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AIDainnova -2nd annual meeting
27 April 2023



**SENER
AEROESPACIAL**

- Space
- Defense
- Science



**SENER
INFRASTRUCTURE**

- High speed railways
- Freight & mainline railways
- Metro systems
- LRT's & tramways
- Roads & highways
- Airports
- Ports
- Architecture
- Water & environment



SENER ENERGY

- Solar energy (CSP, PV)
- Biomass, Waste to Energy, Waste to Chemicals
- Energy Storage
- Offshore Wind
- Power (CCGT, CHP)
- Oil & Gas, LNG
- Industrial Plants

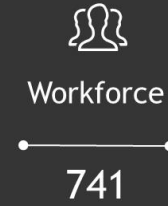
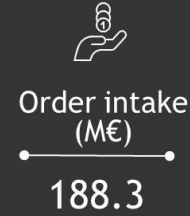


SENER MARINE

- Marine engineering

SENER Aeroespacial

Private engineering company with more than 50 years of experience in Space and 22 years' Science Infrastructures.



SPACE

- . Mechanical ground support equipment (MGSE)
- . Rotary actuators
- . Mechanisms for platforms & Payloads

NAVIGATION SYSTEMS

- . Attitude control
- . Guidance, navigation and control
- . Test equipments
- . Hybrid navigation equipment

- . Antennae pointing sub-systems
- . RF active, passive and antenna products

OPTO-MECHANICAL SYSTEMS

- . Opto-mechanical sub-systems
- . Optical payloads



DEFENSE

ELECTRO-MECHANICAL SYSTEMS

- . Fin control and actuation systems (CAS)
- . Stabilization systems

- . Autonomous Navigation

RF & COMMUNICATION SYSTEMS

- . Communications intelligence (COMMINT) equipment
- . Multi-band Data Link Systems

HELICOPTER MODERNIZATIONS

- . Communications intelligence (COMMINT) equipment
- . Multi-band Data Link Systems



SCIENCE

- . Ground telescopes systems
- . Large mobile structures
- . Mechanisms for Science Infrastructures

- . Waveguides and cavities for accelerators and other research institutes

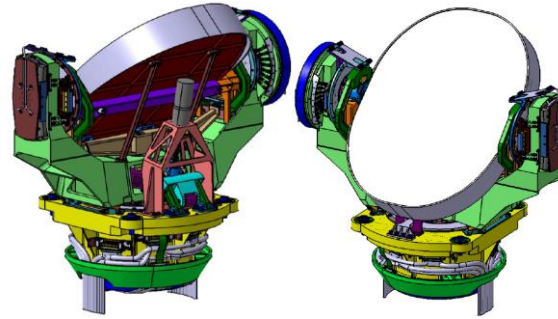
OPTO-MECHANICAL SYSTEMS

- . Active optics: Tip-Tilt & positioning mechanisms.
- . Instruments / Diagnostics sub-systems



