Gaia status and data release scenario

Anthony Brown

Sterrewacht Leiden, Leiden University
brown@strw.leidenuniv.nl

- Gaia survey overview
- Spacecraft status
- Data release scenario

Universiteit Leiden

gaia

Gaia
DPAC

- ESA Cornerstone mission within Horizon 2000+ programme
- Create large and highly accurate stereoscopic map of the Galaxy
- Global astrometry concept successfully demonstrated by Hipparcos

Gaia DPAC

gaia

- Launch in 2013 with Soyuz-Fregat from Kourou
- Orbit: vicinity of L2
- Mission duration 5 (+1) years

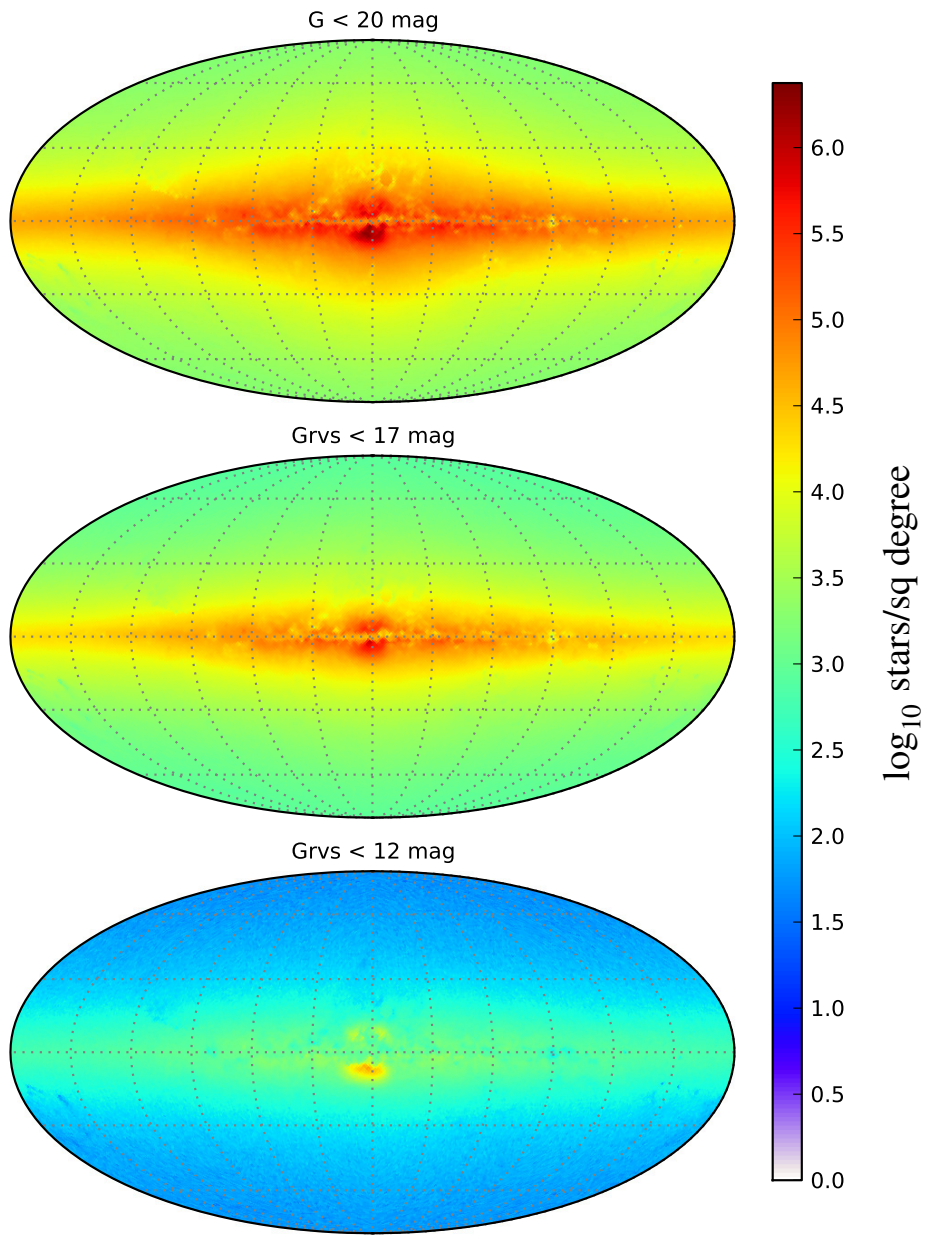
