

# India's first solar mission – Aditya-L1

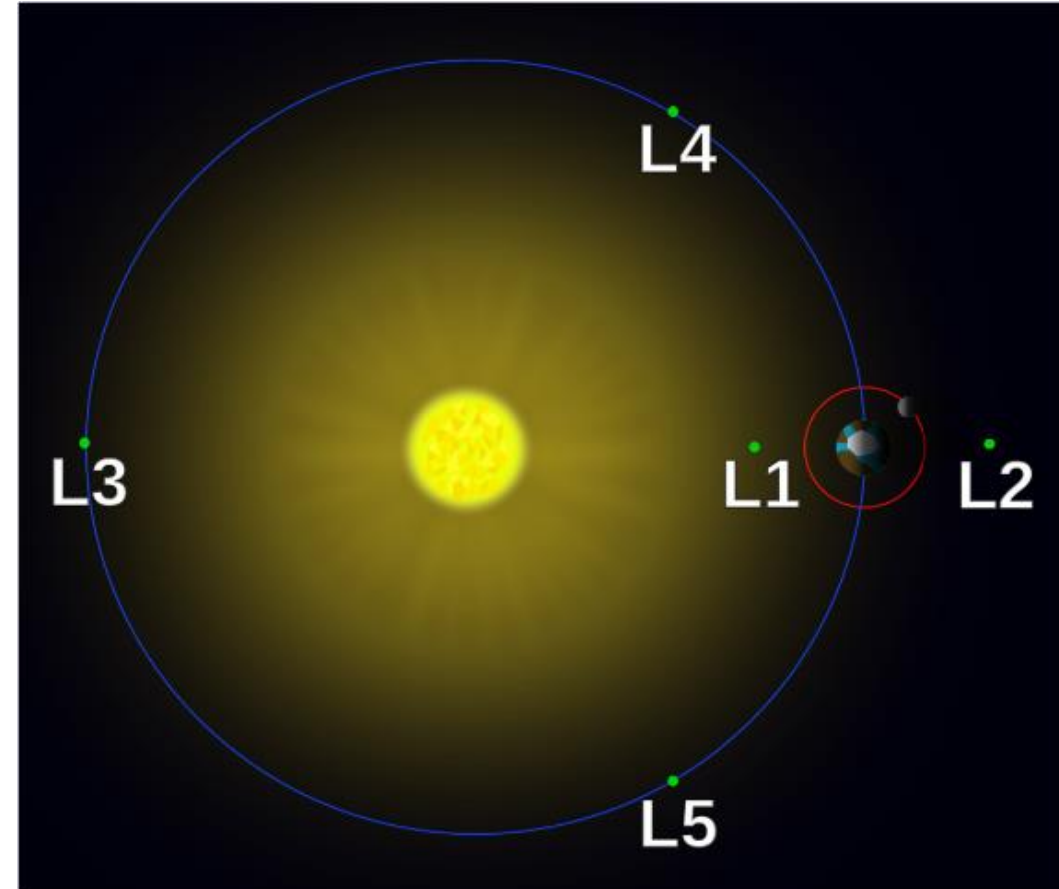


**Presentation by Indian delegation  
to  
59<sup>th</sup> session of STSC - UNCOPUOS  
Vienna, Austria**

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# Aditya L1- Indian Solar Mission

- Aditya L1 shall be the first space based Indian mission to study the Sun.
- The spacecraft shall be placed in a halo orbit around the Lagrangian point 1 (L1) of the Sun-Earth system at a distance of about 1.5 million km from the Earth.
- A satellite placed in the halo orbit around the L1 point has the major advantage of continuously viewing the Sun without any occultation/eclipses.
- As the spacecraft will be directly placed in between the Sun and the earth, It will also provide crucial information in understanding the impact of solar activities on near Earth space weather.



Lagrange points in the Sun–Earth system (not to scale).  
Image courtesy: Wikipedia

# Aditya L1: Science Objectives & Uniqueness

## Major science objectives:

- Understanding the Coronal Heating and Solar Wind Acceleration.
- Understanding initiation of Coronal Mass Ejection (CME), flares and near-earth space weather.
- Coupling and Dynamics of the Solar Atmosphere.
- Solar wind distribution and temperature anisotropy.

