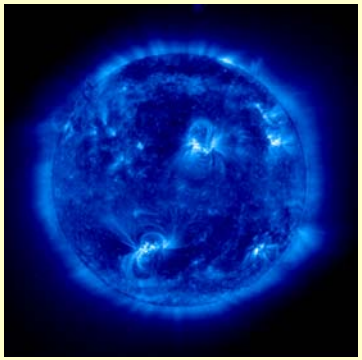
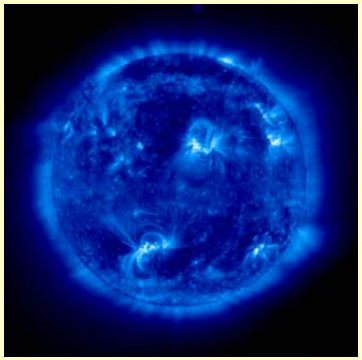


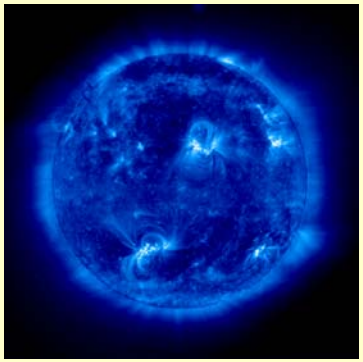
EUS Instrument Concepts

Eric Sawyer RAL

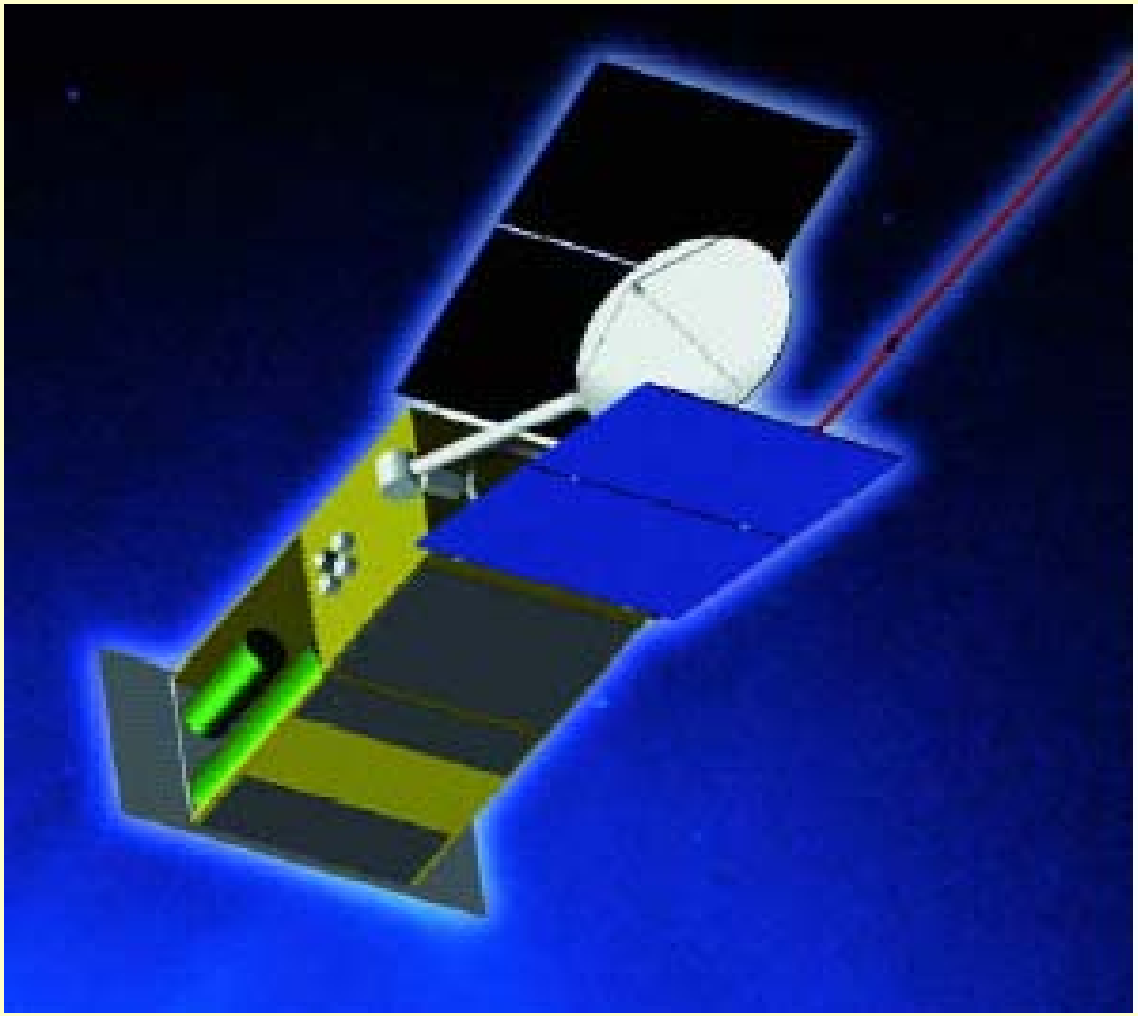


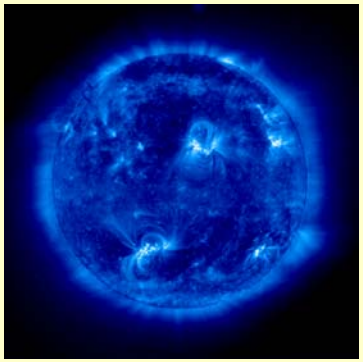
Topics

- Requirements
- Mechanical Concepts
- Future work



Orbiter baseline design



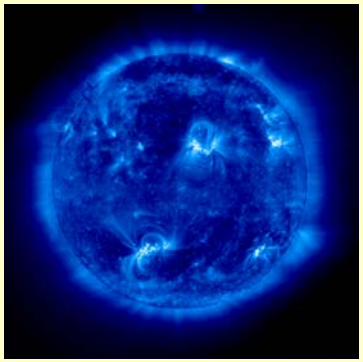


Instrument Requirements 1

Interplanetary mission class – Mars Express

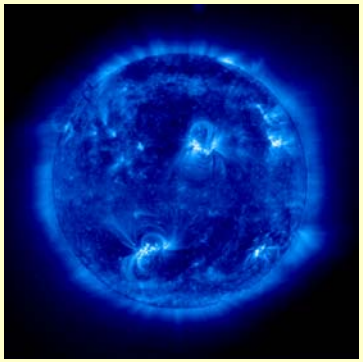
Small, light, not SOHO size

- Total payload mass 120Kg
- Instrument length less than 2.5 m
- Instrument mass less than 30 Kg