SENER Aerospace Electromechanical Systems

DEPLOYMENT MECHANISMS

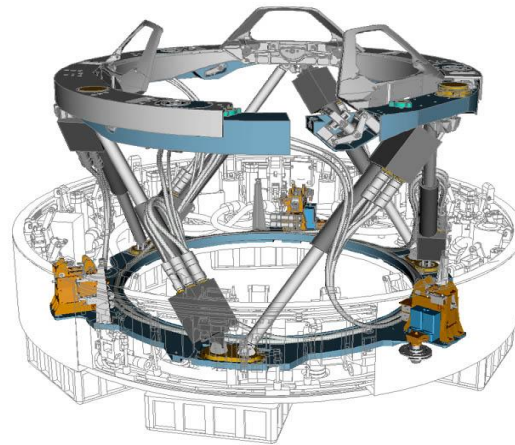


POINTING & SCANNING

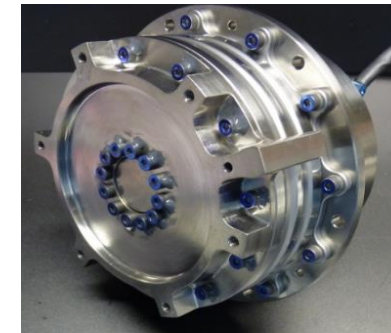
SPECIAL APPLICATIONS



MGSE



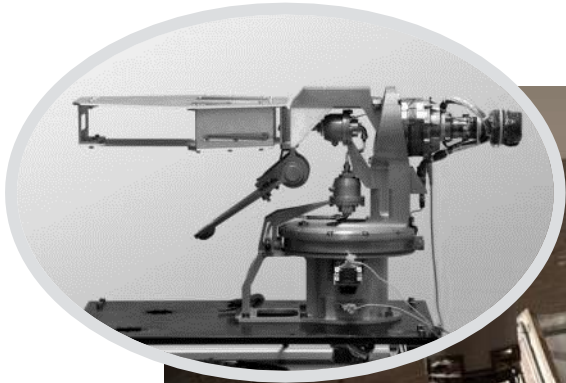
DOCKING SYSTEMS



ROTARY ACTUATORS



SENER Space Pointing Mechanisms



CURIOSITY / PERSEVERANCE HGA APM

Pointing Mechanisms

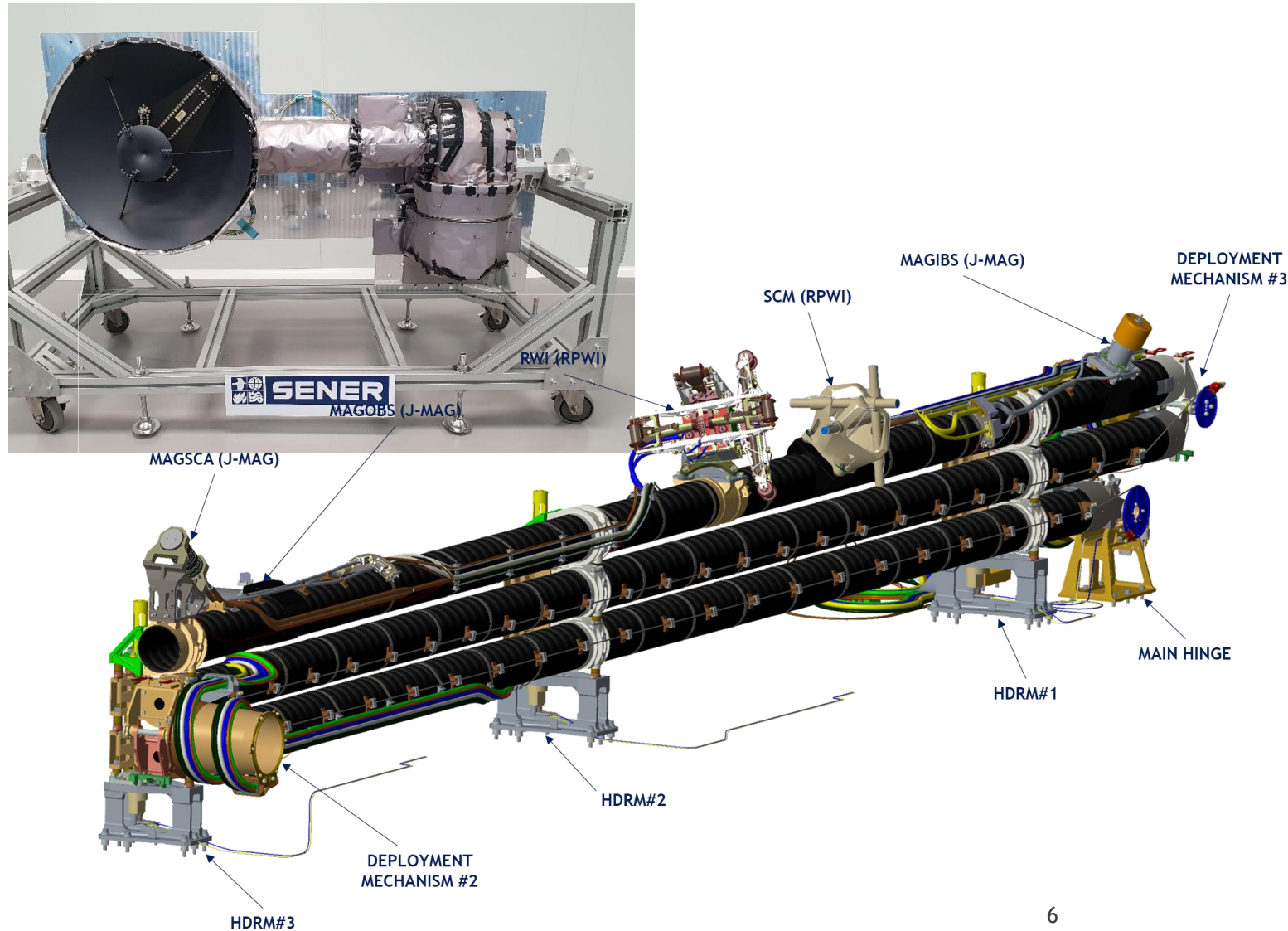
Sener has a large background of pointing mechanisms for antennas and instruments.

