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Advancing Lunar Exploration Through CubeSat Innovation: The LEOPARD Project

31st UN/IAF Workshop on Space Technology for Socio-Economic Benefits: "Space Sustainability as a Game-Changer for Development"

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11 – 13 OCTOBER 2024

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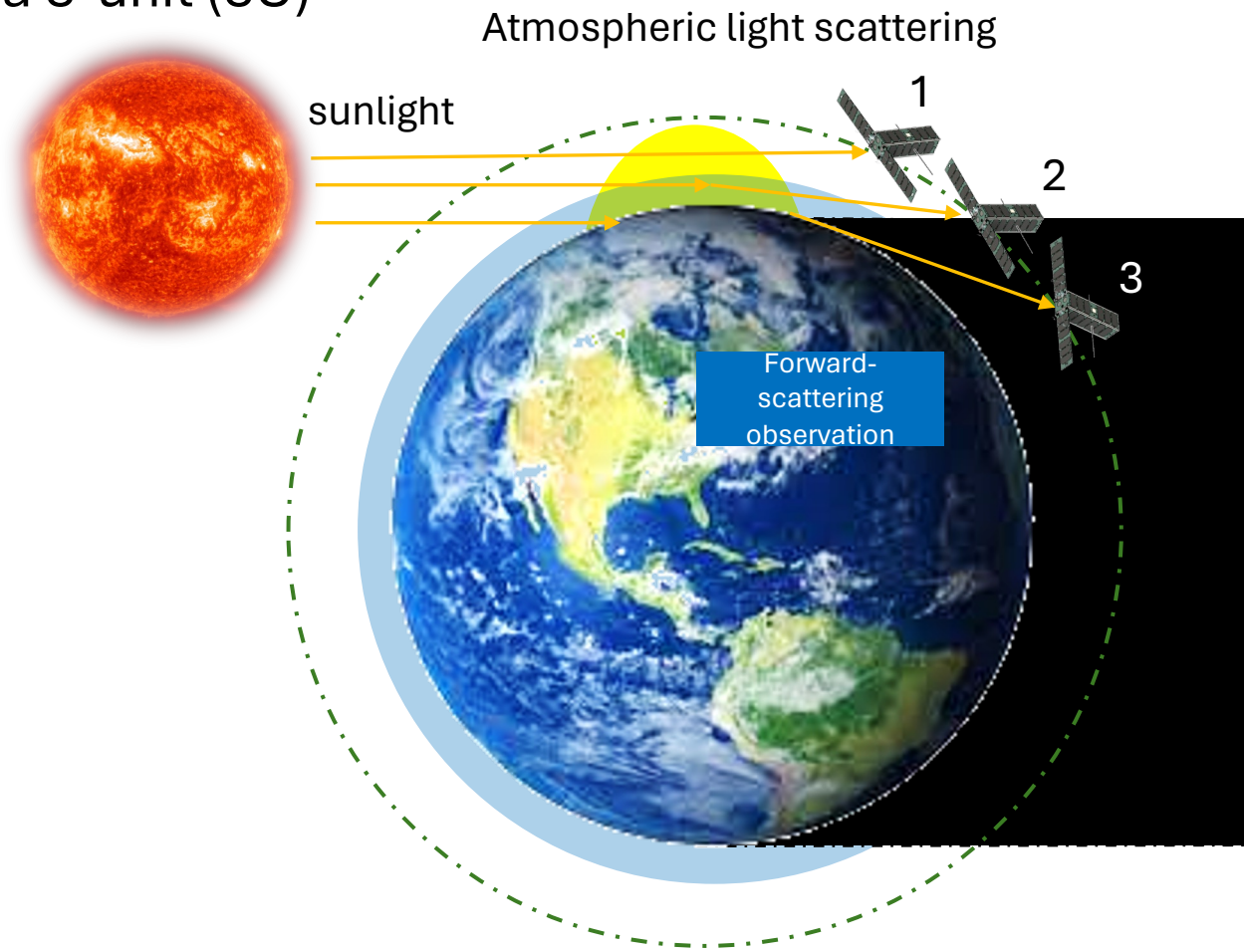
LEOPARD (Light intensity Experiment with On-orbit Positioning and satellite Ranging Demonstration) satellite is a 3-unit (3U) research CubeSat with multiple missions.