- Large data storage requirements, instrument or spacecraft
- Autonomous operations.



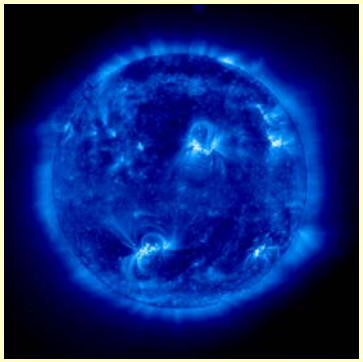
Instrument Requirements 2

- Tolerant of environment
  - Large temperature range between ground and orbit.
  - Large temperature range during orbit
  - High and and unpredictable particle background



Thermal issues

- High and variable heat loads
- Large radiators
- Fluid loop heat pipes
- High temperature stable materials
- Hot optics and cold detectors.
- Heat rejection schemes limit the use of a slit camera



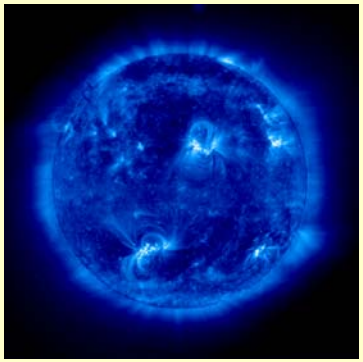
Alignment.