Image credit: Lund Observatory

Survey capabilities

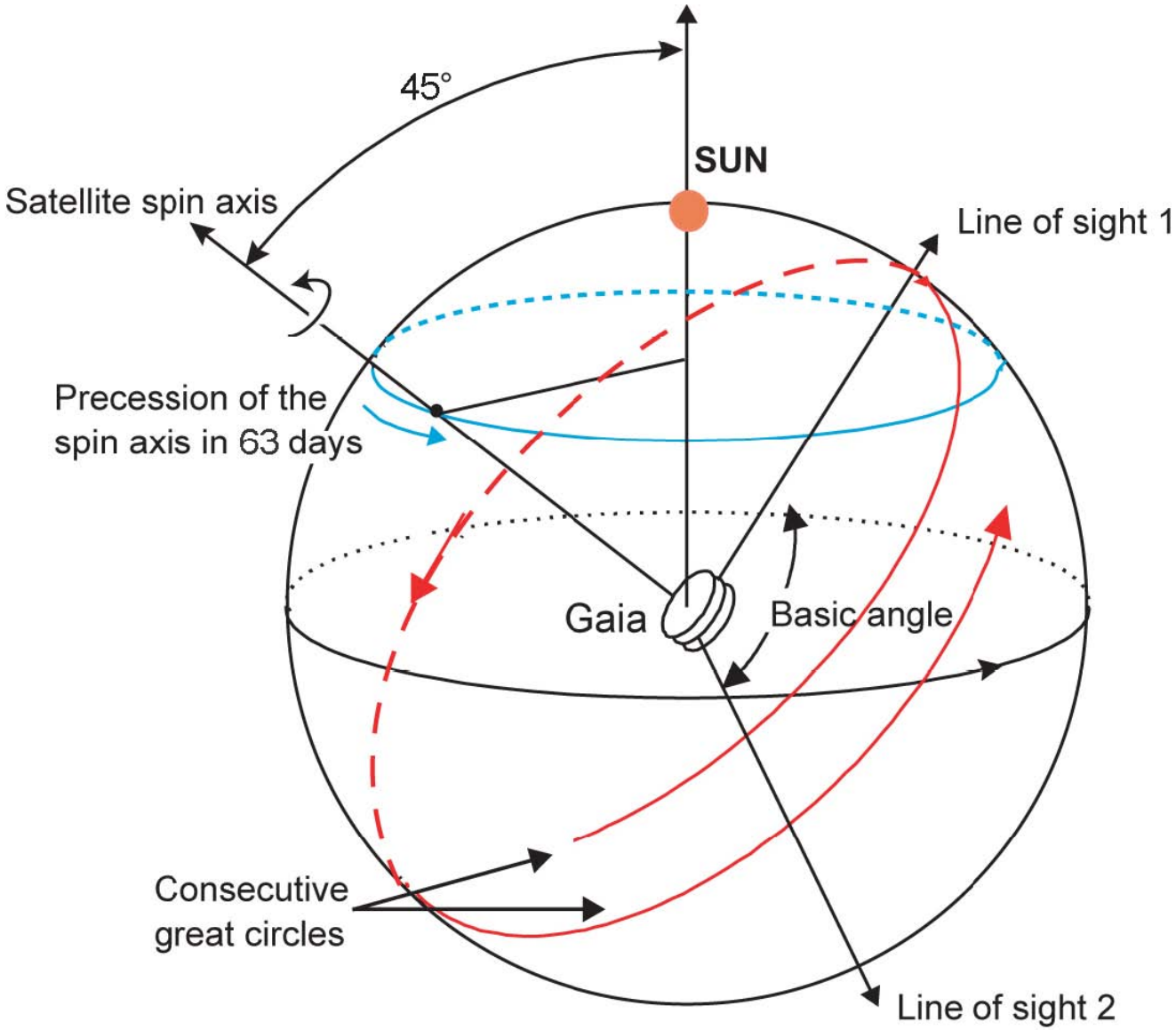
- Three simultaneous observing modes
- Complete to $G = 20$ ($V = 20$–22)
- Observing programme: autonomous on-board detection and unbiased
- Quasi-regular time-sampling over 5 years ($\sim$ 80 observations)
- Angular resolution comparable to HST

Number of objects

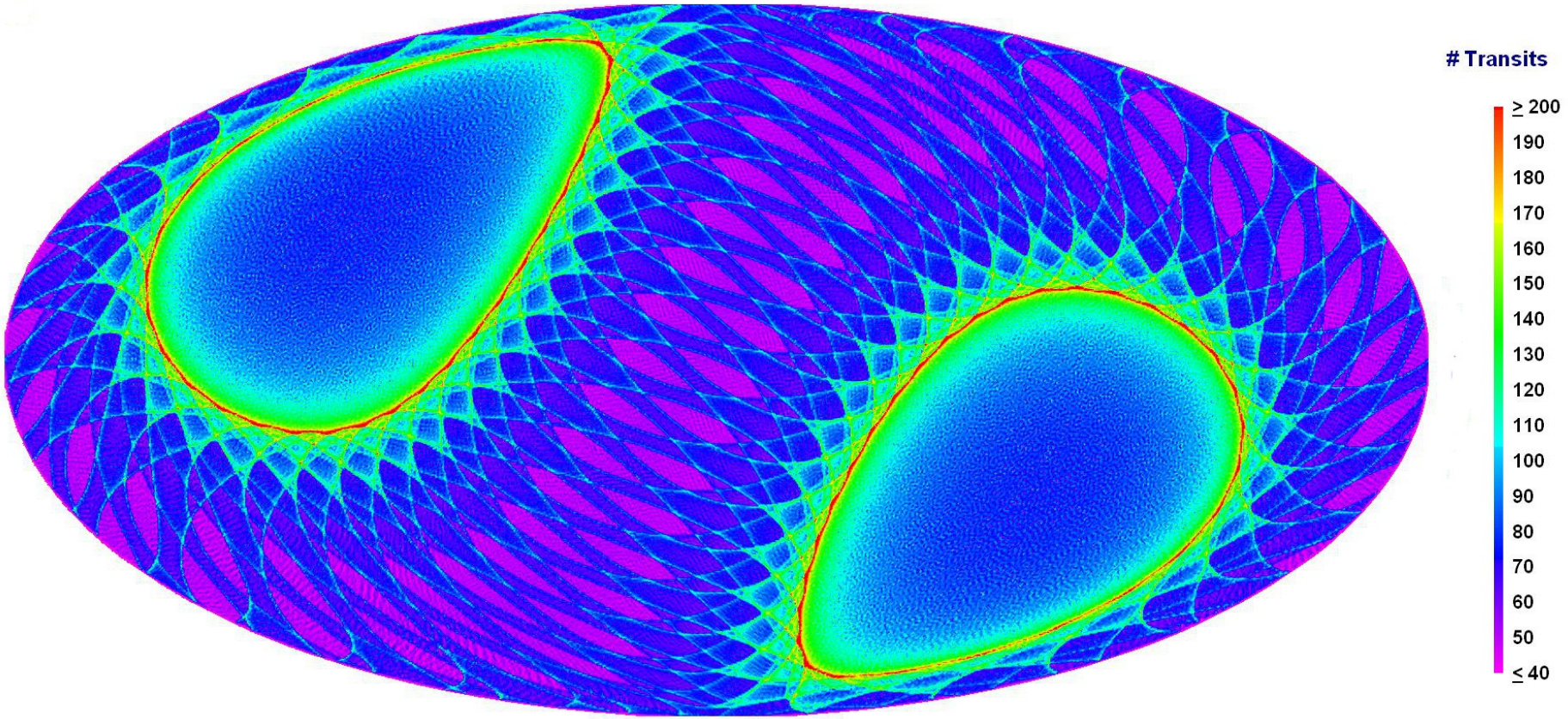
- 1 billion stars to $G = 20$
- 10^6–10^7 galaxies
- 500 000 quasars
- 3×10^5 solar system bodies
- tens of thousands of exoplanets



