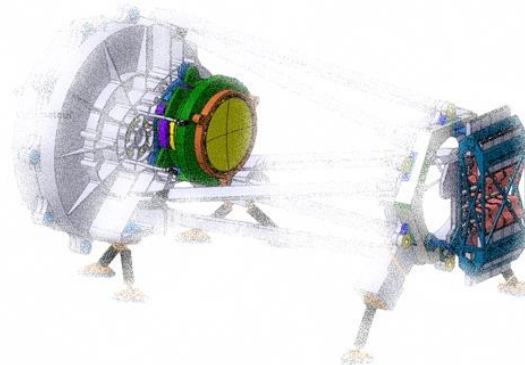


Euclid @ OAS Bologna: experimental activities, ground segment and scientific exploitation preparation. Status and perspective



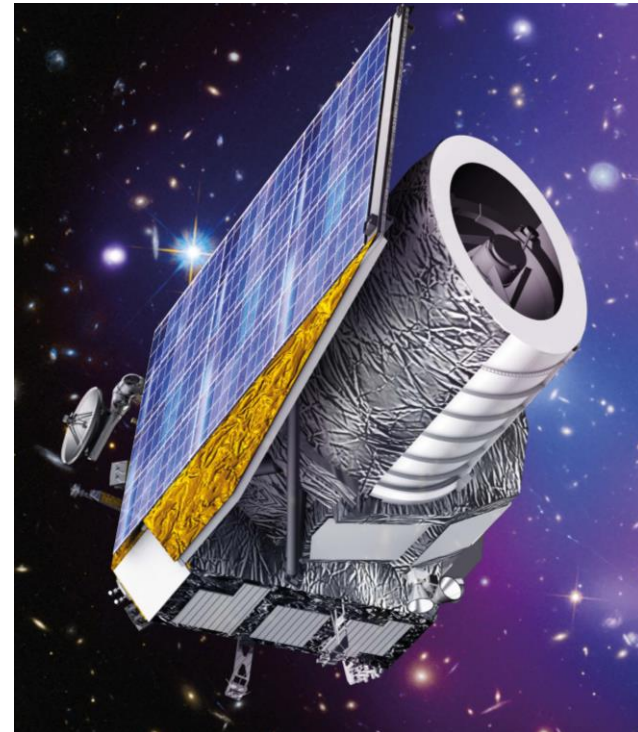
Natalia Auricchio & Elena Zucca
On behalf of the Euclid Consortium

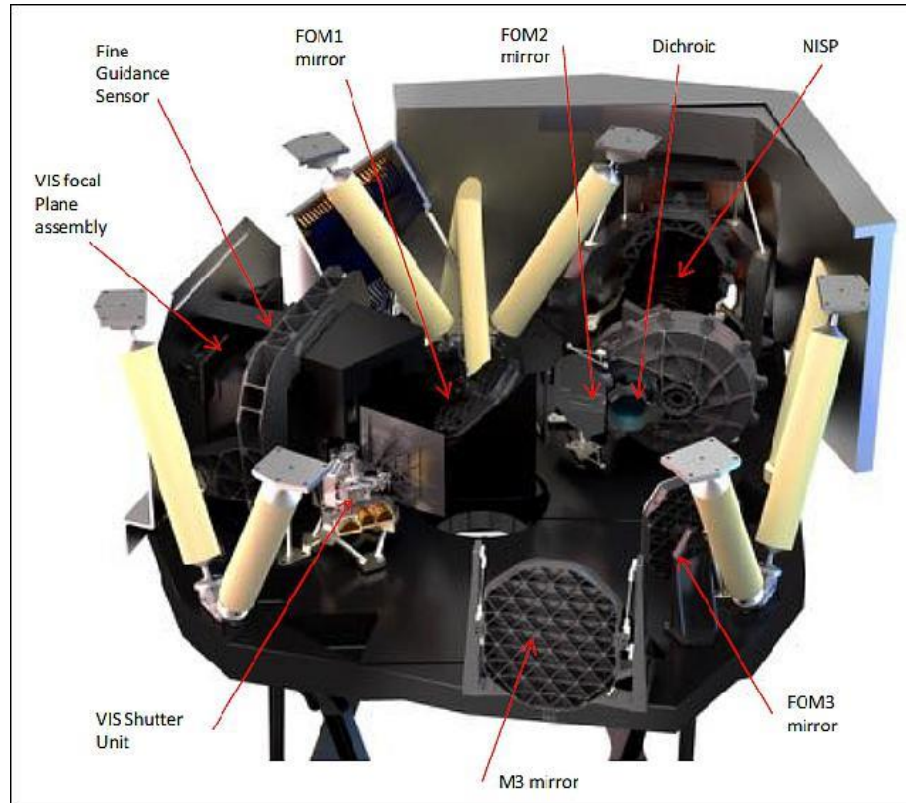
- **The Euclid mission**
- **VIS&NISP**
- **NISP: General Architecture and current status**
- **People**