Primary to secondary separation tolerance, 3microns

SIC	3 °C
Invar or Zerodure	120 °C
Carbon/carbon	60 °C

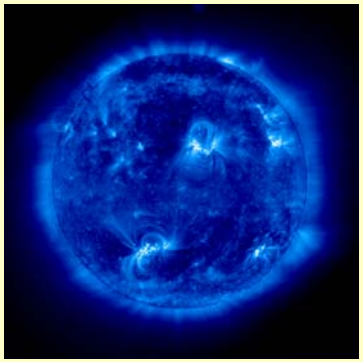
Options:

- Low expansion materials?
- Close thermal control?
- Calculate hot alignment, verify by test?
- Refocus mechanism?



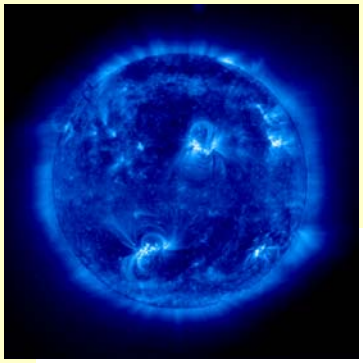
Pointing and rastering

- Cover whole solar disc at 0.2 AU
- Raster perpendicular to the slit in 10 μm steps
- Options to study
  - Move primary
  - Move secondary
  - Move whole instrument
- Co-alignment of instruments with very variable thermal environment will be extremely difficult

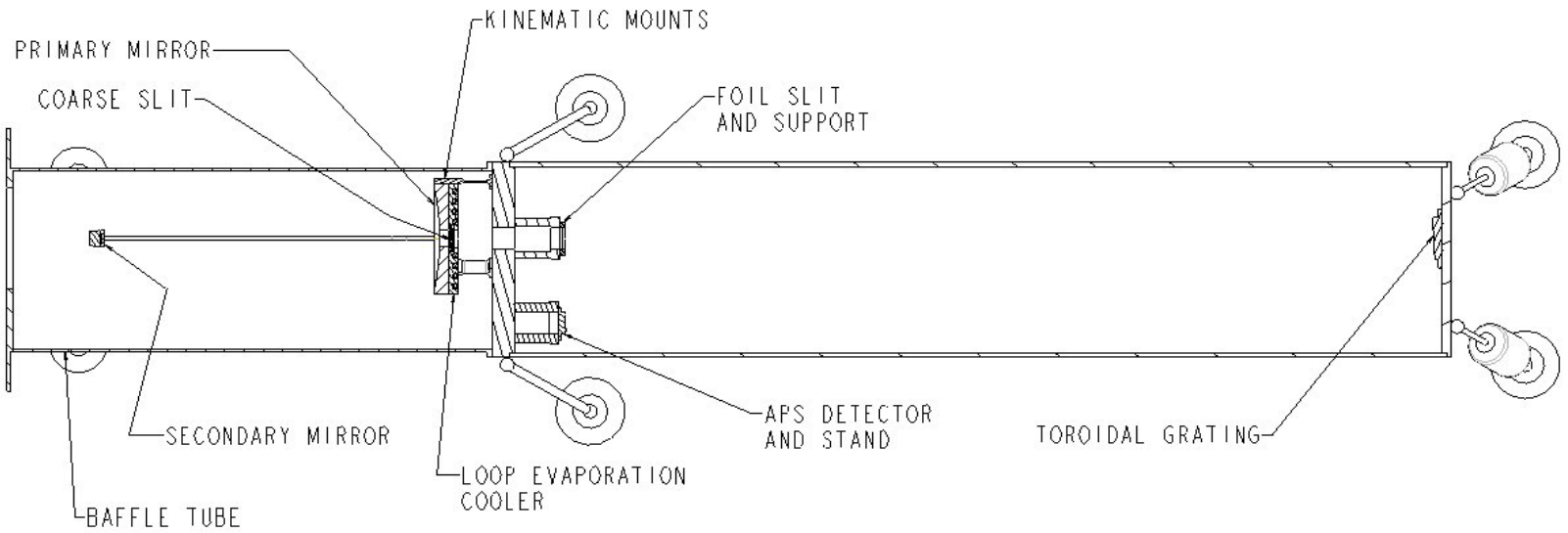


Wavelength selection

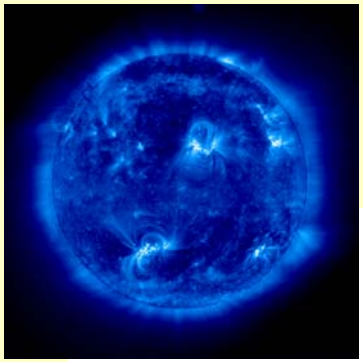
- Number of wavelength bands open
- If spectra are stacked as in CDS, image area is reduced. (FOV)
- More gratings means fewer photons – poorer time resolution.



