



**HIGH ENERGY SOLAR PHYSICS DATA IN EUROPE**

# ***Mainstreaming High Energy Solar Data***

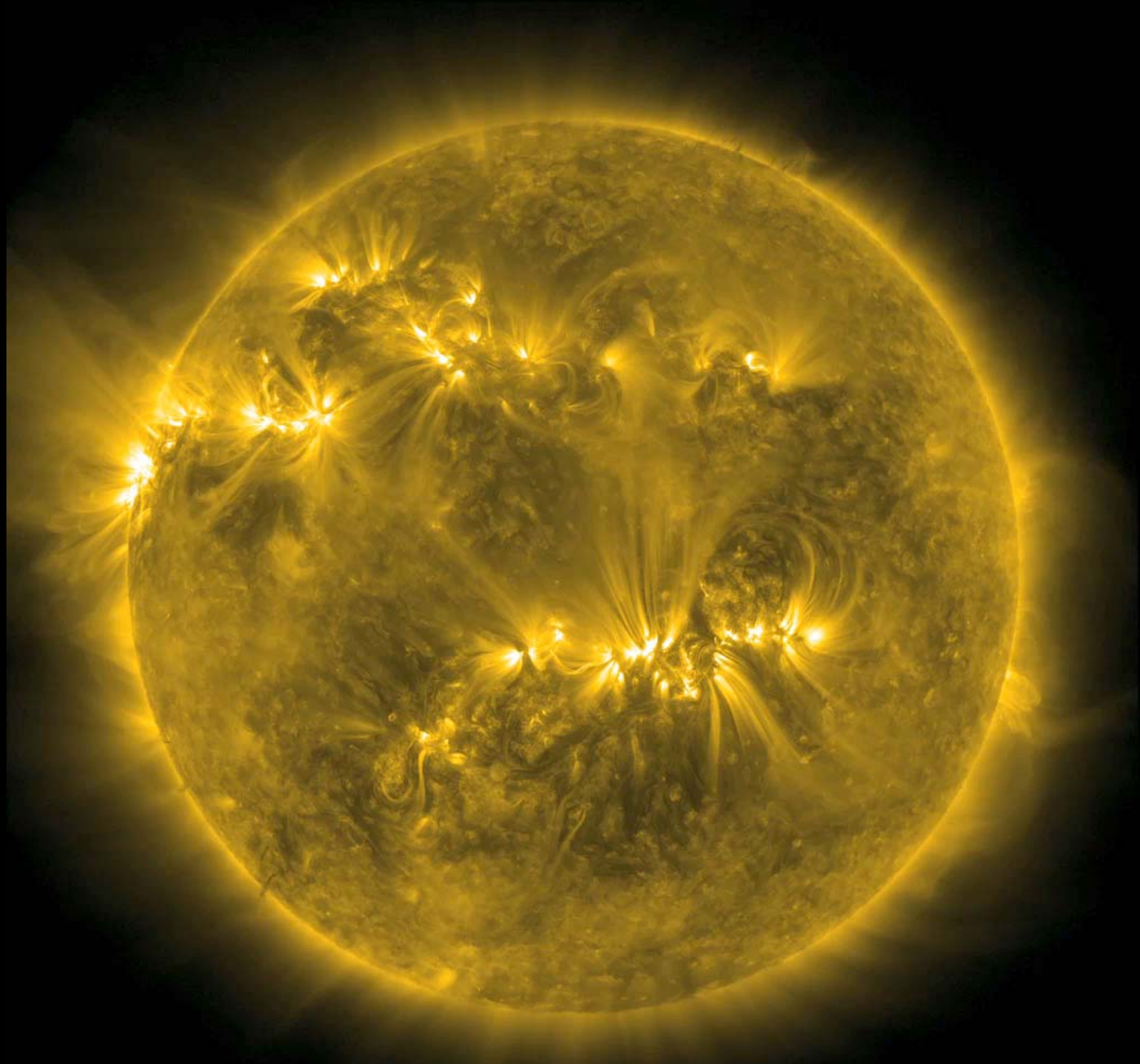
**André Csillaghy, Nicky Hochmuth and Laszlo Etesi**

**Institute of 4D Technologies**

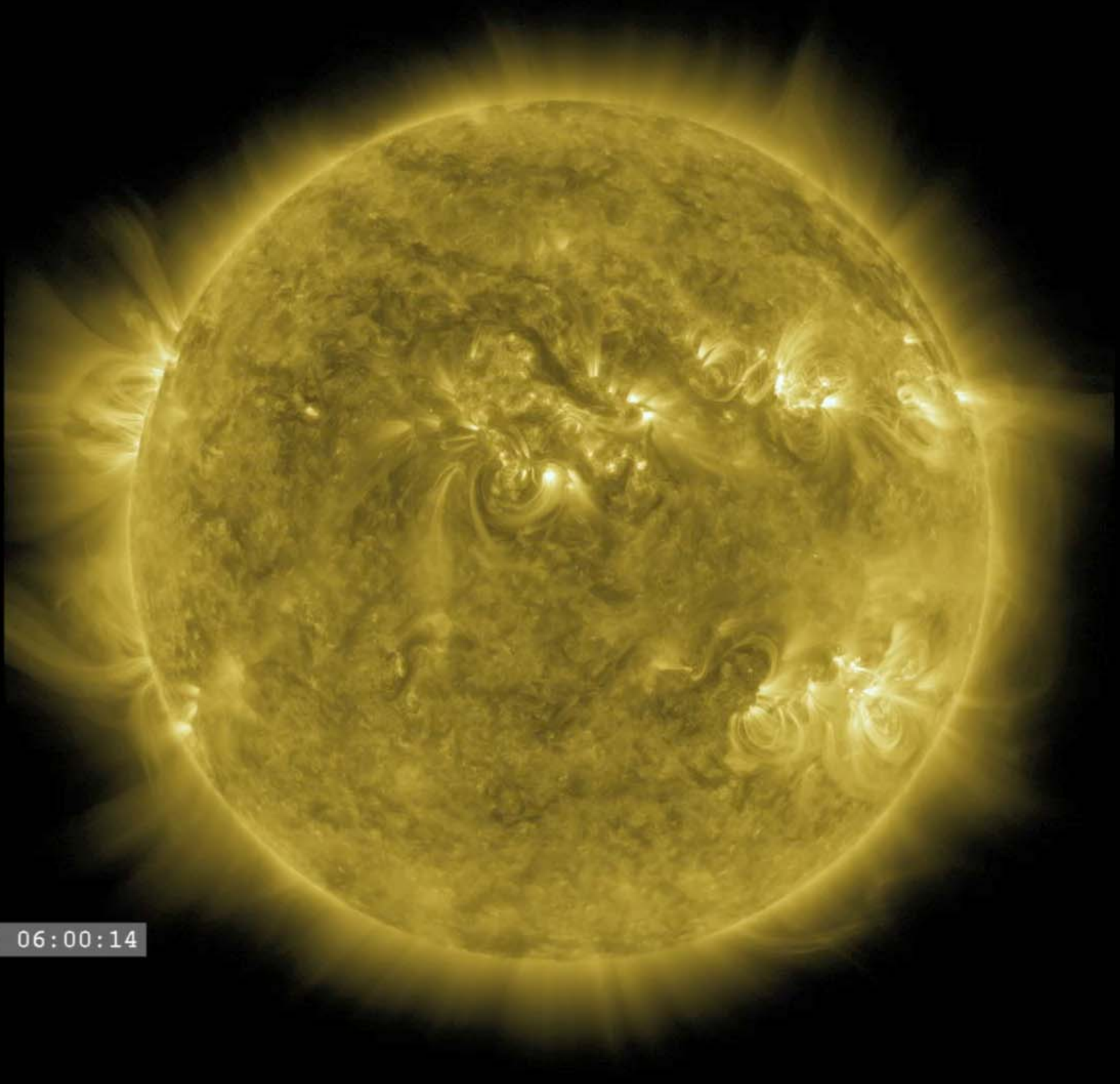
**University of Applied Sciences North Western Switzerland (FHNW)**