- ❑ ESA mission dedicated to the study of dark energy and dark matter
- ✓ Selected in Oct. 2011 ⇒ Fully funded
- ✓ Partners: ESA, TAS, Airbus DS, Euclid Consortium (EC)
- ✓ Overall mass: ~**2020 kg**, Power: **1920 W** (EOL),
Data rate: **850 Gbit/day**
- ✓ **6.25 years** mission

- ❑ Technology:
- ✓ Telescope 1.2m aperture (T=125K)
- ✓ 2 cryogenic instruments ⇒ VIS&NISIP
(T=**100-150K**, passive)

- ❑ L2 orbit
- ✓ Launch Vehicle –Soyuz-Fregat
- ✓ Launch date: **2022**, from Kourou space port





Payload

- ❑ 36 CCDs, 4kx4k pixels, 12 μm
- ❑ Pixel size: 0.1 arcsec
- ❑ Spectral band: 550-900 nm
- ❑ Data volume: **423 Gbit/day**
- ❑ Temperature: 150-155 K (passive)

- ❑ 16 2kx2k H2RG NIR detectors
- ❑ Pixel size : 0.3 arcsec
- ❑ Spectral band: 920-2000 nm
- ❑ Data volume: **290 Gbit/day**
- ❑ Temperature: 100-140 K (passive)

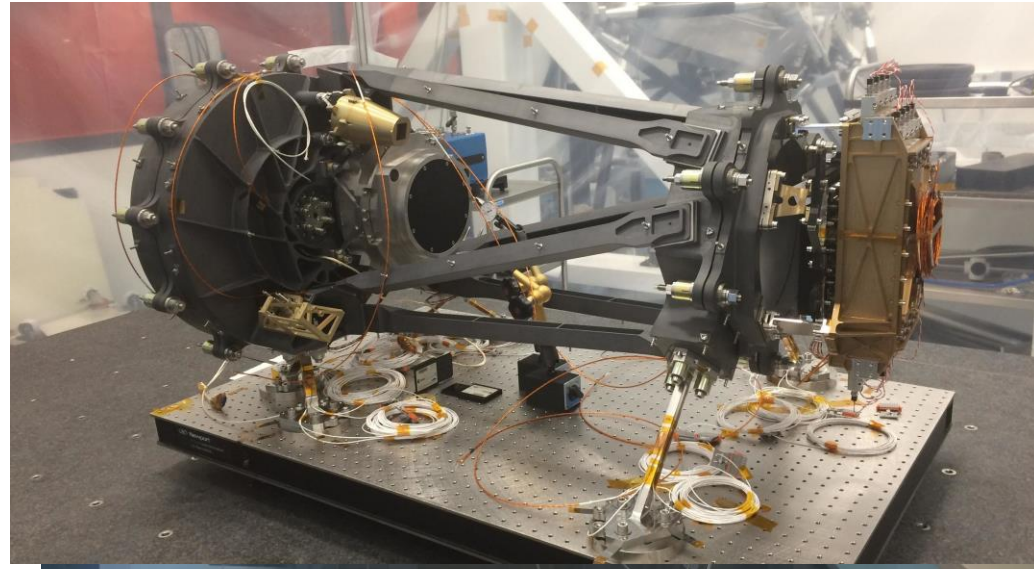
❑ Budgets: **Box Size: 1.0x0.5x05 m, Mass: 160 kg, Power: 200 W**

❑ 3 main assemblies:

➤ NI-OMA: Opto Mechanical Assembly

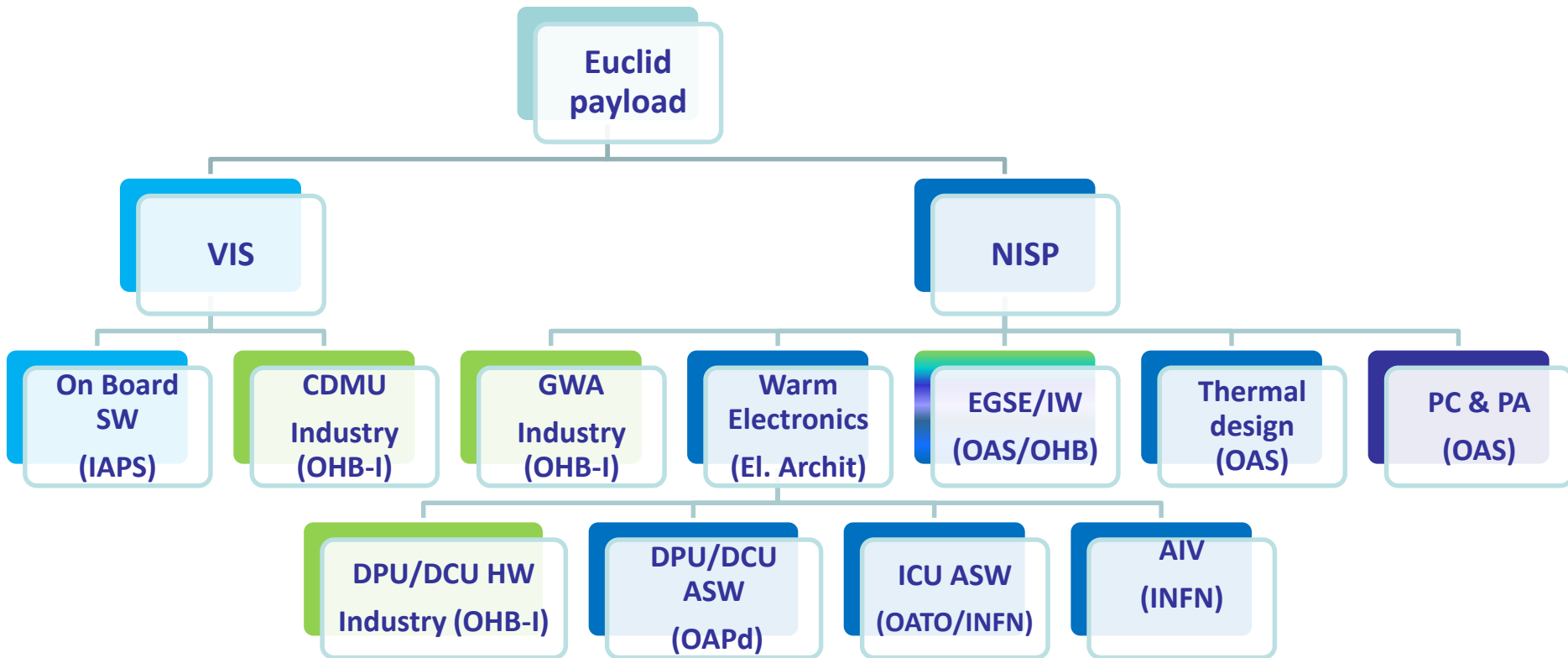
➤ NI-DS: Detection System

➤ NI-WE: Warm Electronics



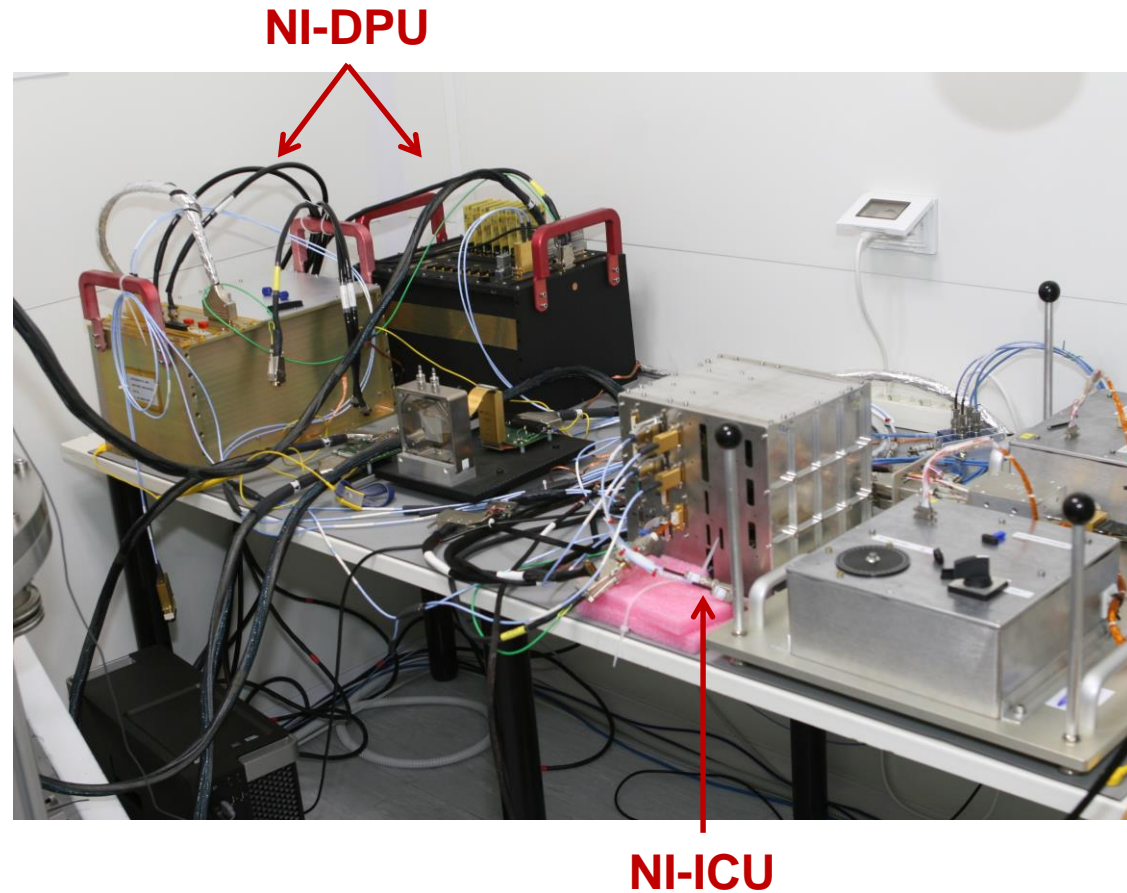
**NISP FM global
overview**



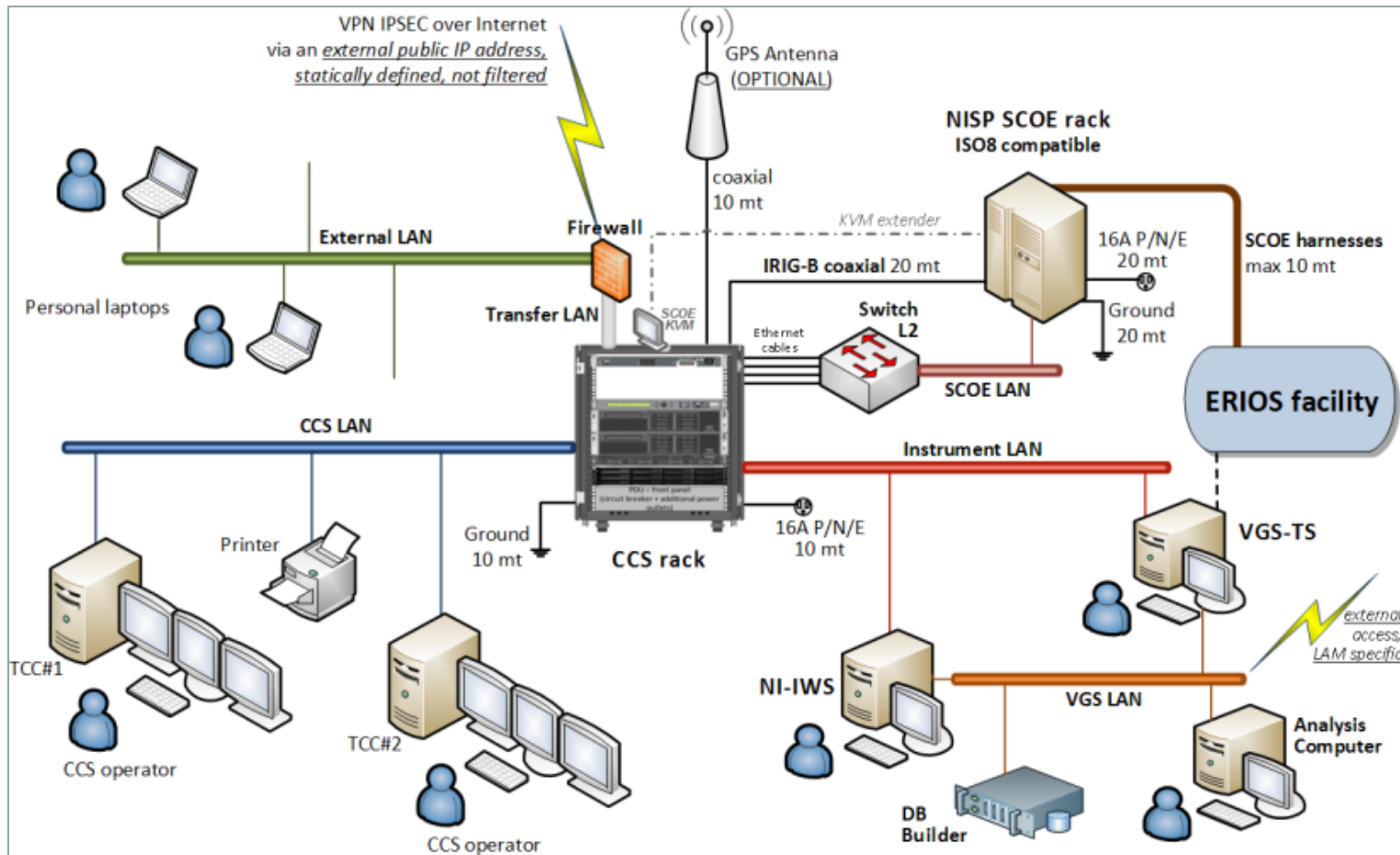


