Kayser Italia potential contribution to Toliman

Alessandro Donati

Conference "FINDING EARTH-TWINS WITHIN 10pc"
ASI 19-20th November 20182018 • San Francisco

Kayser Italia S.r.l.
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kayser@kayser.it

Company overview

- Kayser Italia is a fully independent Italian system engineering company (SME), incorporated in 1986
- Kayser Italia offers its products and services into the space and aeronautical sectors
- Kayser Italia has a staff of about 70
- Kayser Italia has extensive expertise in the design and manufacturing of experiments and payloads, related Ground Support Equipment and Mission Operations and Support, both as prime-contractor, as well as sub-contractor
- Kayser Space branch established in UK in 2016

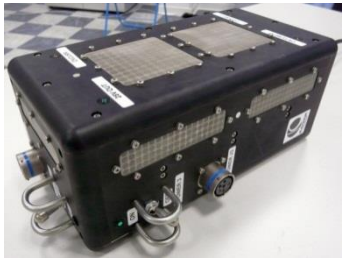
Company overview

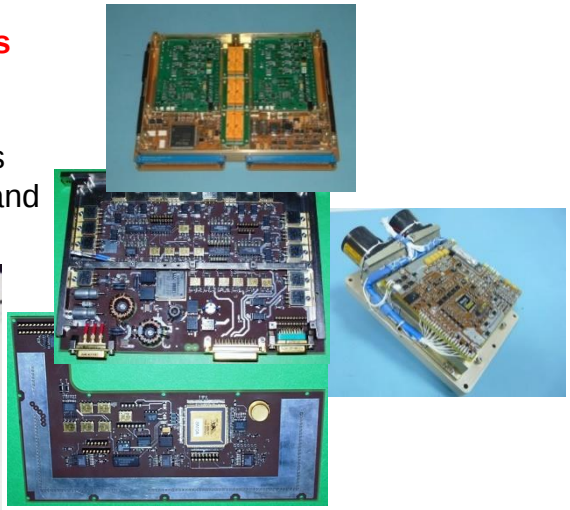
- Kayser Italia has over 30 years experience in the supply of hardware and software solutions and on-site support services for the aerospace sector
- Kayser Italia has participated to 68 space missions with 108 payloads, ranging from sounding rockets, to unmanned and manned European, Russian, Japanese, Chinese platforms, to Shuttle, SpaceX and ISS.
- Engineering services with key focus on the following application areas:
  - Life and Physical Science experiment hardware, for both manned and unmanned missions
  - Equipment for spacecrafts
  - Systems and sub-systems for exploration missions
  - Mission support
  - Support to on-board and ground operations

Technical know-how and competencies

Electrical/Electronics

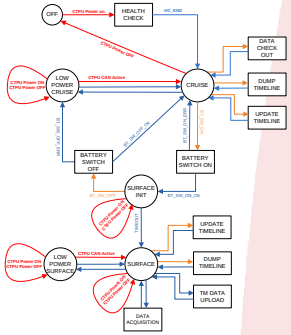
- Power distribution
- Data acquisition
- Electronic controls
- Microprocessors and microcontrollers

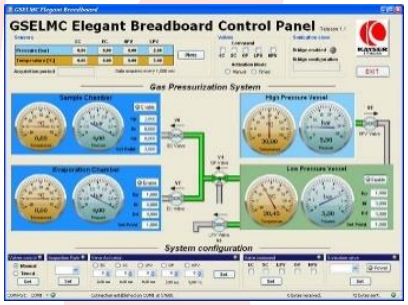




Software

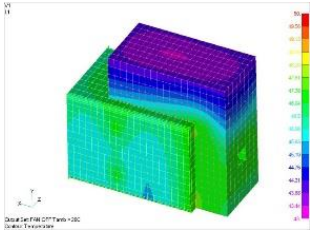
- Instrument firmware
- Flight software
- Man-machine interface
- EGSE software
- Data acquisition, storage and presentation

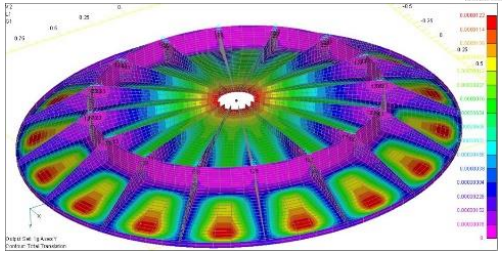


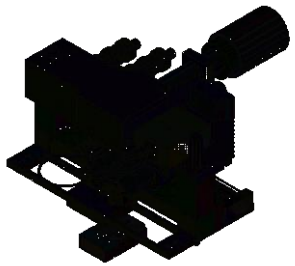


Mechanics/Structural/Thermal

- Mechanical design
- FEM
- Structural analysis
- Assembly and integration
- Fracture Control
- Thermal design and analysis



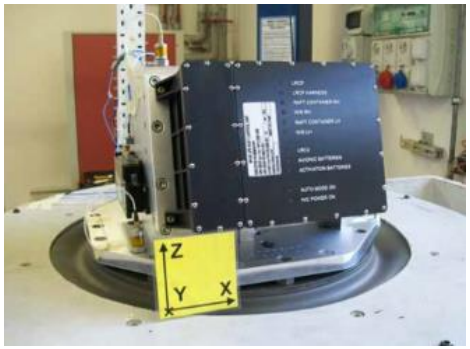


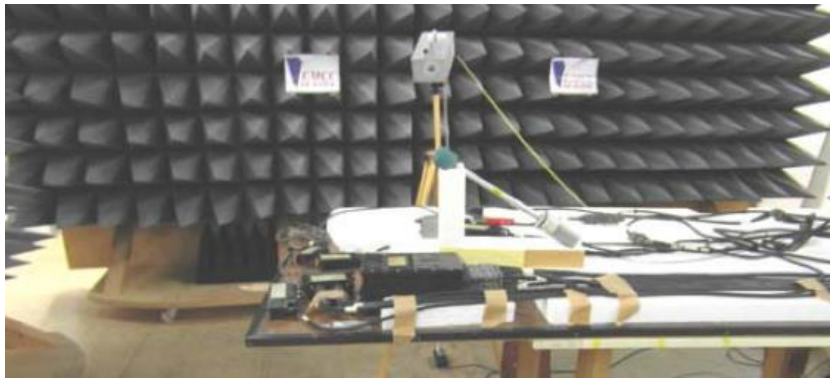


Biology

Technical know-how and competencies

System AIV





Mission and operations

Internal Facilities

Clean room

Electronics laboratory

Biology laboratory

Fast prototyping

Soldering room

Inspection area

Climatic chambers

Quality Assurance

CERTIFICATE

kiwa

Reg. Numero / *Reg. Number* 00297- N
Inizio validità / *Issue date* 2017-05-12
Prima emissione / *First issue date* 2017-05-12
Ultima modifica / *Reissue date* 2018-09-07
Prossimo rinnovo / *Expiry date* 2020-05-11
Settore IAF / *IAF Sector* 21, 19

Certificato di Approvazione
Certificate of Approval

Si dichiara che il Sistema di Gestione per la Qualità dell'Organizzazione:
We certify that Quality Management System of the Organization:

KAYSER ITALIA S.r.l.