**and the HESPE Team**





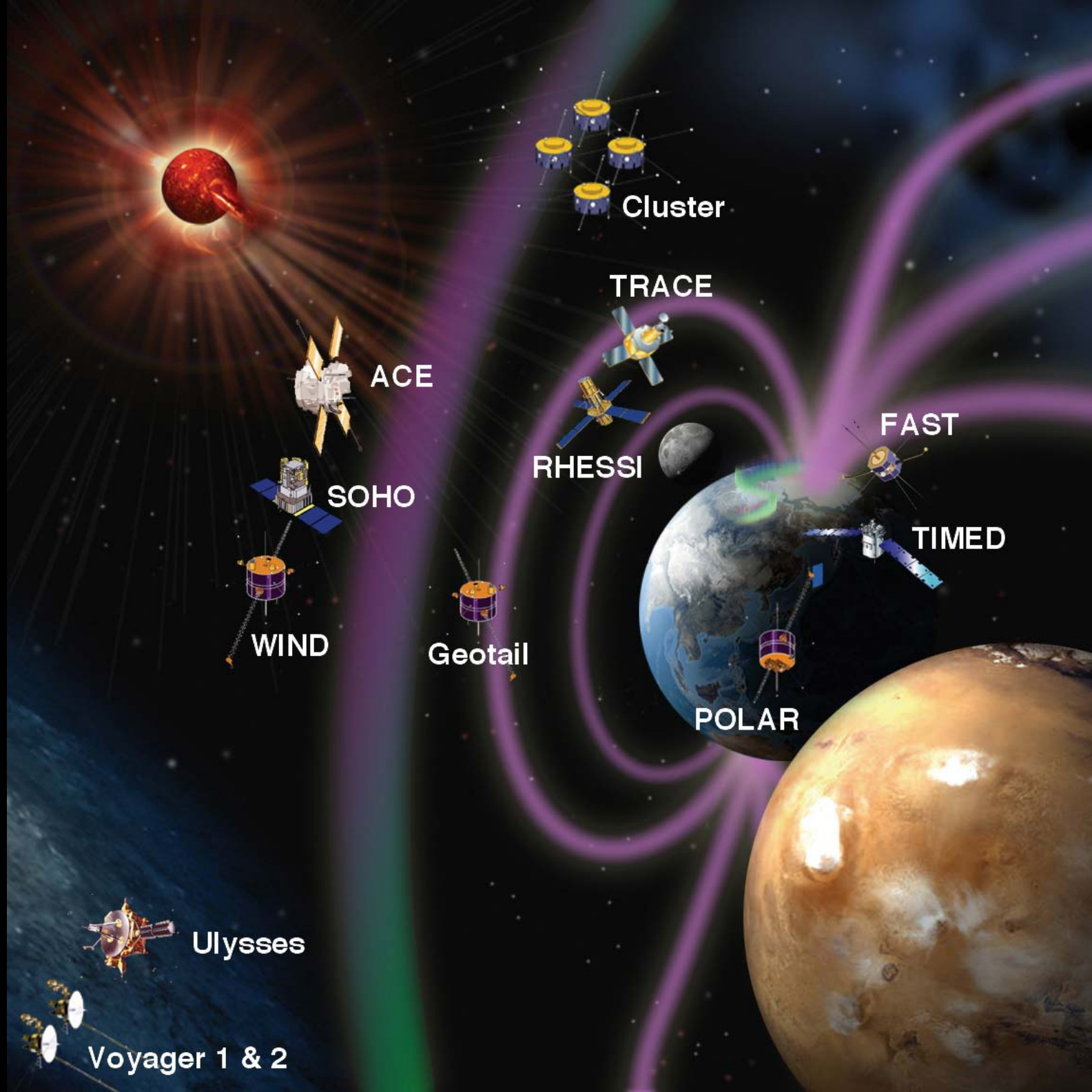
011 Jun 7 06:00:14





Apr 17 2002 23:59:32

