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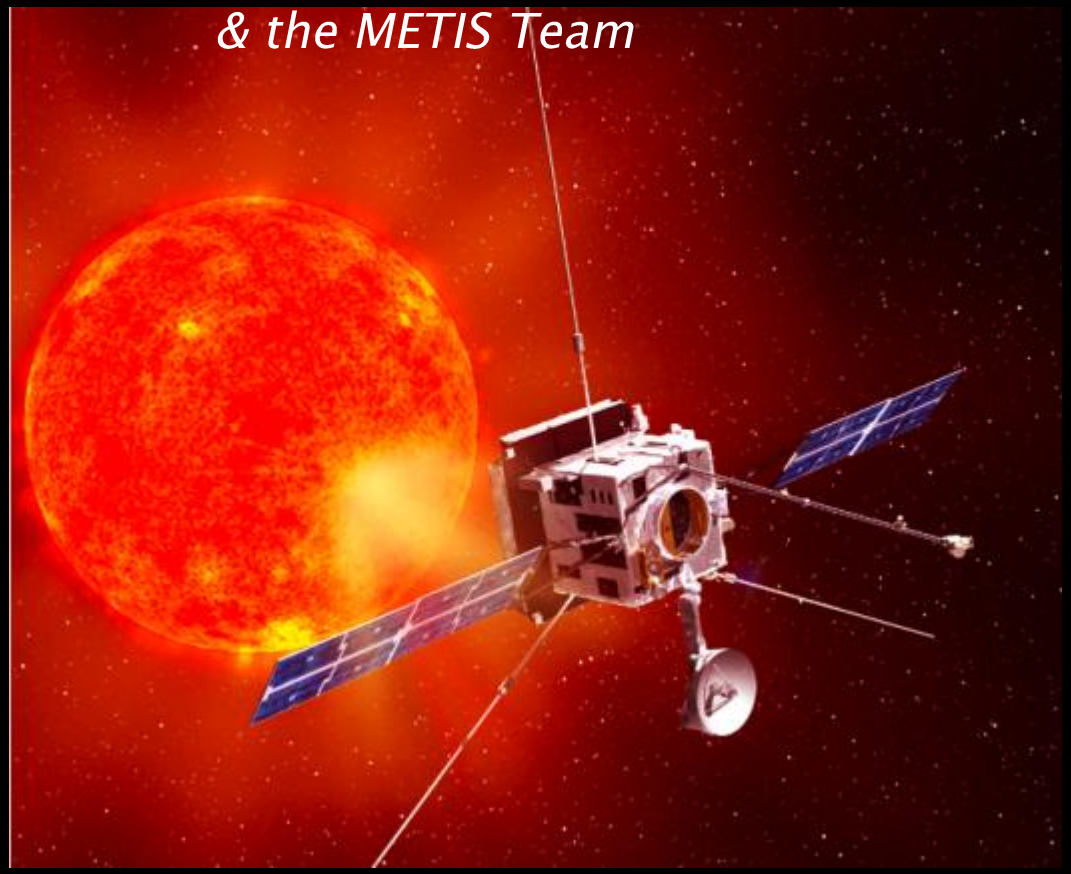
METIS
Experiment & Science Implementation

Silvano Fineschi
INAF – Osservatorio Astronomico di Torino (Italy)

& the METIS Team



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METIS

Multi Element Telescope for Imagining & Spectroscopy

International Consortium under responsibility of INAF – OATo
Leading Funding Agency: ASI
Industrial Partners: Thales Alenia, Selex Galileo

Principal Investigator: E. Antonucci, INAF-OATo, Turin
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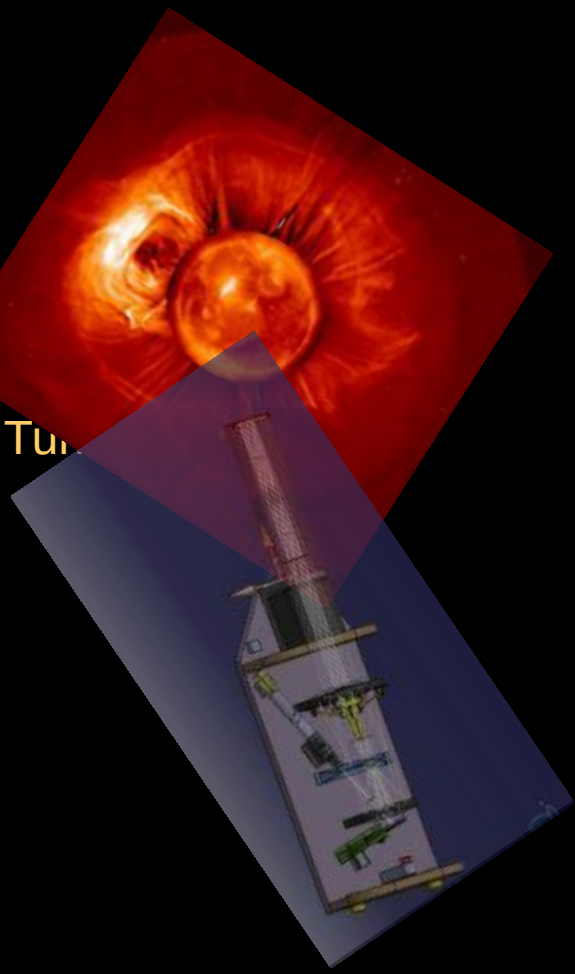
Experiment Manager: G. Naletto, University of Padua
Instrument Scientist: M. Romoli, University of Florence
Science Team Coordinator: Daniele Spadaro, INAF-OA

INAF Institutes: OAC, OACt, OARm, OAPa, OATo, OATs, IFS
Universities of Florence, Padua, Pavia, Catania, Politecnico of Tu

Max Planck Institut (MPS) Lindau, G
Astronomical Institute of the Czech Academy of Science (ASU-CAS), Czech Republic

Institute d'Astrophysique Spatiale (IAS), F
Laboratoire d'Astrophysique de Marseille, F
Naval Research Laboratory (NRL), US
University of Athens, Gr



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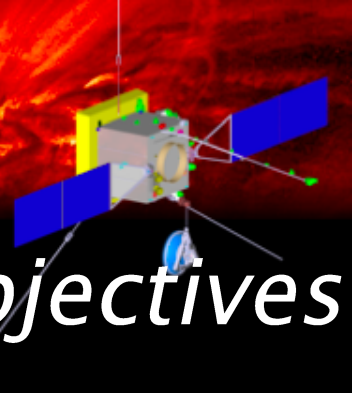

Solar Orbiter top level scientific objectives

- How does the solar dynamo work and drive connections between the Sun and the heliopshere?
- How and where do the solar wind plasma and magnetic field originate in the corona?
- How do solar transients drive heliospheric variability?
- How do solar eruptions produce energetic particle radiation that fills the heliosphere?

