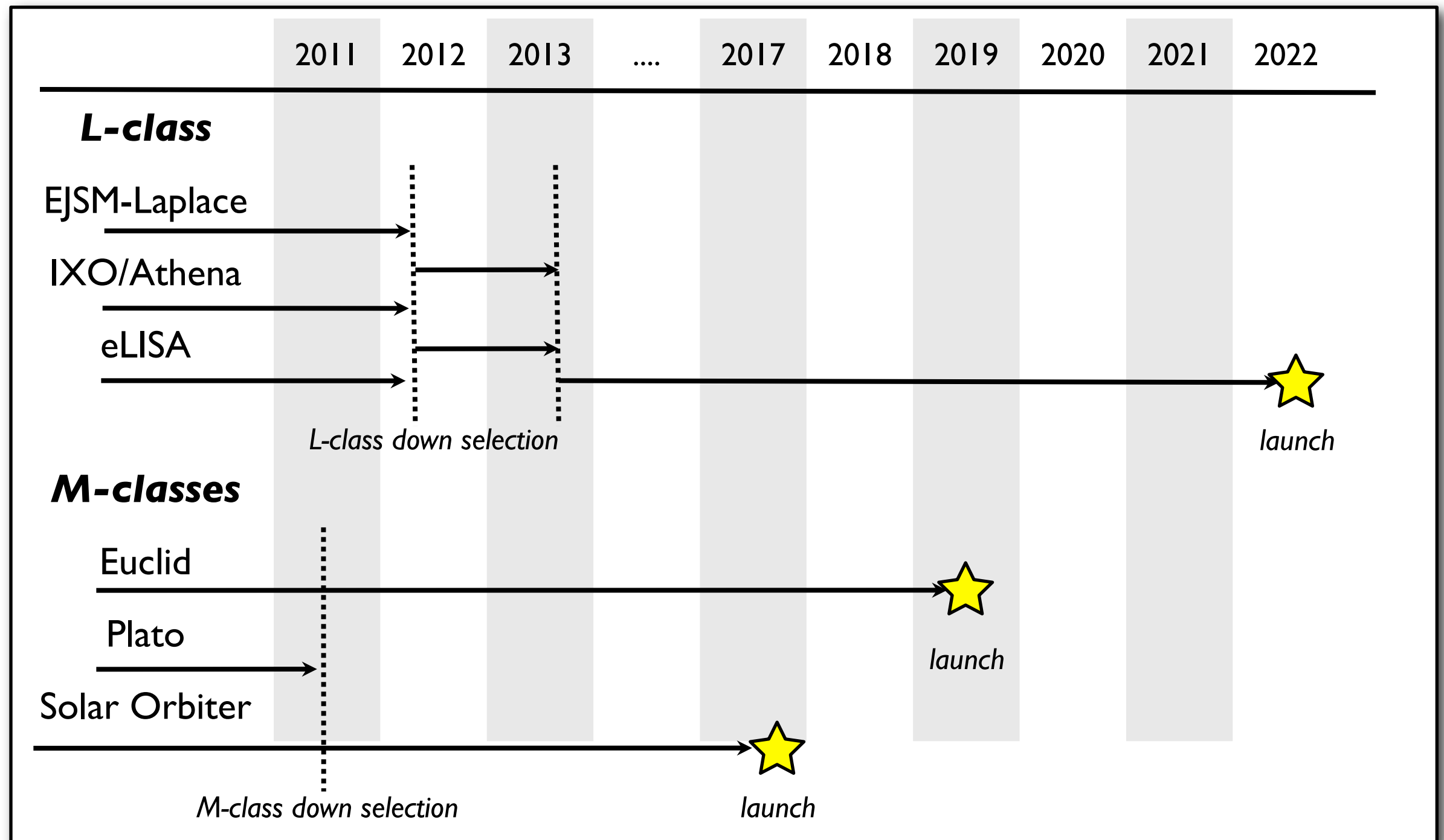


# Dutch contributions to ELISA

Ben Braam, Ernst-Jan Buis, Marc Klein-Wolt, Gijs Nelemans

# Cosmic Vision



# Dutch Science & Industry Involvement

- Interest is coming from Science community and industry
- Involvement at early stage is **required** for securing high profile science output
- For matching funding and support from NL (NSO) a strong science and industry community is essential
- Time to act now: ESA programs have a long lead time