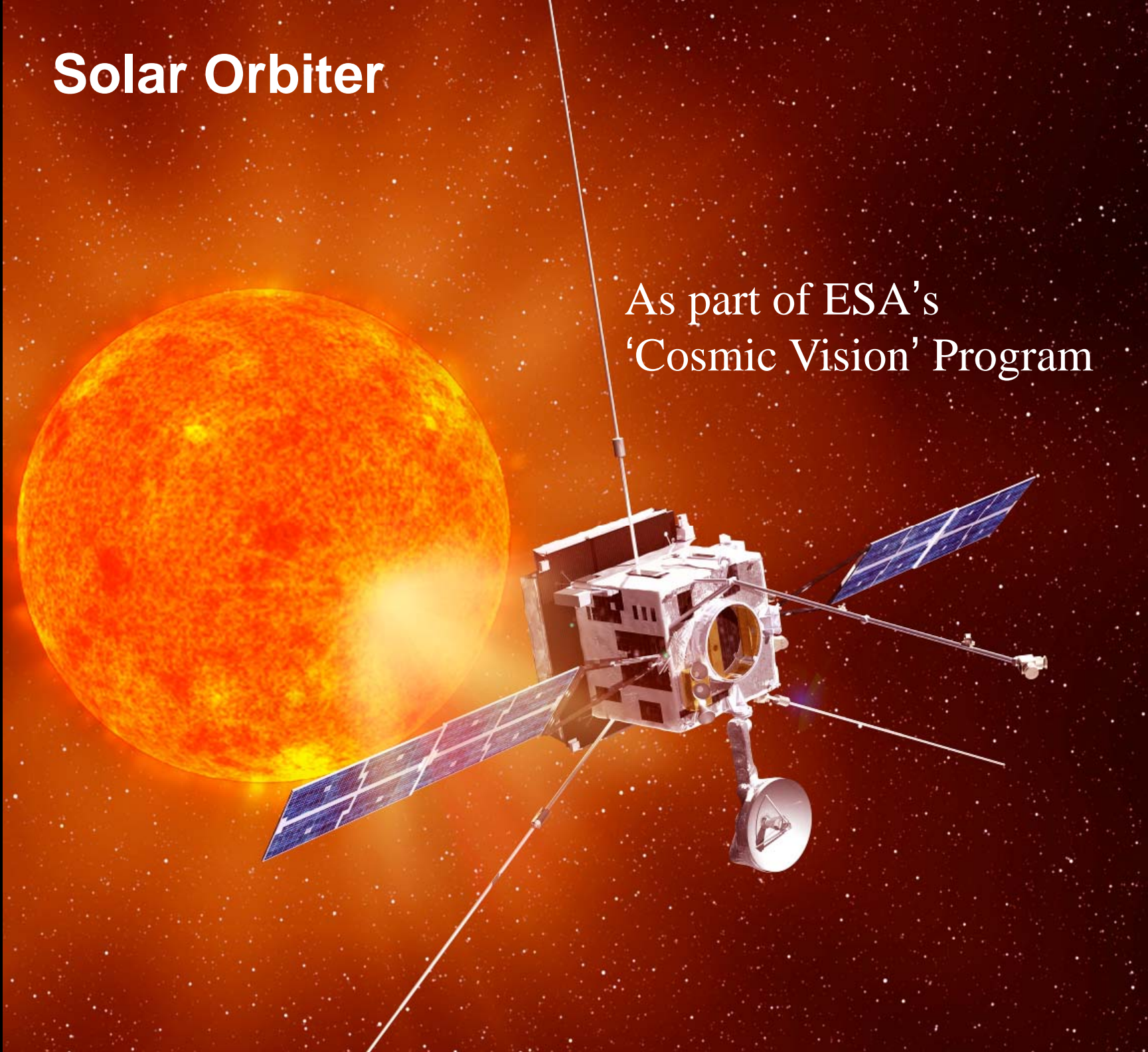






# Solar Orbiter

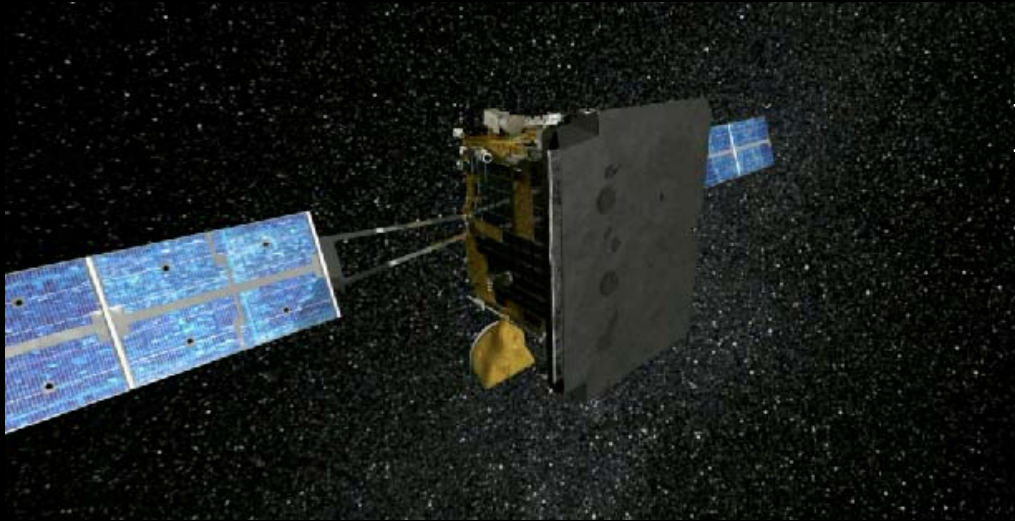
As part of ESA's  
'Cosmic Vision' Program