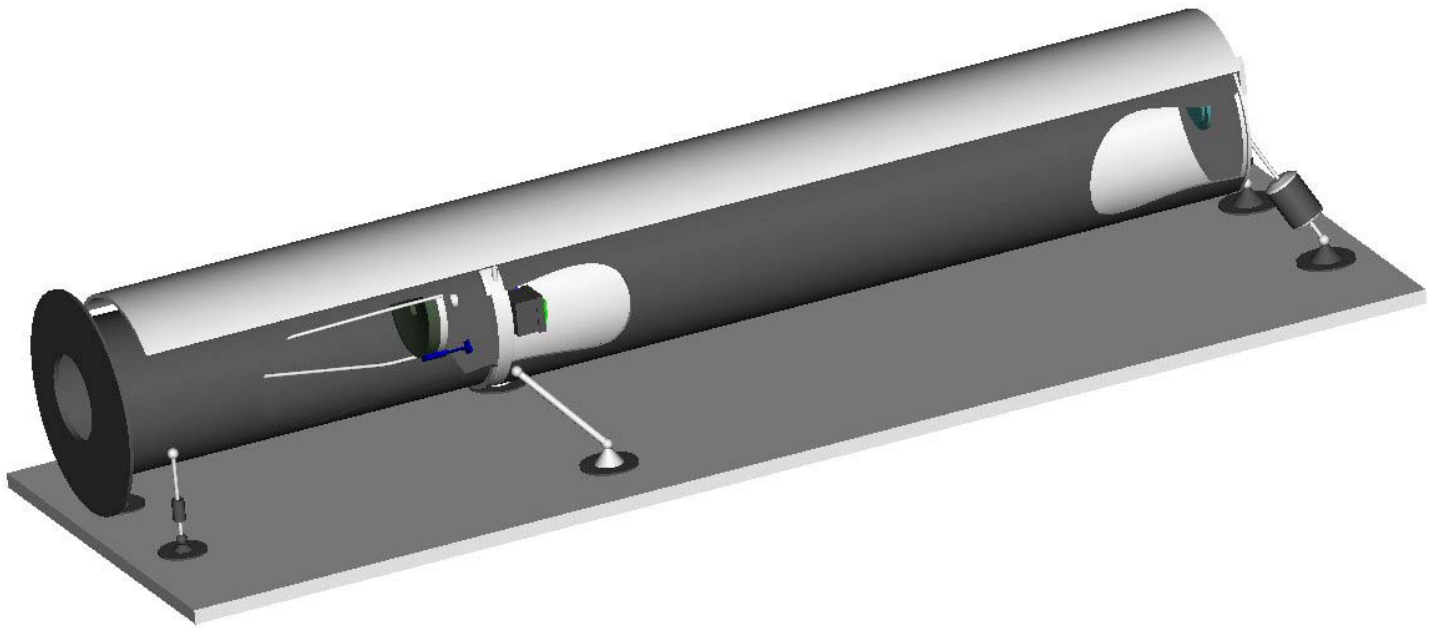
Straw man design

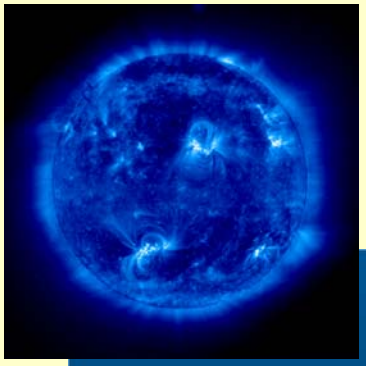


