



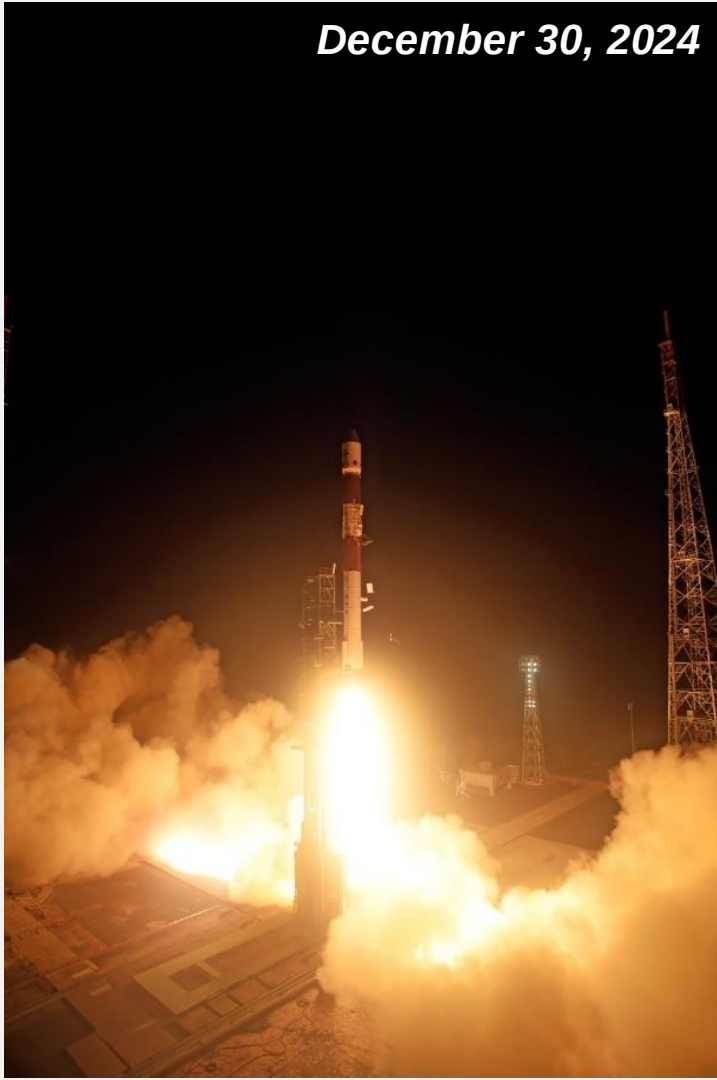
Space Docking Experiment (SPADEx) & PSLV Orbital Experimental Module (POEM-4)