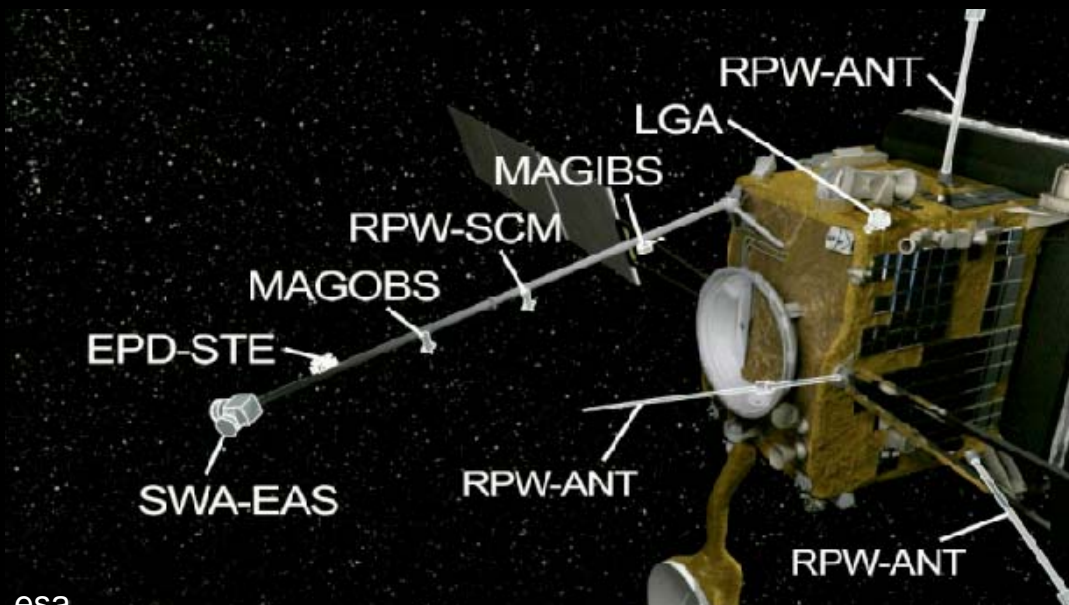


# Solar Orbiter Payload:

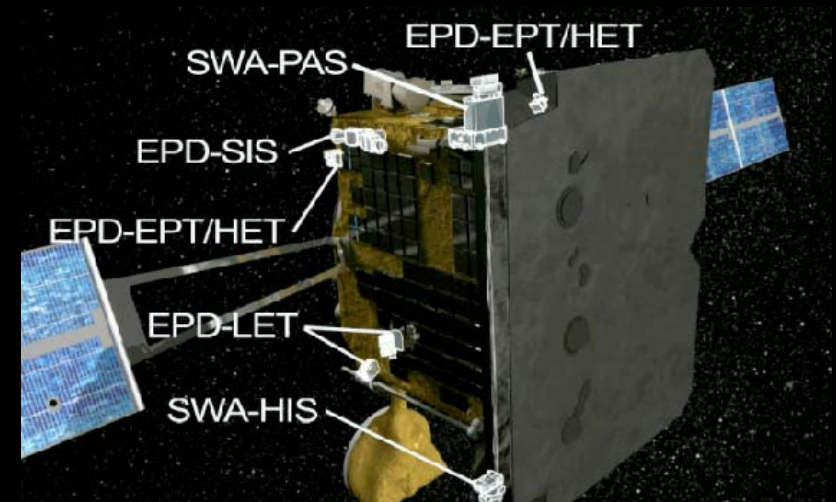
In-situ instruments  
(behind heat shield)



**In-situ instruments measure  
Solar wind, magnetic fields, waves, electrons and ions**

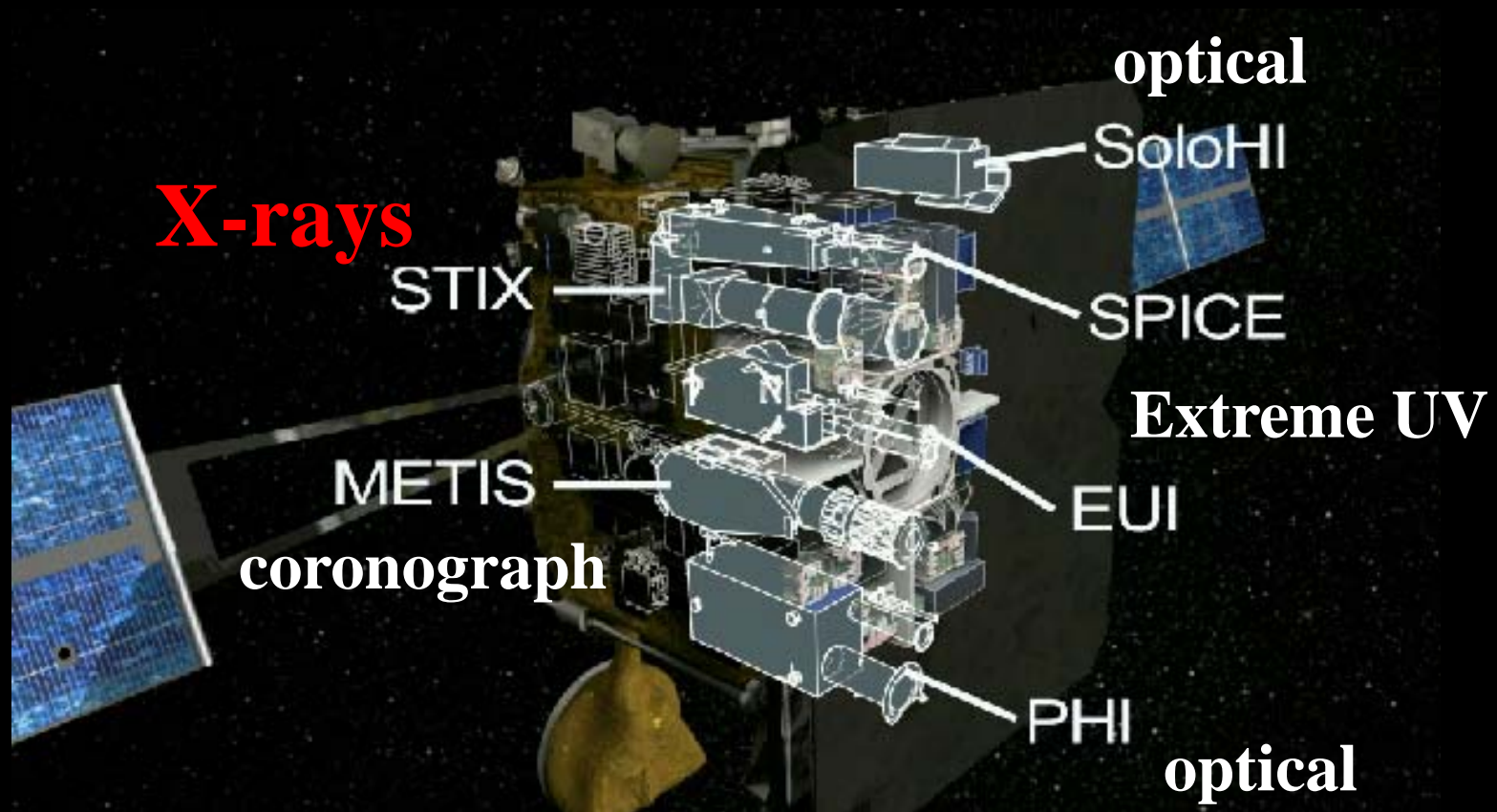
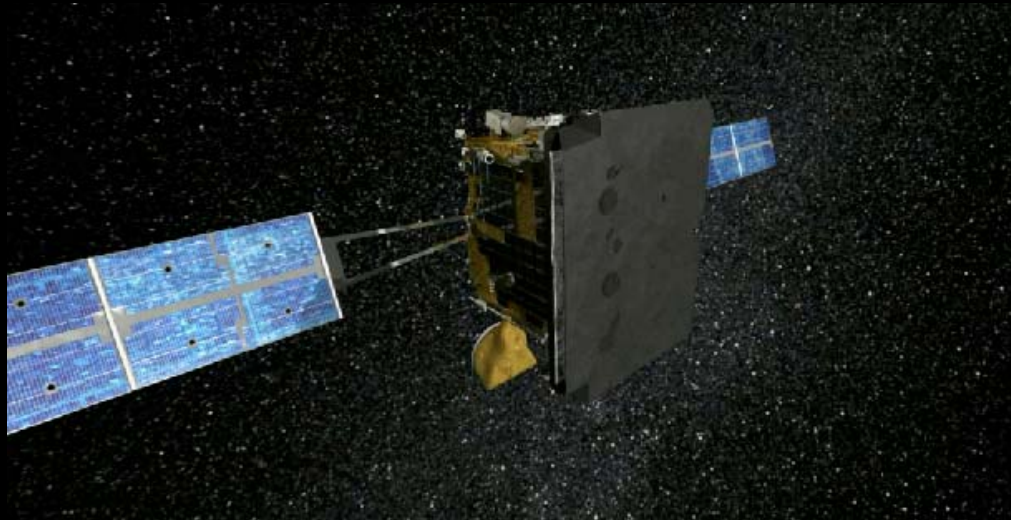