SCALE : 0.500 TYPE : ASSEM NAME : EUS_ASSY SIZE : A0

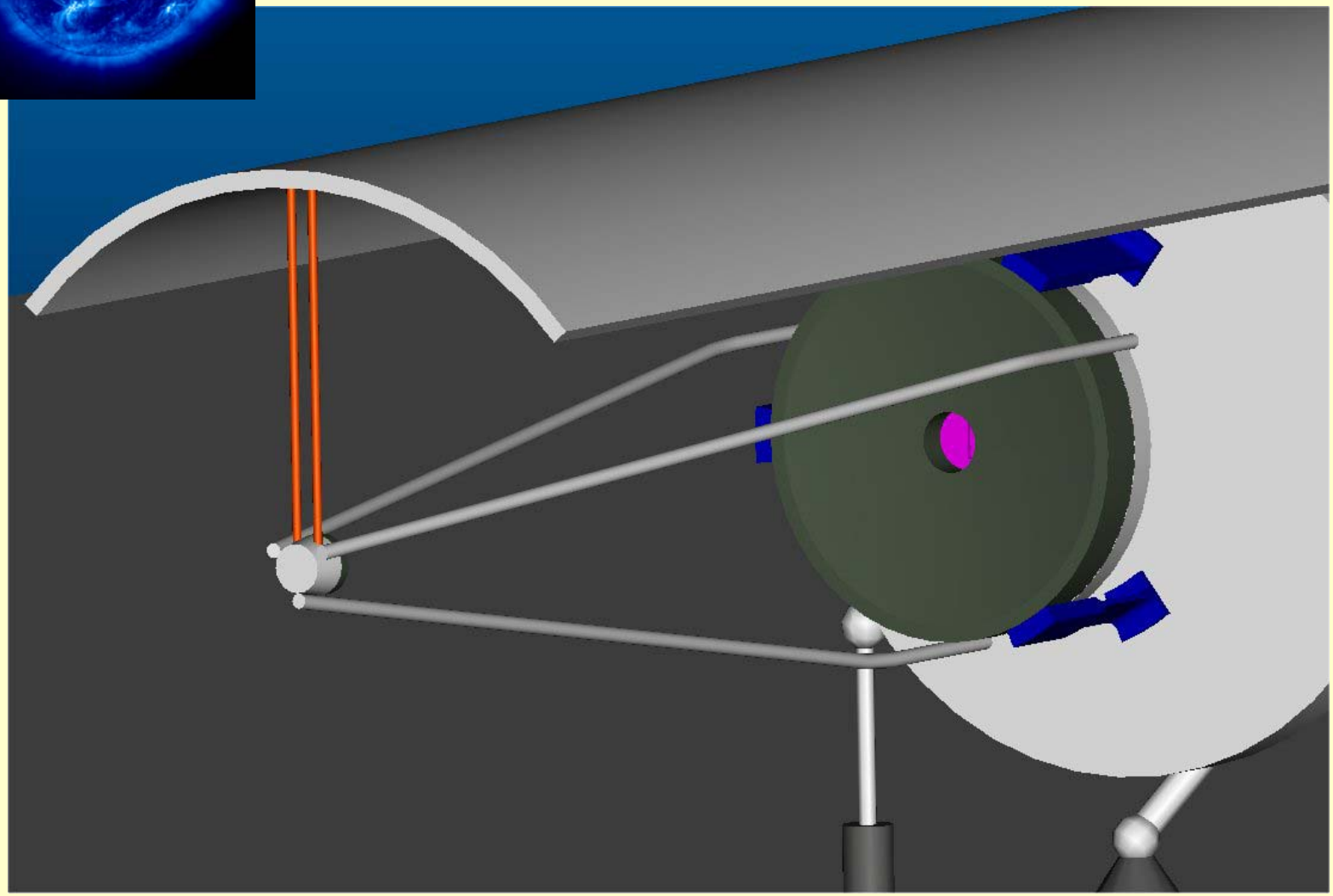


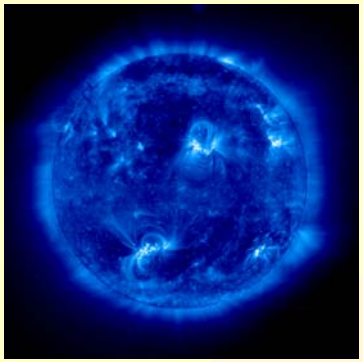
