Stockholm University

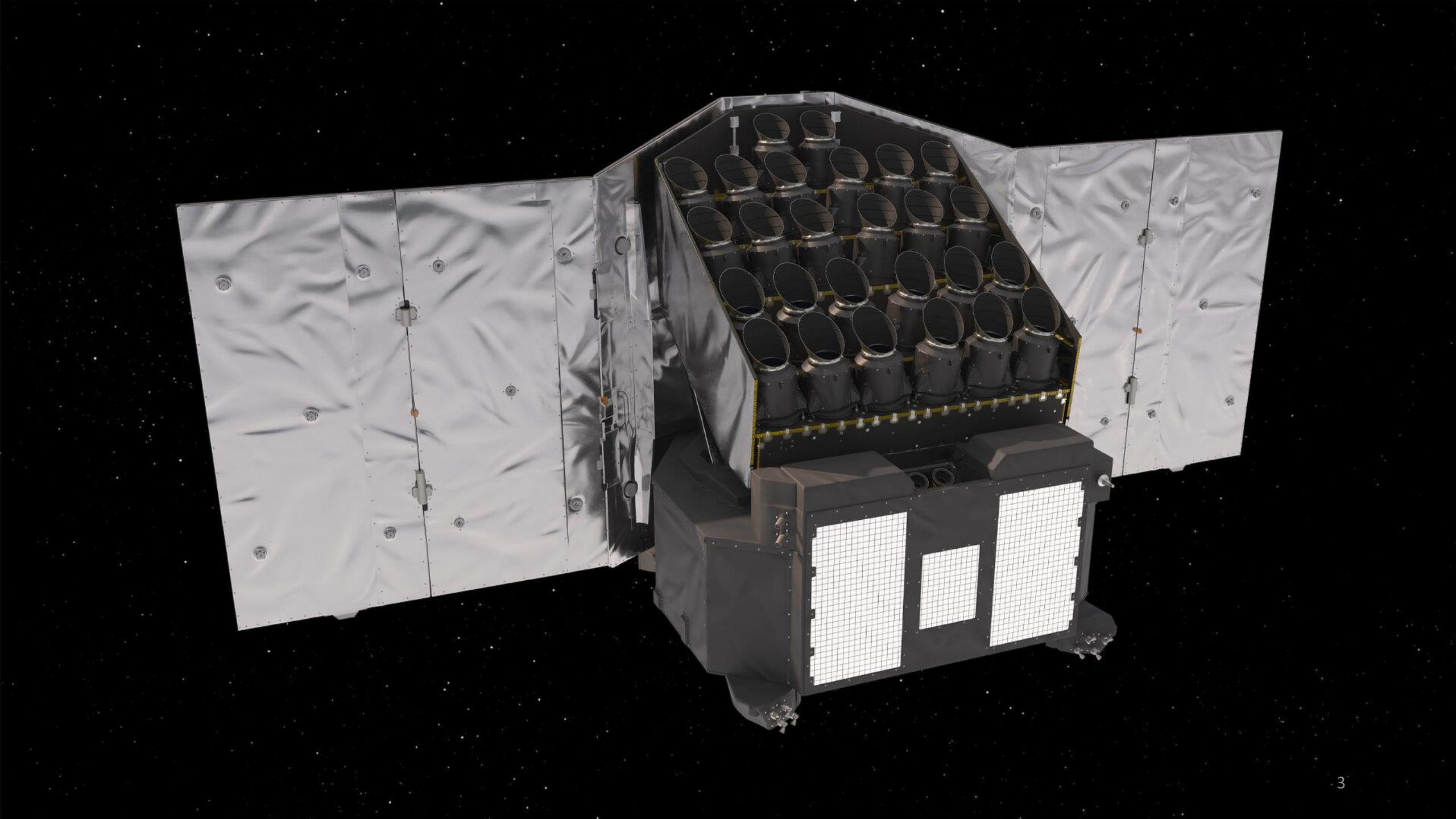
PLATO

Alexis Brandeker

Dept. of Astronomy

PLATO facts

- Launch: December 2026, Ariane 6
- Orbit: L2
- Four years, extensions possible up to 8.5 years
- 24 Normal telescopes (25s)+ 2 Fast telescopes (2.5s, with filters)
- 4 detectors per normal camera (81 Mpix), 3 per fast camera
- In total 2 Gpix (Comparison Vera C. Rubin Obs.: 3.2 Gpix)
- Field of view ~ 49 deg x 49 deg