esa

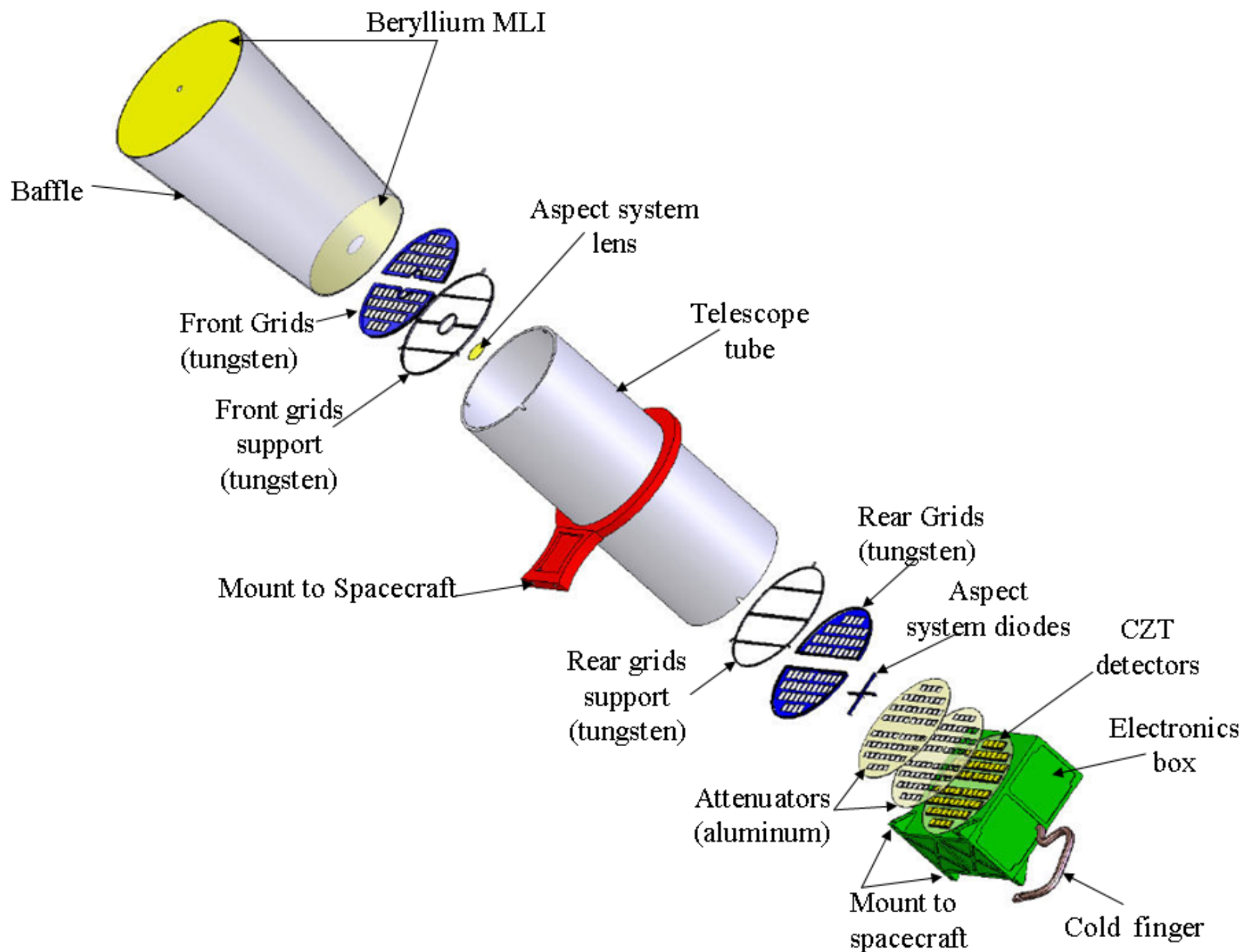


# Solar Orbiter Payload:

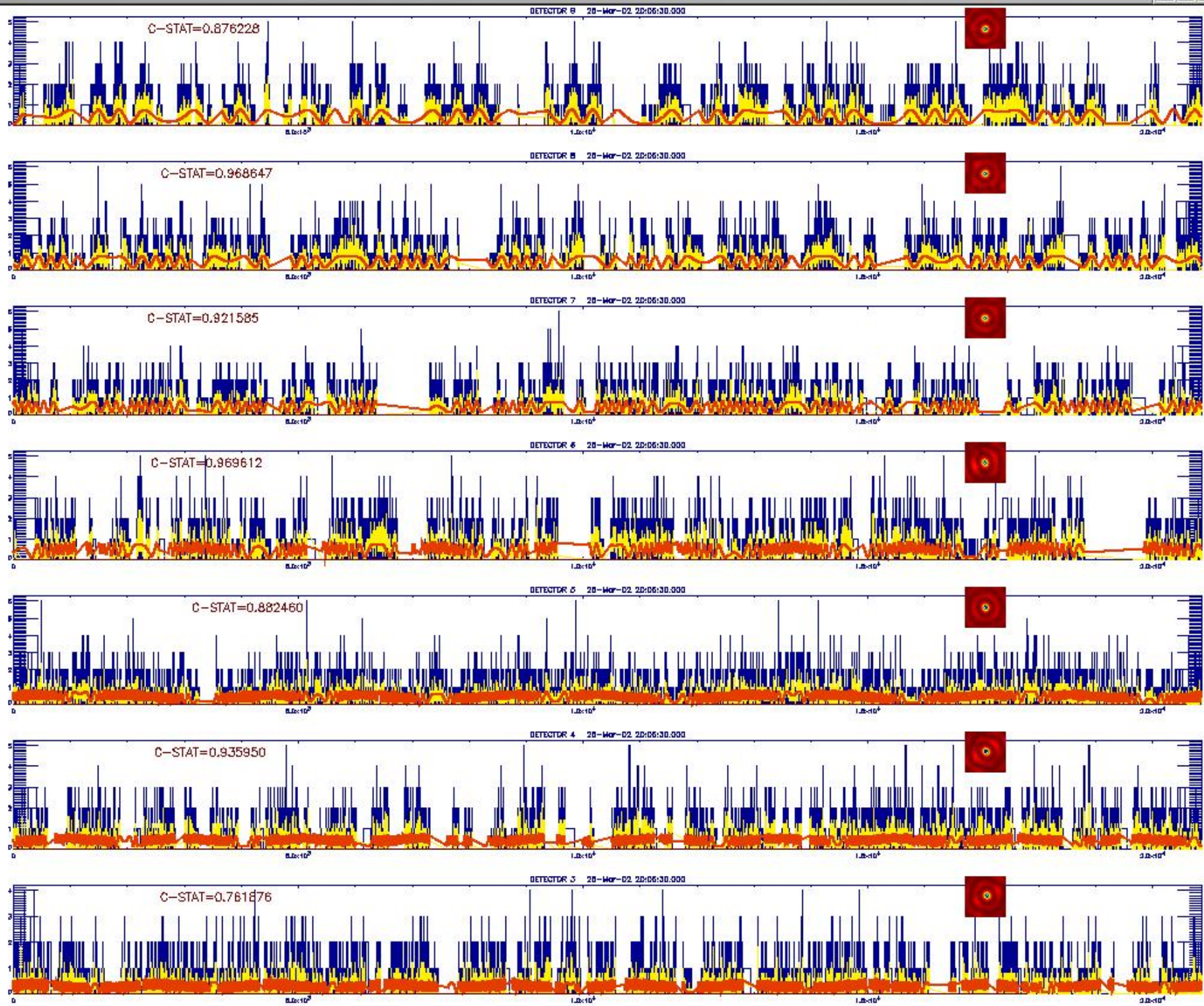
Remote sensing instruments  
with windows in heat shield