**Presentation to 62nd STSC
Indian Space Research Organisation (ISRO)
INDIA**

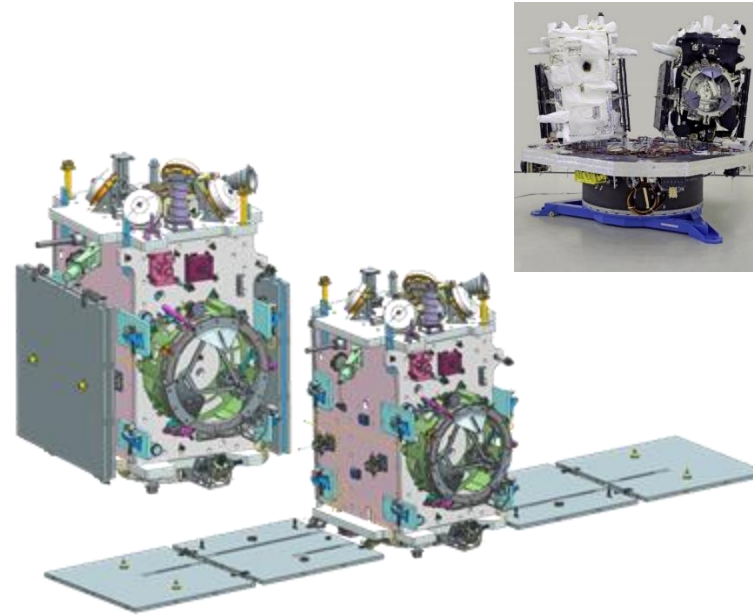
PSLV-C60 / SPADEX Mission



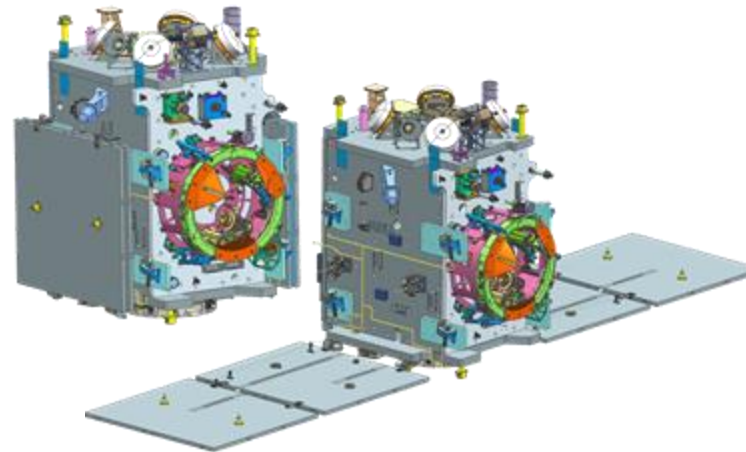
December 30, 2024



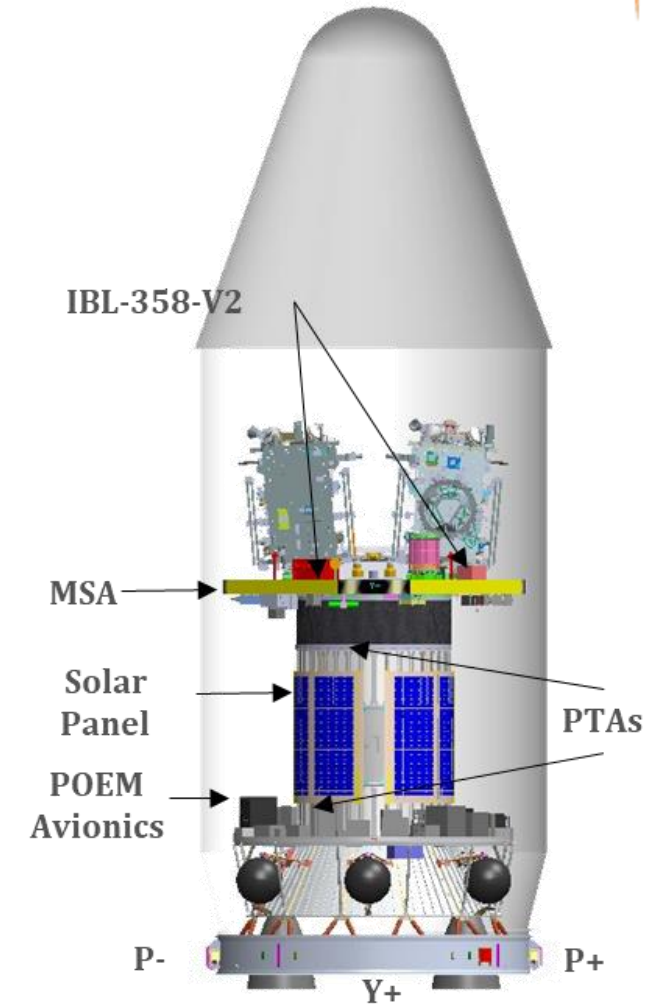
Launch of PSLV C60



Spacecraft A – SDX01

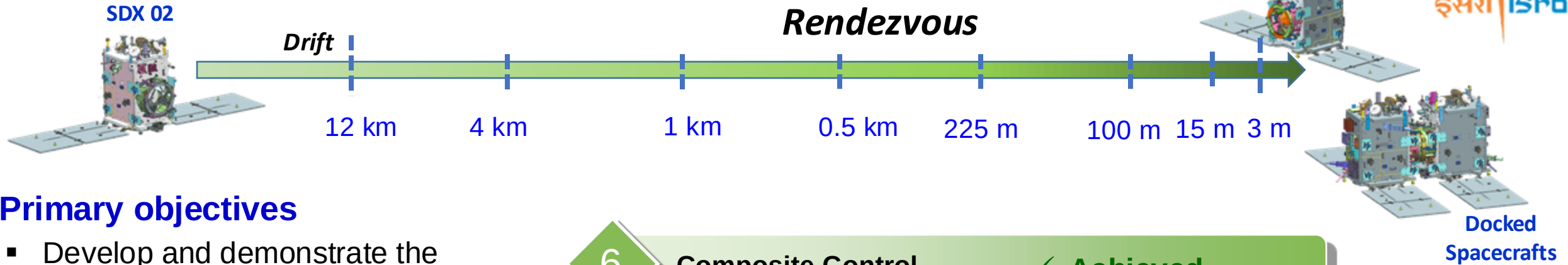


Spacecraft B – SDX02



PSLV Orbital Experimental Module (POEM-4)

SPADEX – Mission Profile



Primary objectives

- Develop and demonstrate the technology needed for rendezvous, docking & undocking using two small spacecrafts.

Secondary objectives

- Demonstrate the controllability of spacecrafts in docked condition
- Demonstrate transfer of power between spacecrafts on experimental basis
- Post undocking payload operations



Orbit	
Altitude	475km
Inclination	55deg
Mission Life	2 yrs.