Straw man design



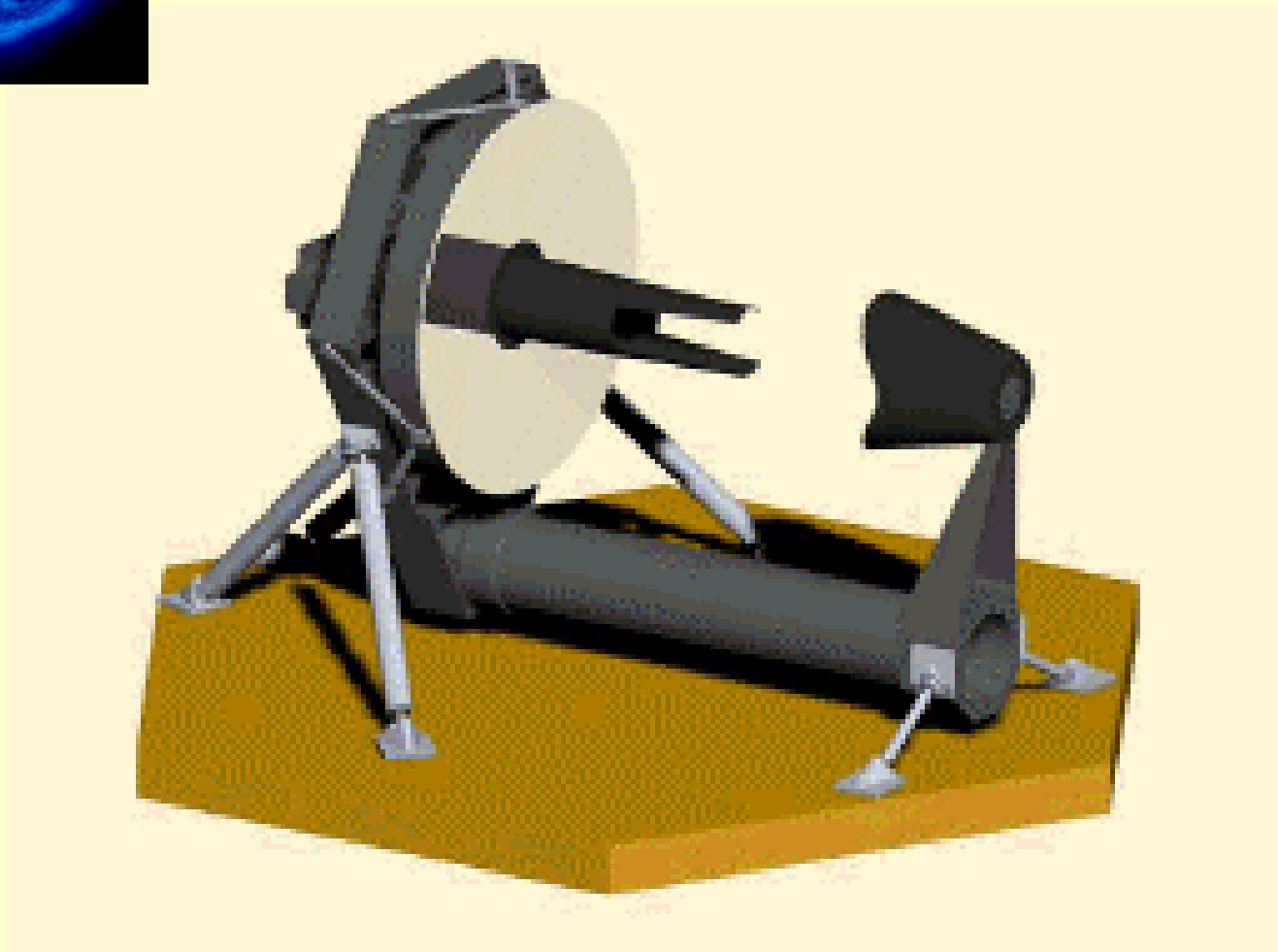


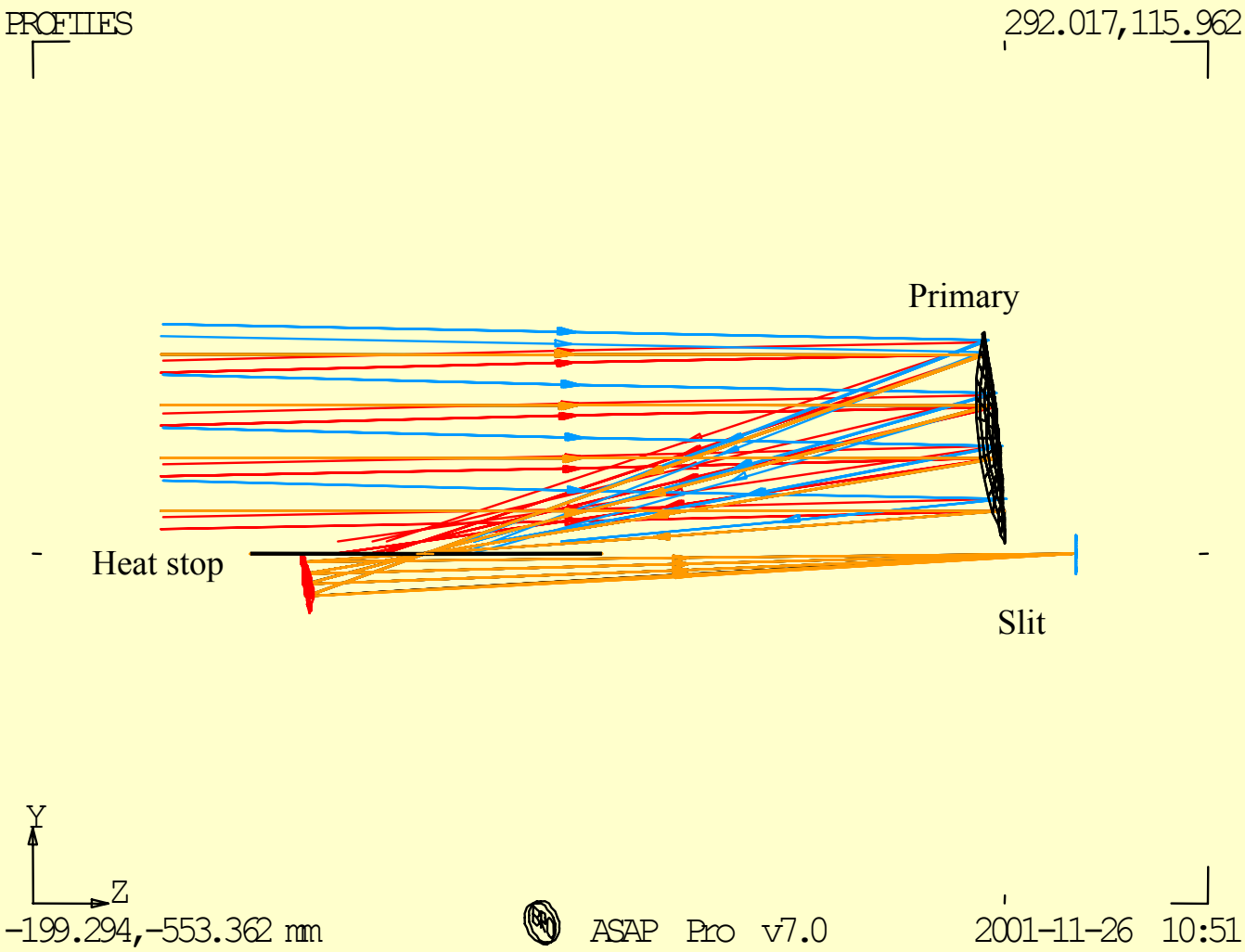