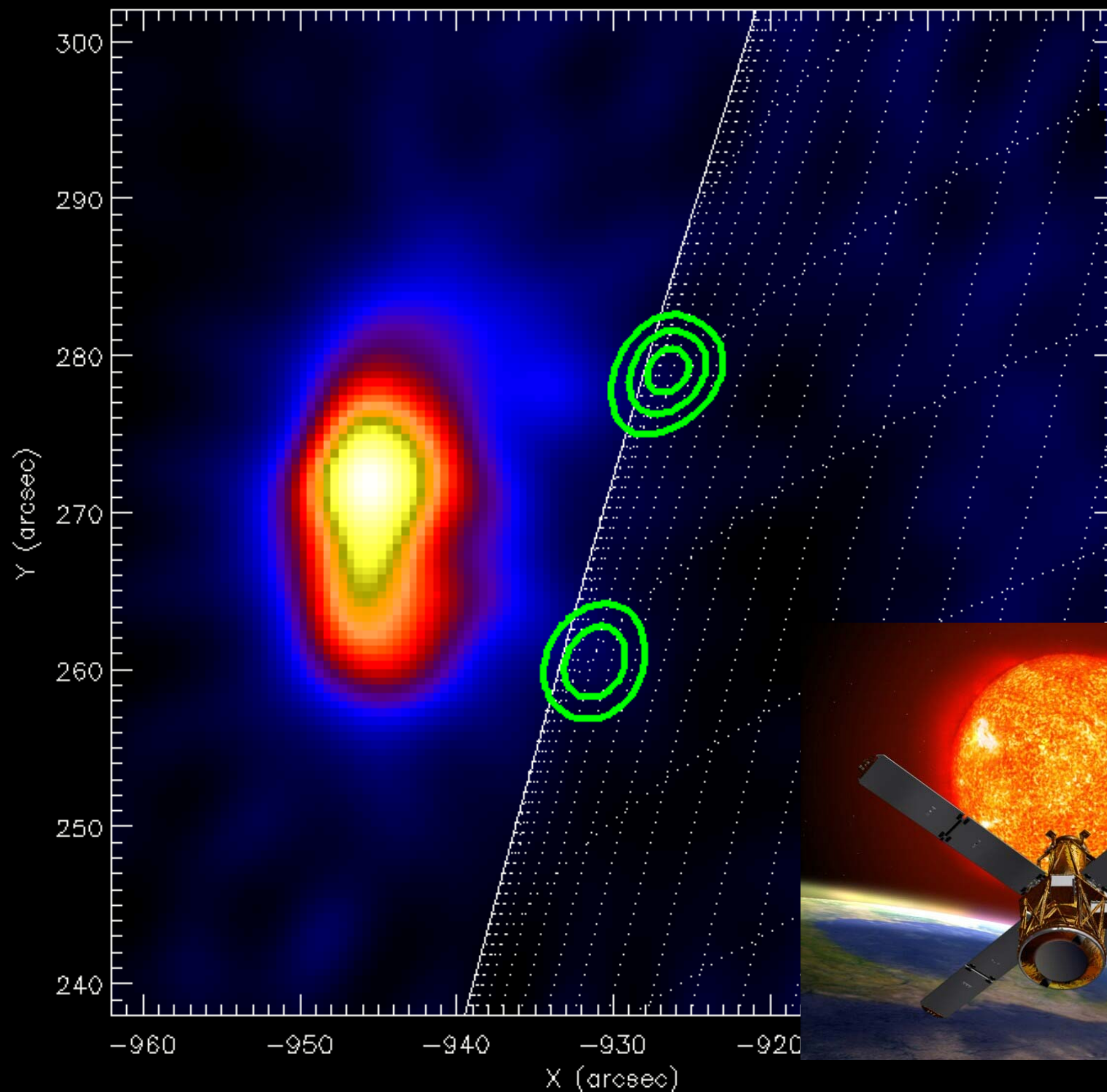








RHESSI 6.0–12.0 keV 24-Feb-2011 07:31:10.000 UT



**RHESSI image  
enhancement**

Output: enhanced image

Input: raw image

*Control: quality\_level, iteration\_number, ...*

*Info: quality\_reached, error\_estimation, ...*

---

**Raw image  
generator**

Output: raw image

Input: reduced/selected data

*Control: image\_size, pixel\_size, ...*

*Info: <empty>*

---

**Data  
reduction**

Output: reduced/selected data

Input: unpacked raw data

*Control: time\_binning, energy\_binning*

*Info: count\_number*

---

**Telemetry data  
access**

Output: unpacked raw data

Input: telemetry files

*Control: time\_range*

*Info: filename*





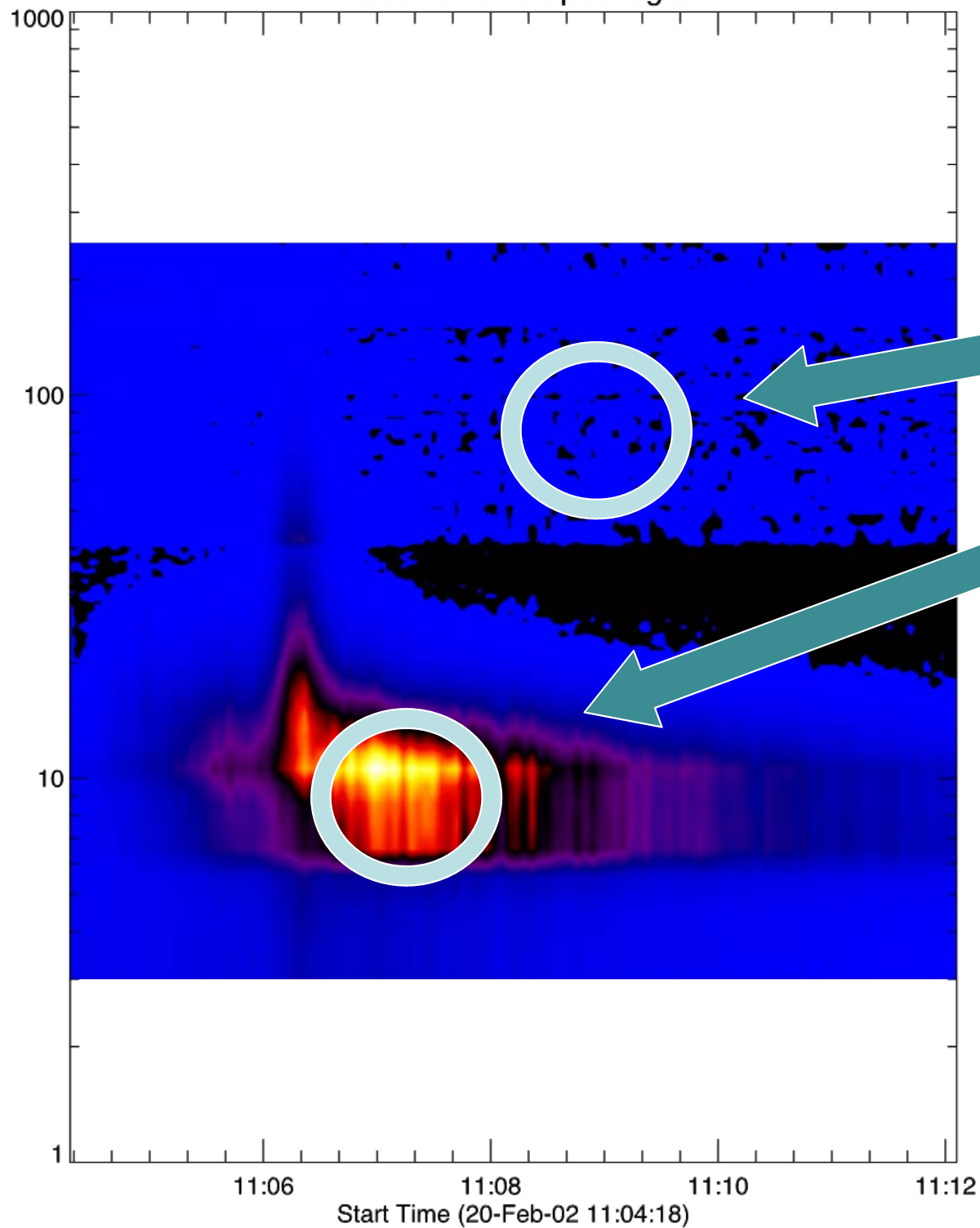
