Lagrange mission to L5

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27th june 2019

The L5 mission is a challenging mission

First Mission ever to occupy L5

The position at L5 allows monitoring the Sun's activity ahead of its influence with Earth.

A stable communication is required over a distance of 1 AU / 150 Million km.

Large instrument suite

The Lagrange spacecraft accommodates a wide range of Solar Science payloads which to a large extent are evolutions and simplifications of Solar Orbiter units.

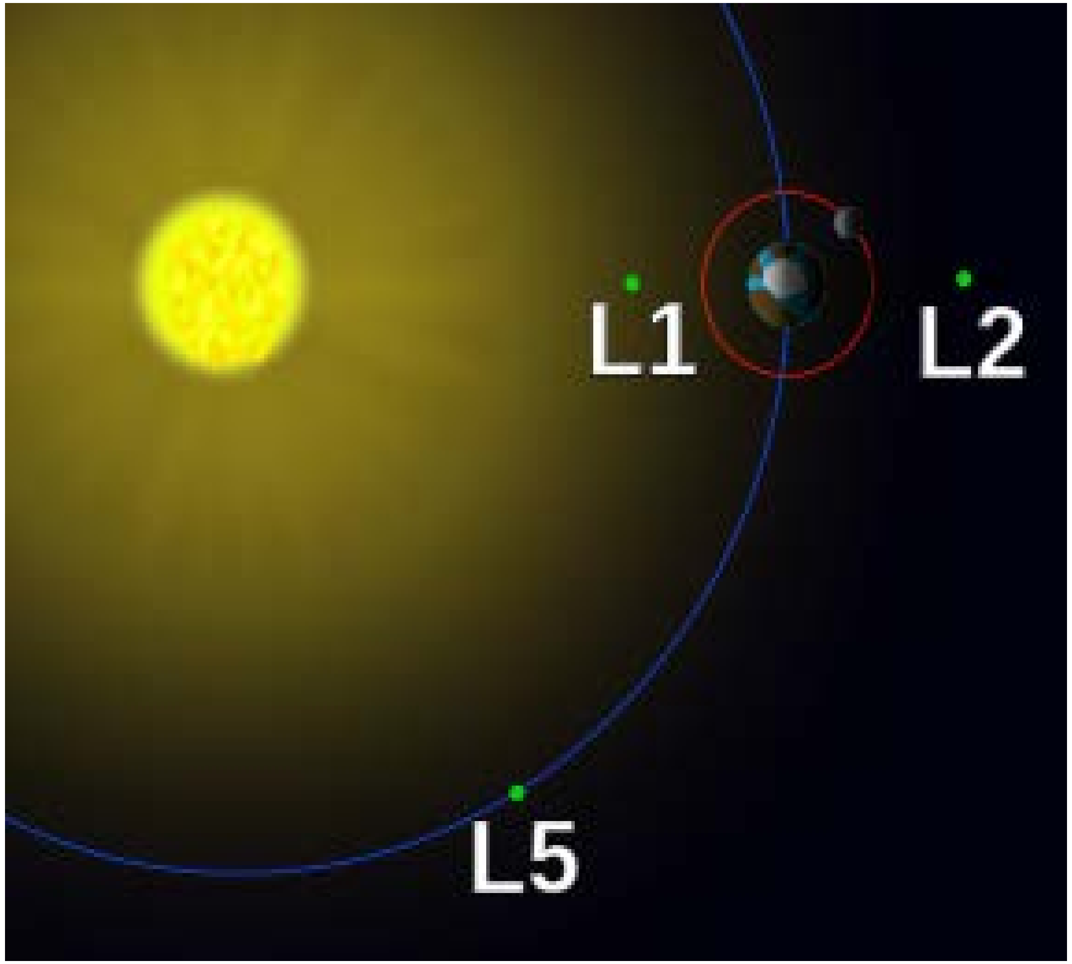
Getting the best performance out of these instruments means managing a combination of performance requirements at the top end of spacecraft capabilities today.

Operational aspects

Continuous observations are needed:

→ 24/7/365 and 99 % availability are required to ensure fast triggering of alarms.

→ System shall be operational even in severe SWE conditions unlike other missions where adherence to performance requirements are more usually suspended.