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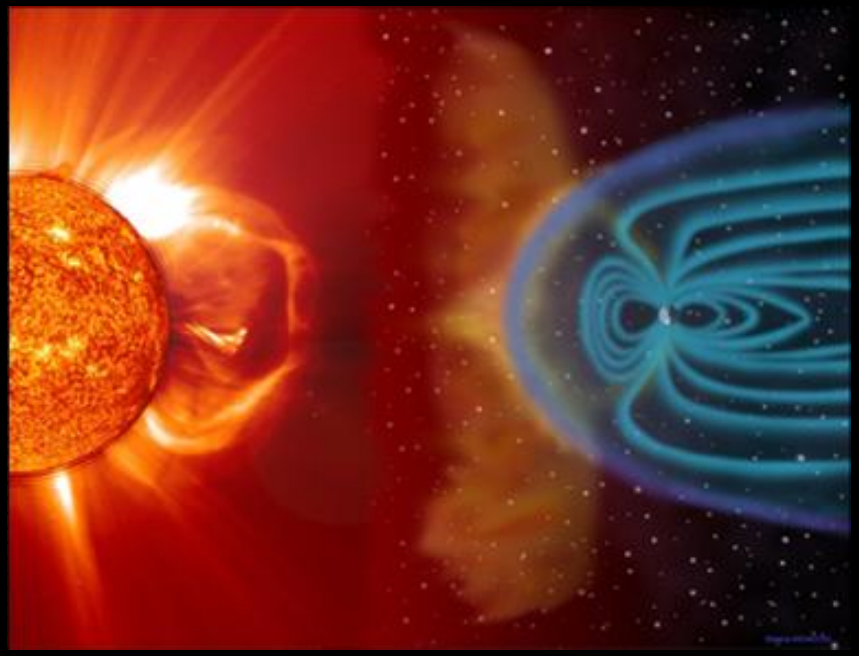
METIS Science: the next step in understanding the corona as link to the heliosphere

- How energy is deposited in coronal holes & solar wind
- What are the source regions of the slow solar wind
- How the global corona evolves and solar transients originate
- How shock fronts accelerate particles in the solar corona



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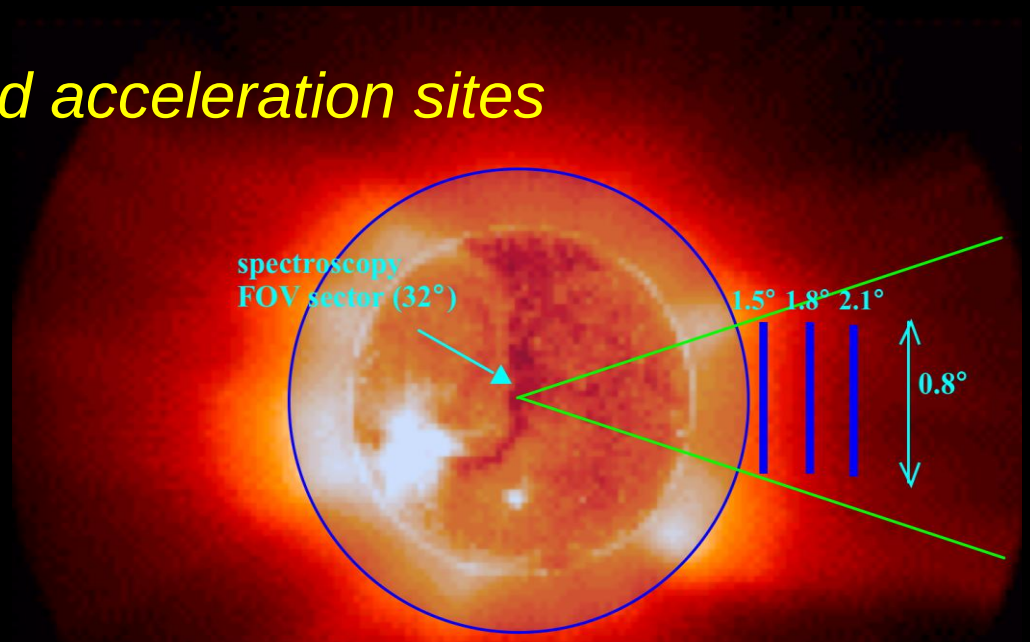
METIS science implementation

Fully characterize the
dynamics and composition of the major plasma components (e^-, H^0)
in the corona and solar wind acceleration sites

Density/abundance maps H^0, e^-
Outflow velocity maps of H^0
Velocity distribution of H^0