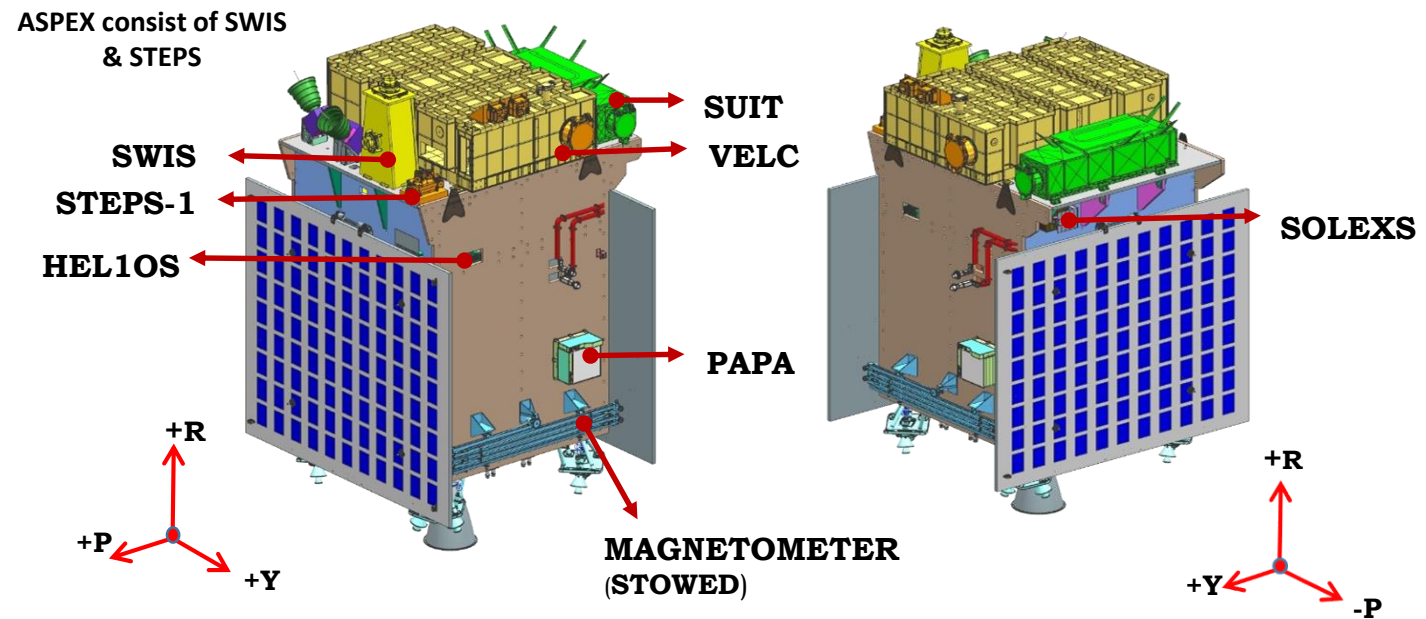
## Uniqueness

- First time spatially resolved solar disk in the NUV band.
- CME dynamics close to the disk ( $\sim 1.05 R_{\text{sun}}$ ) and thereby providing information in the acceleration regime of CME which is not observed consistently.
- On-board intelligence to detect CMEs and Flares for optimized observations and data volume.

# Aditya L1: Science Payloads

- **VELC**: Visible Emission line Coronagraph
- **SUIT**: Solar Ultra Violet Imaging Telescope
- **HEL1OS**: High Energy L1 Orbiting X-ray Spectrometer
- **SoLEXS**: Solar Low Energy X-ray Spectrometer
- **PAPA**: Plasma Analyzer Package for ADITYA
- **ASPEX**: Aditya Solar wind Particle Experiment
- **MAGNETOMETER**