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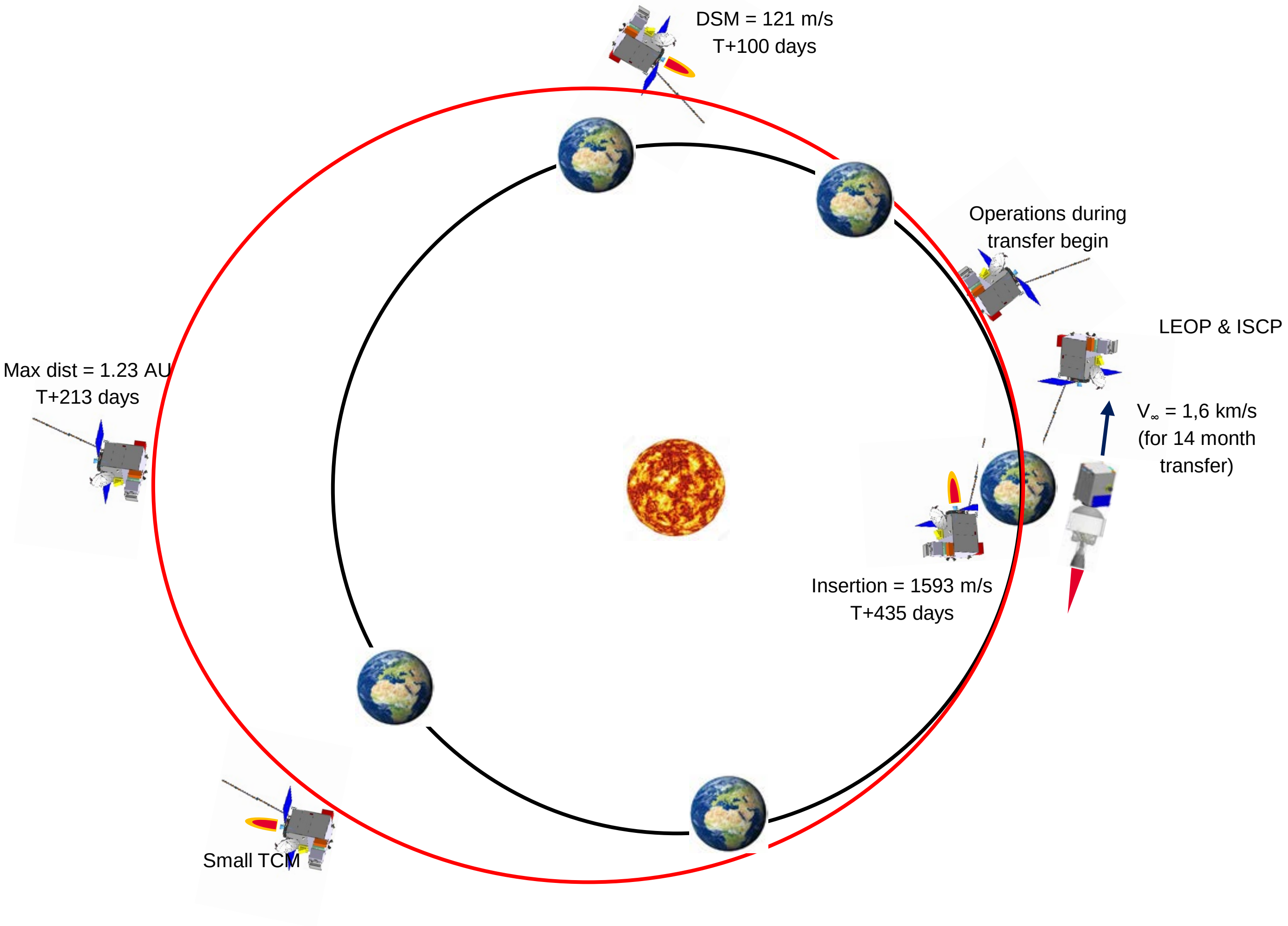