OATS is responsible for the Science Ground Segment

- **NI-DPU/DCU: two Data Processing Units, 8 Detector Control Units for each DPU.** 
- **NI-ICU: Instrument Control Unit**
- **NI-DPU Application SW** 
- **NI - ICU Application SW** 



The **NISP EGSE** (including CCS, SCOE and IWS) was moved to LAM (Marseille) to perform the NISP EM TV test at mid-January 2019.



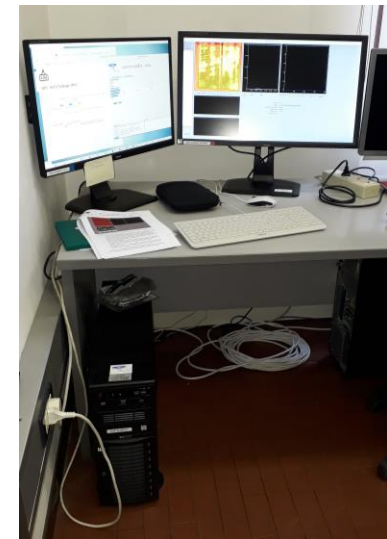
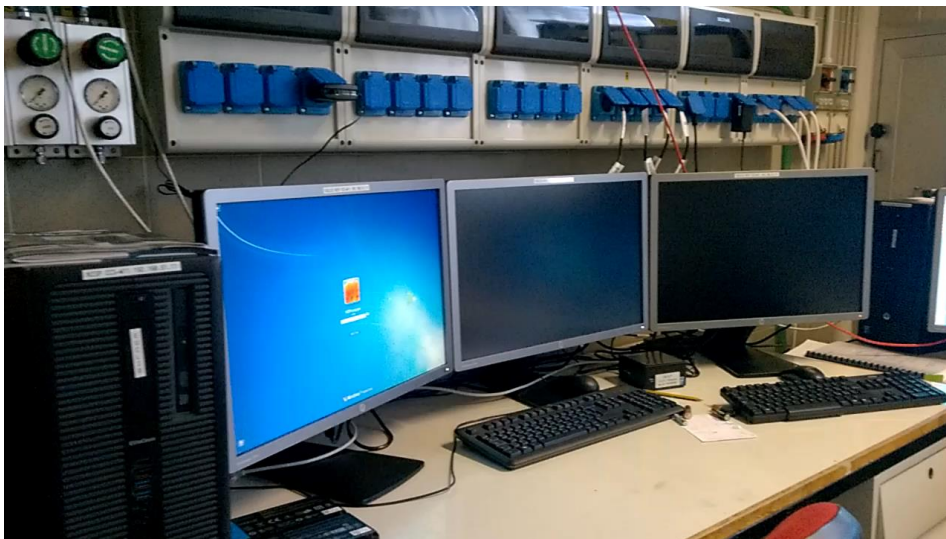
The **NISP EGSE** is a set of Test Equipments that will support all the AIV/AIT campaigns.