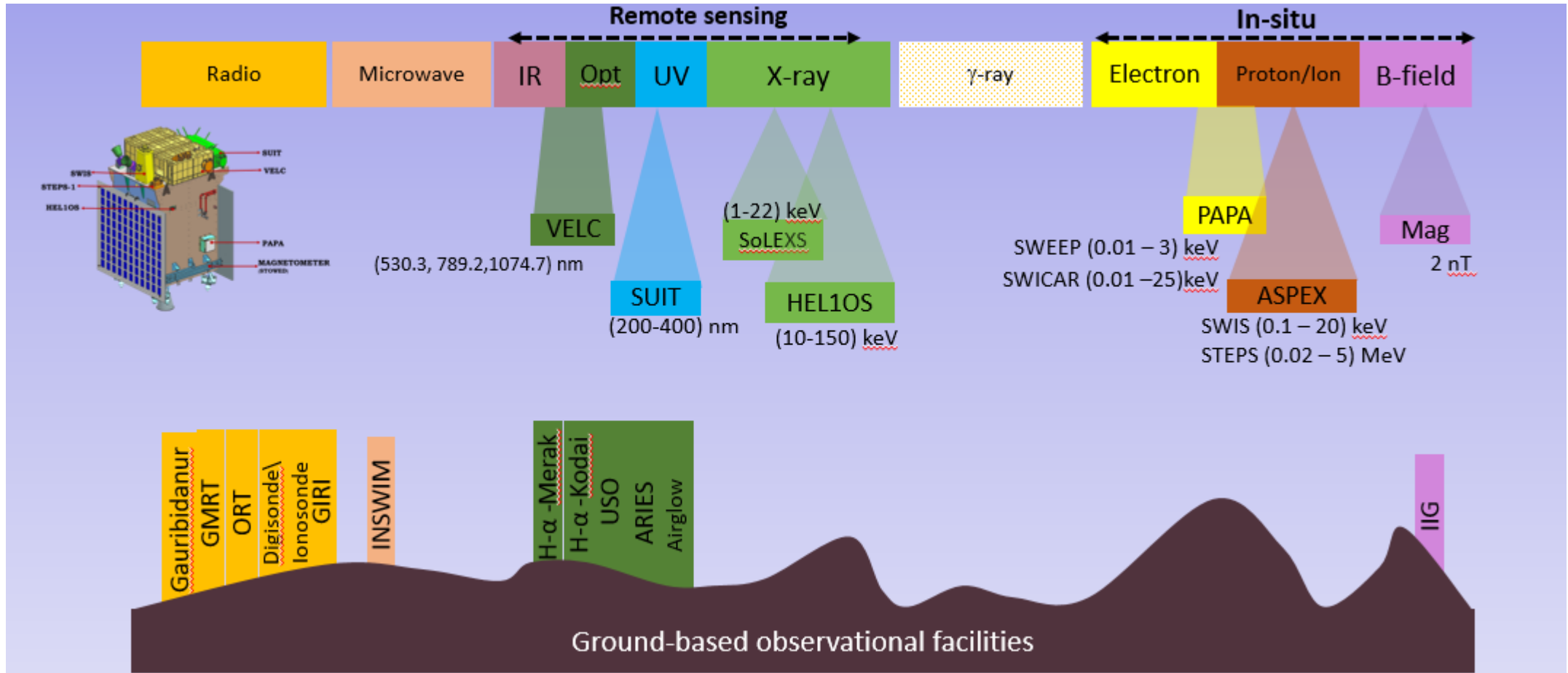
## PAYLOADS – Stowed View of Satellite



In-situ measurements by PAPA, ASPEX and MAGNETOMETER.

# Aditya-L1 and ground based comprehensive observational capability

Due to special vantage point L1, combined data analysis of Aditya-L1 and various ground based observatories would provide important understanding of **Solar Phenomena, Space Weather and Solar-Terrestrial Relation.**





# Aditya L1: National and International Collaboration

## Payloads development



**SUIT payload** is being jointly developed with **Inter University Centre for Astronomy and Astrophysics (IUCAA)**, Pune and ISRO.



**VELC payload** is being jointly developed with **Indian Institute of Astrophysics (IIA)**, Bangalore and ISRO.

## Aditya-L1 Support Cell



**Aditya-L1 Support Cell** is established in **Aryabhata Research Institute for Observational Sciences (ARIES)**, Nainital to carry out training and workshops.

- **Aditya-L1 Science Working Group** comprises members from different national institutes.
- **National level science meets** were conducted on Aditya-L1 driven science.

## International Collaboration: Ground Support, Science and Cross-Calibration

- ESA ground support: Initial phase spacecraft operation
- ISRO-NASA Heliophysics Working Group
- ISRO-NOAA Heliophysics Cooperation
- ISRO-ASI Heliophysics Working Group

# Aditya L1 Mission Profile

- Expected launch: second half of 2022.
- Nominal mission life – 5-years.
- Insertion in large 3D halo orbit around L1 after about 109 days post launch.