Science goals

- O1. How do planets and planetary systems form and evolve?
- O2. Is our Solar System special or are there other systems like ours?
- O3. Are there potentially habitable planets?

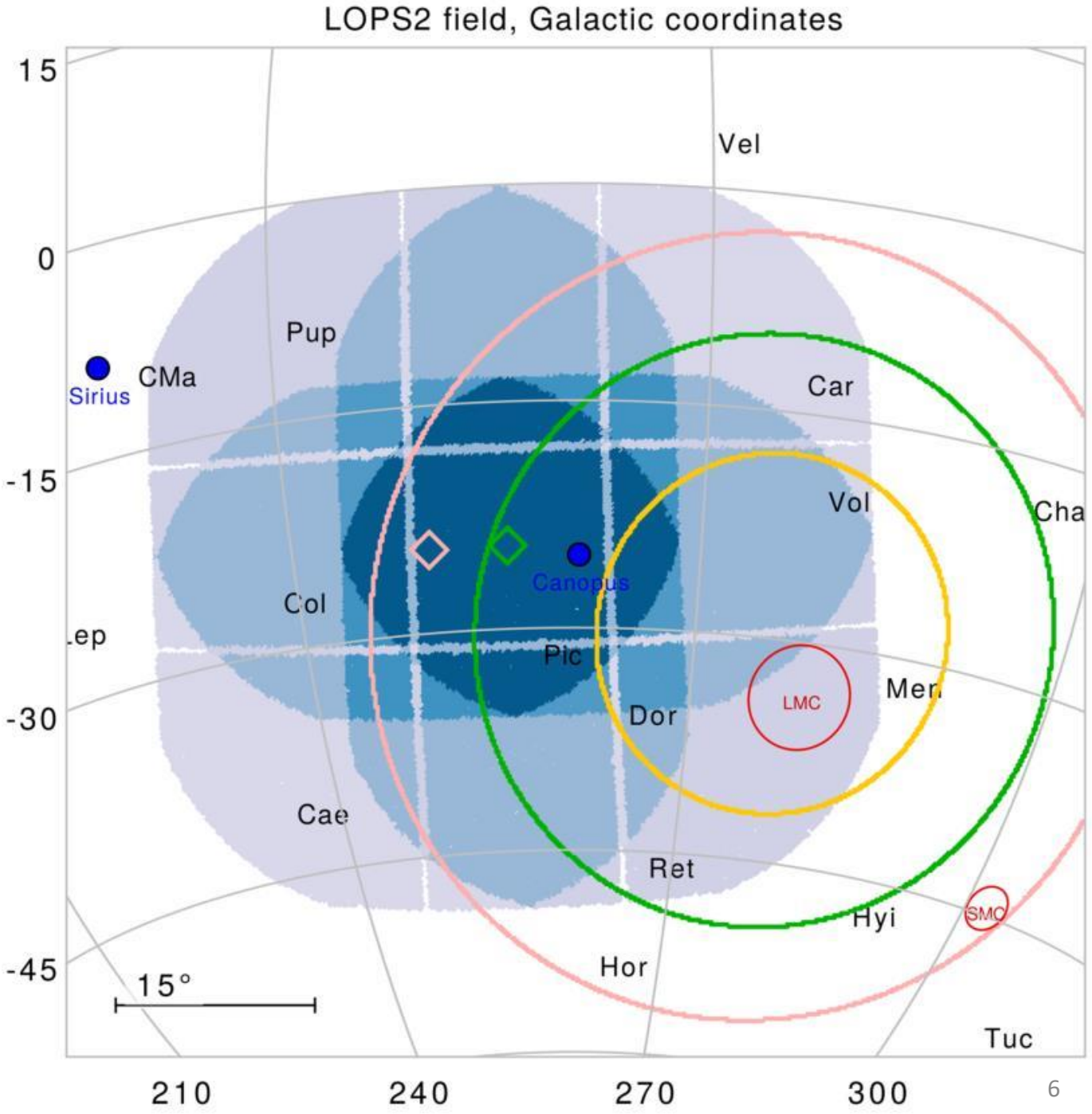
Mearuements and expected results

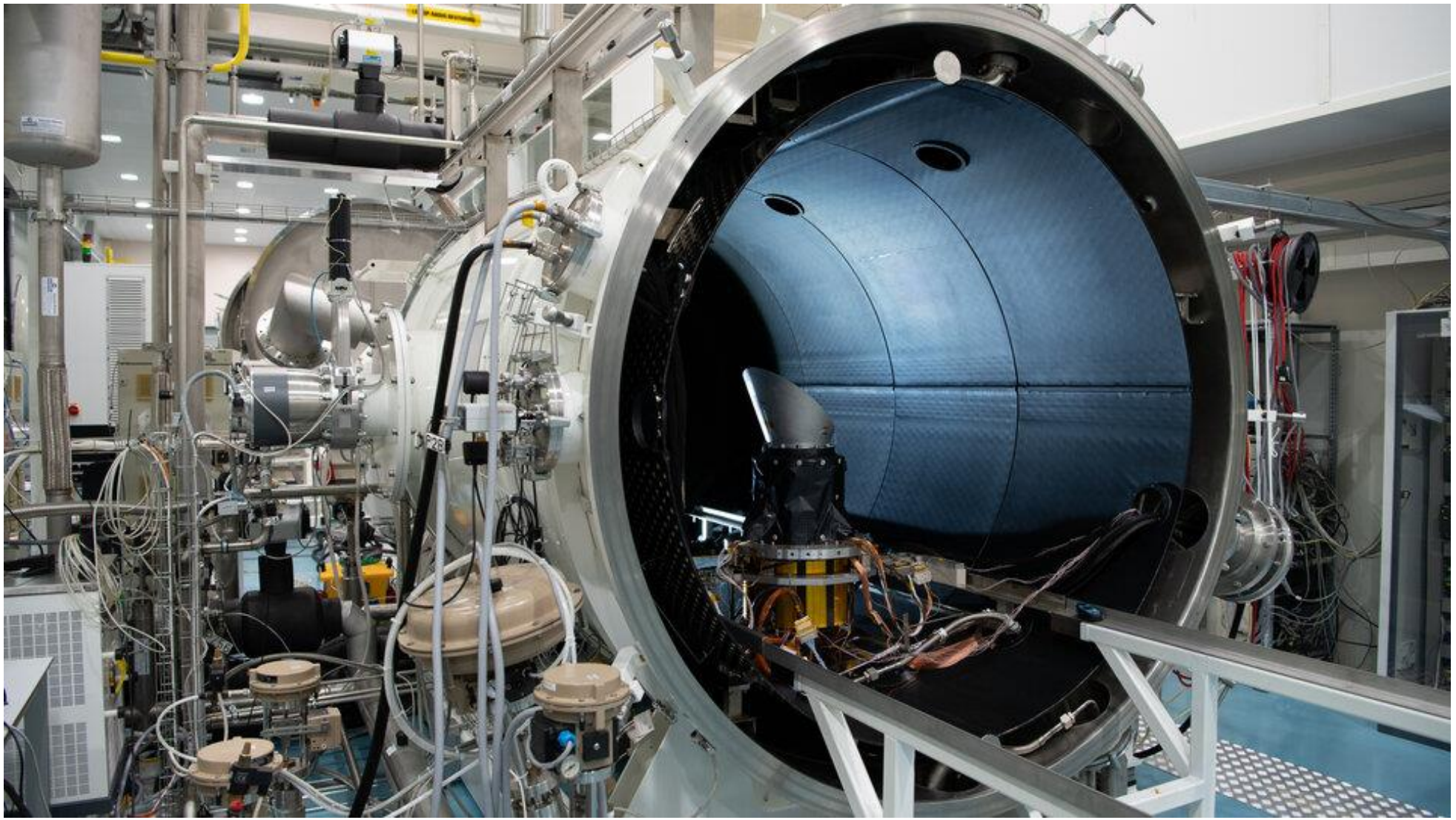
Overall scientific questions	Scientific objectives	Measurements	Expected results
(see Section 2.1)			
O1, O2, O3	S1. Determine the bulk properties (mass, radius and mean density) of planets in a wide range of systems, including terrestrial planets in the habitable zones of solar-like stars	Photometry of ~15,000 (goal 20,000) solar-like stars with $m_v \leq 11$ and precision of 34 ppm in 1 hour. RV spectroscopy for >100 (goal: 400) planets.	A sample of >100 (goal: 400) exoplanets, characterised for their orbits, radii (accuracy better than 3%) and masses (accuracy ~10%) over a wide range of physical sizes and mean densities, including >5 (goal: 30) (super-)Earths in the habitable zone of solar-like stars.