SPADEX – Configuration



Mainframe systems

- Structure, Power, Communication, Satellite Positioning System (SPS), Sensors (Star Sensor, 4Pi Sun Sensor, Magnetometer & Gyros), Actuators (Reaction wheels, Magnetic Torquers & Thrusters), Onboard Computer and Data Handling systems

Rendezvous Sensors Suite

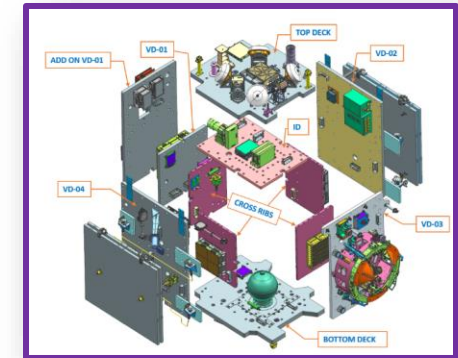
- Relative Orbit Determination and Propagation (RODP) through Inter Satellite Link (ISL) using SPS
- Laser Range Finder (LRF)
- Rendezvous Sensor (RS)
- Proximity Docking Sensor (PDS)

Docking Mechanism and Sensor Suite

- Mechanism Entry Sensor (MES)
- Capture, Extension/ Retraction and Rigidisation Mechanism
- Power Transfer Connector Mechanism

Payloads:

- High Resolution Camera (HRC) in SDX 01
- Radiation Monitor (RadMon) and Multi Spectral Payload (MMX) in SDX 02