# ESA (Space) Development



EU Funding



EMITS Tender system



**Pre-Phase A:  
Advanced  
Studies**

**Phase A:  
Preliminary  
Analysis -  
feasibility**

**Phase B:  
Definition  
(design)**

**Phase C:  
System  
Design**

**Phase D:  
Development  
(build,  
integrate,  
verify)**

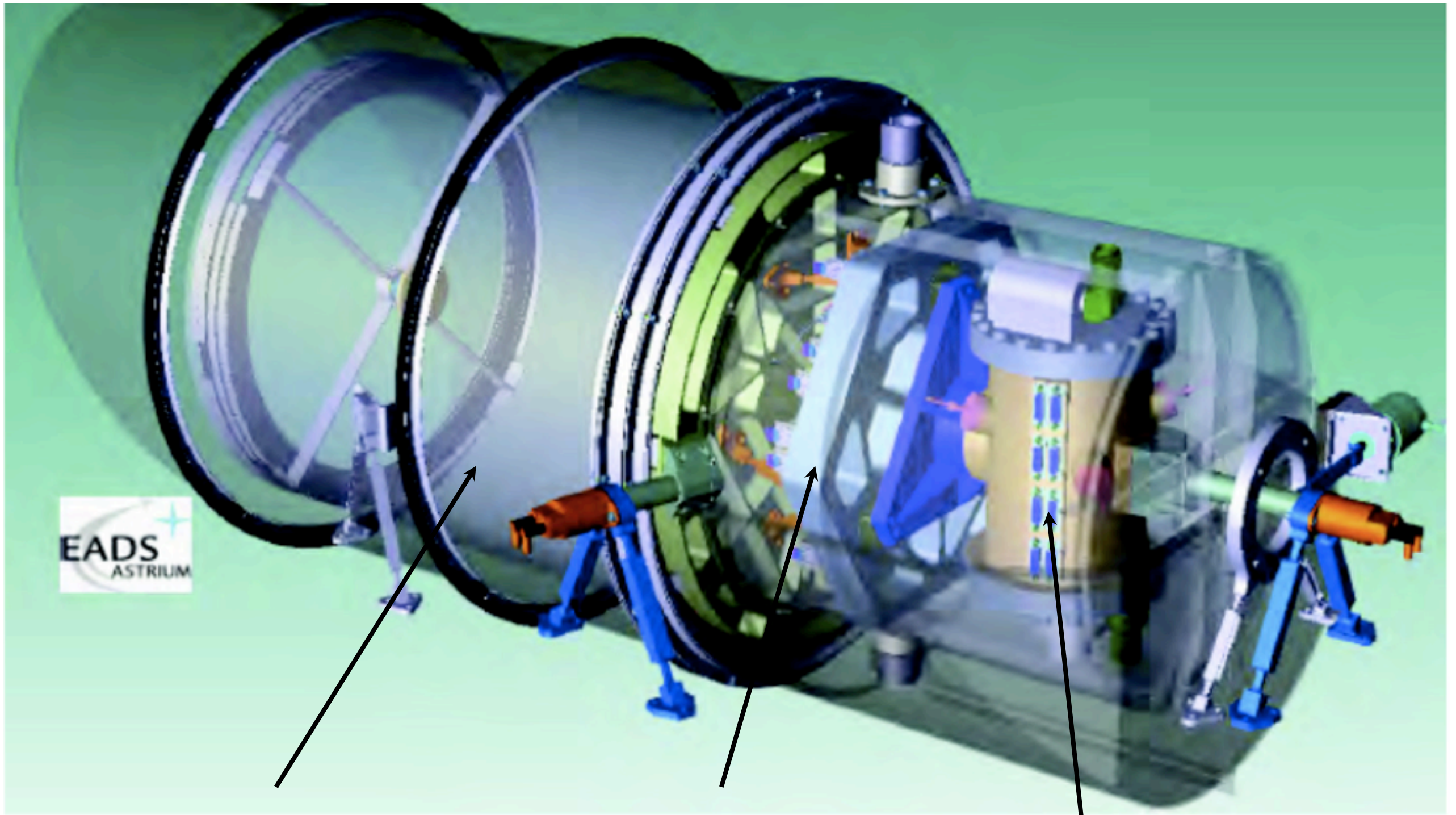
**Phase E:  
Operations**

Science input

Typical up to 20 years

Current stage

# 3 main components:



1) telescope