È stato valutato in accordo ai requisiti della EN 9104-001:2013 e del Regolamento Tecnico Accredia RT 18 / *Has been audited in accordance with EN 9104-001:2013 requirements and Accredia RT 18*

Ed è conforme ai requisiti delle seguenti Norme per la gestione dei Sistemi Qualità / *and It is in accordance to the following Quality Management System Standards*

EN 9100:2018, AS9100D, JISQ 9100:2016
ISO 9001:2015

Scopo/*scope:*
Progettazione, produzione, collaudo e assistenza di sistemi per la ricerca aerospaziale, sistemi e sottosistemi satellitari, sistemi avionici per la difesa.
Design, manufacturing, testing and product support of aerospace research systems, satellite systems and subsystems, avionic systems for defence.

Chief Operating Officer
Giampiero Belcredi

Il mantenimento della certificazione è soggetto a sorveglianza annuale e subordinato al rispetto dei requisiti contrattuali di Kiwa UNAVIAcert / *The maintaining of the certification is subject to annual surveillance and dependent on the observance of Kiwa UNAVIAcert contractual requirements.*

Il presente certificato è costituito da 1 pagina.
This certificate is composed by 1 page.

KAYSER ITALIA S.r.l.
Sedi oggetto di certificazione / *Certified Sites*
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Kiwa UNAVIAcert S.r.l.
Via Cadriano, 23
40057 Granarolo dell'Emilia (BO)
Tel. 051459311 0
Fax 051763382
Email info@unaviacert.it
www.unaviacert.it

UNAVIAcert

IAF ACCREDIA

SGQ N° 024A

The company has a Quality System certified:

EN 9100:2018 / ISO 9001:2015

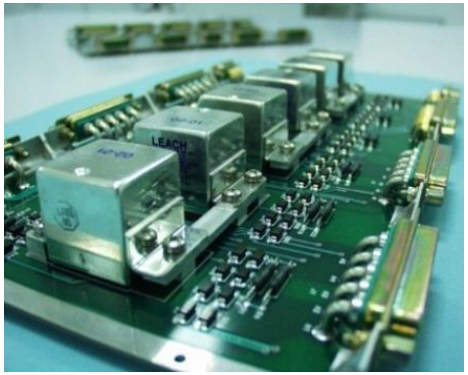
The manufacturing operators and QA inspectors are regularly trained and certified by ESA/NASA approved institutions.

ECSS Certifications are maintained for :

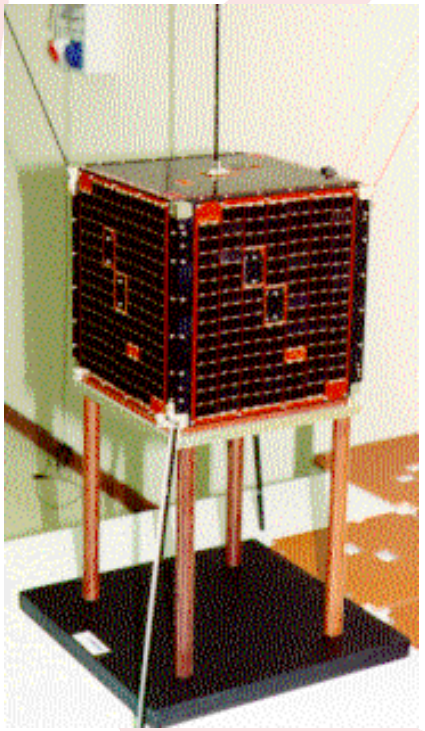
- Soldering of PCBs (including SMD) and connectors
- Solder joints inspections
- Crimping, harness manufacturing and inspection
- Personnel is also trained on Safety aspects for payloads on manned and un-manned USA and Russian platforms.

Application areas: satellites

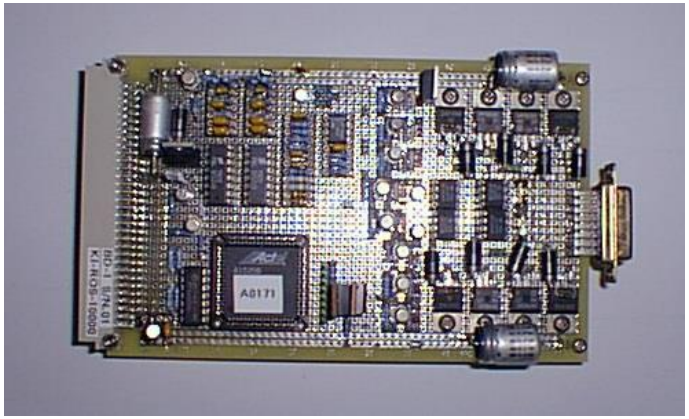
PAMELA (INFN)
Telecommand and Telemetry interfaces