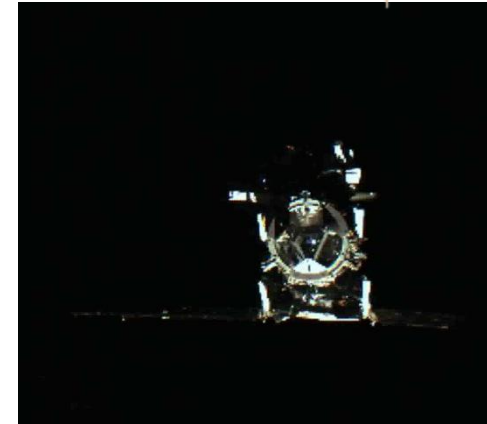
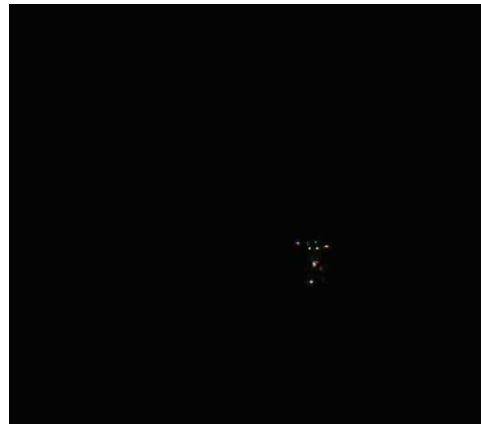
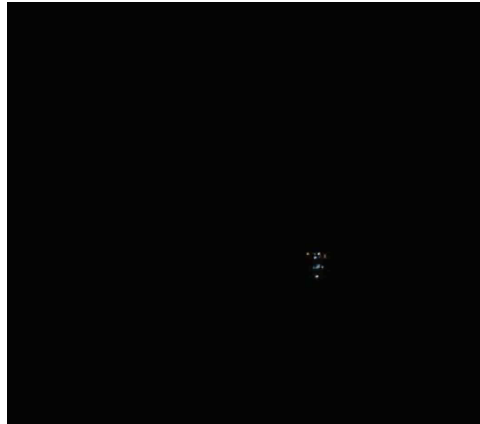


Mass, kg	
SDX 01	220
SDX 02	222

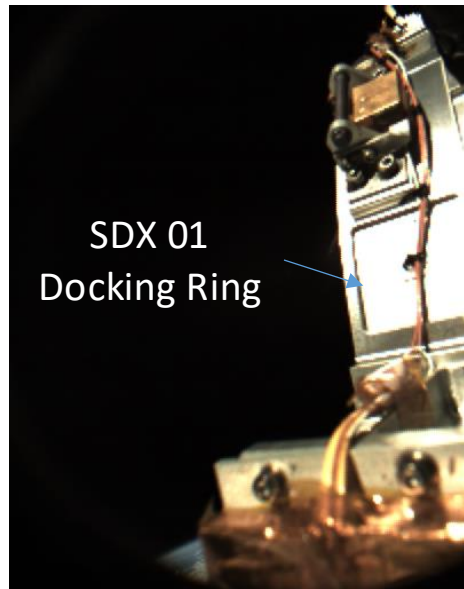
Power (W)	
Power generation	528 (SS)
Continuous load	300

SPADEX – On orbit events

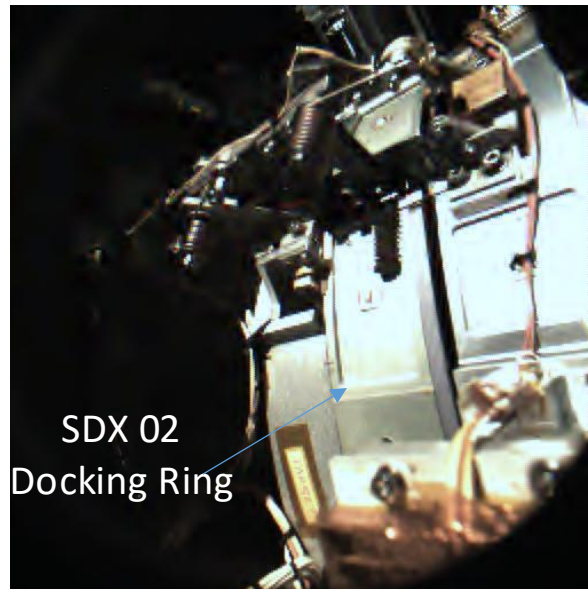
India's Space Docking Experiment achieved successfully on Jan 16, 2025