2) Optical bench

3) Proof mass

# Space R&D @TNO

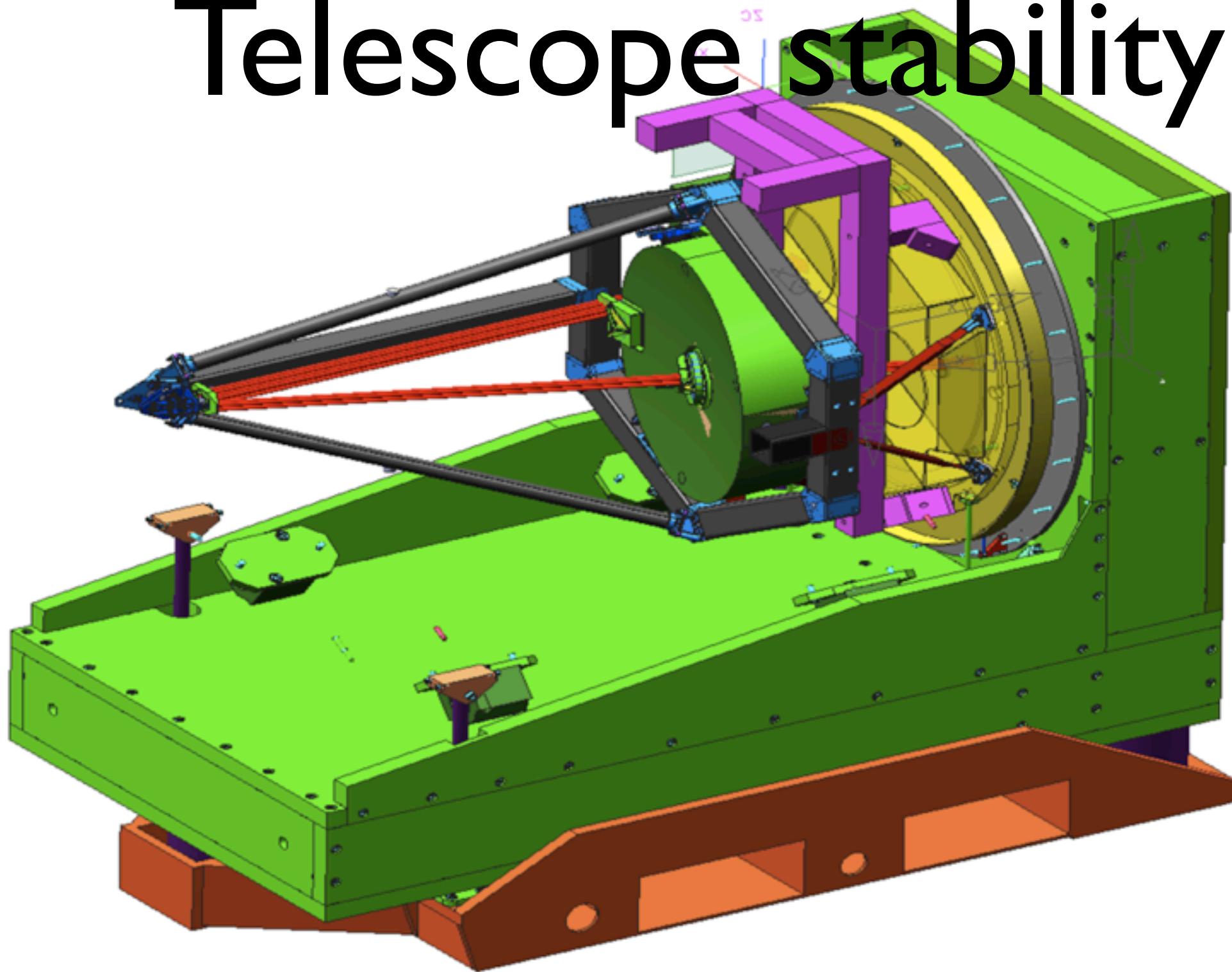
- Facilities:
  - Space hardware calibration environment (clean room, thermal vacuum tank, optical sources)
- Large experience in optics:
  - Interferometry, spectrometry, optics design, calibration
- Large experience in (opto-mechanics for) space hardware:
  - Involvement in missions such as GAIA, SPICA, Darwin, Earth Observation missions