## HIGH ENERGY SOLAR PHYSICS DATA IN EUROPE

**Problem:** It is a difficult task to construct images, it requires a deep knowledge of the instrument and its imaging techniques. Also, the basic products cannot be included in the VO.

**Result:** up to now X-ray solar data has remained accessible only to few people. X-ray data products have still a significant science potential to exploit. Furthermore, STIX data products need to be accessible easily to all Solar Orbiter scientists.

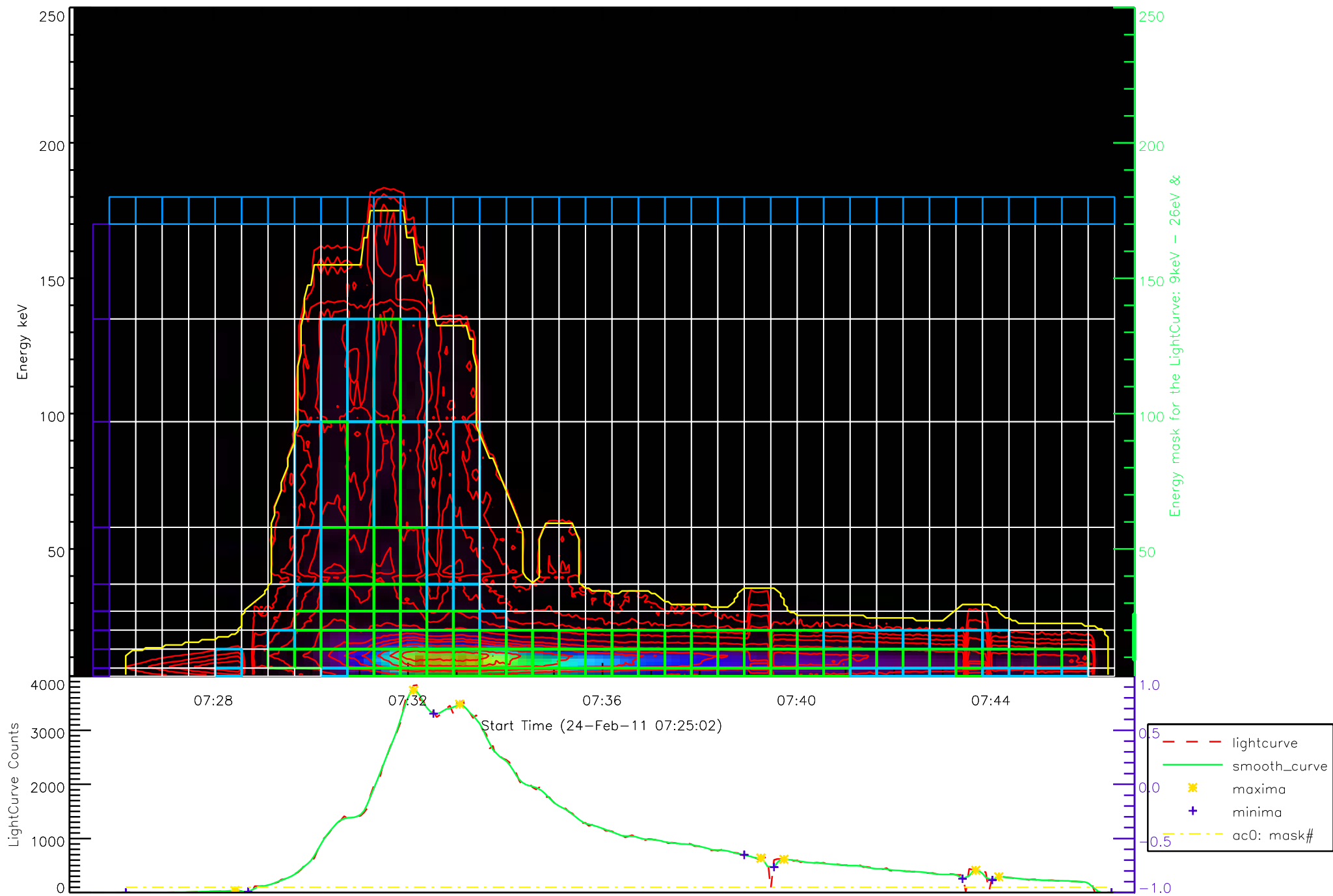
**Solution:** Establish a comprehensive database of instrument-independent science products. This is HESPE: a bunch of computer scientists and high energy solar physicists building a framework to generate these products automatically