- monitoring of horizon light scattering with a multispectral camera
- onboard processing of Earth-origin one-way radio ranging signal (OPERA)
- single event latch-up (SEL) detection
- solar panel deployment demonstration with shape memory alloy
- ambient magnetic field measurements
- ~~total ionization dose measurement for onboard commercial-off-the-shelf components~~



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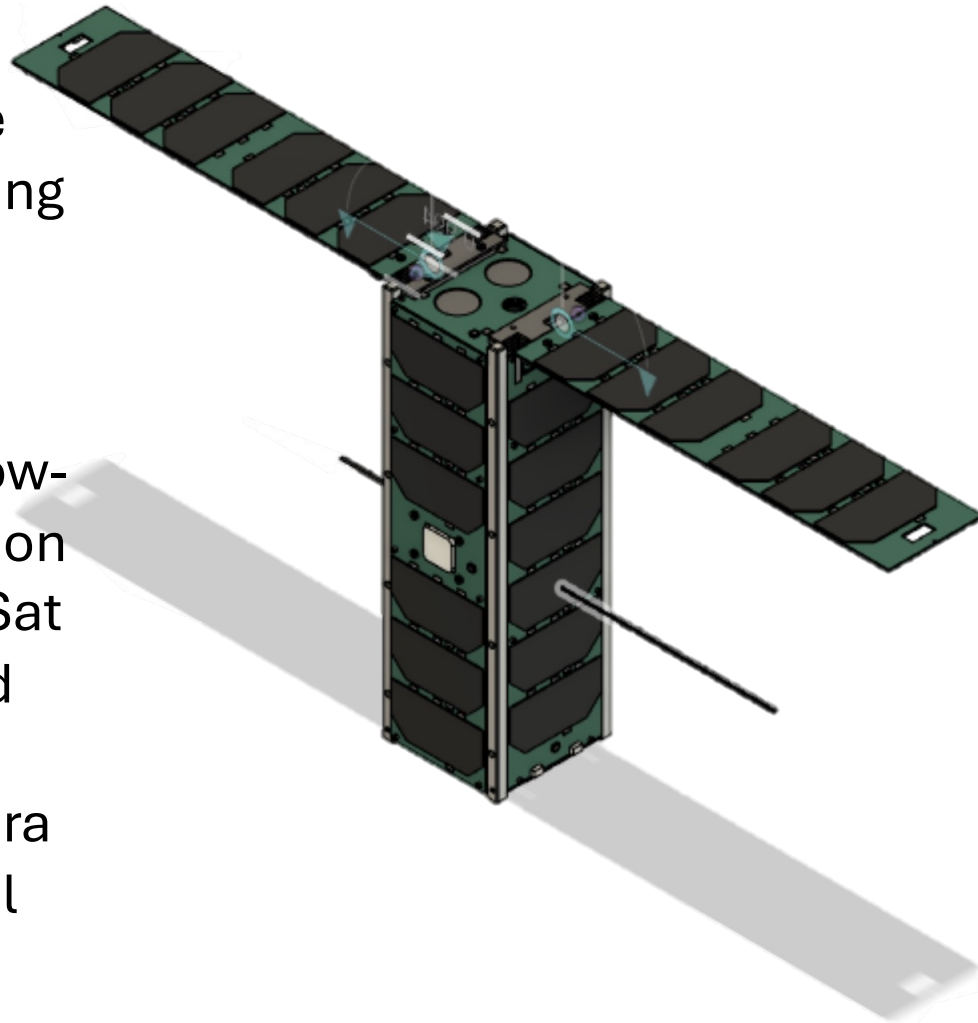
Mission Impact

The LEOPARD project, involving over 20 members from more than 10 countries, contributes to capacity building by fostering collaboration and expertise development of members from across diverse regions.

A multispectral imaging payload will be demonstrated in a low-Earth orbit (LEO) on LEOPARD prior to a lunar CubeSat mission called Horyu-VI. While Horyu-IV is planned to be a 6U CubeSat mission for the Moon, there are several key technologies and subsystems to be demonstrated and tested in LEO. These subsystems are initially selected to be a multispectral camera (MSC) payload and an on-board one-way radio ranging signal processing unit (OPERA) in LEOPARD mission.



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Current Status

June 2022

The Mission Definition Review examined the proposed requirements, the mission architecture, and the flow down to all functional elements of the mission.

April 2023

The Preliminary Design Review demonstrated that the preliminary design met all system requirements with acceptable risk and within the cost and schedule constraints.

May 2023

The Delta PDR was done to address concerns identified in the initial PDR.

May 2024

The Critical Design Review demonstrated that the technical effort was on track to complete the flight and ground system development and mission operations

Currently

The Flight Model is undergoing tests and analyses that determine the system's readiness for a safe and successful launch and subsequent orbit.

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