Rendezvous as seen from SDX 01



Before docking

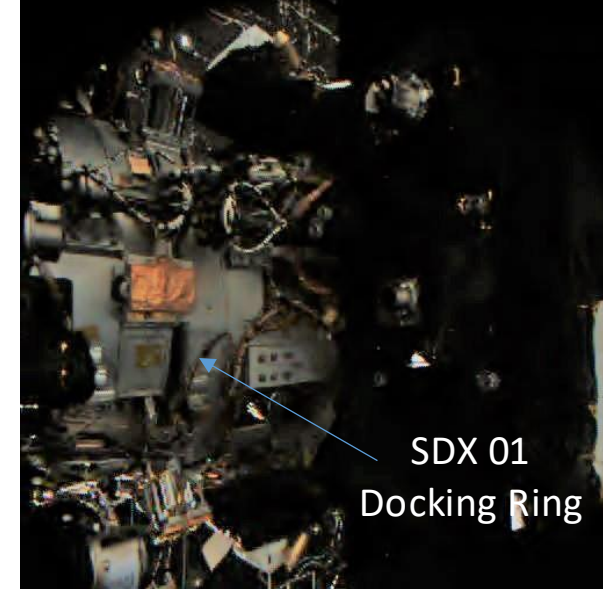


After docking

Docked Images from SDX 01



Before docking



After docking

Docked Images from SDX 02

Space Docking Experiment (SPADEX) – Gateway for future



- India's Space ambitions
 - Bharatiya Antariksh Station (BAS)
 - Indian on Moon
- Docking Technology essential
 - Utilisation of multiple launches to achieve common mission objective
- Small spacecrafts with low inertia – Precise rendezvous and docking
- Forerunner for Autonomous Lunar docking without GNSS support from Earth

PS4-Orbital Experiment Module (POEM-4)



- PSLV-C60 hosted 4th POEM Mission of India.
- POEM-4 utilizes the spent PS4 stage of the PSLV-C60, repurposing it to host various scientific & technological experiments in space.