TEMISAT (Telespazio)
Microsatellite, EGSE and OCC



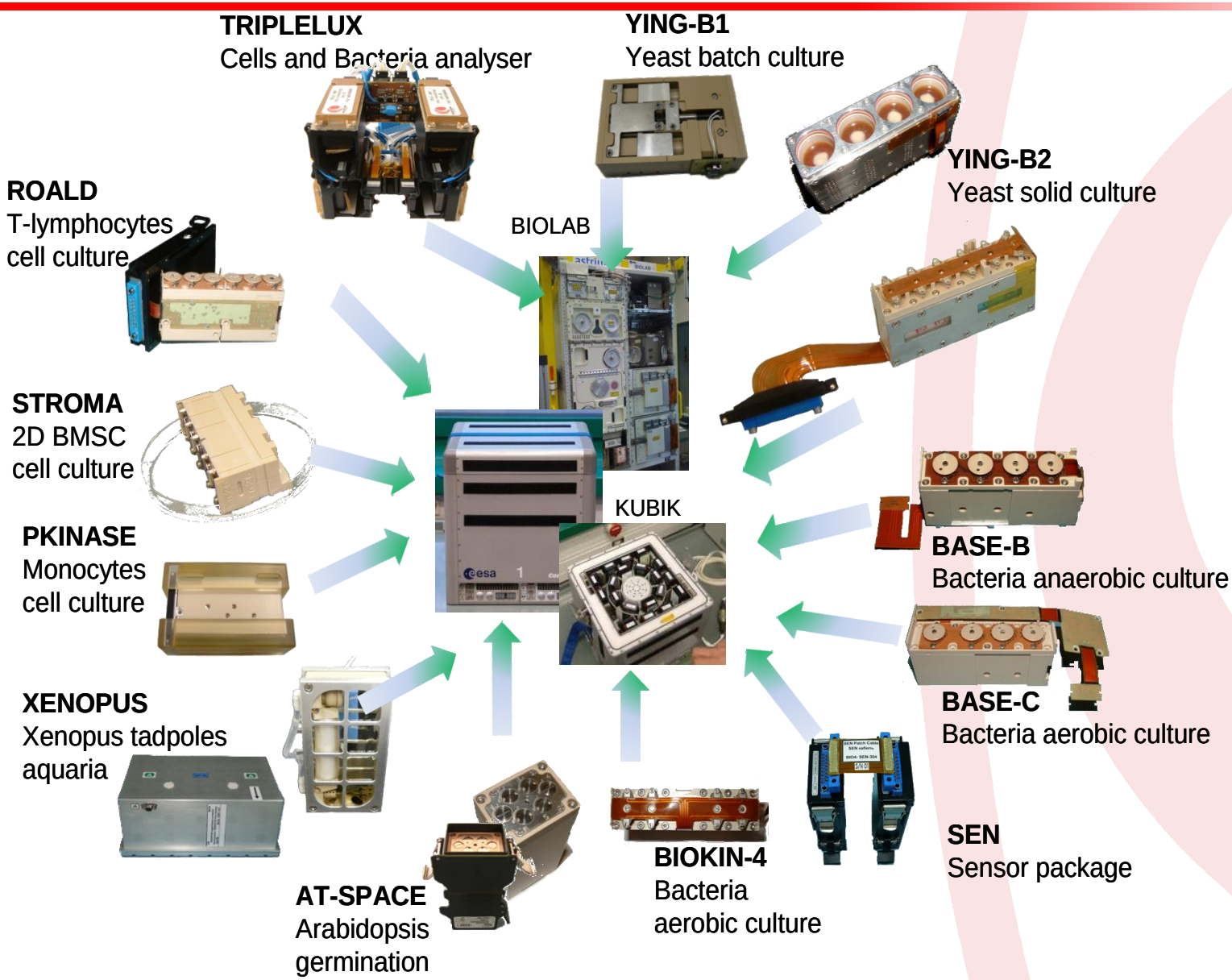
MITA (CGS) - EGSE



ROSETTA (OG)
Breadboard of drill and carousel control for Shark subsystem

COSMO-SKYMED (ALENIA)
- EGSE Focal plane

Application areas: satellites: life science



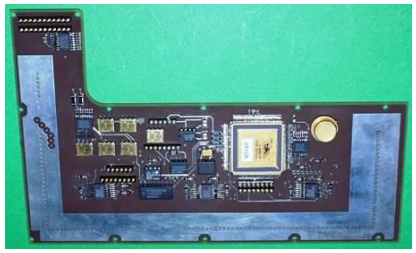
Application areas: physical science

GABRIEL (ESA)



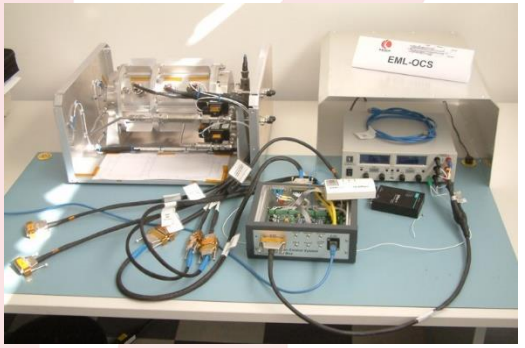
MSL (ESA)

(Sub to KT. Power Distribution Module)

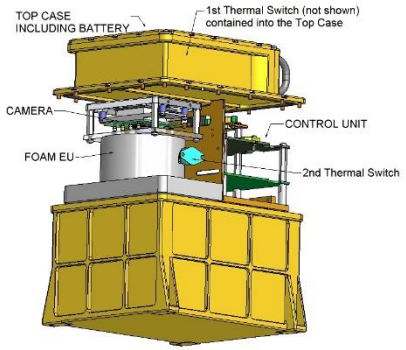



EML-OCS (ESA)

(Sub to AST. Power and control electronics)



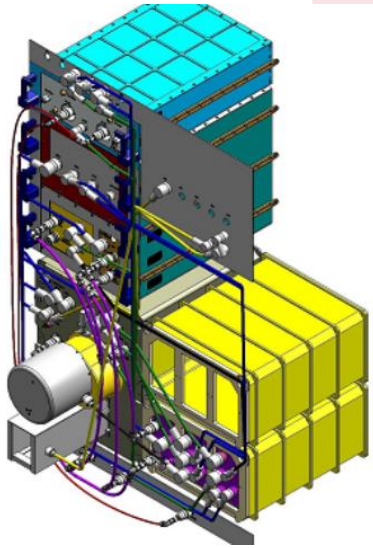
IFOAM (ASI)

EML (ESA)

(Sub to AST. Power distribution, signal/data acquisition & control electronics, GSEs





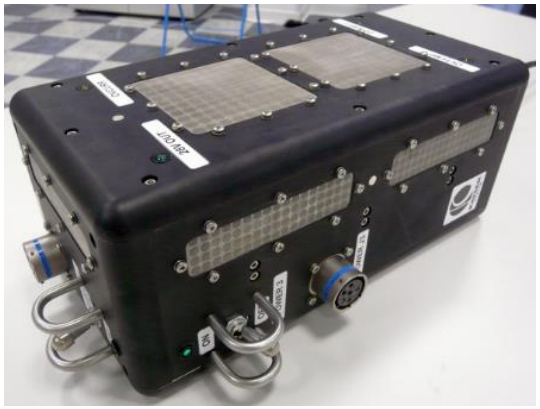
Application areas: ISS equipment

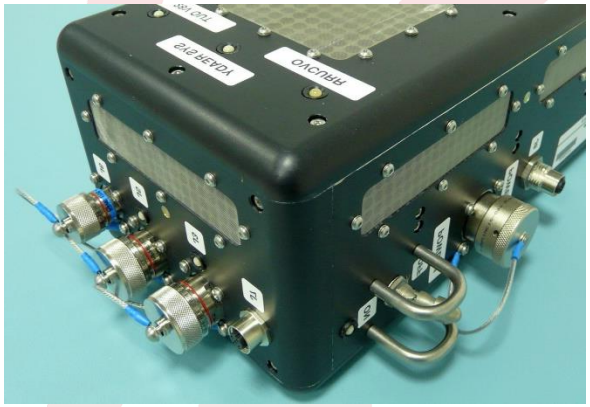
EHD (ESA)

Data storage device

PPS/KuPS (ESA)

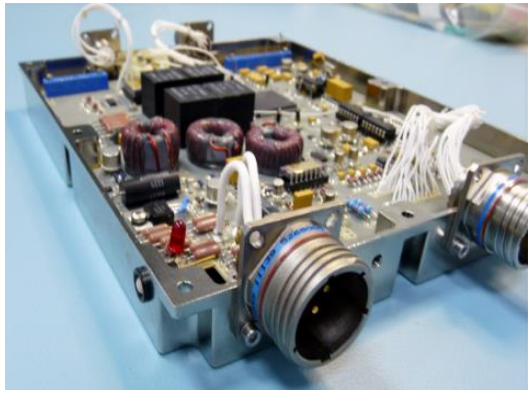
Portable Power Supply





CFEU (ESA)

