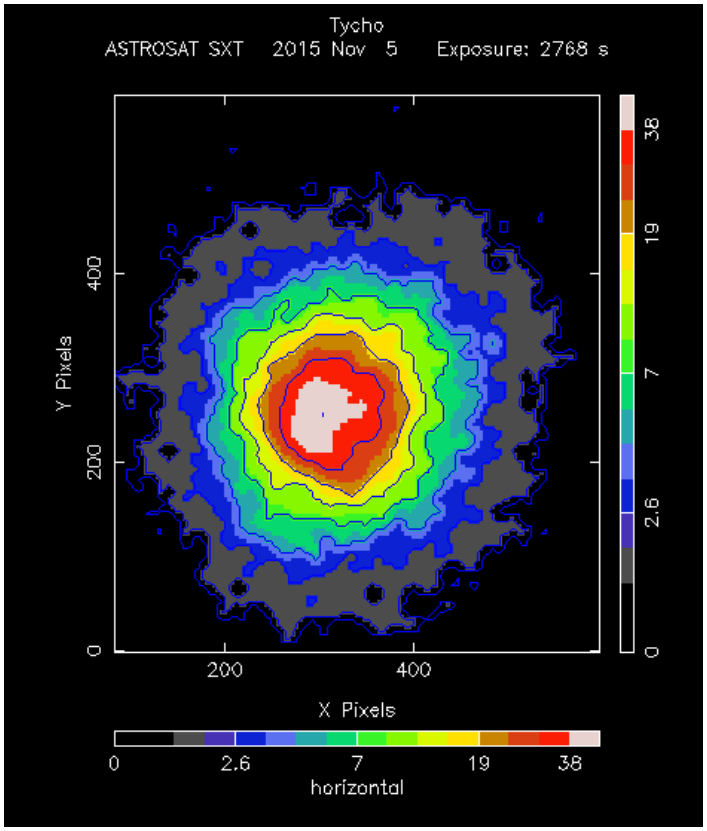


Faint galaxy (red box) and the bright star (yellow box) are clearly visible in near UV

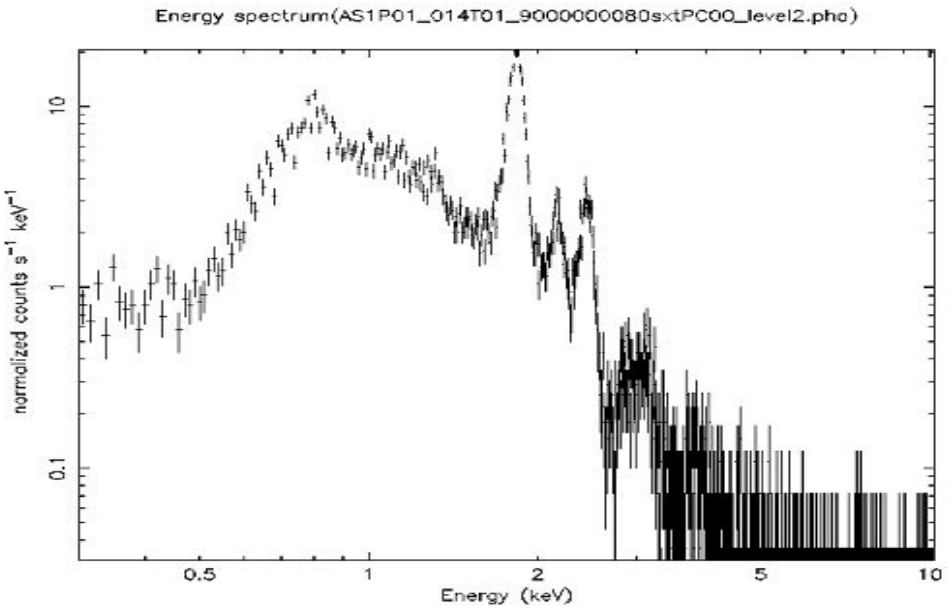


In FUV, only the hotter stars/objects get detected. Though the galaxy is faint (red box) it has hot stars and detected in FUV image. The bright star (yellow box) is hardly visible since it is a cool star.