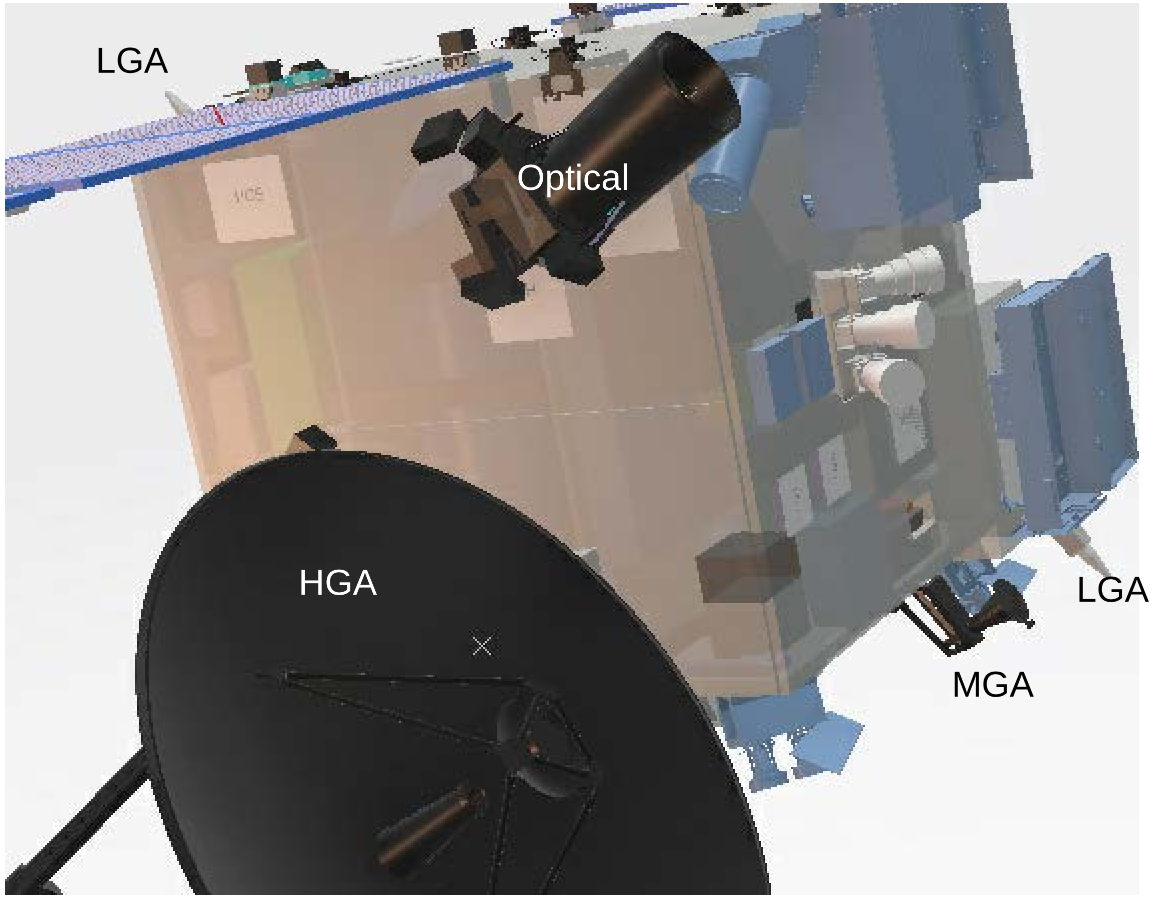
The Transfer to L5