O1, O2, O3	S2. Study how planets and planet systems evolve with age	Asteroseismology for > 5,000 stars with $m_v \leq 11$ and photometric precision of 34 ppm in 1 hour.	A sample of >100 (goal: 400) bright planetary host stars with accurate ages (~10%) and planets with accurate densities.
O1, O2	S3. Study the typical architectures of planetary systems	Photometry of >245,000 stars with $m_v \leq 13$. RV spectroscopy for >100 (goal: 400) planets, and mass determination from TTVs and upper mass limits.	Planet distribution of orbital parameters for >4,000 (goal: 7,000) of planetary systems (with less accurate masses); for >100 (goal: 400) planets, with accurate masses (~10%); for a sub-set of planets, with TTV determined masses.
O1, O2, O3	S4. Analyse the correlation of planetary properties and their frequencies with stellar parameters (e.g., stellar metallicity, and stellar type)	Photometry of >15,000 (goal 20,000) stars with $m_v \leq 11$ and precision of 34 ppm in 1 hour; observations of 245,000 stars with $m_v \leq 13$. Observations of M dwarf stars and stars across the HR diagram. RV spectroscopy for >100 (goal: 400) planets; mass determination from TTVs and upper mass limits.	Well-known stellar parameters (age accuracy ~10%) for >5,000 stars, leading to improved stellar models. Characterised host stars of hundreds of planetary systems.
O1	S5. Analyse the dependence of the frequency of terrestrial planets on the environment in which they formed	Photometry of >245,000 stars with $m_v \leq 13$.	A sample of >4,000 (goal: 7,000) detected planetary transits from different regions in the sky.
O1, O2, O3	S6. Study the internal structure of stars and how it evolves with age	Asteroseismology for > 5,000 solar-like stars with $m_v \leq 11$ and photometric precision of 34 ppm in 1 hour.	A sample of >5,000 bright stars for which asteroseismic modes can be analysed with high precision to improve stellar models (age accuracy ~10%).
O1, O3	S7. Identify good targets for spectroscopic measurements to investigate planetary atmospheres	Photometry of ~1,000 stars with mv ≤ 8 and precision of 34 ppm in 1 hour. Photometry of 5,000 M dwarf stars with mv ≤ 16.	A sample of >10 (goal: 30) planets around bright stars and >100 planetary transits around M dwarfs from different regions in the sky.