Cabin Fan Electronics Unit

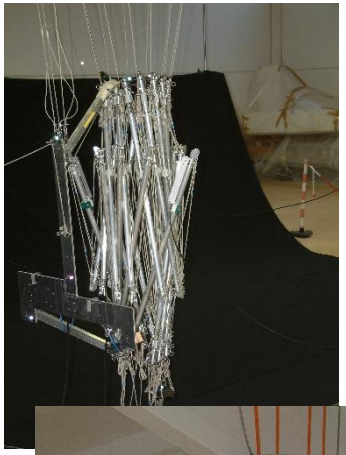


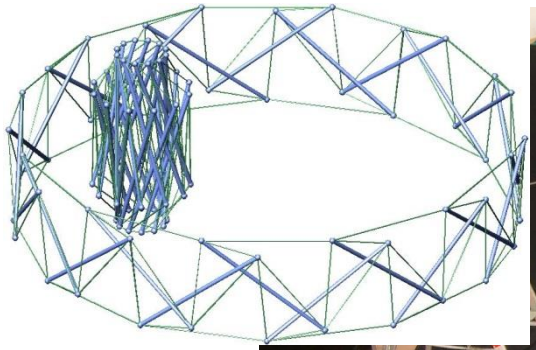
HAMVIDEO (ESA)

Video Transmitter

Application areas: technologies

TSS (ESA) - Tensegrity Space Structures





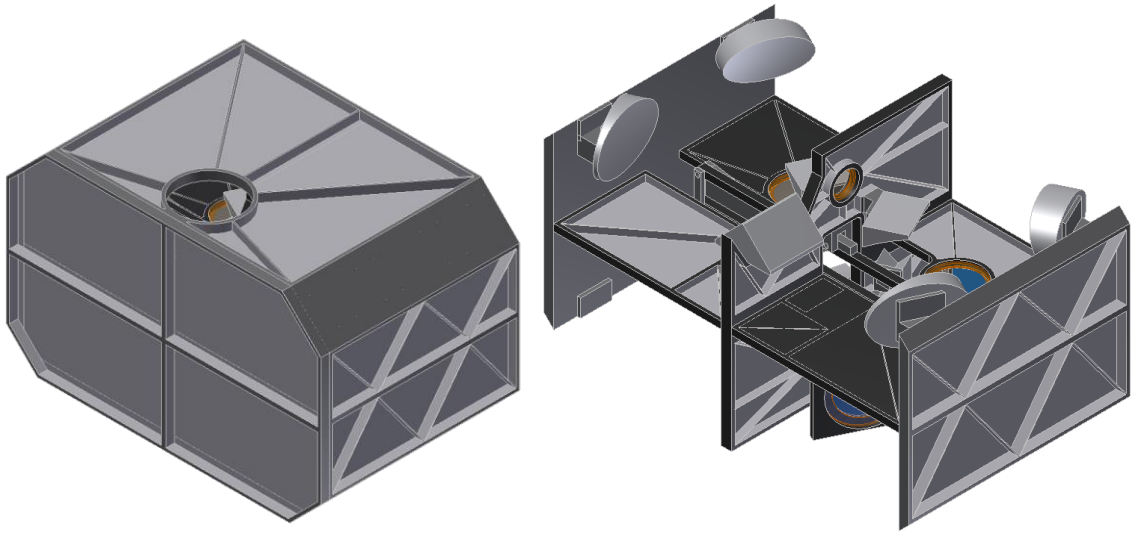
Application areas: Ground Support Equipment

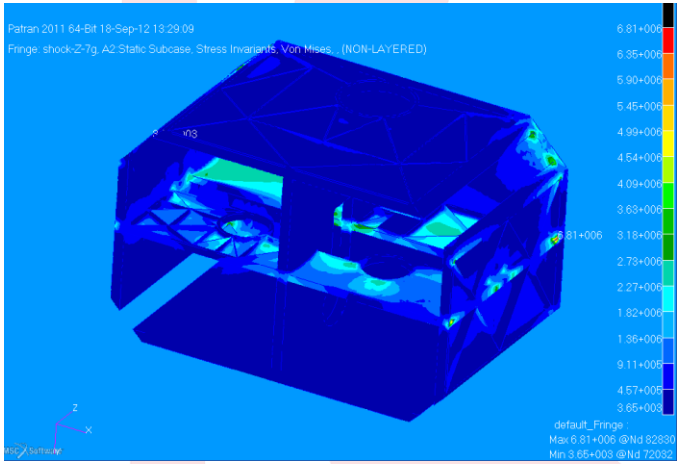
- Electrical GSE
- Mechanical GSE
- Thermal GSE

Potential contribution from: MILLIMETRON

DIFFERENTIAL FTS for MILLIMETRON (University La Sapienza)