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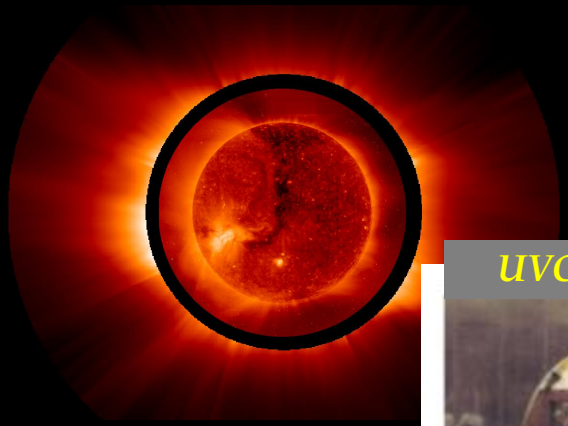
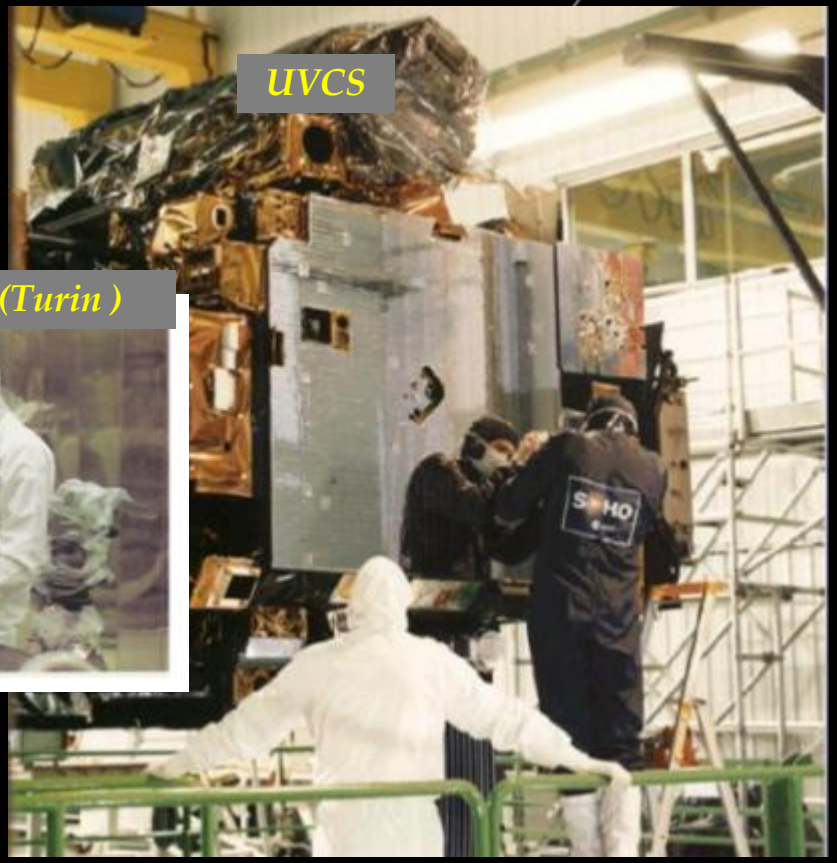
METIS Heritage: UVCS (ASI-NASA) on SOHO



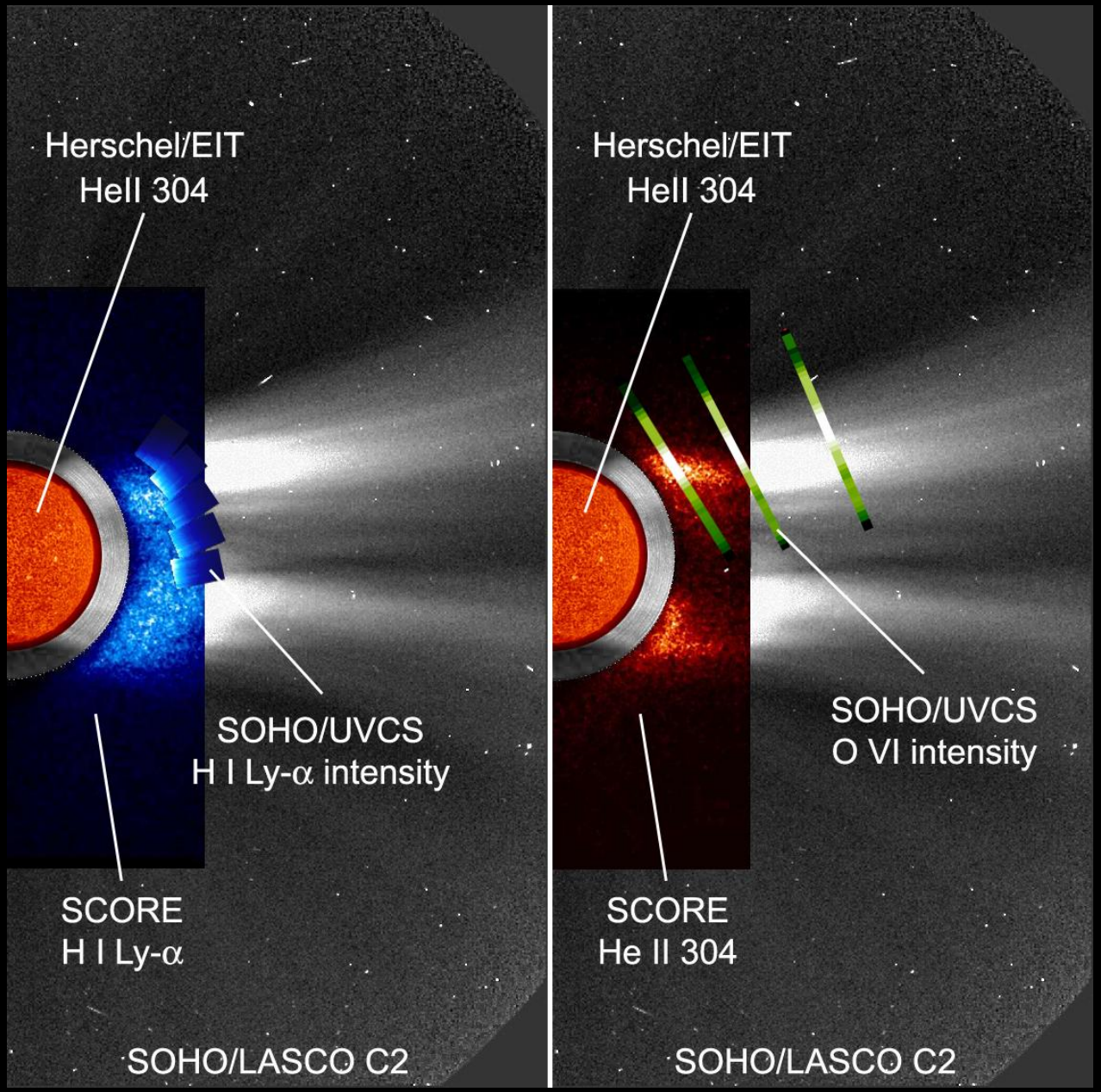
UVCS spectrometer at TAS (Turin)