SXT : Tycho Supernova remnant

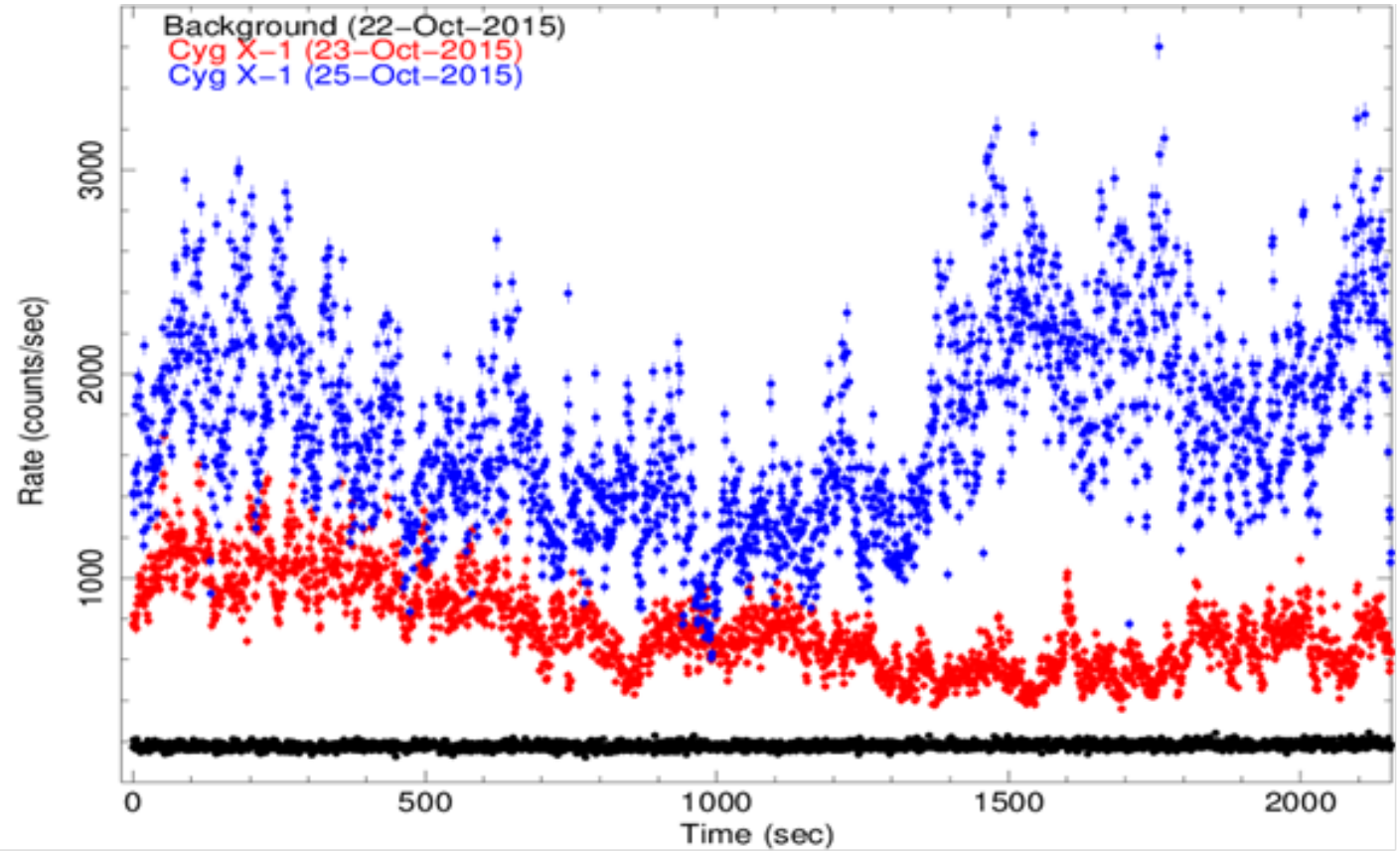


Tycho A: Supernova remnant (1572 AD) 8000 ly away observed on Nov 6, 2015

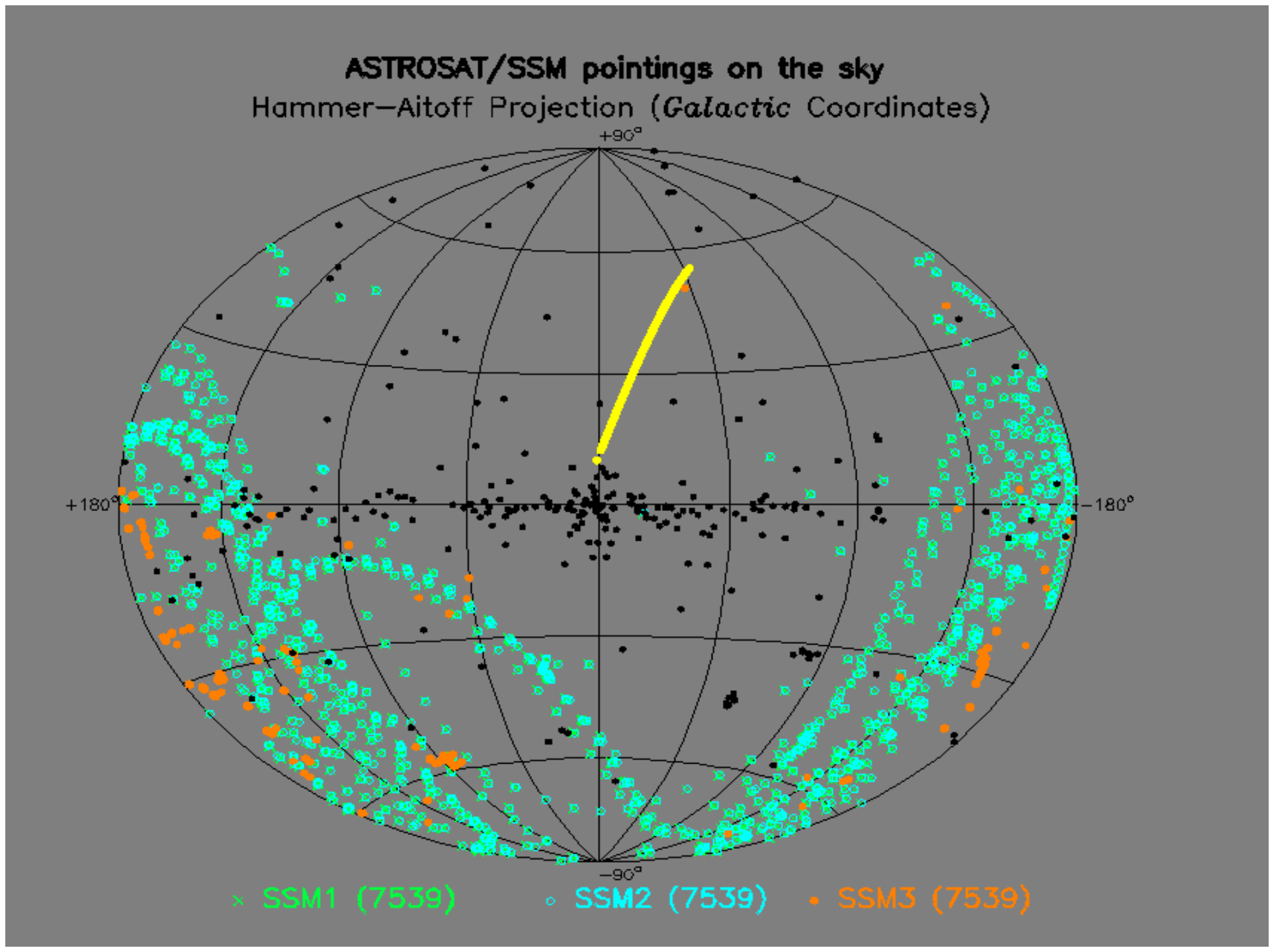


The energy spectrum of Tycho Supernova remnant . Emission lines from fully ionized Mg, Si, S, Ar, Ca are seen.

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)
+90°
+180°
−180°
−90°
SSM1 (7539)
SSM2 (7539)
SSM3 (7539)

Science…

- 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*** website.
- Science observations ongoing.
- Astrosat Support Cell : ***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 22nd 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