## Halo orbital parameters

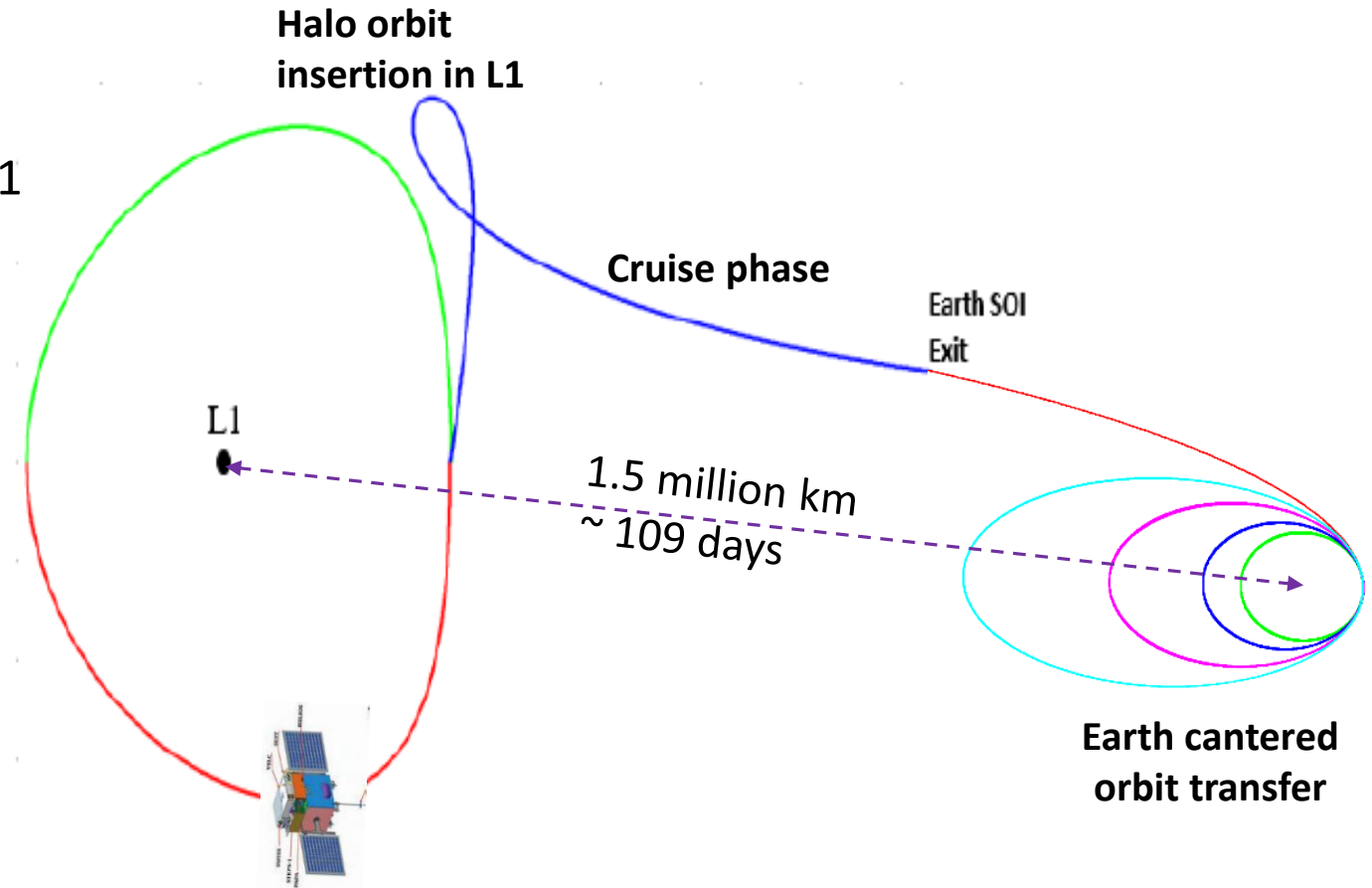
AX : 208951 Km (along Sun-Earth line in Ecliptic plane)

AY : 670024 Km (Perp to Sun-Earth line in Ecl plane)

AZ : 120000 Km (Perp to Ecliptic plane)

Orbital Period : 177.86 days

## Aditya-L1 trajectory



**Thanks for your kind attention**