UVCS



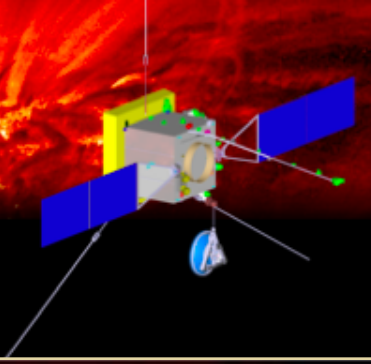
Coronagraph introducing UV spectroscopy of the outer corona >1.5 R
Diagnostics: Doppler dimming techniques

Sounding-rocket Coronagraphic Experiment - SCORE



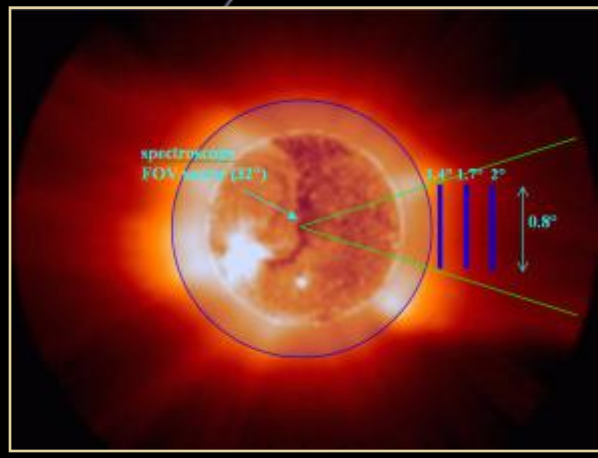
SCORE & SOHO/ UVCS, LASCO coordinated observations

METIS Instrument



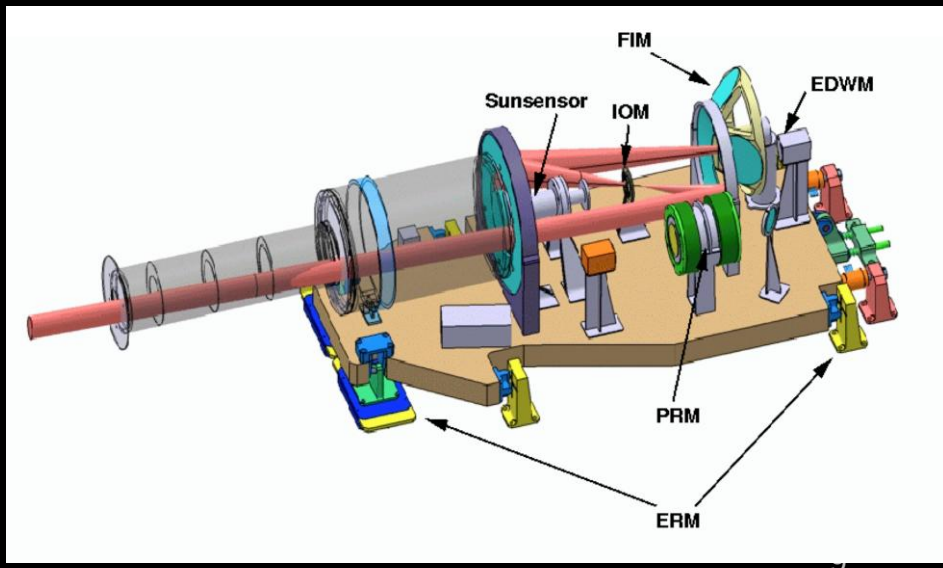
Externally occulted coronagraph designed for:

- broad-band imaging - polarized Visible-light K-corona
- narrow-band imaging - UV corona (HI Ly-α, 1216 Å)



