



# FISAT: Far-UV Imaging Satellite

*A 3.4 U imaging telescope*

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**Shubhangi Jain (PhD Student, IIA)**

With

Bharat Chandra, Praveen Kumar, Mahesh Babu, Shubham  
Ghatul, Rekshesh Mohan, Jayant Murthy, Margarita Safonova

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# Space/Small Payload Group

- PhD thesis in Astronomical Instrumentation, UV astronomy and Space instrumentation
- Our group at IIA **develops small payloads** for astronomy to address specific science goals and low cost subsystem.
- Typical mission life : 1-2 years.

NUTE<sub>x</sub>: NUV Imager (Shubham Ghatul)

**“Driven by science, Constrained by launch Opportunities”**

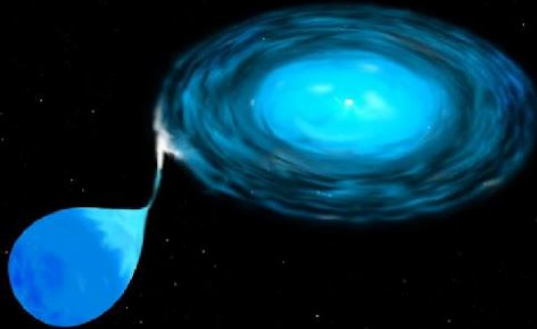


Scan me!

<https://www.iiap.res.in/projects/spg/>

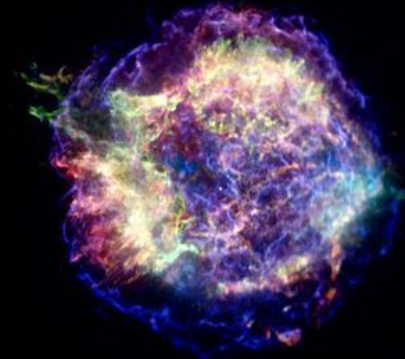
# Science cases for a small FUV mission

**Detection of  
Novae and other  
transients**



<http://burro.case.edu/>

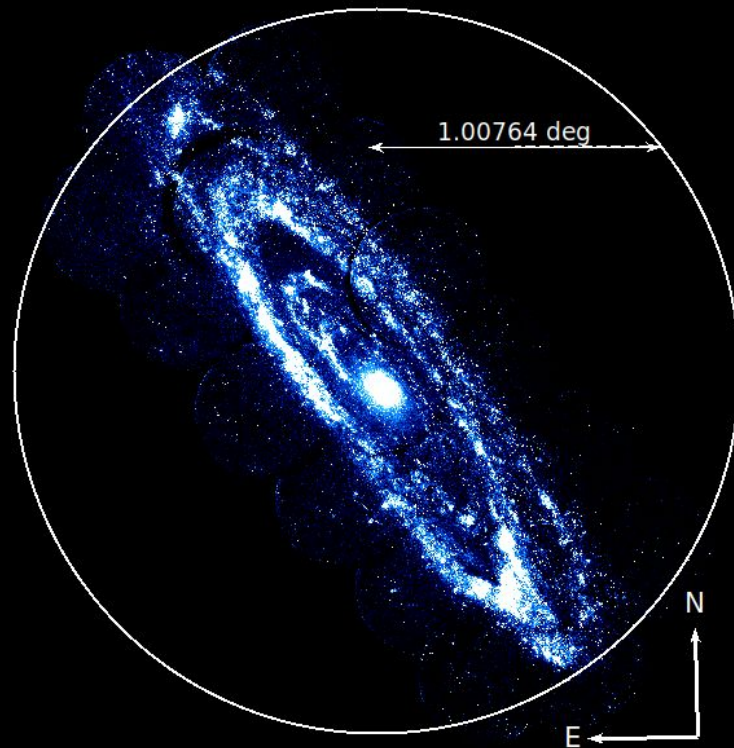
**Follow-up of  
transients**



*Credit: NASA/DOE/Fermi LAT Collaboration*

# Detecting Novae and transients in M31

- M31 is **nearest spiral galaxy** with nova rate of **40+/-5 per yr.**(Rector et al 2022).
- M31 monitoring at 1-day cadence
  - Higher chances of detecting transients
  - Capable of detecting the elusive short-lived "**UV flash**", predicted by theoretical models to be occurring before the optical peak.
- Large FoV to capture **M31 in a single pointing.**
- Follow-up of novae in FUV to complement optical ground-based observation (for eg. GIT observations).