Large range of pointing options, including open/closed loop; brushless/stepper driven or optical/inductsync/resolver/pot. feedback.

Proprietary control electronics and control algorithms.

SENER Space

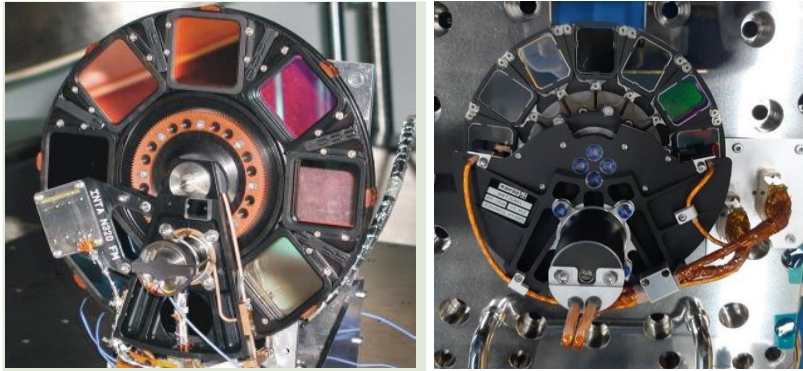
JUICE Magnetometre Boom & Medium Gain Antenna



- Largest ESA deployable boom: 10,5 m
- Medium Gain Antenna
- Instruments components:
 - JANUS Filter Wheel + electronics
 - GALA Power Supply