- Structural design refinement
- FEM analysis

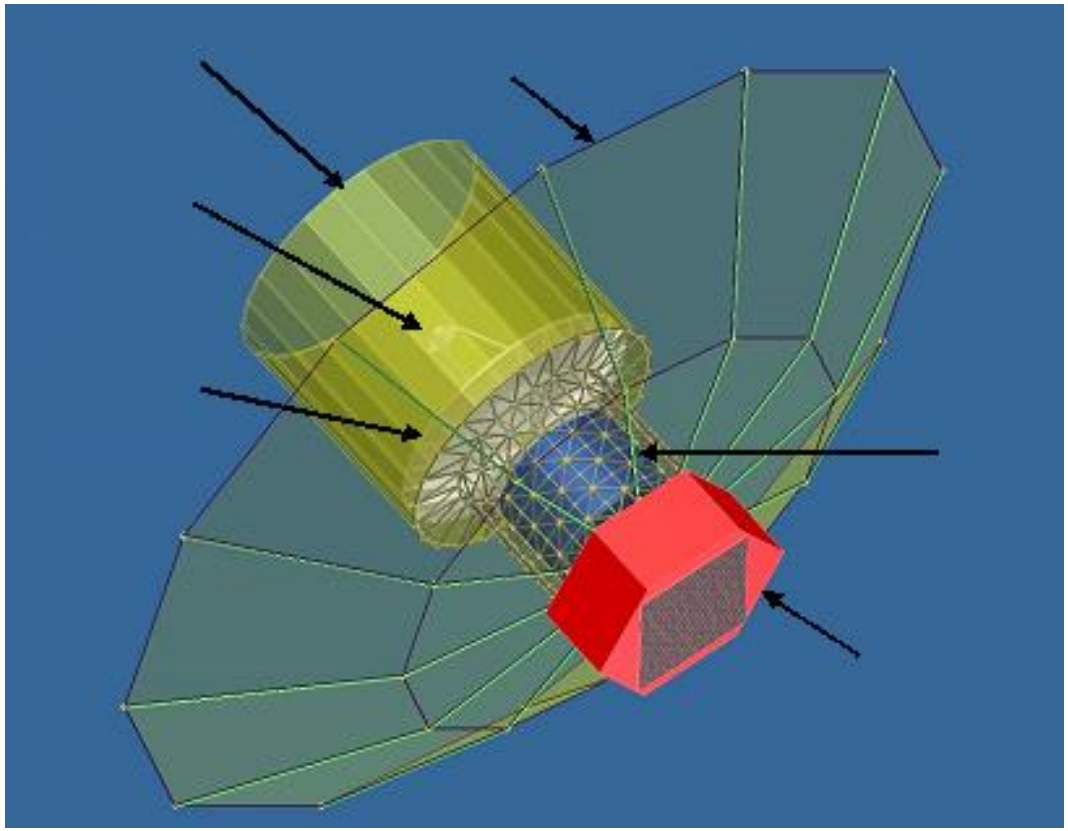


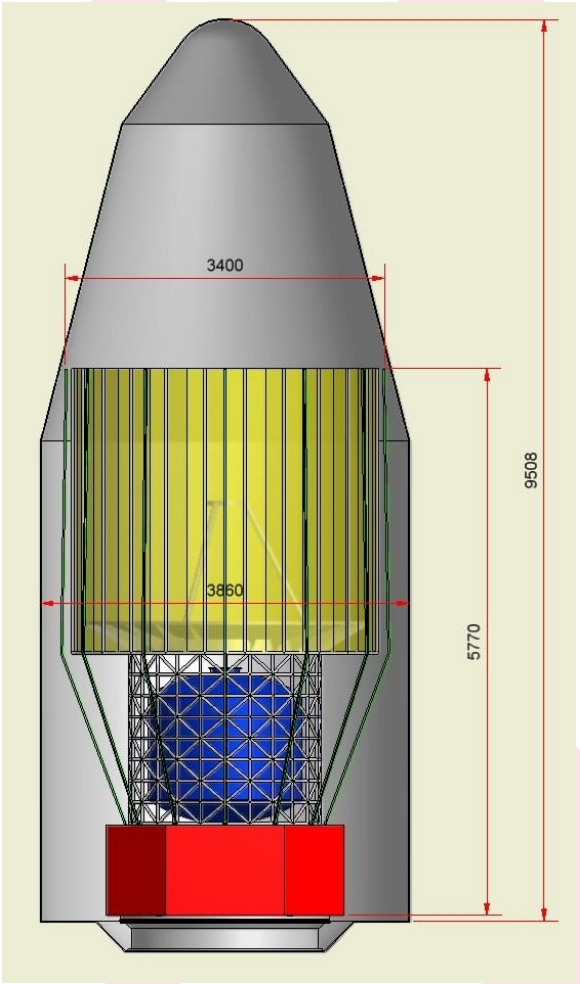


Potential contribution from: SAGACE

SAGACE - Spectroscopic Active Galaxies And Clusters Explorer (ASI)

- Prime Contractor
- Mission analysis
- Spacecraft design and analysis
- Ground segment



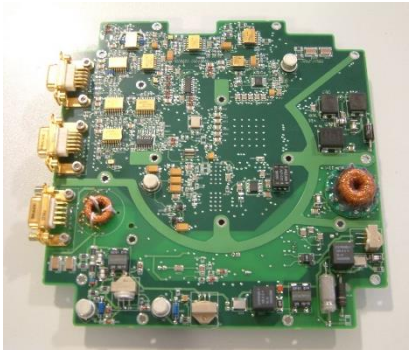


Potential contribution from: IRES-C for MetOp-SG

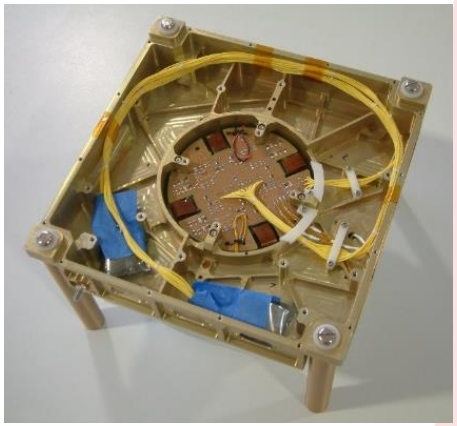
IRES-C (Leonardo)
MetOp Second Generation - Coarse Earth Sensor

- Main board and proximity board design (EM, EQM, FM)
- RAMS analysis
- FPGA design and development
- PCB layout and engineering

- Low noise low power multiple DC/DC converter
- Low noise amplifier
- FPGA based data acquisition and control



IRB Main Board



IRB Proximity Board

EGSE

Potential contribution from: PLATO

PLATO – Instrument Control Unit (ASI)

The ICU is the main interface between PLATO Data Processing Units and the Service module and consists of an integrated box with two electronic chains which can work independently or with crossed configurations.

Its main characteristics are to:

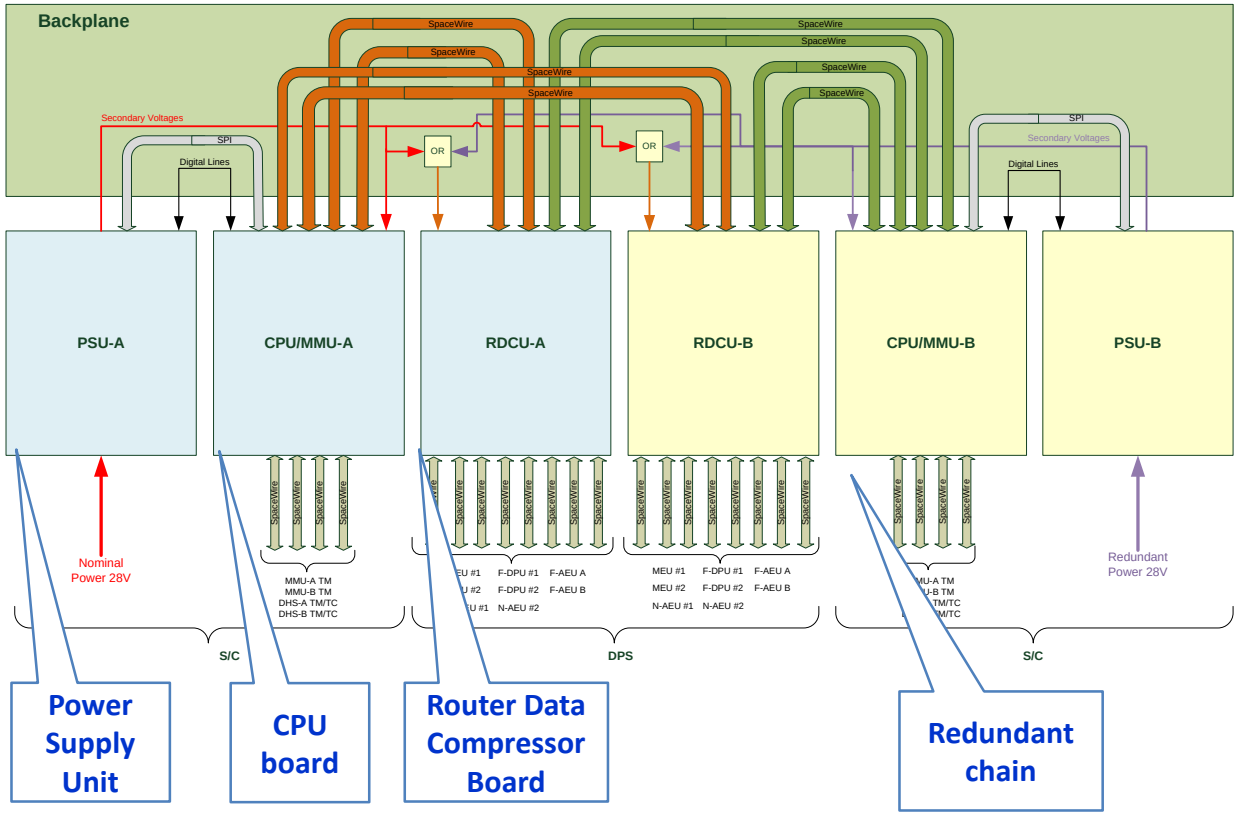
- Being the interfacing node between the Service Module and the payload on a SpW network
- Manage the payload units through the SpW network
- Manage 1 GB of internal SDRAM to compress scientific data
- Provide powerful computing capability through the LEON3FT running at 133Mhz
- Manage high-speed and complex memory bus (SDRAM, MRAM and PROM)
- Use of PCI bus between processor and FPGA in order to speed up the data flow.