Objective

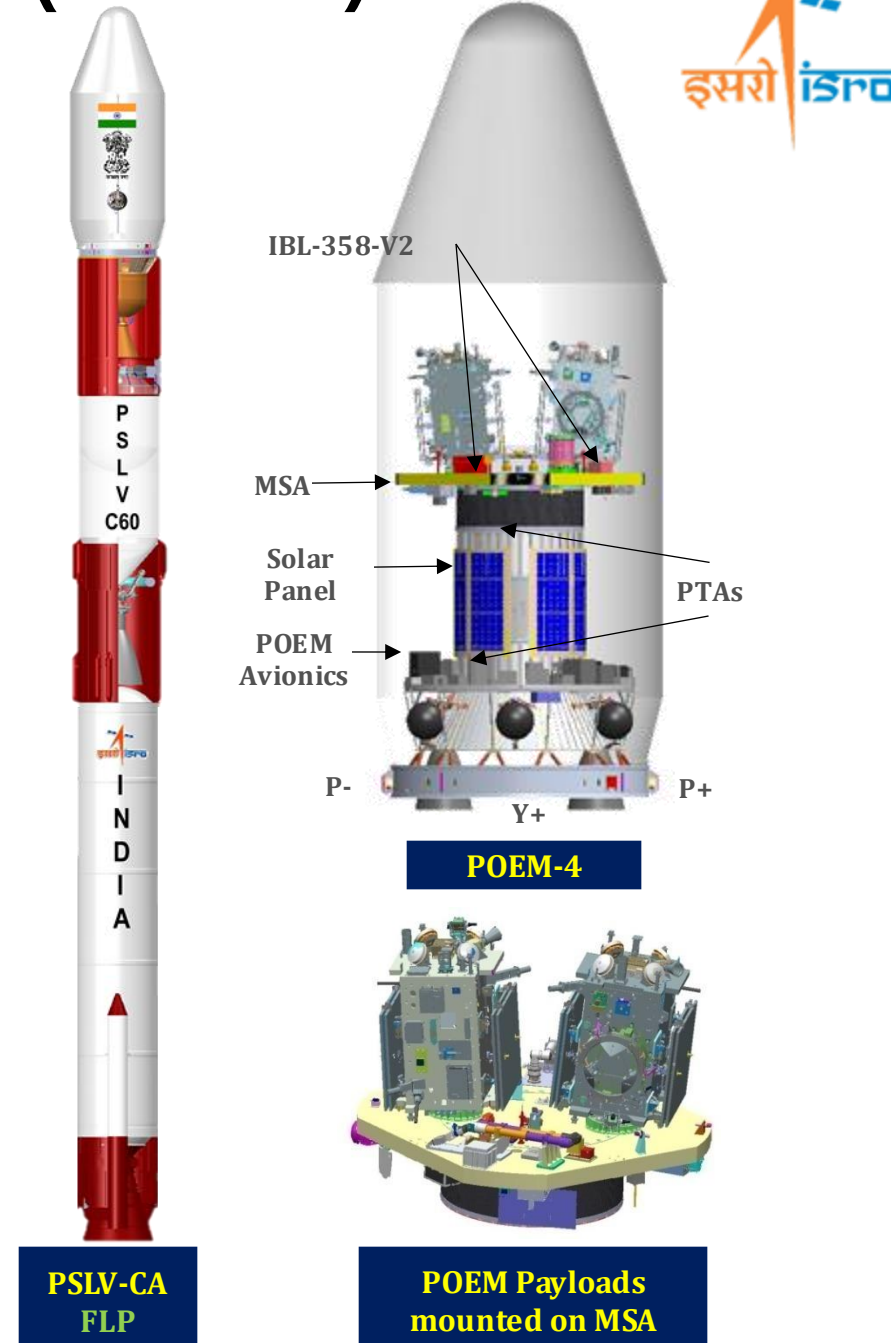
To carry out certain in-orbit microgravity experiments for an extended duration of up to three months using the POEM platform.