SENER Space Opto-mechanical Systems



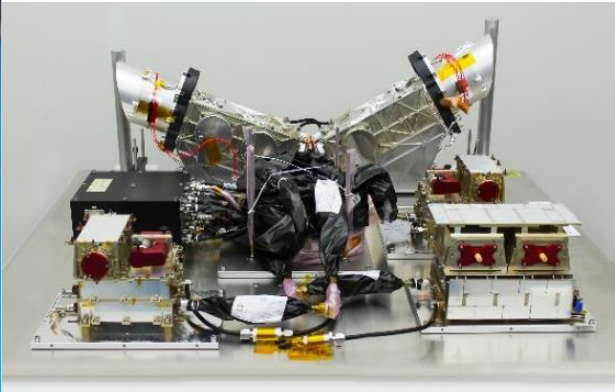
ROSSETA & JANUS FILTER WHEELS



5 DOF M2M MECHANISMS



X-RAY Masks & Baffles



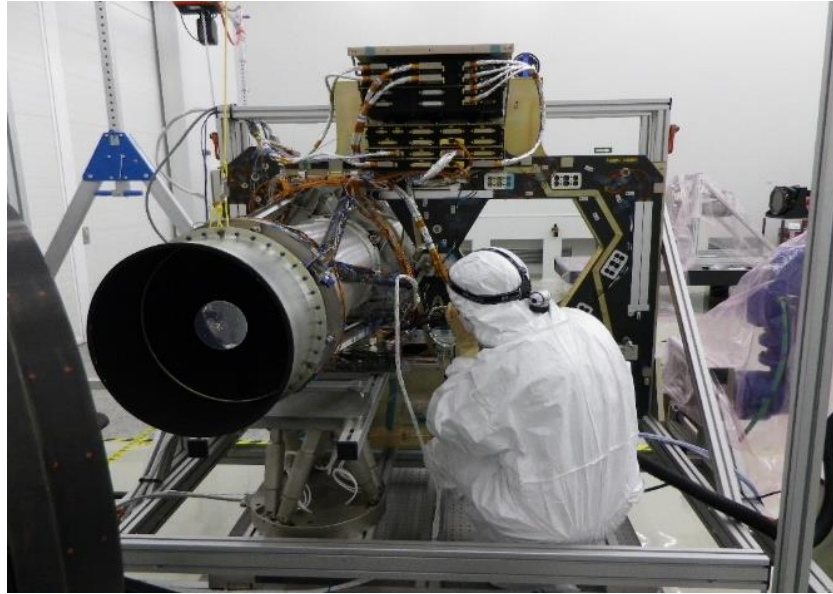
SOLO PHI / EPD / WSO Instruments



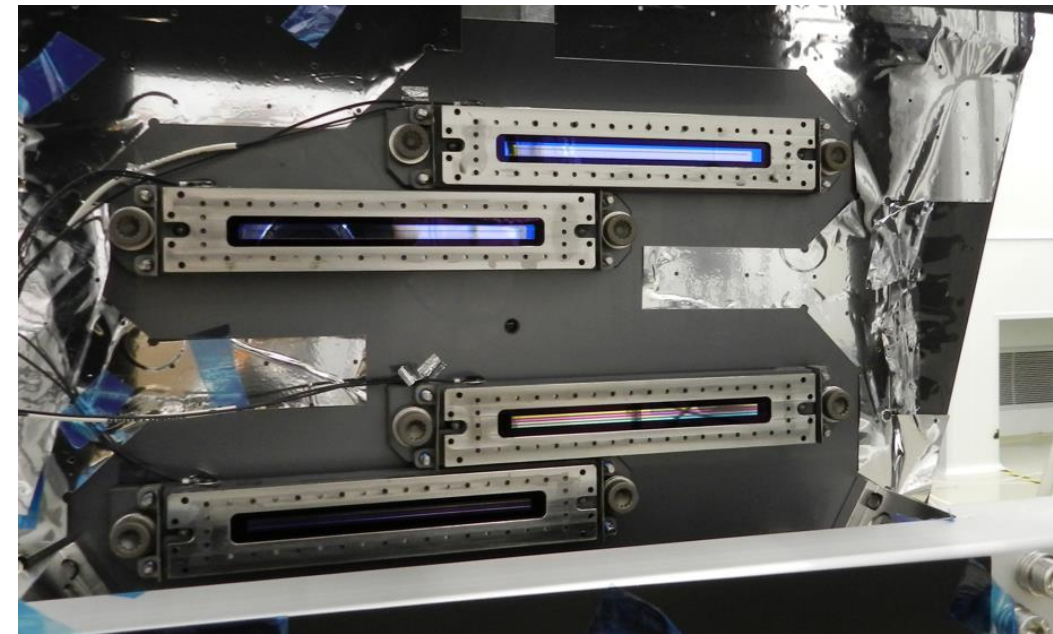
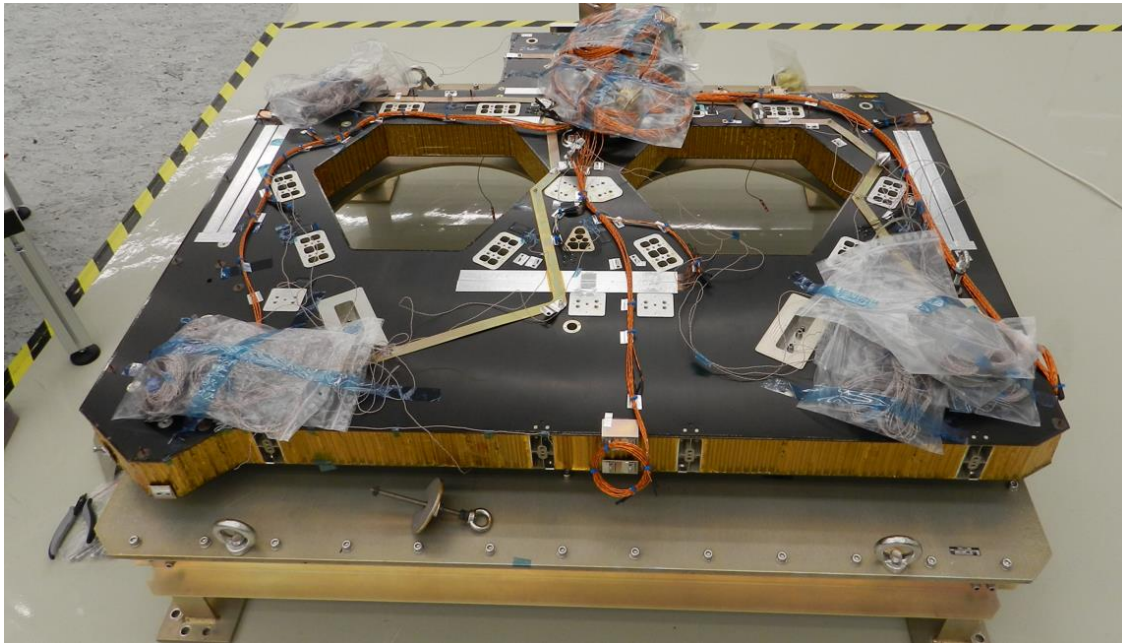
SENER Space