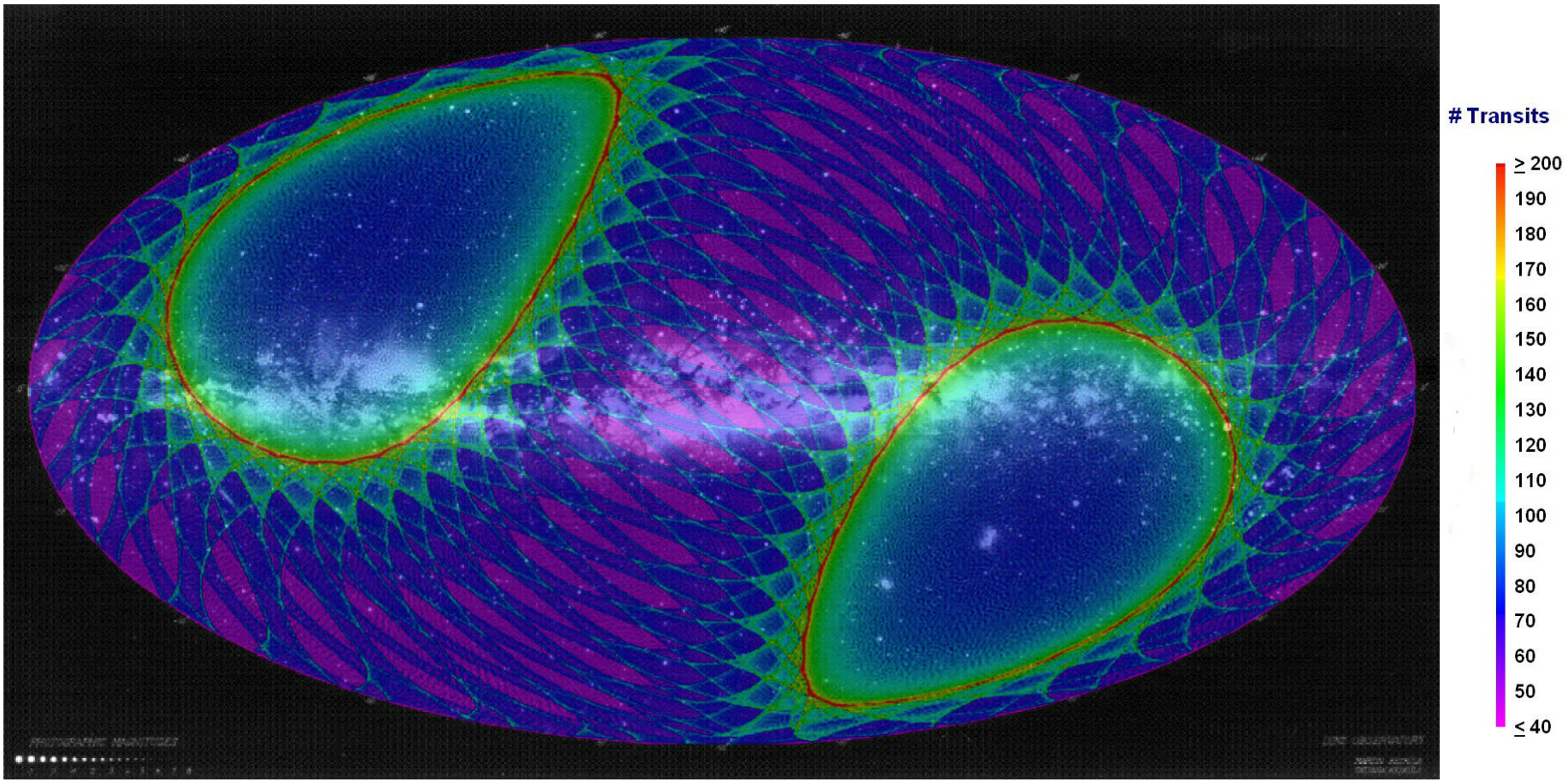
Survey capabilities



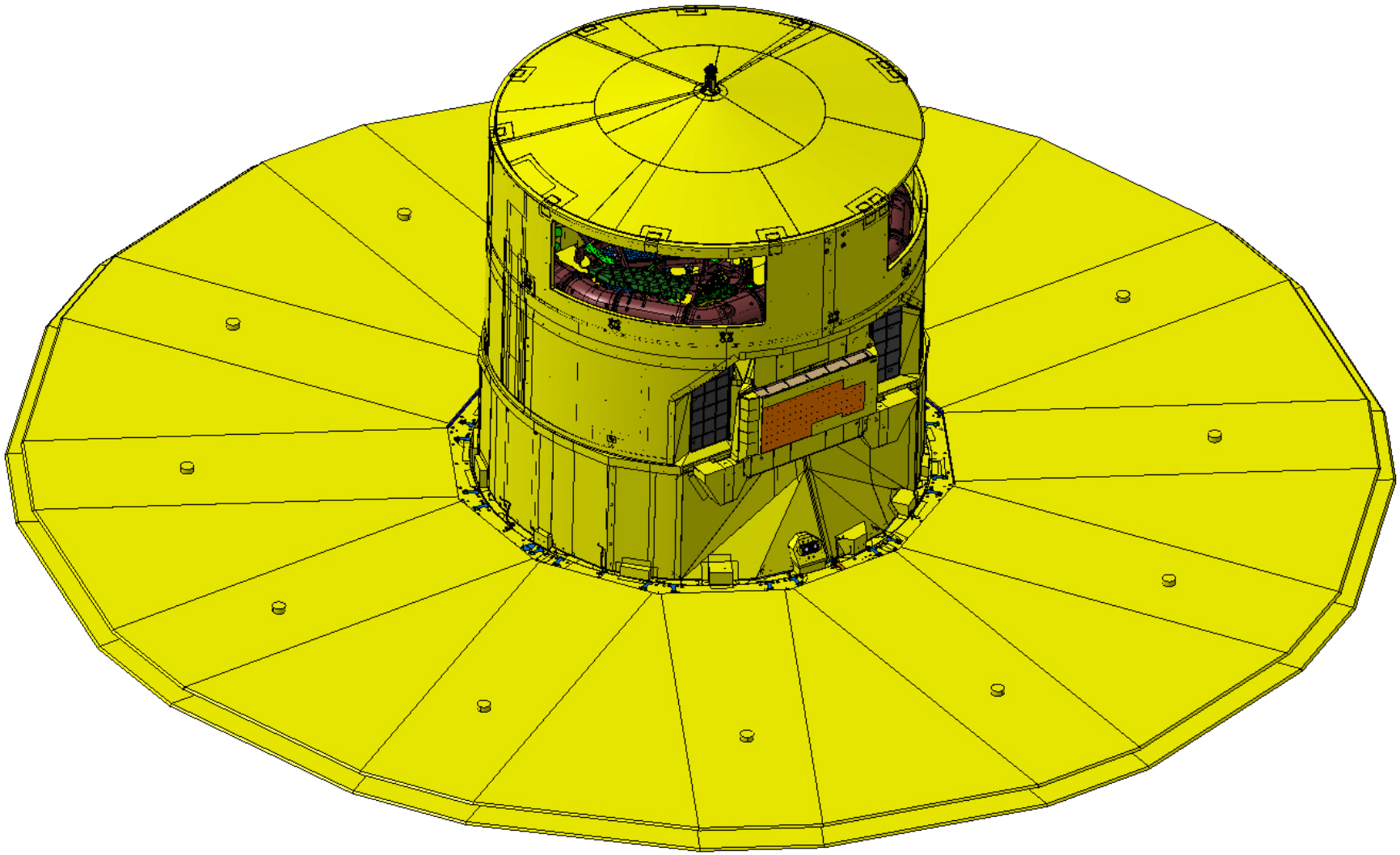
Number of field of view transits



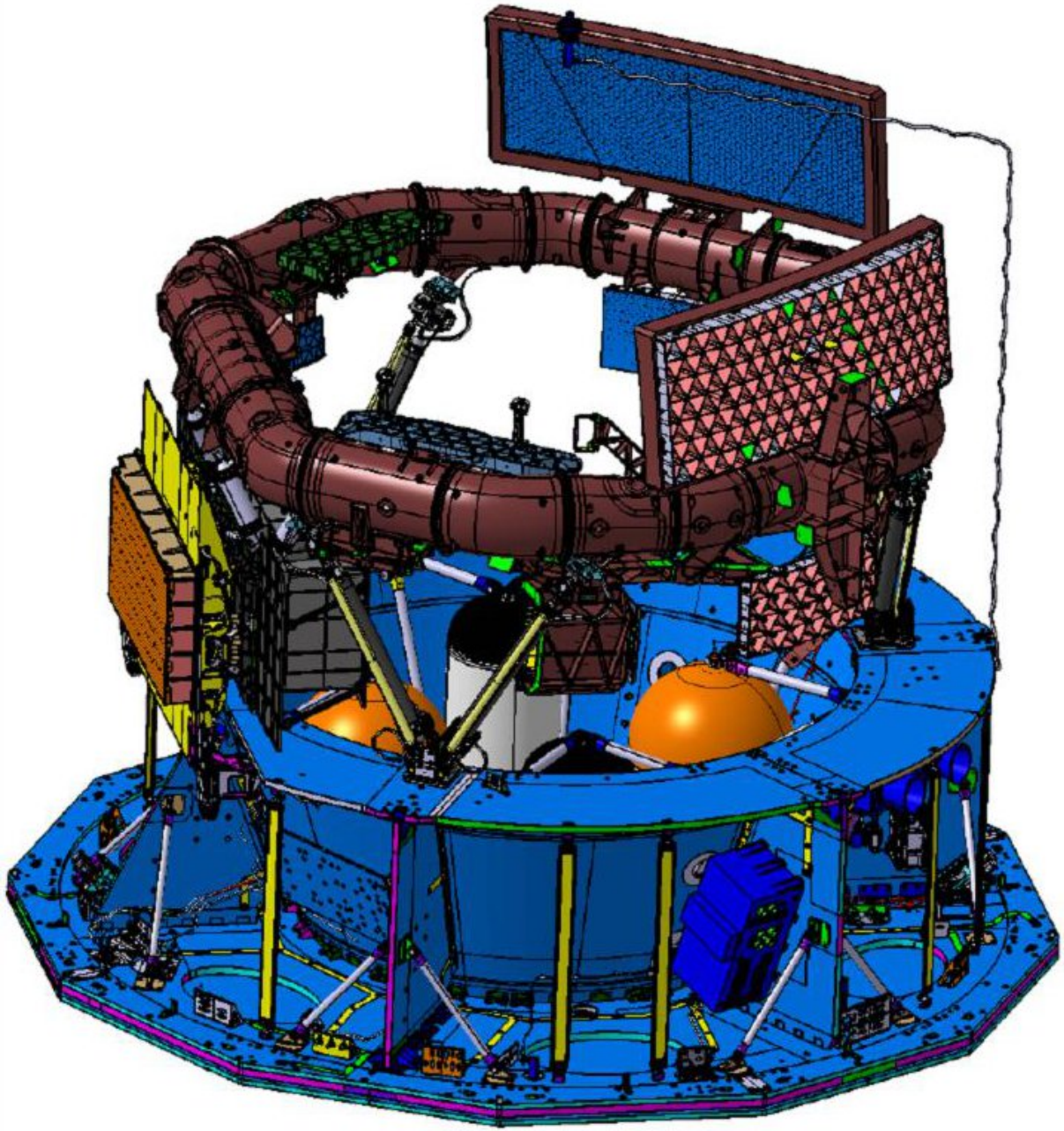
Number of field of view transits



Spacecraft status



Spacecraft status



Spacecraft status

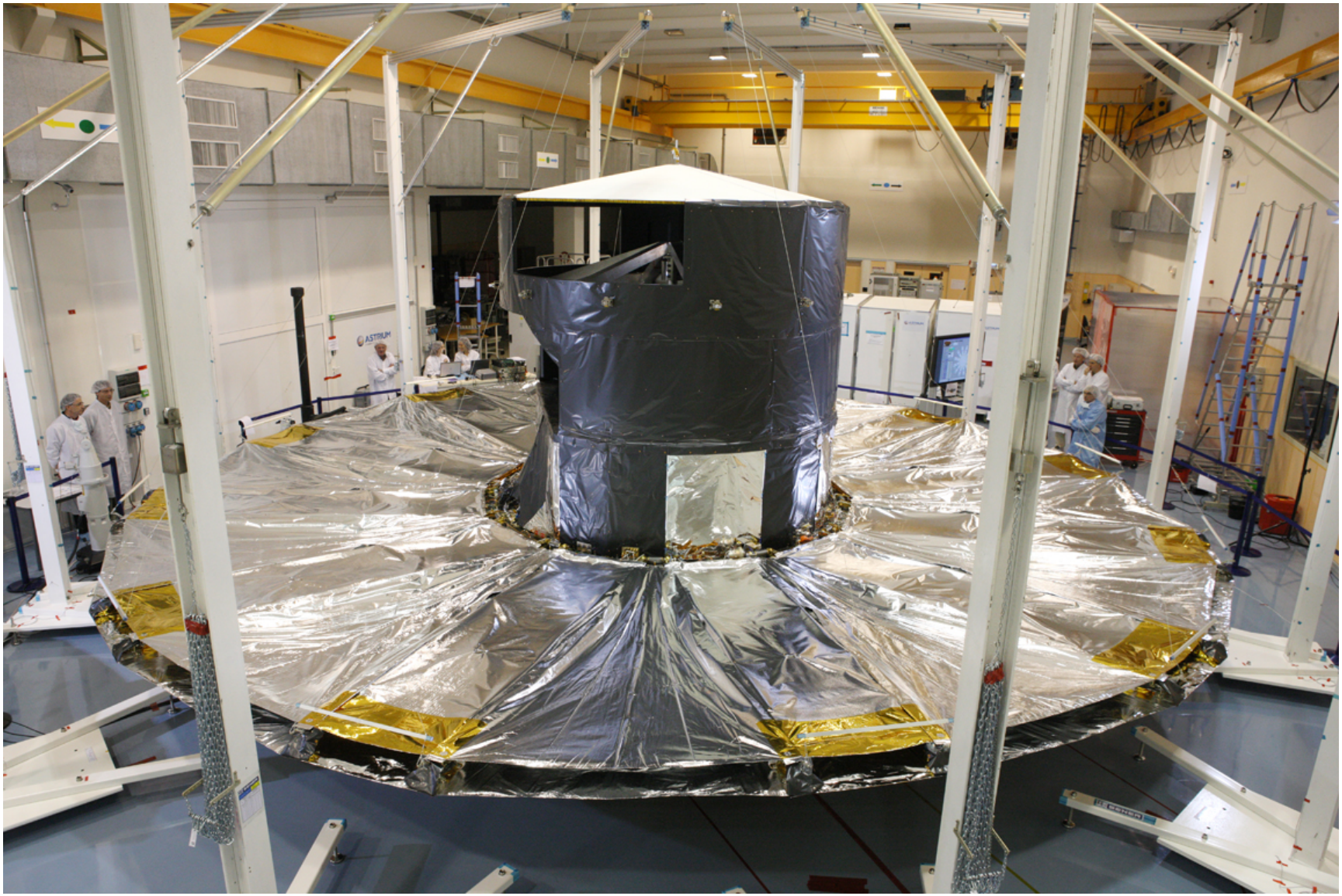
Launch in August 2013

Images courtesy EADS-Astrium

Spacecraft status

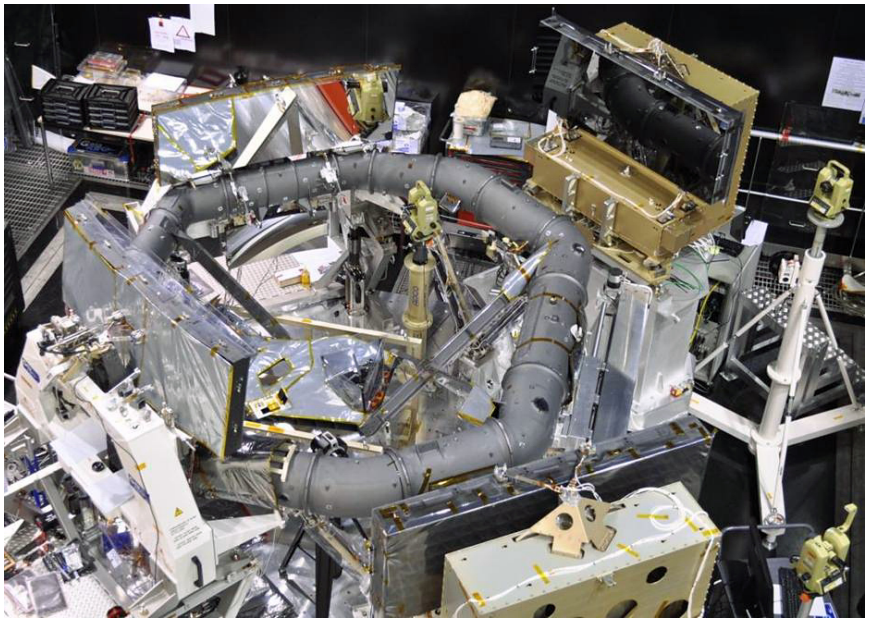
Images courtesy EADS-Astrium