annular FOV: 1.5 - 3.0 $R_\odot$ at min perihelion 0.28 AU

Simultaneous UV, VL coronal images



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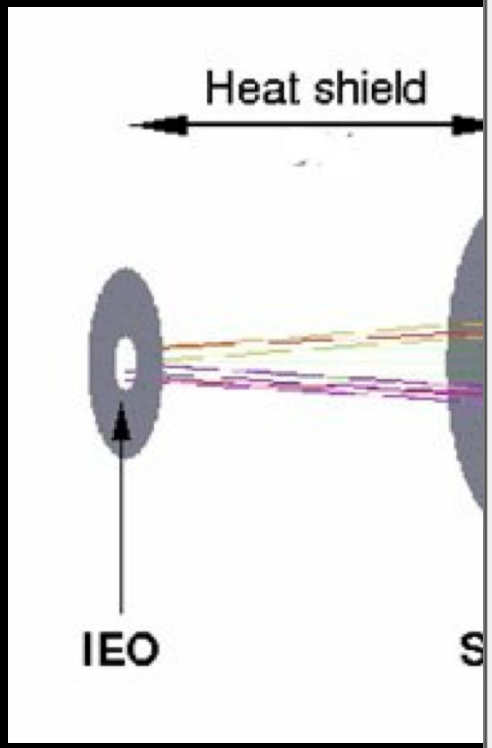
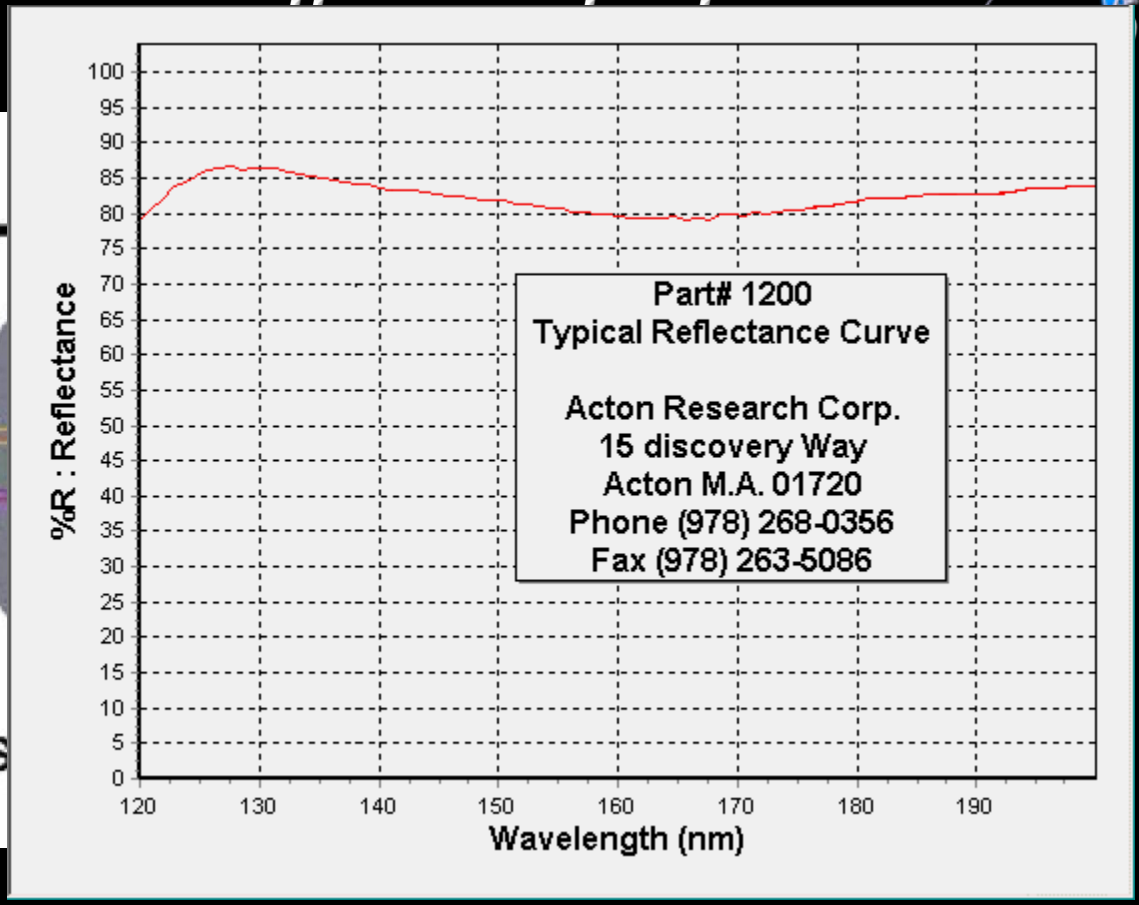
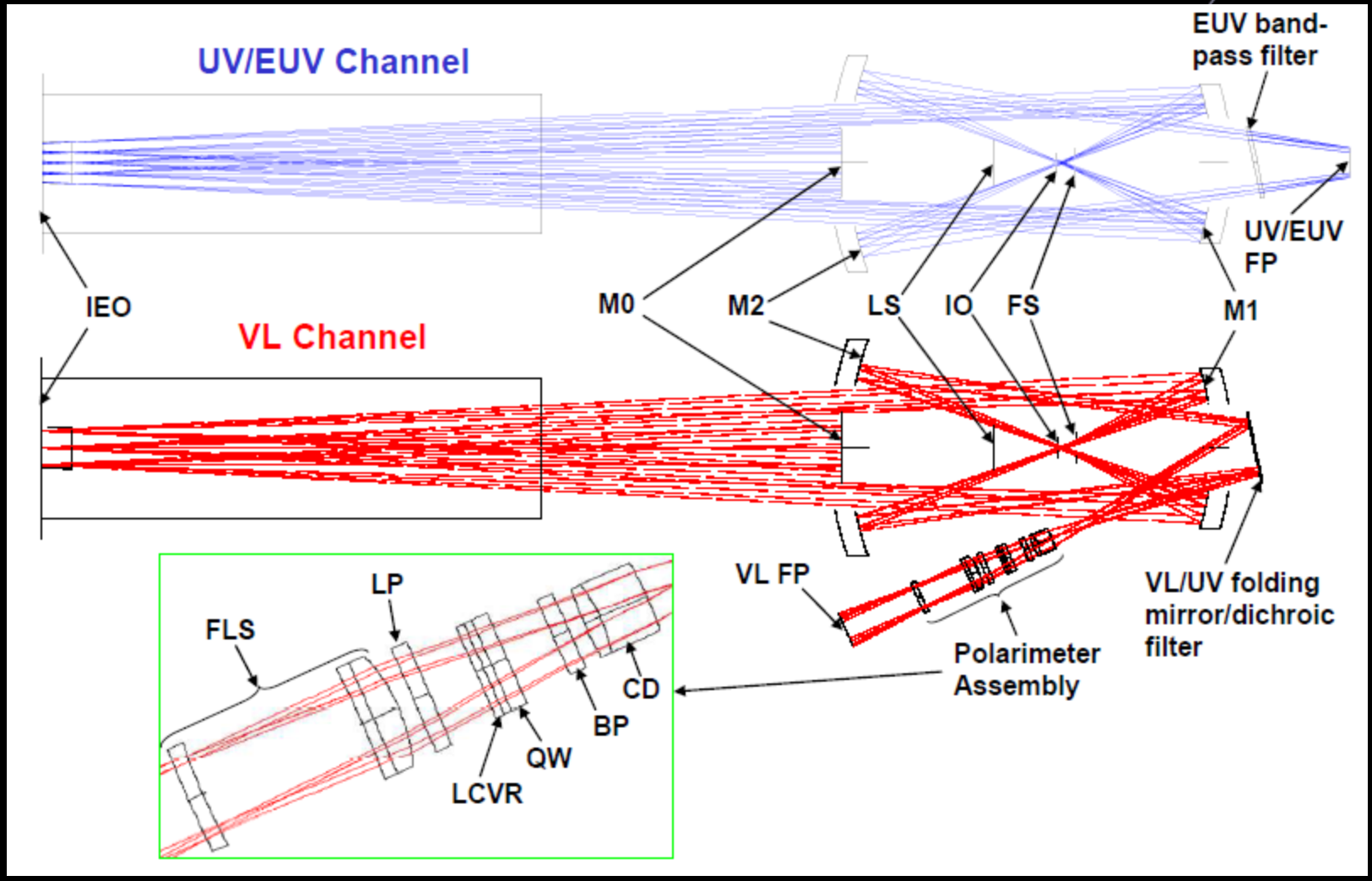
METIS: Inverted