SEOSAT Focal Plane

The two Cameras of SEOSAT were installed on a sandwich structure with CFRP skin and aluminum core called HSSP that provides good thermo-elastic stability, and high stiffness with a reduced mass



The FP of SEOSAT is made of SiC to provide very high thermo-elastic stability.
It had 4 detectors (2 PAN + 2 MS) aligned with micrometric tolerances.





SENER Science

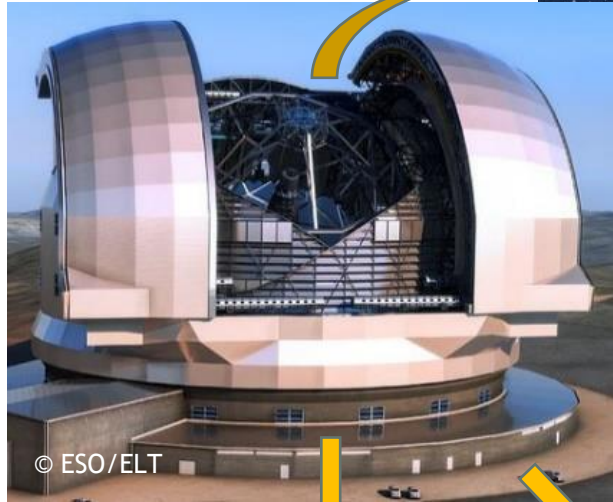
Active Optics: Mirror cells



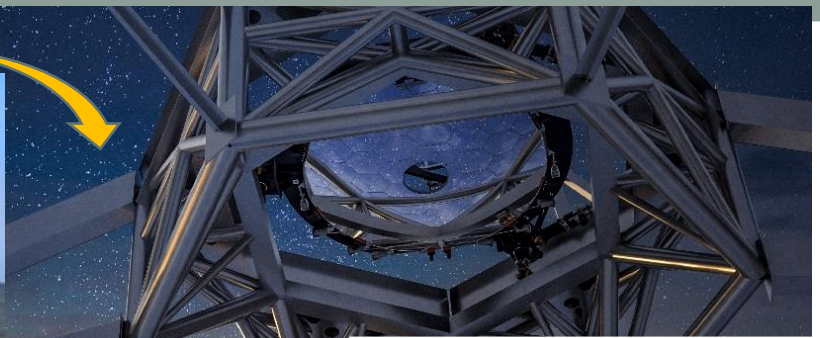
© GTC