Payloads in POEM-4

24

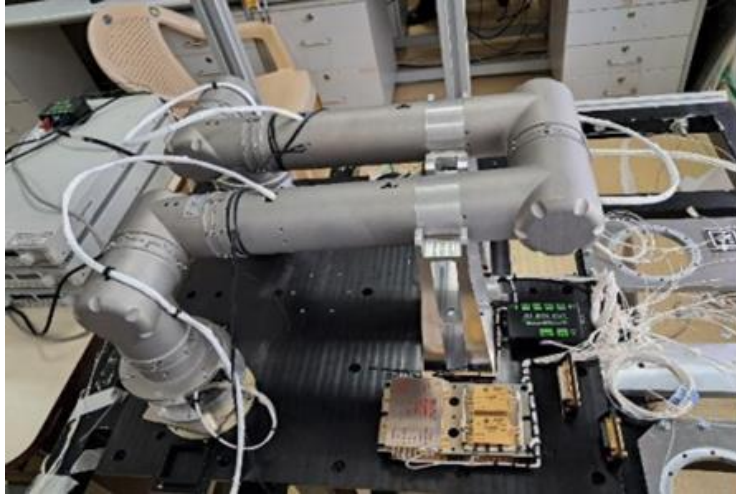
14 payloads from DOS ~ 95 kg

10 payloads from various NGEs ~ 25 kg



POEM-4 Payloads

RRM-TD: Walking Robotic Arm



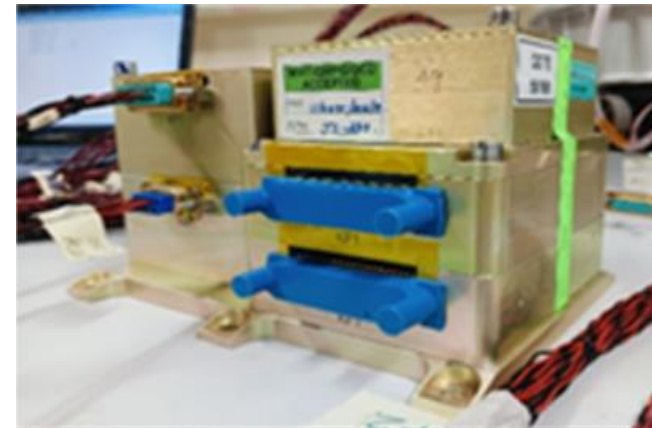
Debris Capture Robotic Manipulator



**Amity Plant Experimental
Module in Space (APEMS)**



**Compact Research Module for
Orbital Plant Studies (CROPS)**

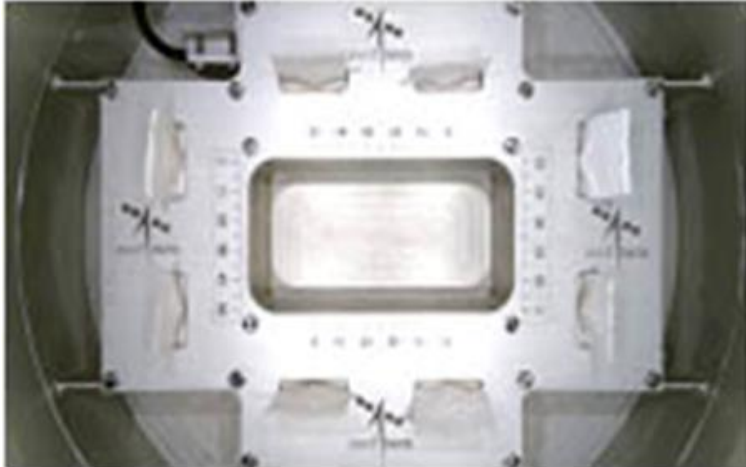


POEM-4 Payloads

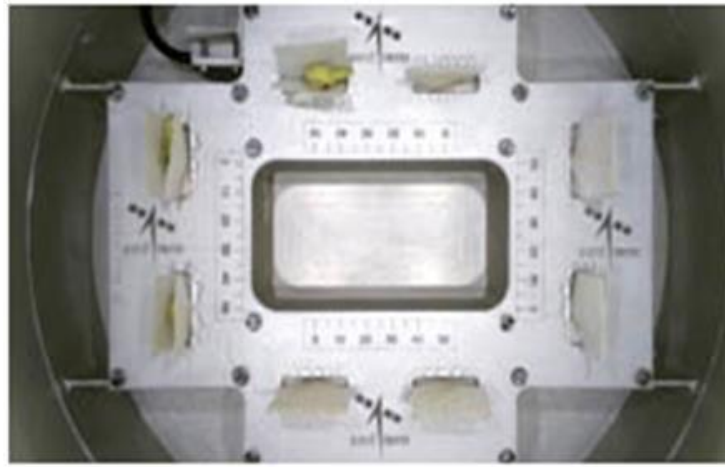


Compact Research Module for Orbital Plant Studies (CROPS)

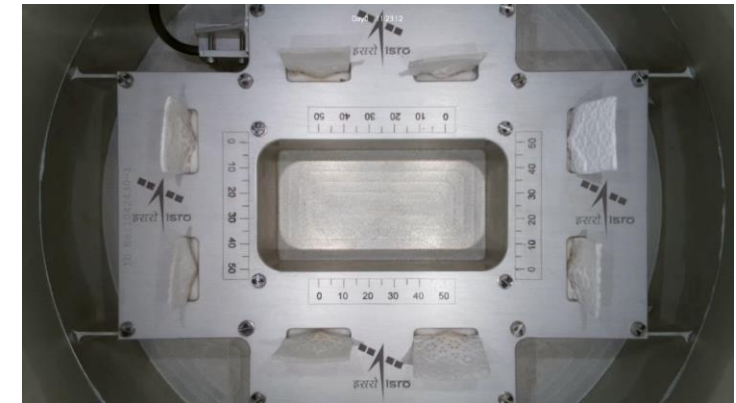
Demonstrate germination of a seed and growth of a plant up to two leaves stage in space for 5 to 7 days.