*UVIT FUV view of M31*

# Follow-up of transients

Follow-up observations of novae and other transients including core-collapse supernovae (CC SNe), thermonuclear supernovae (SN Ia).



*Credit: NASA/DOE/Fermi LAT Collaboration*

**“Open to new science cases and Collaboration” !!!**

Contact Details: [shubhangi.jain@iiap.res.in](mailto:shubhangi.jain@iiap.res.in)



## Launch opportunity

 InterCosmos  
BEYOND THE PALE BLUE DOT

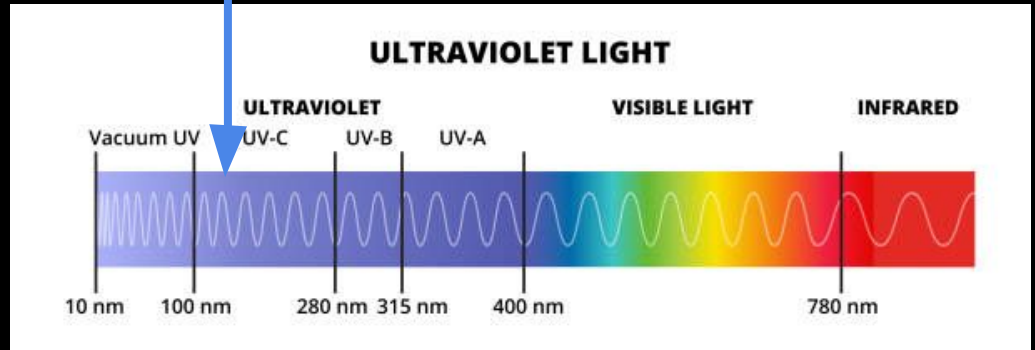
- Inter Cosmos is a private Space Start-up currently building Propulsion and Launch solutions for small satellites
- Willing to host IIA payload on their satellite
- Operational costs will be handled by them
- Upto 3.4 U offered ,6-7 Kg mass
- Pointing Accuracy : Upto 0.05 deg
- Pointing Stability : +/- 0.004 deg/s



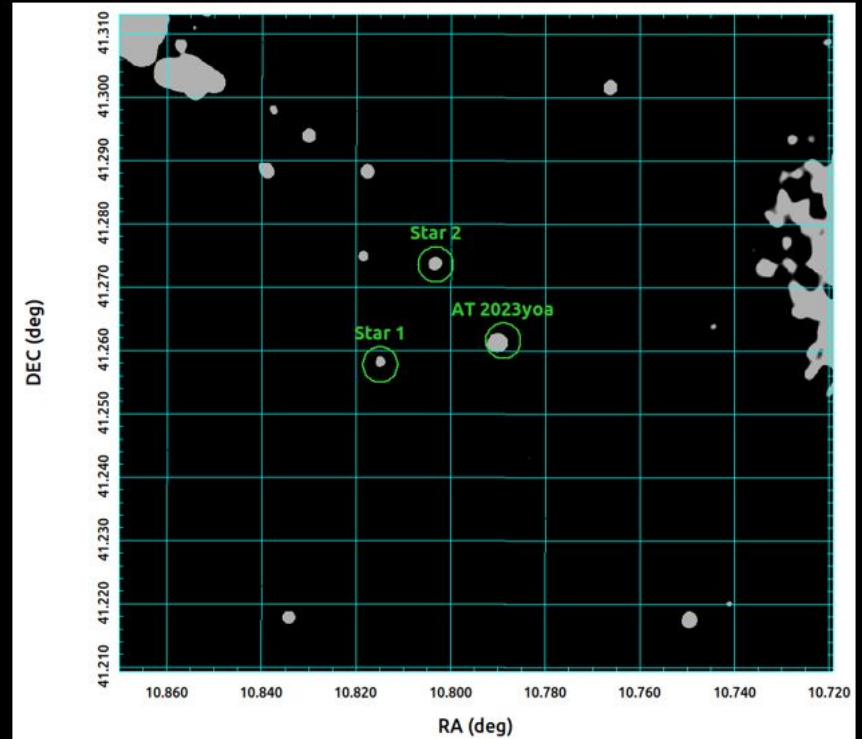
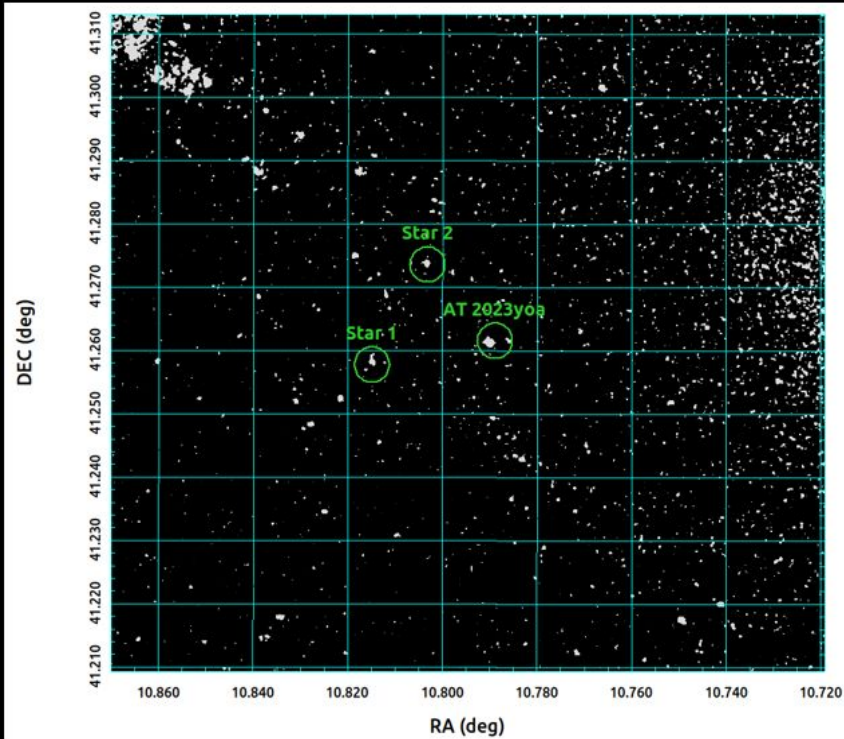
*Inter cosmos payload : HYPERX*