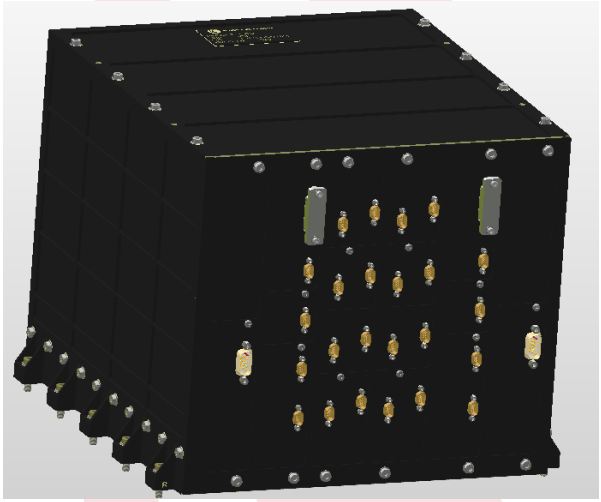
Main activities:

- Electronic design (AVM, EM, EQM, FM)
- RAMS analysis
- FPGA design and development
- PCBs layout and engineering
- LEON-3FT based with boot loader software class B
- Structural and thermal design and analysis
- MAIT of all models

Potential contribution from: PLATO

- All ICU data interfaces are SpW links up to 100Mbps:
  - 4 Nominal & 4 Redundant SpW links to Spacecraft
  - 8 Nominal & 8 Redundant SpW links to PLATO DPUs
- ICU consists of 3 main and 3 redundant boards connected together thanks to a back-plane
- SpW links are also used for internal ICU data sharing among the boards in cross strapping configuration for the RDCU

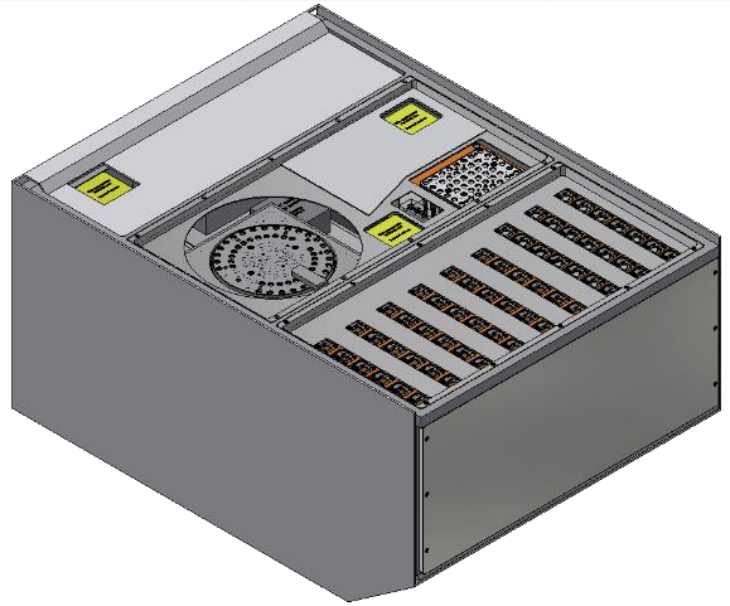


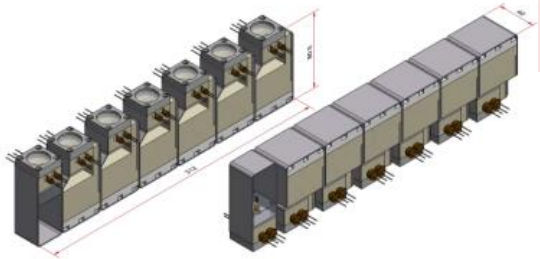


Potential contribution from: Exobiology facility

EXOBIOLOGY FACILITY (ESA)

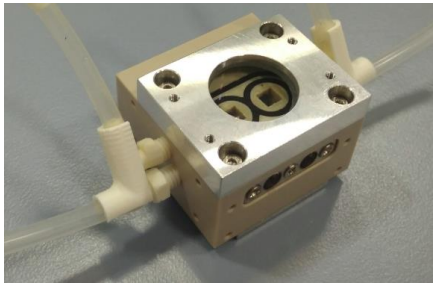
- ISS External facility for exposure of experiments
- Exposition facility specialized for cell biology and chemistry experiments dealing with the investigation of the effects of the extreme space environment (vacuum, radiations, solar irradiance, microgravity) on the biological systems and inorganic/organic molecules. With respect to previous similar facilities (e.g.: EXPOSE) EXPO will perform in-situ measurements with optical systems (spectrometers, LED\photodiodes) and a mass spectrometer.

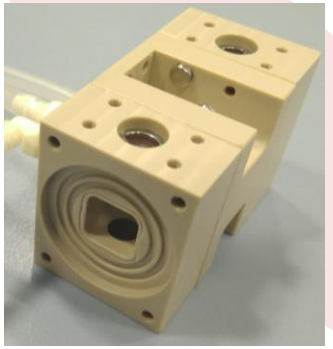




ICECold

EXOCube Bio

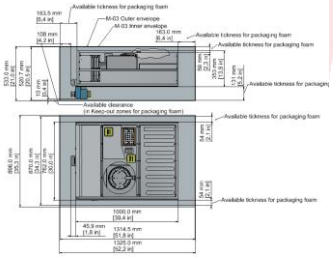




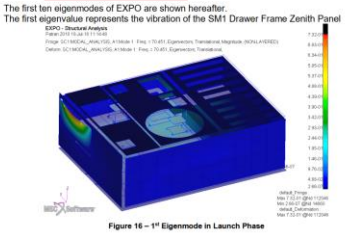
Potential contribution from: Exobiology facility

The facility has been designed against the requirement for launch (soft stowed to the ISS) and for installation on BARTOLOMEO

- **Launch configuration and mechanical loads evaluation**

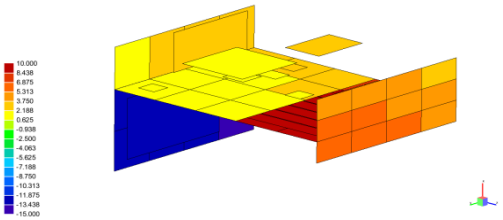


Accomodation in M-03 bag



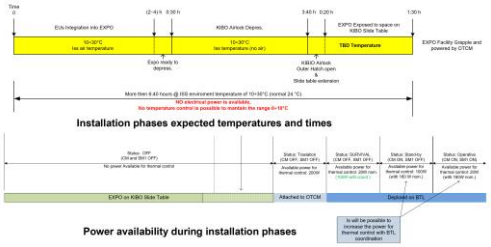
FEM analysis

- **Thermal analysis**



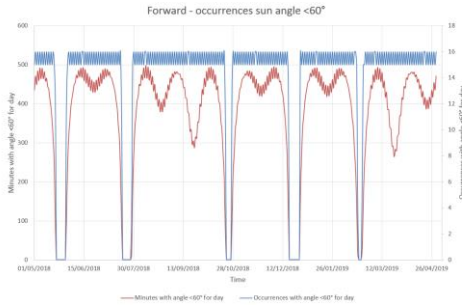
ESATAN-TMS analysis for hot and cold cases

