In-flight calibration and performance verification of the Metis instrument for the Solar Orbiter mission

Chiara Casini - 36th Cycle

MEETING FOR THE ADMISSIONS OF THE DOCTORAL STUDENTS

06/11/2020
The solar corona is the outer part of the solar atmosphere that expands, as solar wind, into the interplanetary space to the border of the solar system (heliosphere).

Open Questions:
- How and where do the solar wind plasma and magnetic field originate in the corona?
- How do solar transients drive heliospheric variability?
- How do solar eruptions produce energetic particles radiation that fills the heliosphere? ¹

ESA/NASA Solar Orbiter mission to study also the Solar Corona

**Solar Orbiter**

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**ORBIT:**

- **0.28 – 0.32 AU** (perihelion)
- **0.74 -- 0.91 AU** (aphelion)

Out-of-ecliptic view:
Multiple gravity assists with Venus to increase inclination out of the ecliptic to:
- **>24°** (nominal mission);
- **>34°** (extended mission)

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**Mission phases:**

- **Launch**: 09/02/2020
- **Cruise**: 06/2020 – 11/2021
- **Commissioning**: 01/2026
- **Nominal**: 2030
- **Extended mission time**: 2030
10 Instruments:

- 4 *in-situ* (measurements concerning high and low energy charged particles, magnetic fields and electric fields)
- 6 remote sensing (taking images of the Sun and corona)

**METIS** is a coronagraph with an innovative occultation system.
Full Imaging of the corona (1.7 - 9 R☉):

- UV (121.6±10 nm)
- visible light (580-640 nm) in total and polarized brightness

- depending on the science goal and the instantaneous field of view (FoV): different spatial resolution and detector exposure time,

At the perihelion (0.28 AU)
Spatial resolution $\leq$ 4000 km
Time resolution $\geq$ 1 sec
Simultaneous VL and UV imaging

The CNR-IFN of Padua is participating to the project and the calibration of Metis
Map of the project

Commissioning phase
- processing and comparing
- verifying performances
- perform simulations

Cruise phase
- define the procedures and analyze the data to complete the characterization tests

Nominal phase
- Starting the concrete analysis of data acquired

Solar Orbiter phase
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1 Metis Commissioning Activity Report

Chiara Casini
My research activity will serve to acquire a deep and detailed knowledge of the Metis instrument in one of the most critical and important phase of a space experiment, and it’s essential to obtain scientific useful images.
Conclusions

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Thanks for the attention