UV mode: the cap-layer of the multilayer optics reflects VL & HI Lyα, 1216 Å. The interference reflects VL and transmits UV HI line, absorbing the EUV light. VL and UV channels work simultaneously.

METIS design and optical layout



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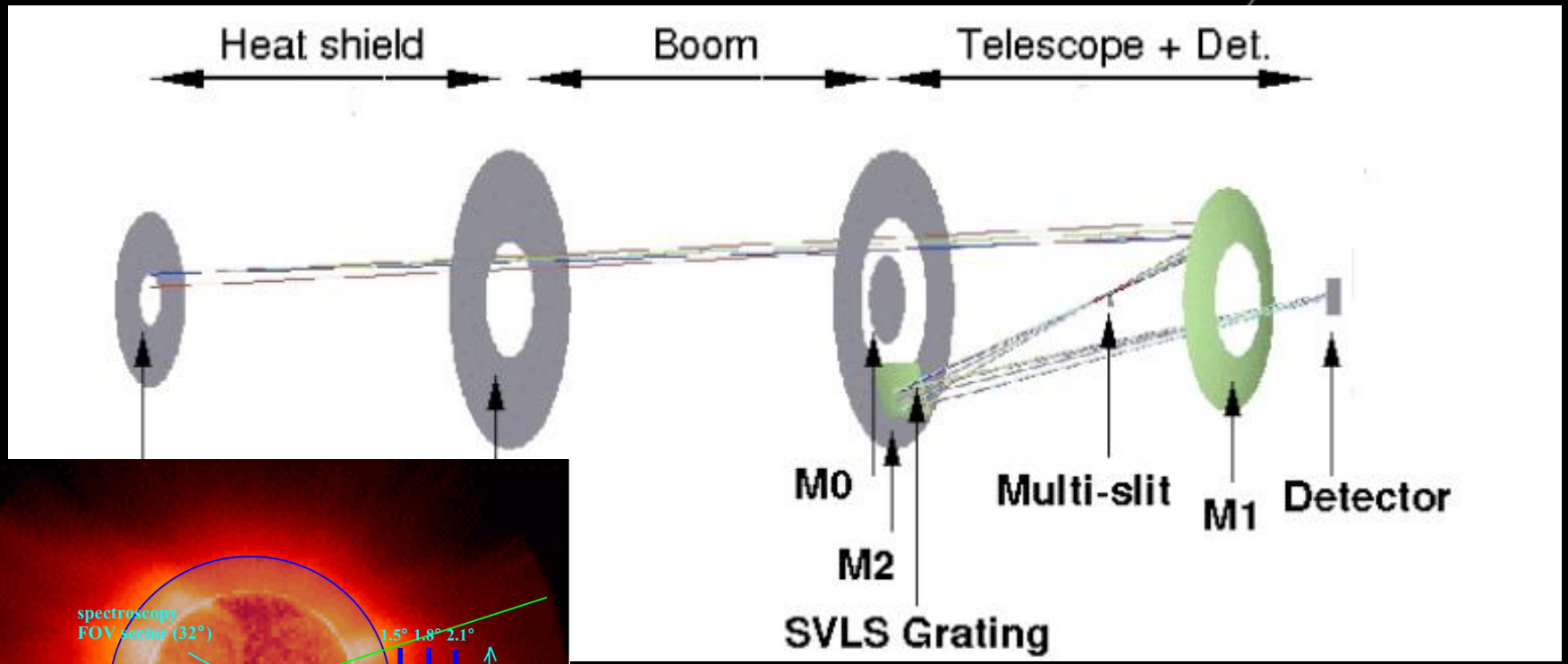
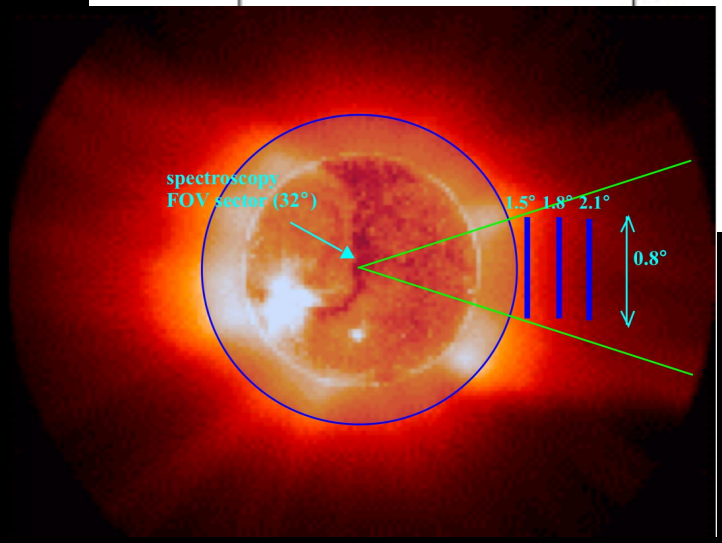
METIS spectrographic channel





UV mode: 1800 l/mm Spherical Varied Line-Space (SVLS) grating diffracts HI Lyα, 1216 Å at 1st order.

EUV mode: The multilayer coated 1800 l/mm SVLS grating diffracts HeII Lyα, 30.4 Å at 4th order.