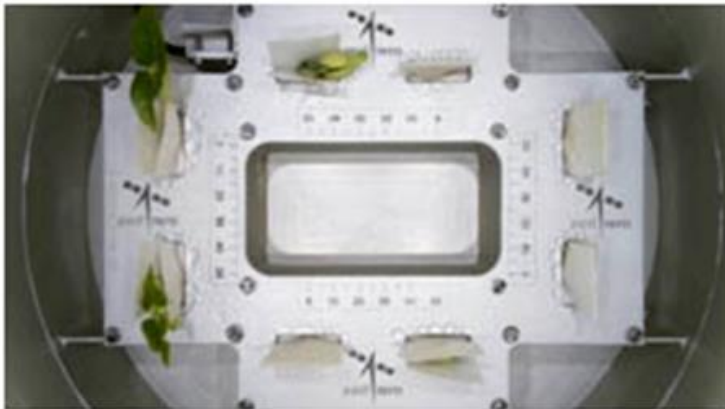
30th December 2024 (Day 1)



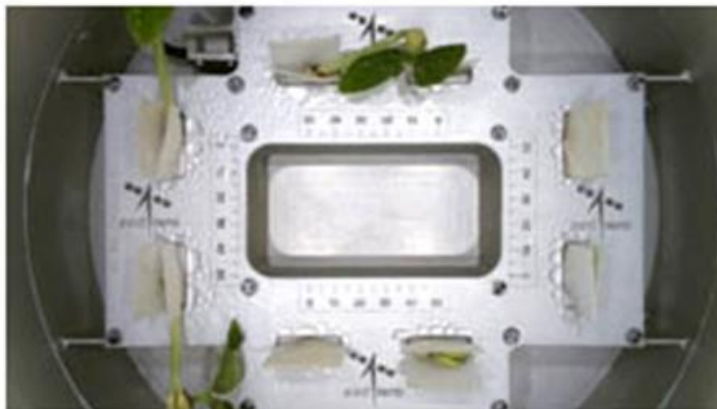
4th January 2025 Sprouting of first seed



CROPS (Video)



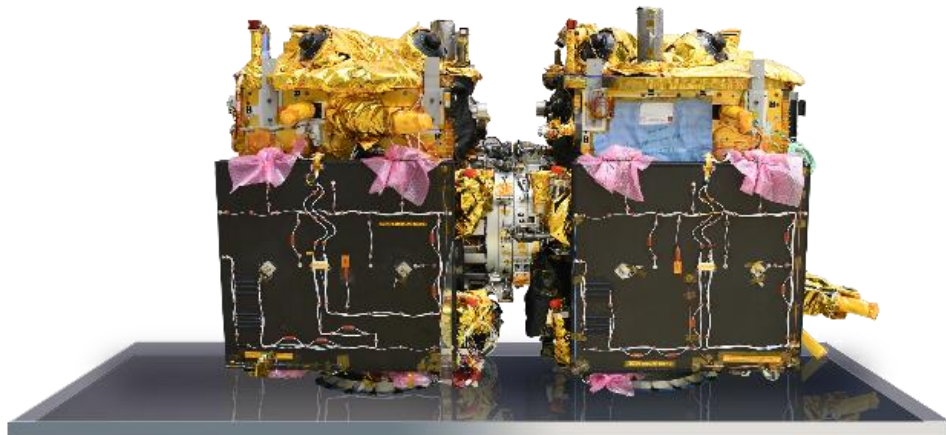
5th January 2025 Two leaves stage



6th January 2025 Two leaves stage

**India's successful Space Docking Experiment
&
Microgravity experiments using PS4-Orbital Experimental Module**

Paving way for Exciting Future Missions



Thank You....