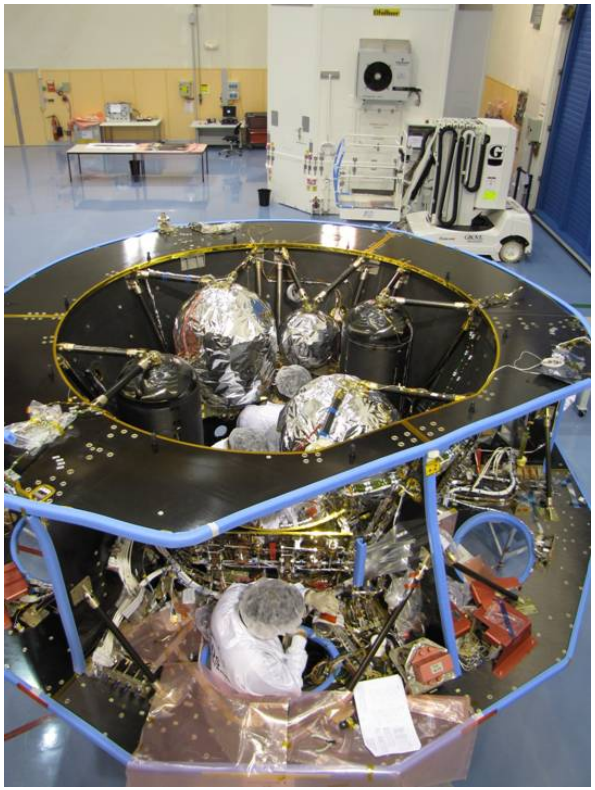
Spacecraft status

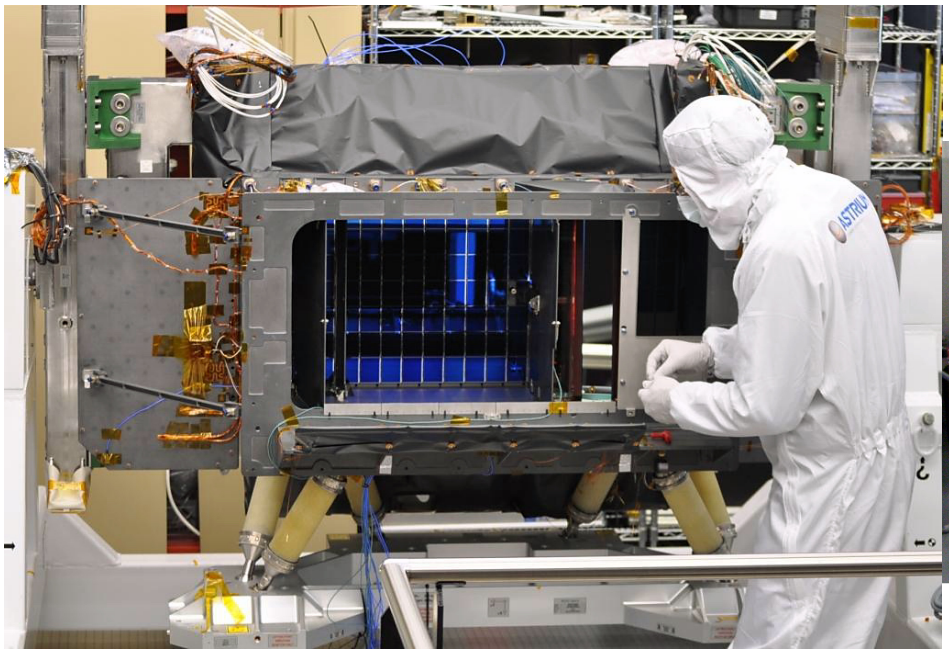


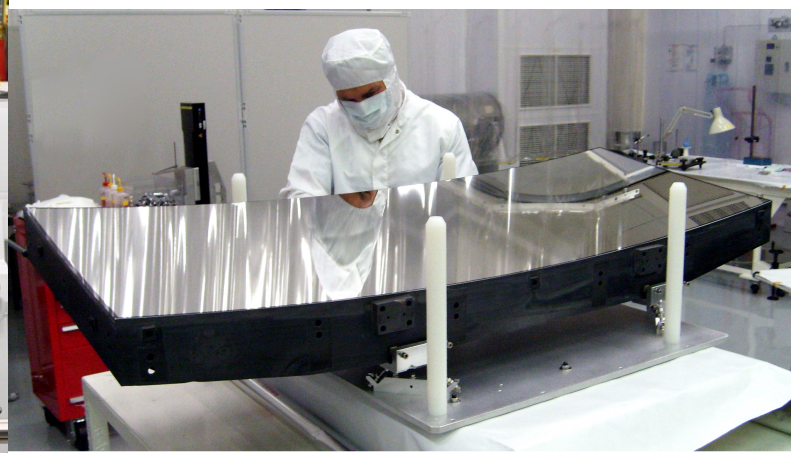
Images courtesy EADS-Astrium

Spacecraft status



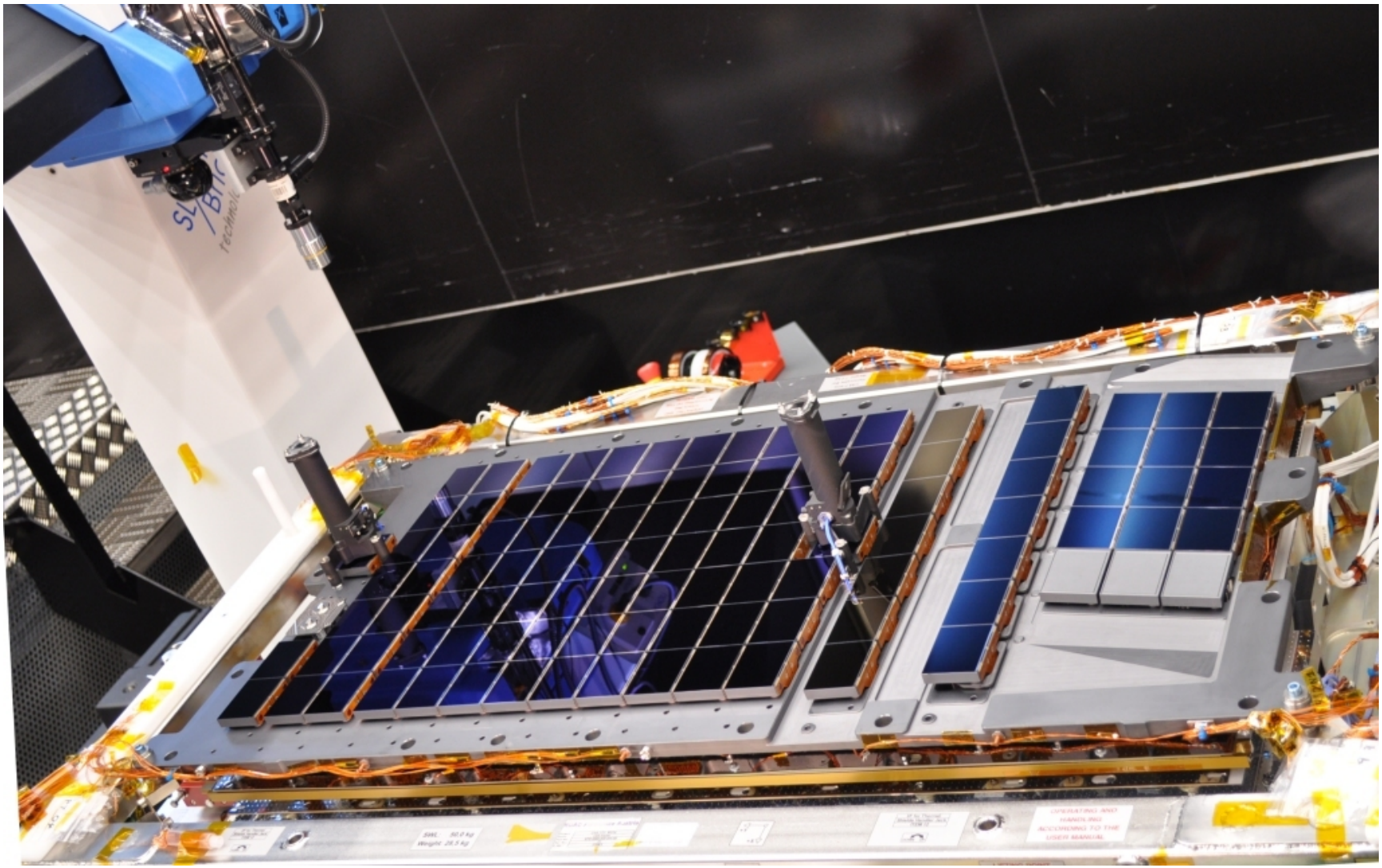






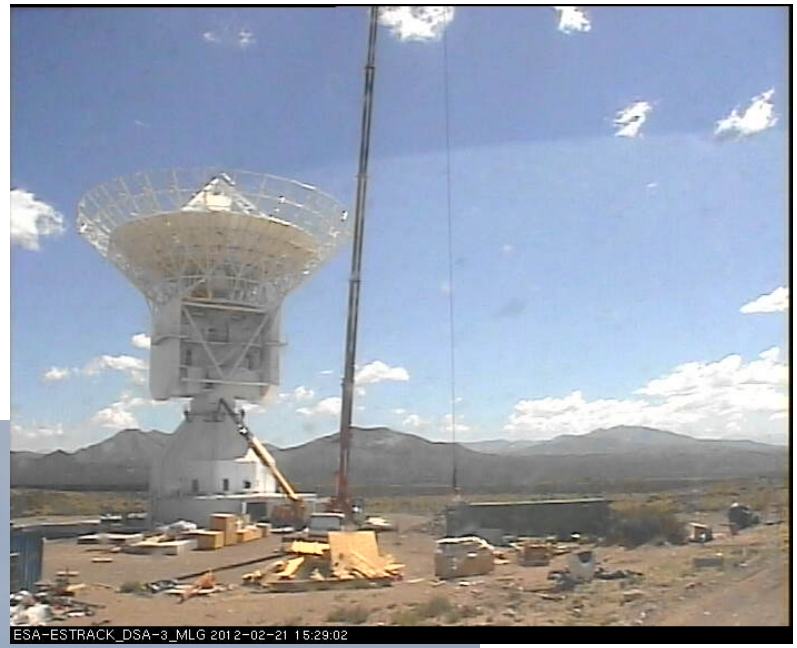
esa EADS astrium SAFRAN Sagem

Spacecraft status



Images courtesy EADS-Astrium

Spacecraft status



Early data releases

- Gaia Science Team has drawn up a list of desirable data releases