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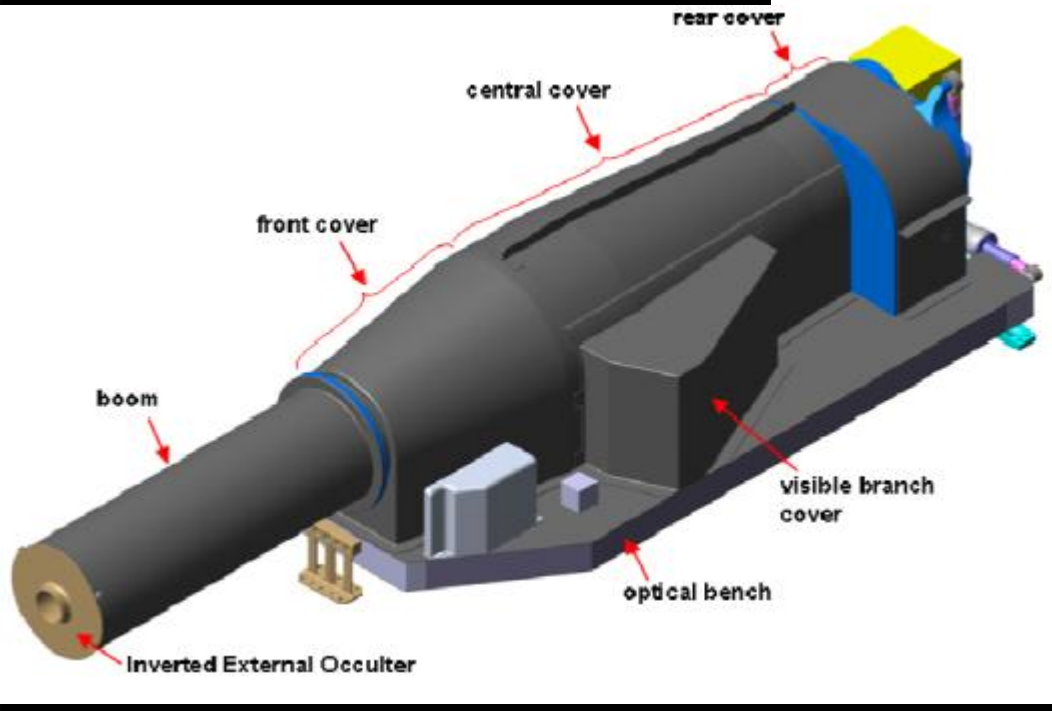
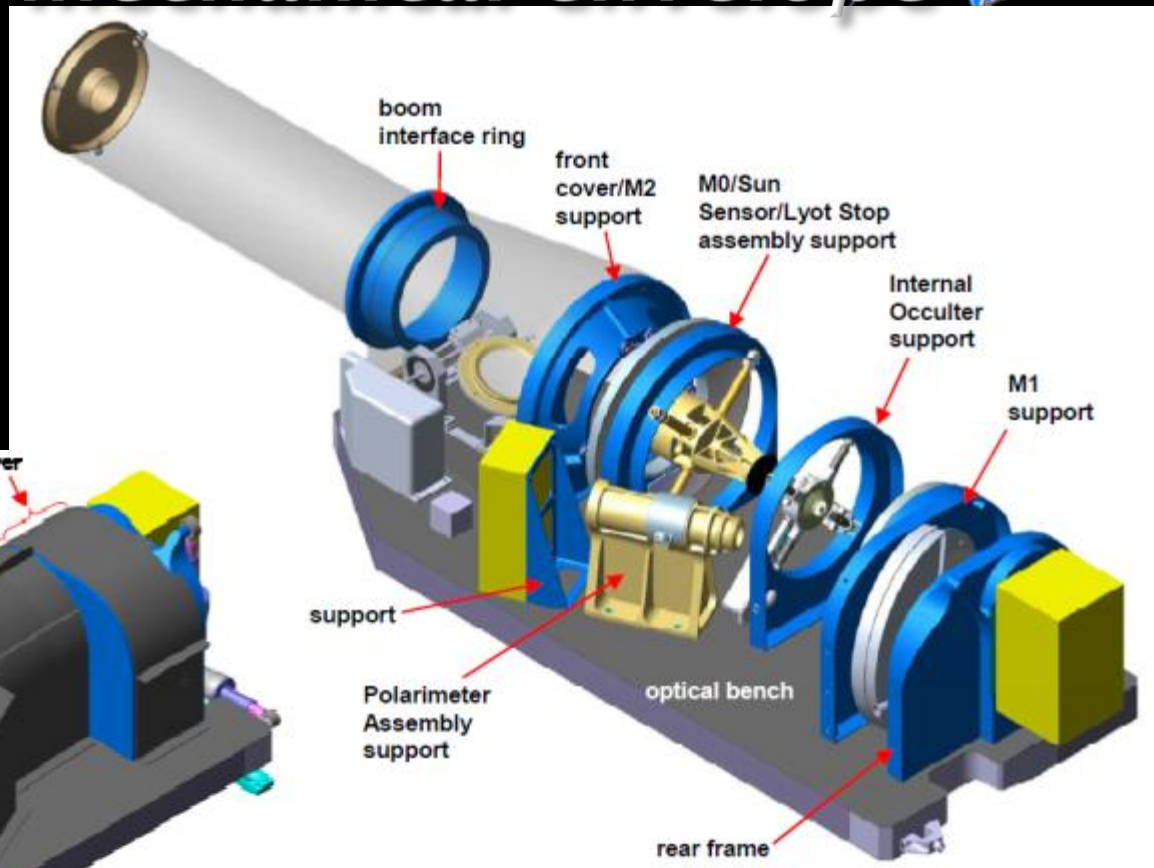
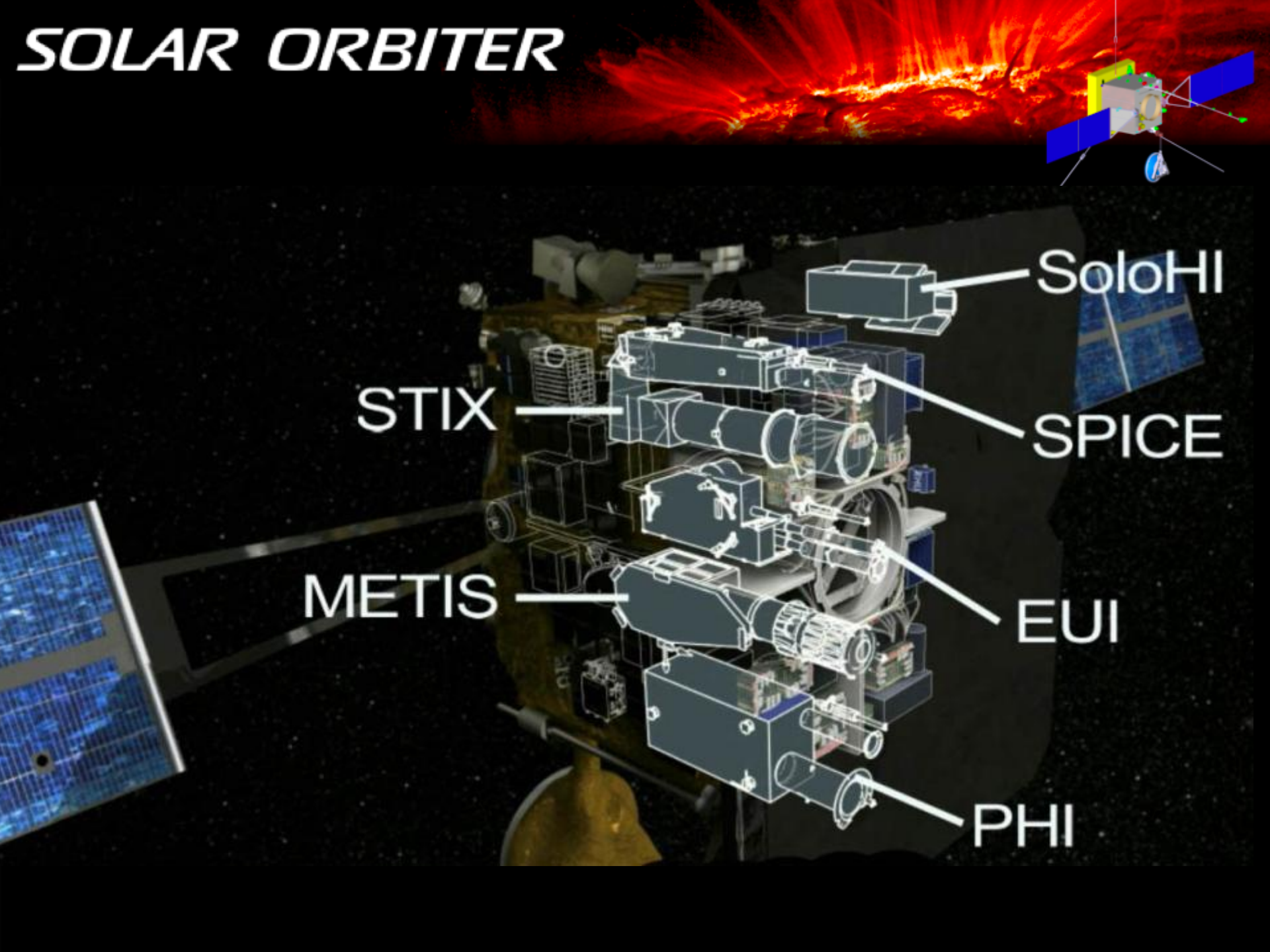
METIS opto-mechanical envelope