- **Operations evaluation (in particular for installation phases)**



Temperature conditions and power availability

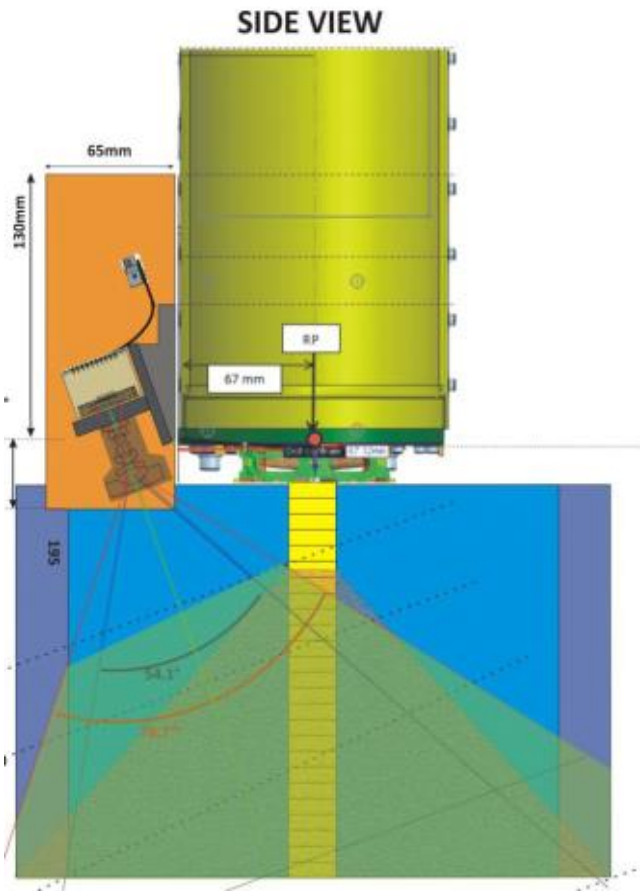
- **Sun illumination scenario analysis**

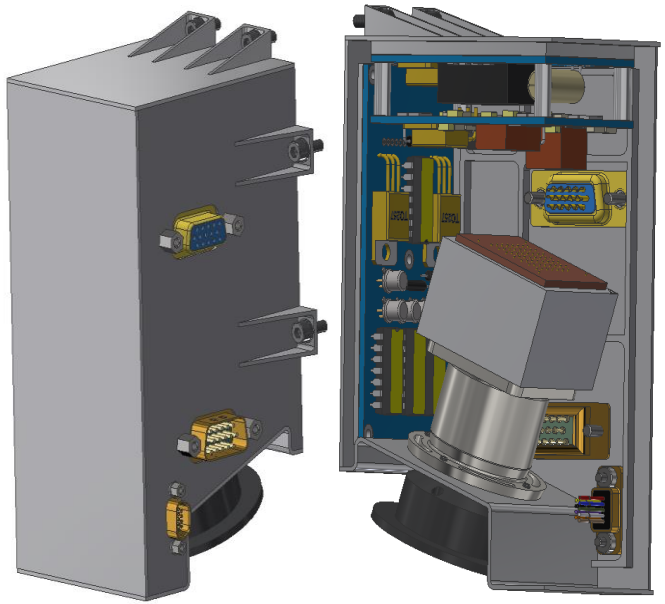


β-angle less than required value

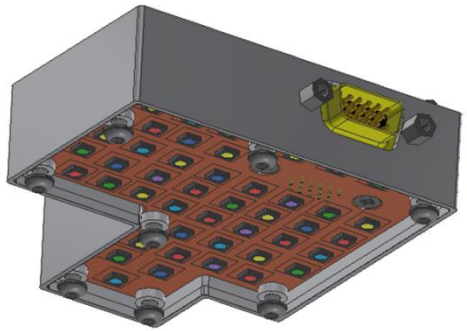
Potential contribution from: Imaging System for LUNA-27

PROSPECT (ESA - Sub to Leonardo)
Luna-Resource (Luna-27) - Imaging System





Camera Unit and electronics



Illumination Unit

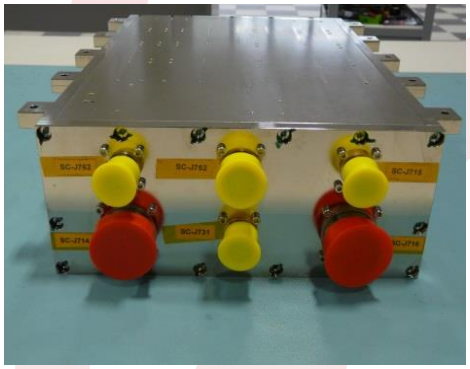
Potential contribution from: ACLS for ISS

ACLS (ESA)

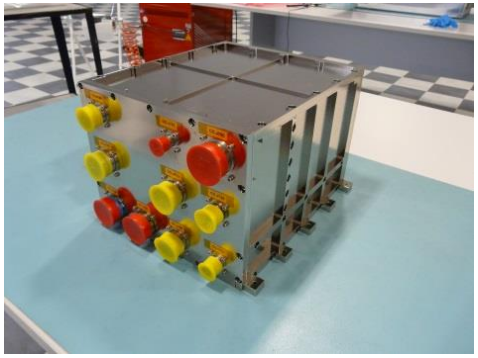
Advanced Closed Loop System
Sub to Airbus. Avionics of the facility

ACLS Front Panel (AFP)

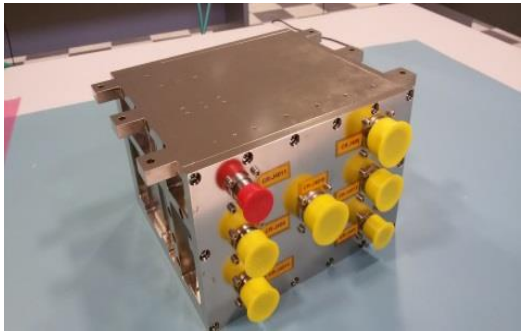
ACLS System Controller (ASC)



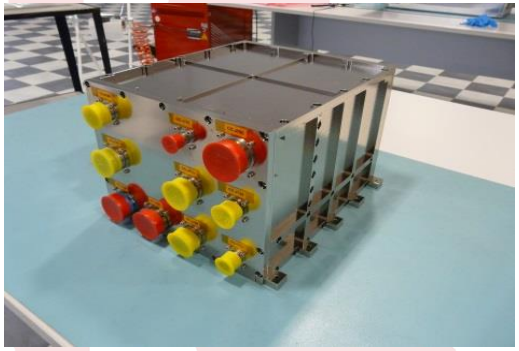
Stack Current Source and Impedance Measurement Unit (SCS IMU)



CO2 Concentration Assembly Power Supply Module (CCA PSM)