- **Launch** with A6.2
- SC performs **LEOP**, and readies to operate payloads
- SC initiates **payload ops**
- Large **DSM** to correct for launch limitations
- **Aphelion** (1.23 AU, 66% solar flux)
- Small **TCM** if needed
- SC enters operational orbit following large **insertion burn**

Communications from L5

A stable communication link is required over a distance of 150 000 000 km, the distance to L1.
The spacecraft will communicate using X-band and will transmit data to Earth continuously using both RF and Optical systems.



RF: Using fixed low gain antennas to give omni-coverage during the first few weeks of the mission the spacecraft ensures communication to ground almost as soon as the spacecraft leaves the launcher, Once the spacecraft has been commissioned a high gain antenna is used to download both telemetry and any data collected from the Instruments.

Optical: At this stage the optical payload is considered experimental as deep space optical communications remain untested. This terminal is designed to transfer data to Earth at 10X the rate of the RF systems. Industry is working closely with the supplier to accommodate this equipment.

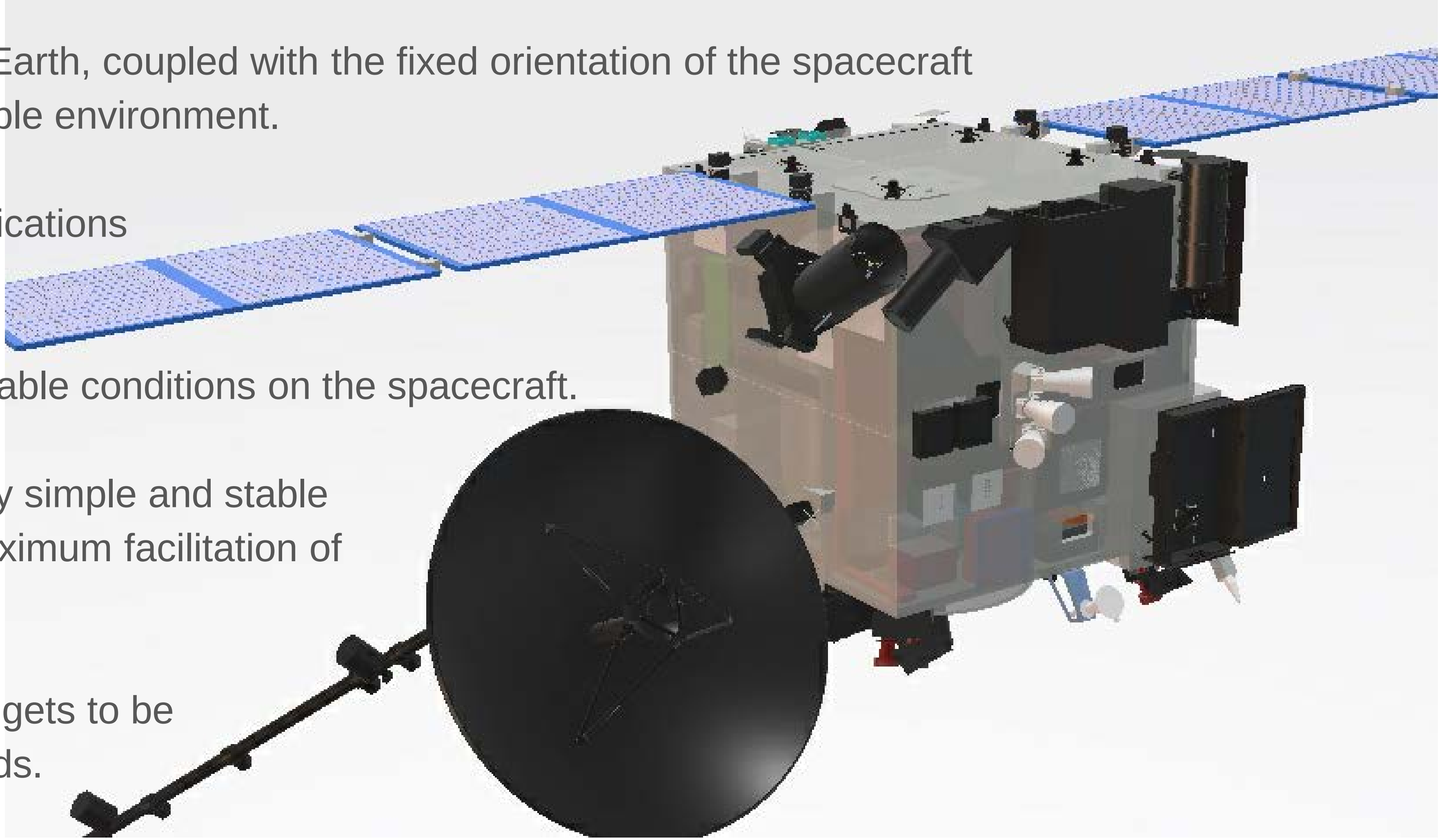
Mechanical, Thermal and Power Systems

A fixed distance from the Sun/Earth, coupled with the fixed orientation of the spacecraft to the Sun results in a very stable environment.