Straw man design



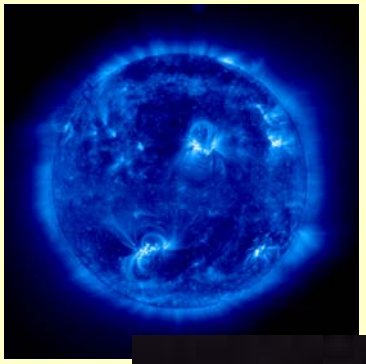


ROCSAT telescope

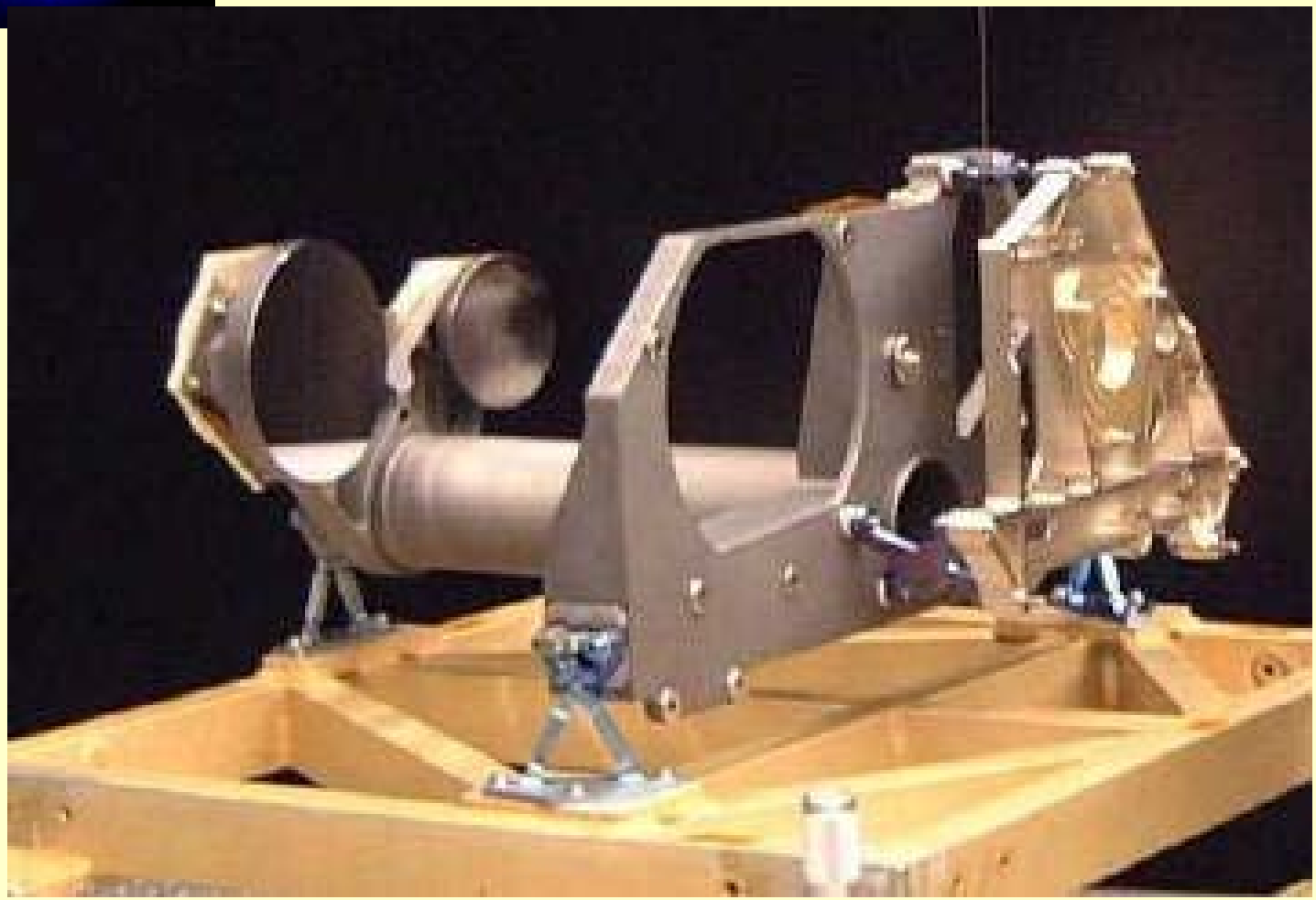




Off-axis telescope & rays from full solar disc, blocked at heat stop



OSIRIS instrument on Rosetta



End