# LISA projects @TNO

- LISA:
  - Optical telescope stability, ongoing
  - Pointing Angle Ahead mechanism
  - Launch Lock mechanism
- LISA Pathfinder:
  - Testing interferometry on the optical bench
- Prospects:
  - ESA's R&D program
  - Teaming with industrial partners such as EADS Adrium and KT
  - eLISA community



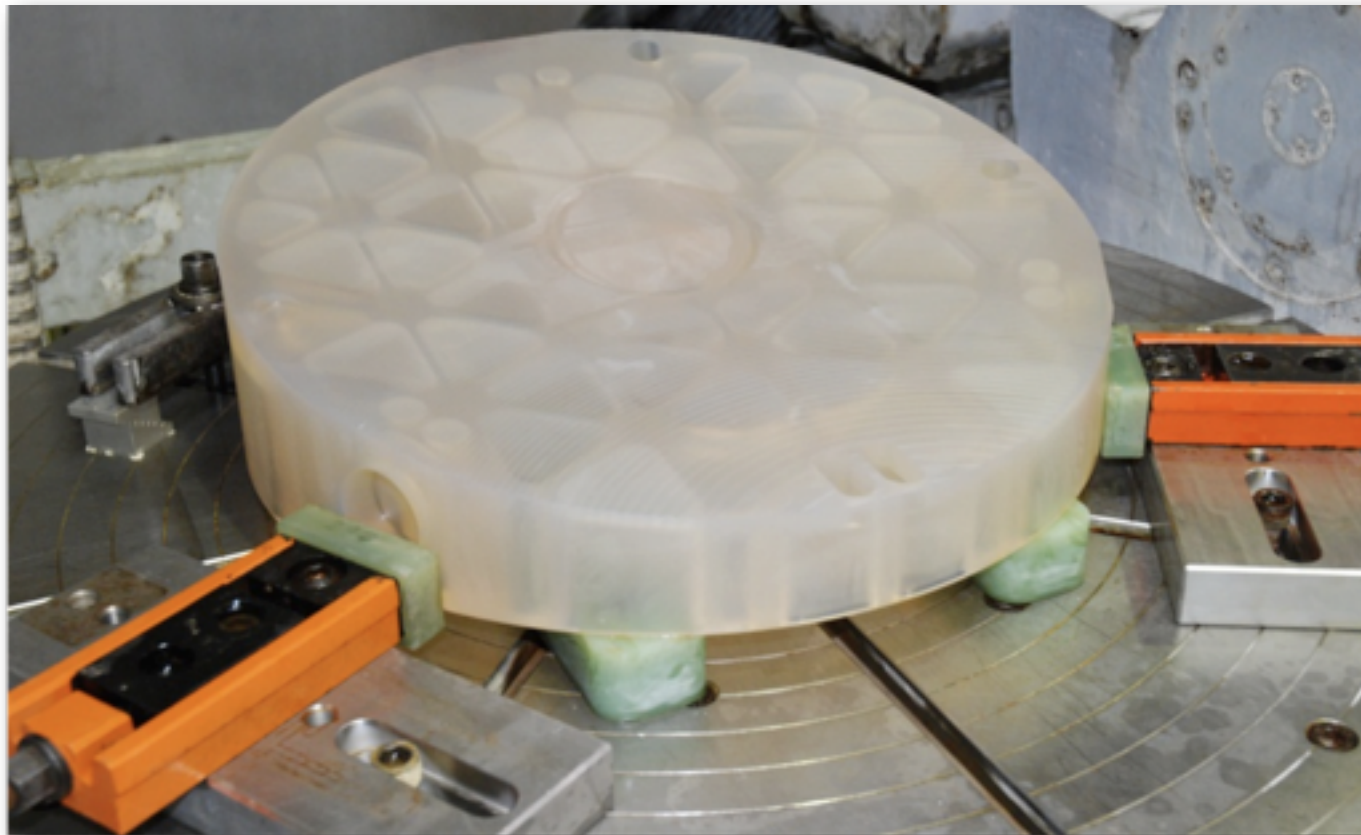
# Telescope stability



TNO with Astrium: experimental setup for stability testing of the optics

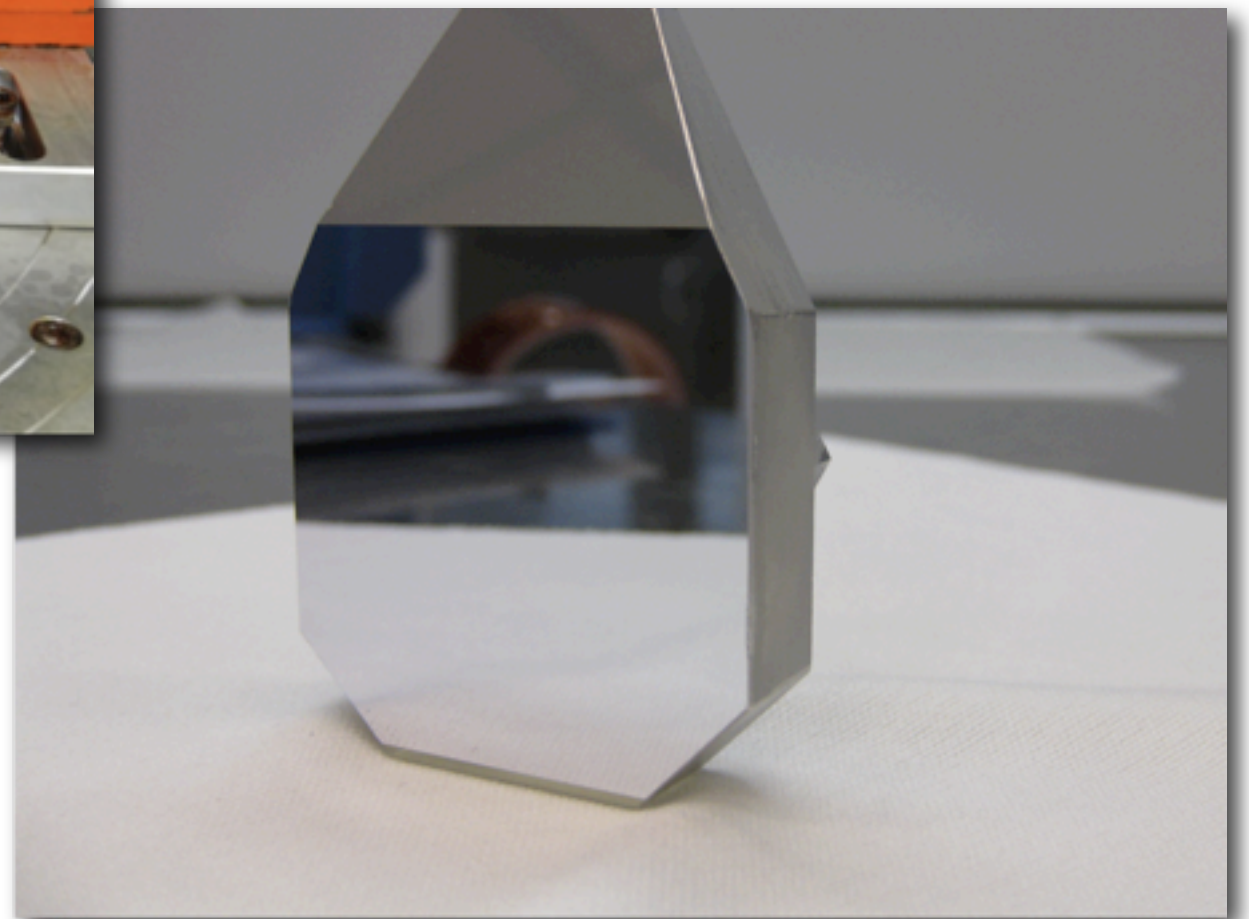


# Telescope stability



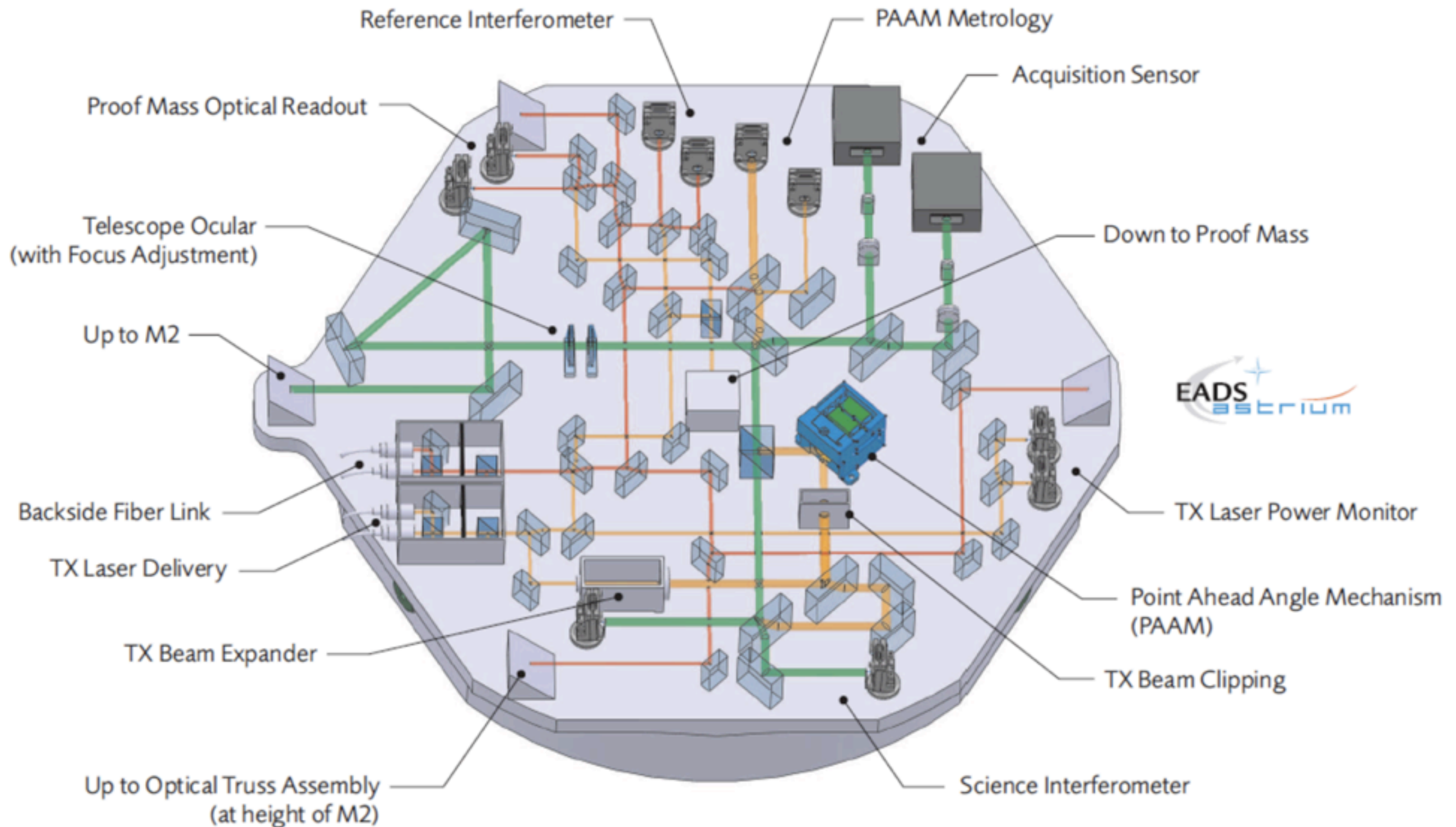
M1 mock-up,  
40cm diameter

M2



*In-house production of large mirrors*

# Optical bench



# eLISA-NL

- eLISA is a new and different type of mission
  - requires a coherent community
  - makes a stronger case to get NL involved in eLISA (and to get the science data eventually)
- Start a new community in NL with astronomers, physicists and industry