# FISAT : FUV imaging satellite

- Far-UV Imaging Satellite (FISAT): A 80 mm aperture far-UV imager operating in the wavelength range of 130 to 180 nm. FISAT is expected to be launched by end of 2025.
- FISAT is a wide-field ( $3^\circ$ ) imager with a photon counting detector in the far-UV (130 -180 nm)
- Ritchey–Chrétien (RC) Telescope
- MCP based photon counting detector
- 3.4 U in size, 6-7 kg mass
- Mission period : 6-12 months  
(offered by launch partner)



# Anticipated image



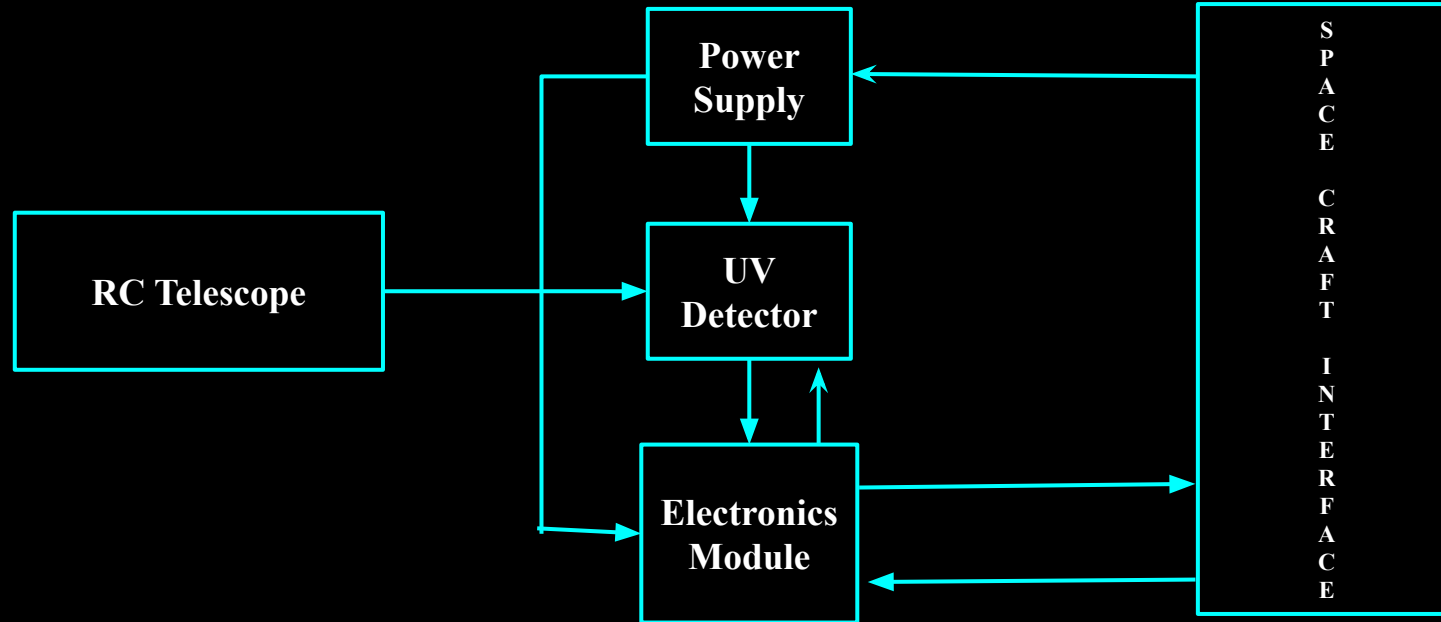
Credit: Judhajeet Basu

UVIT (900s)

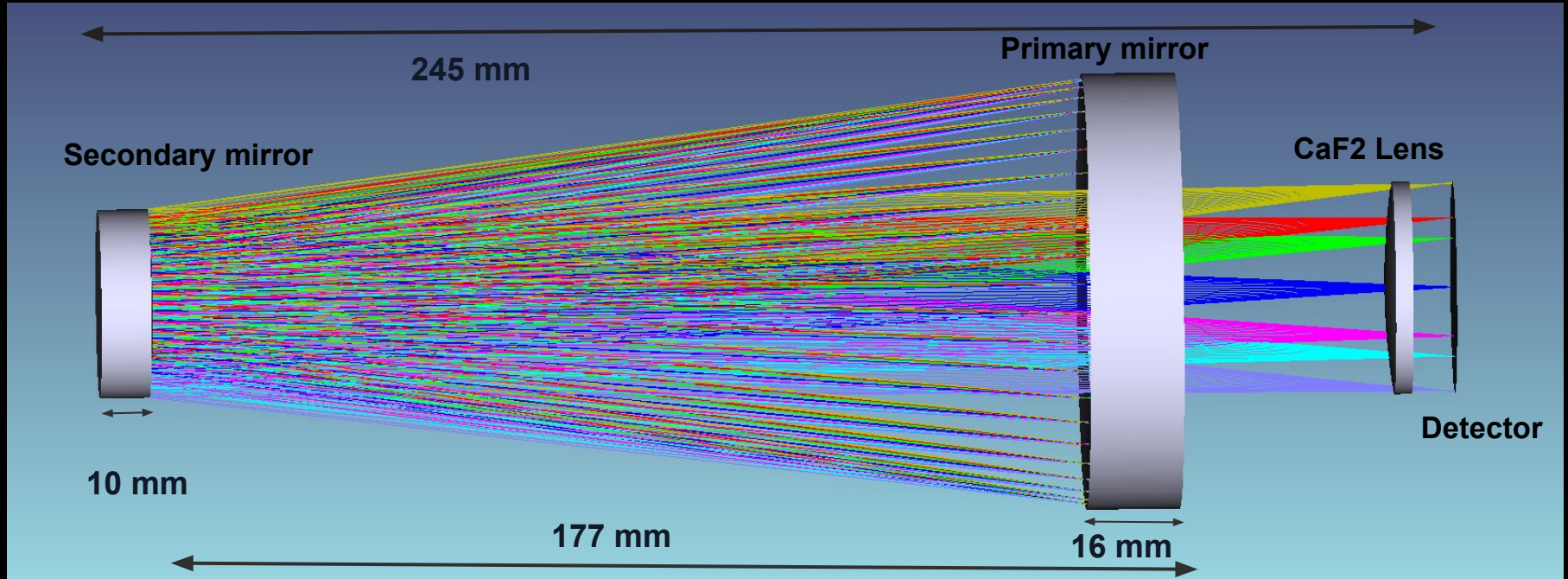
FISAT(3500s)