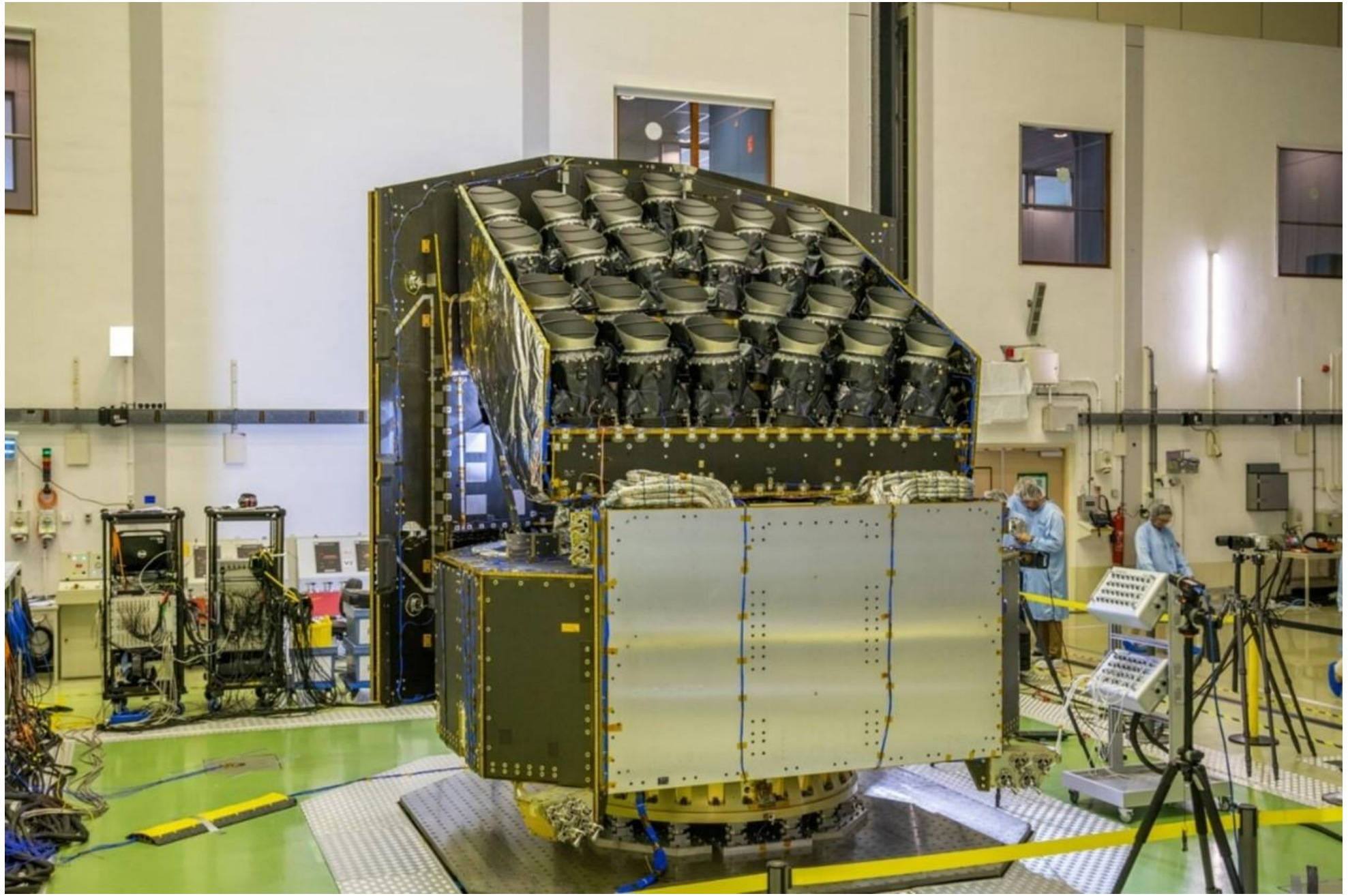
Long-duration phase field

(LOPS2)

The PLATO Input Catalogue for this field contains more than 9000 dwarf and subgiant stars of spectral types from F5 to K7 with $m_V < 11$ that will be observed with a random noise lower than 50 ppm in one hour, and more than 159,000 dwarf and subgiant stars of spectral types from F5 to K7 with $m_V < 13$.