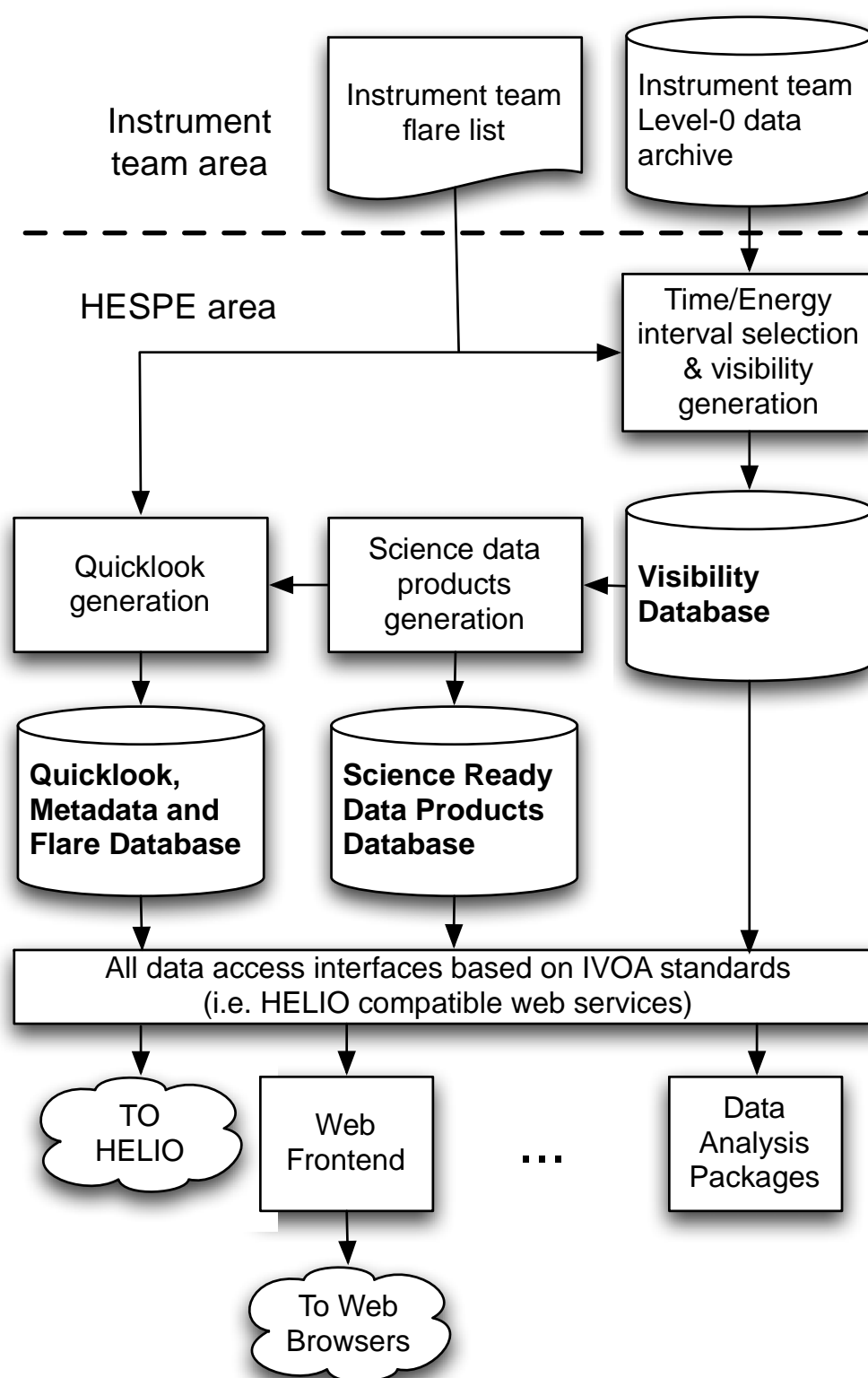
RHESSI Counts Spectrogram



Need  
enough  
counts  
to make  
an  
image

Tradeoff between  
energy and time





# What do we have at the end of the day

- For RHESSI (a 10 TB data archive): VO compliant data products
  - Visibility, „instrument independent“ database (FITS)
  - Quicklook products (jpeg)
  - Science ready spectrograms, images, and spectra
- Easy connection with tools such as jhelioviewer
- For STIX: A tested way of generate science ready data products
- Schedule: completion in 2 years



# Thanks to the HESPE team

- University of Genova
  - Michele Piana & Anna Maria Massone
- University of Glasgow
  - Lindsay Fletscher & Eduard Kontar
- University of Graz
  - Astrid Veronig
- CNRS (@ Paris Observatory)
  - Nicole Vilmer
- University of California Berkeley
  - Gordon Hurford & Säm Krucker