CO2 Reprocessing Assembly Power Supply Module (CRA PSM)



Oxygen Generation Assembly Power Supply Module (OGA PSM)

Other:

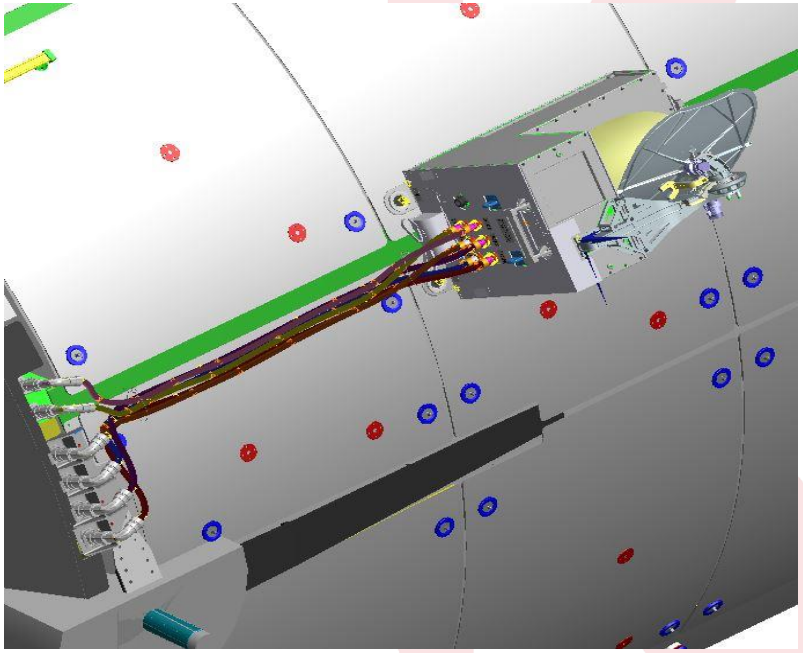
- **CO2 Concentration Assembly (CCA) - Data Acquisition Unit (DAU)**
- **Oxygen Generation Assembly (OGA) - Data Acquisition Unit (DAU)**
- **ACLS Rack Harness**
- **Avionics Software**
- **Avionics EGSE**
- **Special Test Equipment (STE)**

Potential contribution from: COLKa for ISS

COLKa (ESA)

Columbus Embarkation Platform
External platform and harness, system integration, EVA

COLKa Embarkation Platform (in progress) partially assembled including Case with the Temporary Cover installed



Artistic impression of the COLUMBUS Ka-band Terminal installed on the COLUMBUS external surface

Potential contribution from: CAM

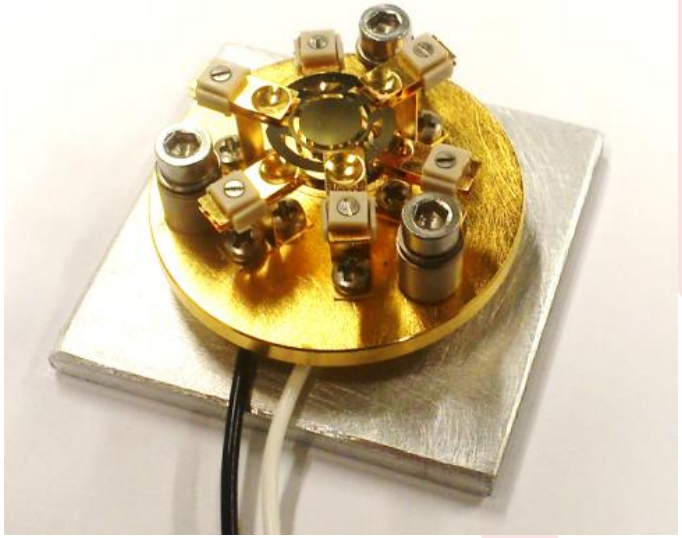
CAM (ESA) - Contamination Assessment Microbalance
(Sub to IAPS-INAF)

Contamination Assessment Microbalance (CAM) is a low-mass (< 1 kg) device which will monitor in-orbit contamination of sensitive surfaces on ESA's future satellites.

Purpose of the activity: design, manufacture and test a breadboard model and an engineering model of a compact Quartz Crystal Microbalance (QCM) measuring system.

KI responsible for:

- EM production
- Software development

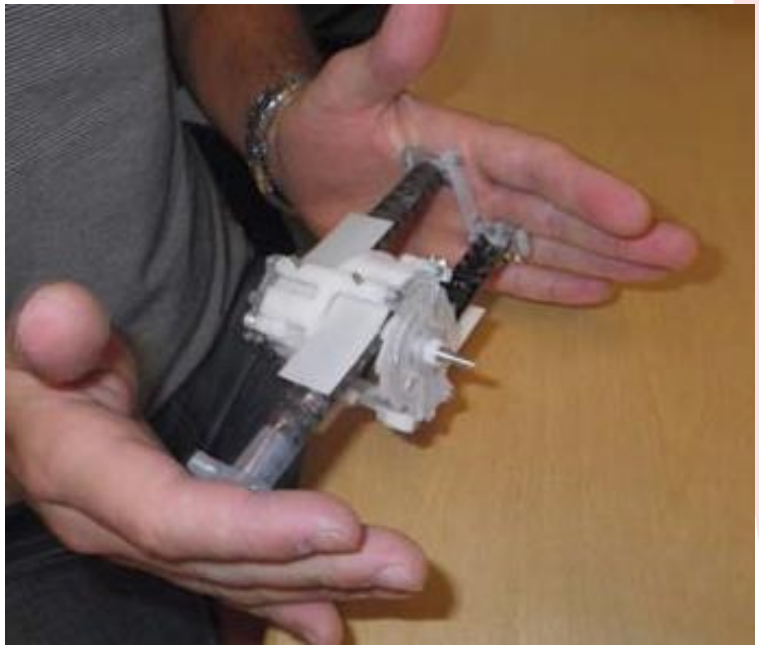


Potential contribution from: SEAM

SEAM Cubesat (EU FP7) - Small Explorer for Advanced Missions

(Sub to KTH)

KI is partner of the SEAM project. The role of KI is the development of a deployable boom (according to the ”Self-contained lInear Meter-class dePloyablE – SIMPLE”

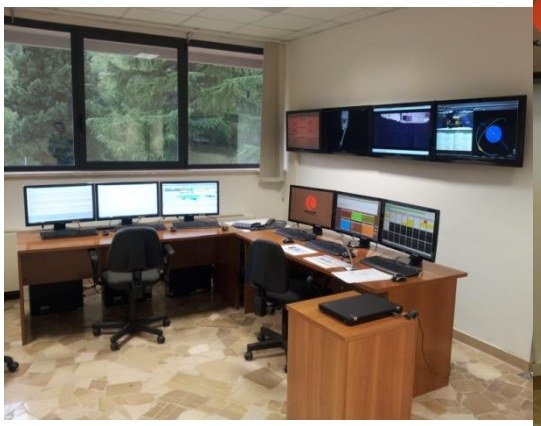


The SIMPLE boom
(Courtesy of KTH)

Potential contribution from: ICARO center

Kayser Italia

Payload Operations Control Center



Management of
on-board payload and facilities
and support to crew operations

End of presentation.