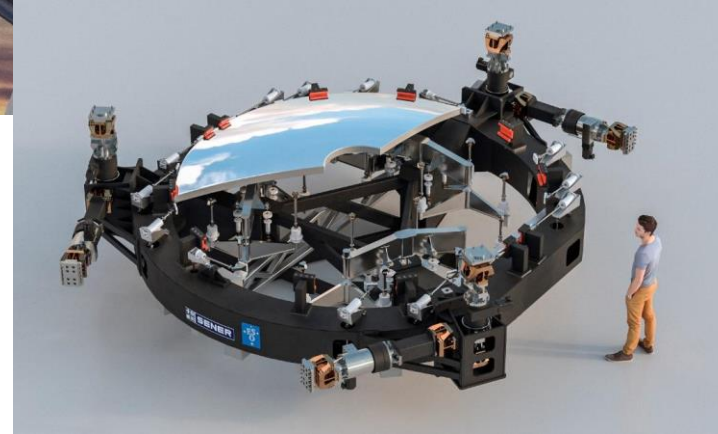
GTC M2



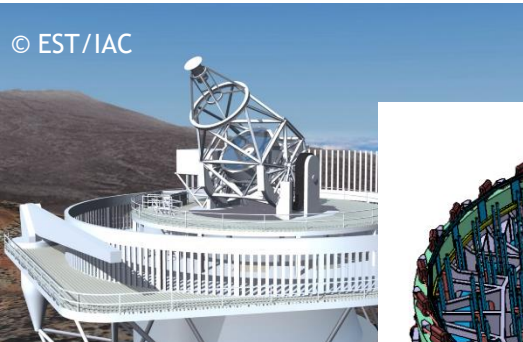
© ESO/ELT



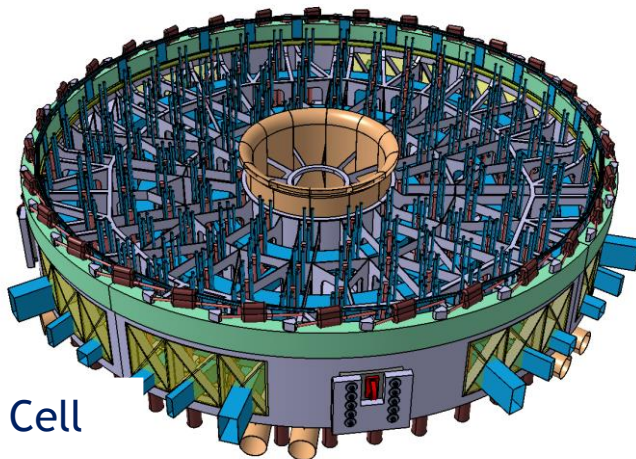
ELT M2-M3 Cells



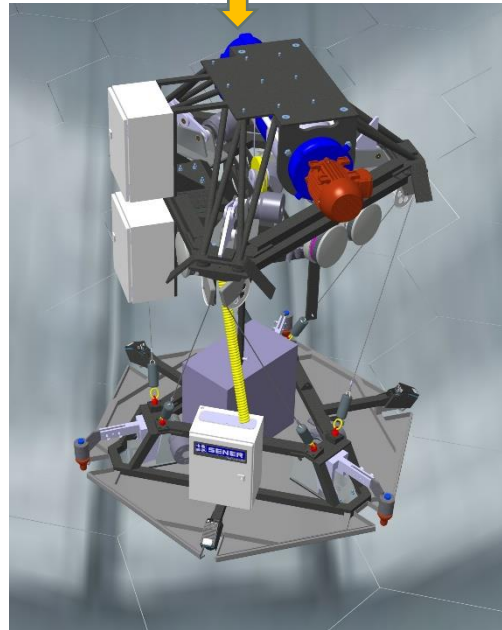
ELT M5 Cell



© EST/IAC



EST M1 Cell



ELT M1 Manipulator



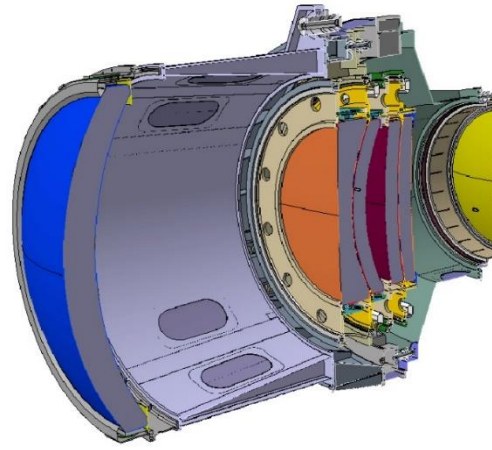


SENER Science

Ground Telescopes Systems

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WHT Focus Translation



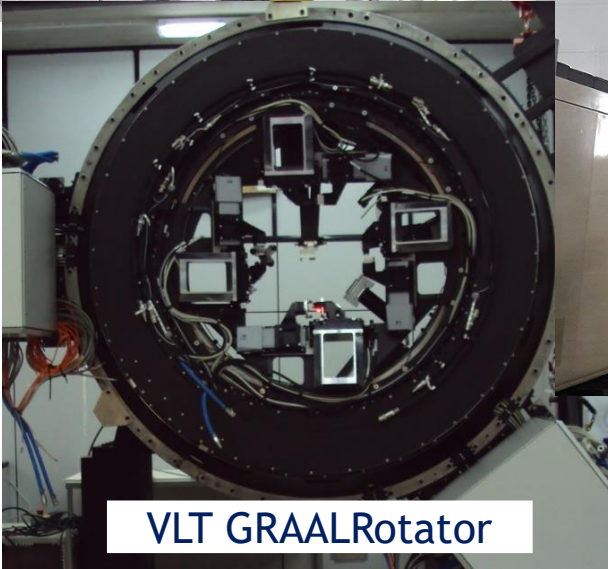
WEAVE Corrector



GTC OSIRIS