# Instrument overview



# 3D optical design layout



Different colors here represent different fields

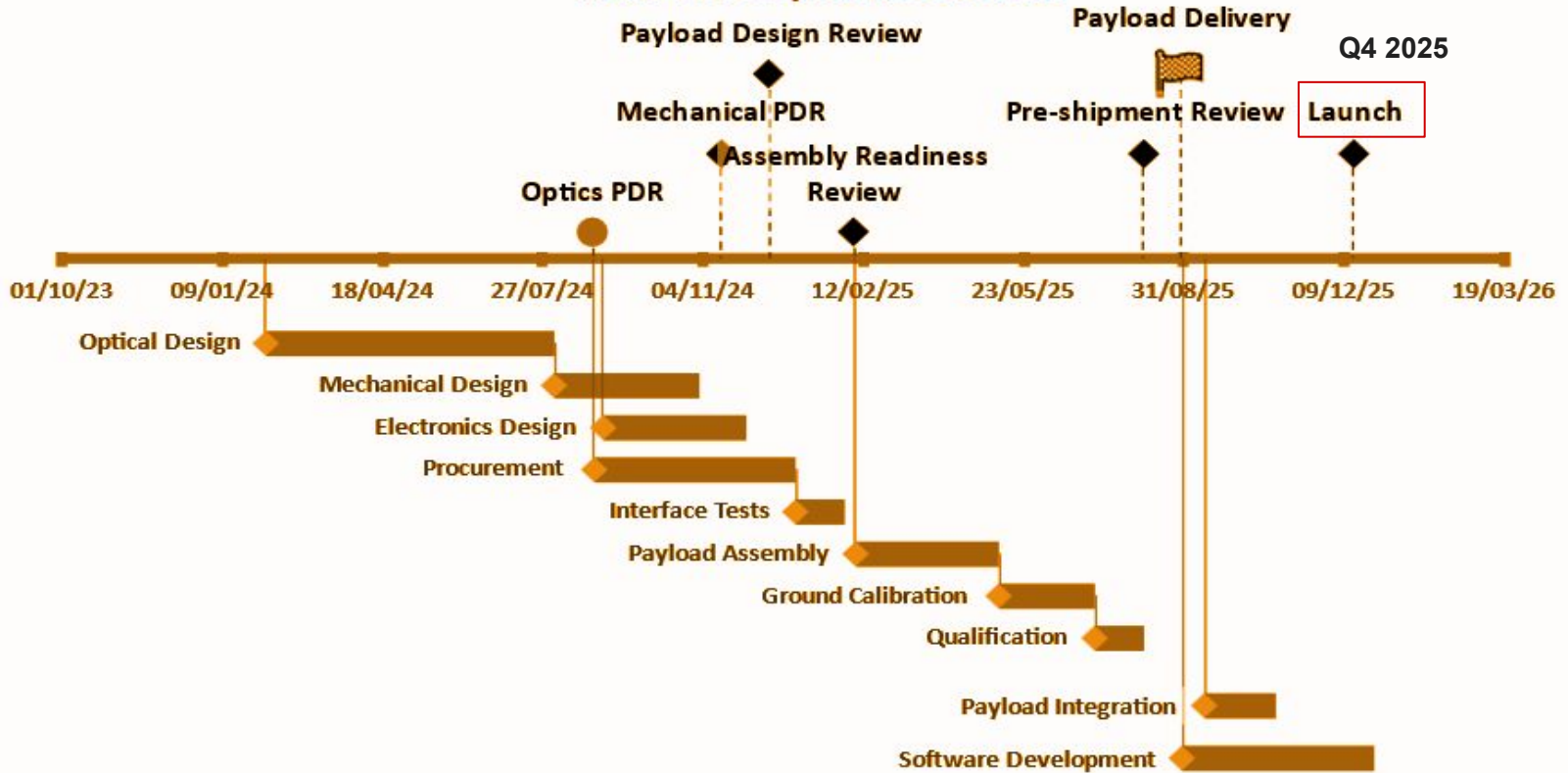
# Optical design specifications

Wavelength Range	130 nm – 180 nm
Field of View	3° (dia)
Primary Aperture	80 mm(dia)
Resolution	8" (centre field)
Focal Ratio	f/9.3
Detector	Micro channel plate ( CsI)
Limiting Magnitude	19 AB (1200s SNR =5)
Effective Area	2.5 cm <sup>2</sup>

# Optical design specifications

Mirrors	On-Axis Hyperbolic
Blank	Zerodur
Coating	Aluminum with MgF2 Protective coating
Power	<12 W
Instrument Size	3.4 U
Expected Launch	Q4 2025

# FISAT Development Schedule





Jayant Murthy

- FISAT :FUV Imager
- Wavelength : 130-180
- Aperture : 80 mm
- FOV : 3°
- Spatial Resolution : 8"
- Mission life : 1 year
- Launch : Q4 2025



Bharat Chandra



Rekshesh Mohan



Shubham Ghatul



Shubhangi Jain

# THANK YOU !!!

SPG

<https://www.iiap.res.in/projects/spg/>



Scan me!



Margarita Safonova



Praveen Kumar



Mahesh Babu