  - Try to get data released as early as possible
  - Incremental approach in terms of data complexity
- DPAC produced a data release scenario by combining the GST requests with what is deemed realistic within the current operations planning

Earliest releases will concern transient sources (‘Science Alerts’) and Near Earth Objects. Not further discussed here

Constraints on data releases

Time

- Launch date
- Anticipate $\sim$ 6 Months for cruise to L2, commissioning, DPAC systems initialization
- First full sky coverage after 6 months of nominal scanning
- Disentangling parallaxes and proper motions requires at least 18 Months of data collection
- Processing, calibration, validation take time
- Each data release requires time to go from DPAC internal database to public archive (3 Months)

Data processing and resources

- *Quality of the data*
- Interdependencies DPAC software systems
- Available staff effort (talk to your funding agencies!)

Data release scenario

Very tentative data releases — highly summarized:

- Assumes smooth operations!
- All values prior to final release may be truncated at some confidence level
  - compatible with estimated uncertainties
- Aim to have significant additions with each release

August 2013 launch

L+22M Positions + G magnitude ($\sim$ all sky, single stars)
- Simultaneous two-colour photometry release still under study
- Hundred Thousand Proper Motions (Hipparcos-Gaia, ~ 50 μas/yr)

L+28M *more tentative* some radial velocities for bright stars

L+40M full astrometry (α, δ, ϖ, $\mu_{\alpha*}$, μ_δ), orbital solutions, $(G_{\rm BP} - G_{\rm RP})$, some BP/RP Spectrophotometry and astrophysical parameters , RVS spectra

L+65M Updates on previous release — including more sources, source classifications, multiple astrophysical parameters, variable star solutions and epoch photometry for them, solar system results

End+3yr Everything