With Instruments and communications operating around the clock, and the fixed orientation of the spacecraft provides very stable conditions on the spacecraft.

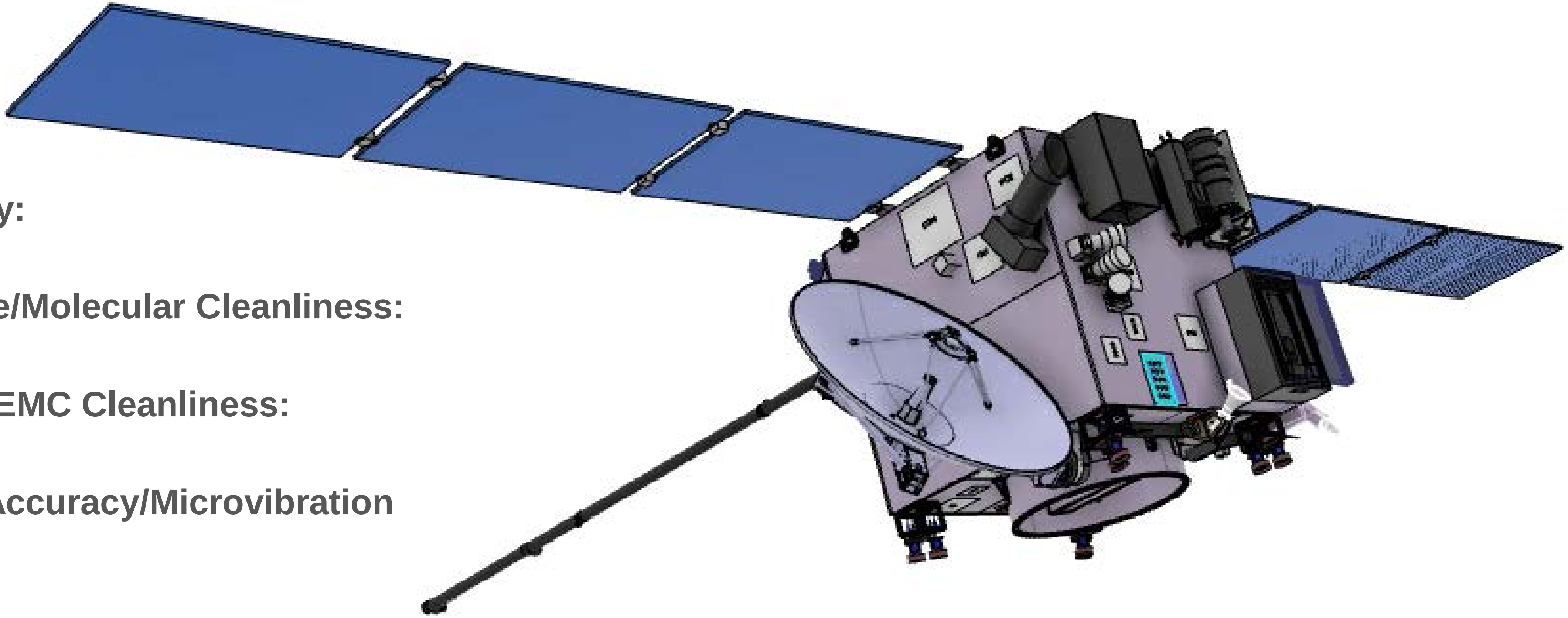
Together, these allow for a very simple and stable spacecraft design ensuring maximum facilitation of the instrument needs

A simple spacecraft allows budgets to be focused on the instrument needs.



Special Considerations for Lagrange Mission

- What makes this spacecraft special



Availability:

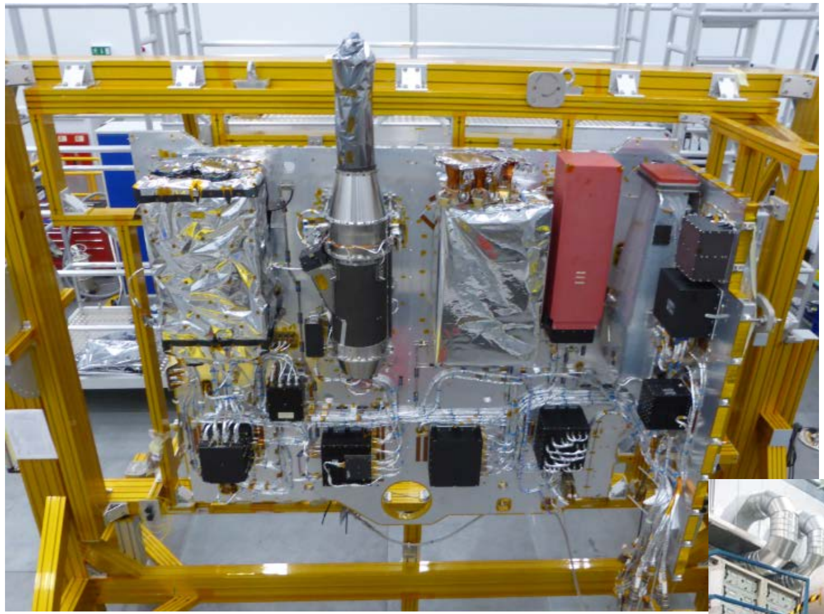
Particulate/Molecular Cleanliness:

Magnetic/EMC Cleanliness:

Pointing Accuracy/Microvibration

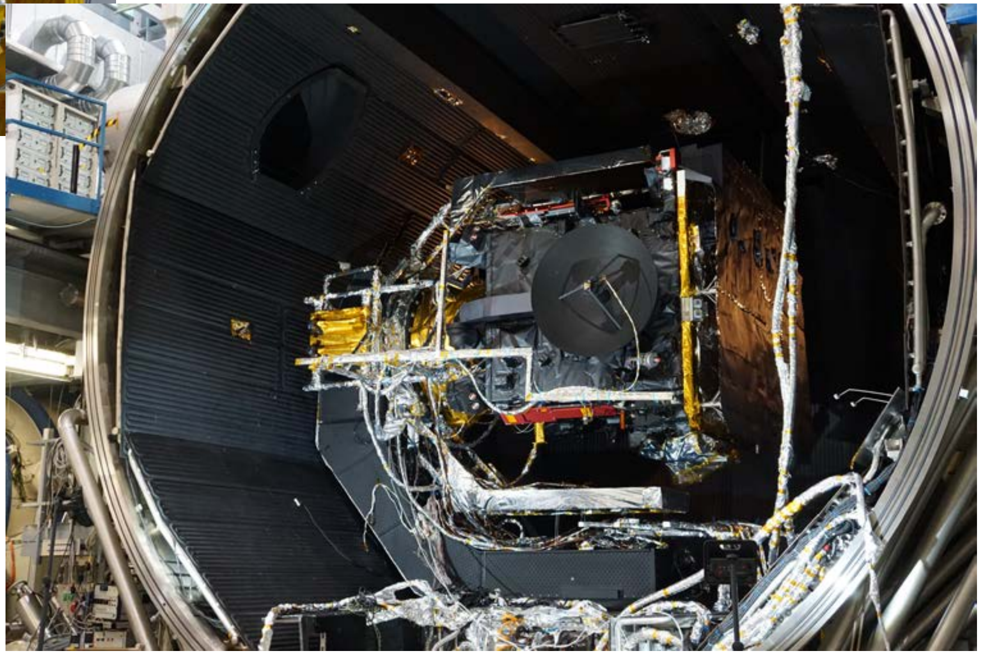
For all of these areas, Industry is able to draw on recent experience, processes' and approaches developed on Solar Orbiter and other missions, in conjunction with Instrument teams, to ensure that the spacecraft platform is optimised for the instrument suites.

Solar Orbiter Payload Integration



Recent experience of multi payload accommodation with

- 24/7 purge
- Very low EMC/Magnetic environment
- Accurate alignment
- Very stringent cleanliness requirements to be observed during all AIT activities



Spacecraft Industrialisation

- A comprehensive industrialisation campaign has been carried out identifying potential candidates to participate in the mission. Additional contacts are continuing to ensure a broad participation.

- The final selection of the spacecraft team will take place after the geo-return targets are confirmed following the November ministerial.

- The spacecraft industrial program will be ready to start with all partners in 2020 with a mature design securing the 2025 launch date.

Any Questions?

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26th June 2019

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