ALMA CALIBRATION



VLT GRAALRotator

INSTRUMENT SYSTEMS

TELESCOPE SYSTEMS



SENER Science

Science Infrastructures

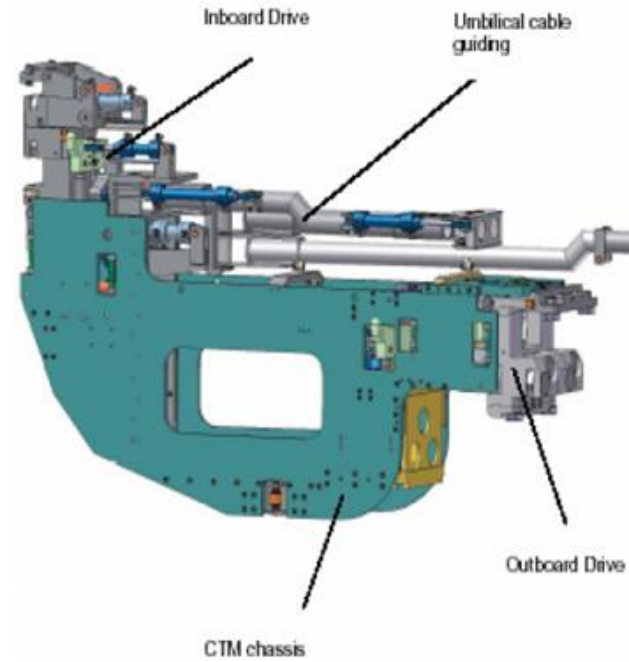
HIGH-ENERGY PHYSICS



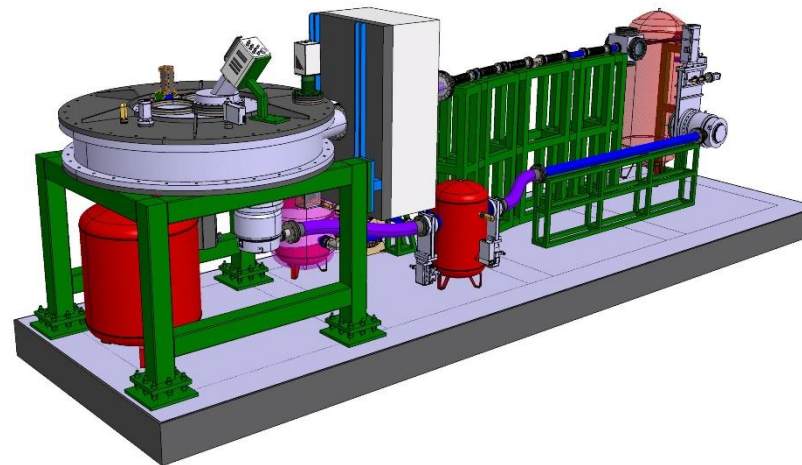
Nanobender



ALBA X-ray Spectrometer

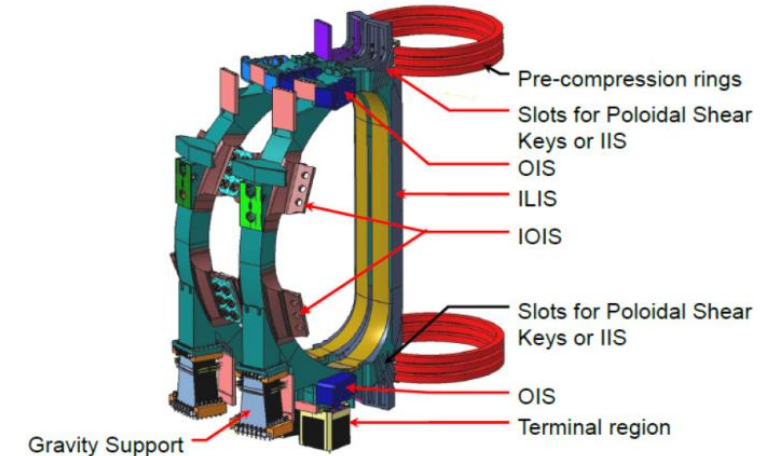


EFDA/ITER Early Studies

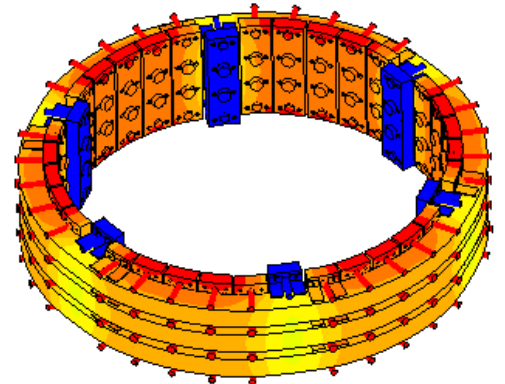


JT-60SA Pellet Injector Centrifuge

FUSION



ITER Pre-compression Rings





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