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SoloHI
STIX
SPICE
METIS
EUI
PHI

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METIS Program Status

- 2010-2012 Phase B
- May 2012 – ESA Preliminary Design Review passed
- 2013 – Phase C/D

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Team

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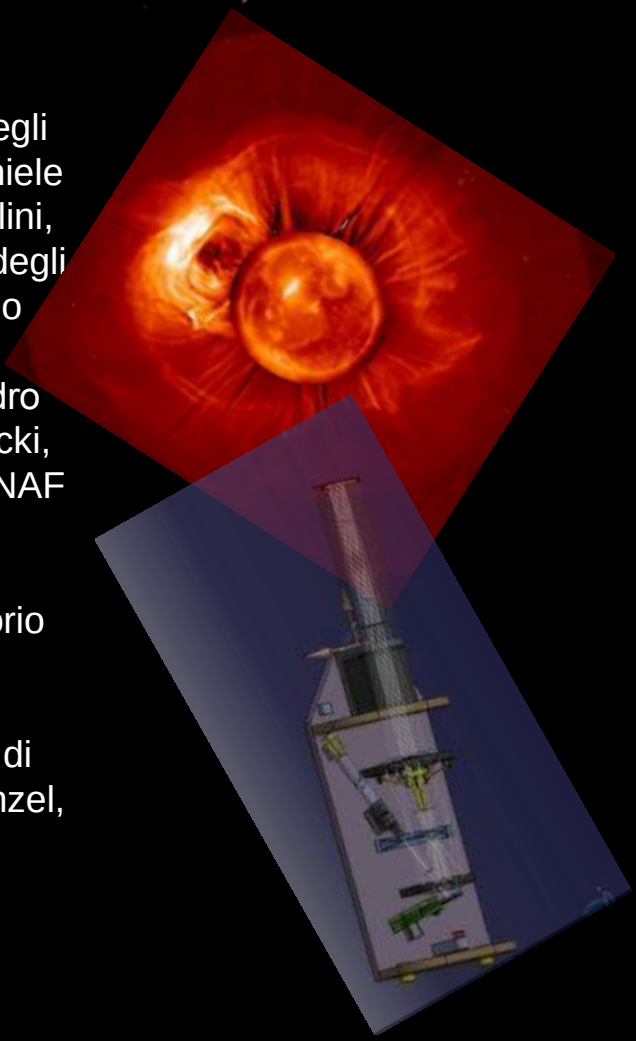

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Thank you

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