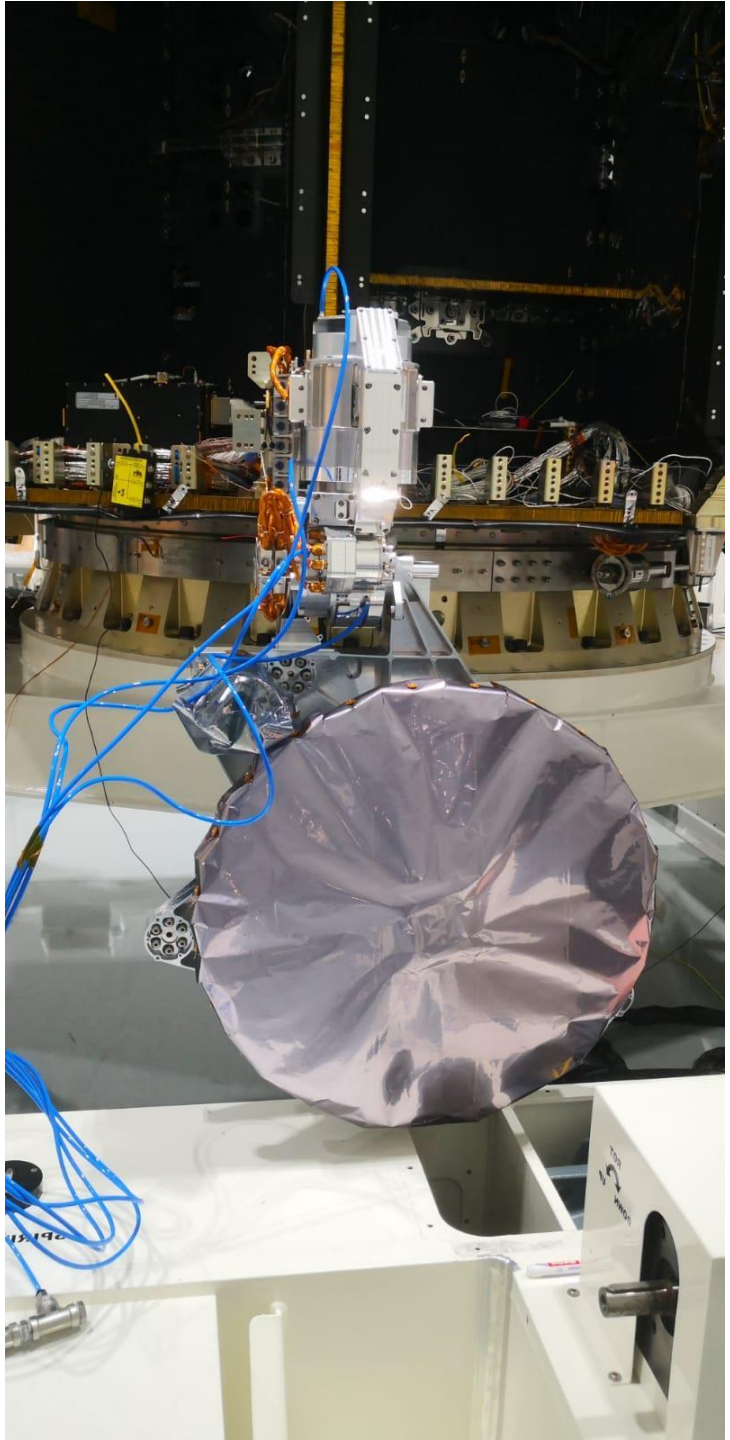




2025-04-11

2025-05-03

High-gain antenna



2025-05-09