The EGSE is composed by three main HW parts, and involves two main SW tasks:

NI-CCS (NISP Central Checkout System), provided by ESA: the combination of SW (mission database, other configuration data, and test sequences) and HW (4 servers and 4 client stations) that implement the main control system used in all test campaigns at the NISP instrument level.

NI-SCOE (NISP Special Check-Out Equipment), provided by ESA: a rack, including two computers and many specialized devices, controlled through the CCS, acting as a spacecraft interface simulator for the payload under test.

NI-IWS (NISP Instrument WorkStation), provided by INAF/OAS-BO: a standalone workstation, interfaced with the CCS, providing quick-look capabilities, FITS data storage, and off-line analysis tools.



- ❑ **Euclid STM: delivered in 2017**
- ❑ **NISP Avionic Model:** DPU&ICU EM and NIOMA&NI-DS electrical simulators ⇒ delivered to TAS-I (Turin) in June 2018 to perform the Integrated PLM Functional Test activities.
- ❑ EGSE/IWS & DPU EQM delivered to LAM last week to perform the NISP EM TV test in ERIOS.
- ❑ **E(Q)M test:** all functional elements, including NI-DS, tested at Operating Temperature on bench. Full functional test. 1 month operations.
- ❑ **Flight Model:**
 - NIOMA: ready at LAM
 - DPU/DCU FM already manufactured. Integration phase in progress. FM 1 and 2 will be delivered in March/ April 2019
 - ICU FM to be delivered in June 2019
 - DS FM to be delivered in March 2019
 - NISP FM test: July-August 2019. Delivery in September 2019

NISP Local PM: Luca Valenziano INAF OAS Bo

INAF OAS Bologna: Enrico Franceschi, Massimo Trifoglio, Fulvio Gianotti, John B. Stephen, Stefano Silvestri, Andrea Bulgarelli, Francesca Sortino, Natalia Auricchio, Gianluca Morgante, Adriano De Rosa, Filomena Schiavone, Gian Paolo Guizzo, Luciano Nicastro, Paola Battaglia, Elisabetta Maiorano

INAF OA Torino: Donata Bonino, Vito Capobianco, Leonardo Corcione, Sebastiano Liori

INAF OA Padova: Andrea Balestra, Favio Bortoletto, Carlotta Bonoli, Maurizio D'Alessandro, Ruben Farinelli, Eduardo Medinaceli

INFN Bologna: Donato Di Ferdinando, Federico Fornari, Francesco Giacomini, Nicoletta Mauri, Laura Patrizii, Gabriele Sirri, Claudia Valieri, Carlo Veri

INFN Padova: Enrico Borsato, Stefano Dusini, Fulvio Laudisio, Chiara Sirignano, Luca Stanco, Sandro Ventura

INFN Genova: Stefano Davini, Sergio Di Domizio

OHB-I: DPU/DCU team: Raoul Grimoldi, Giovanna Ober, Fabio Camozzi, Sergio Legramandi, Elio Mangraviti GWA team: Paolo Radaelli, Andrea Moroni, Matteo Grespi, Sergio Legramandi, Elio Mangraviti. **TEMIS srl:** Luca Marrocchi, Marco Bossi. **S.A.B. Aerospace srl:** Valentina Latini

NISP Instrument:

Enrico Franceschi, Massimo Trifoglio, Fulvio Gianotti, John B. Stephen, Stefano Silvestri, Andrea Bulgarelli, Donato di Ferdinando (INFN) ⇒ **EGSE/IWS, AIV, support to Project Management;**

Francesca Sortino ⇒ **Project control, configuration, Contract management, Support to PO;**

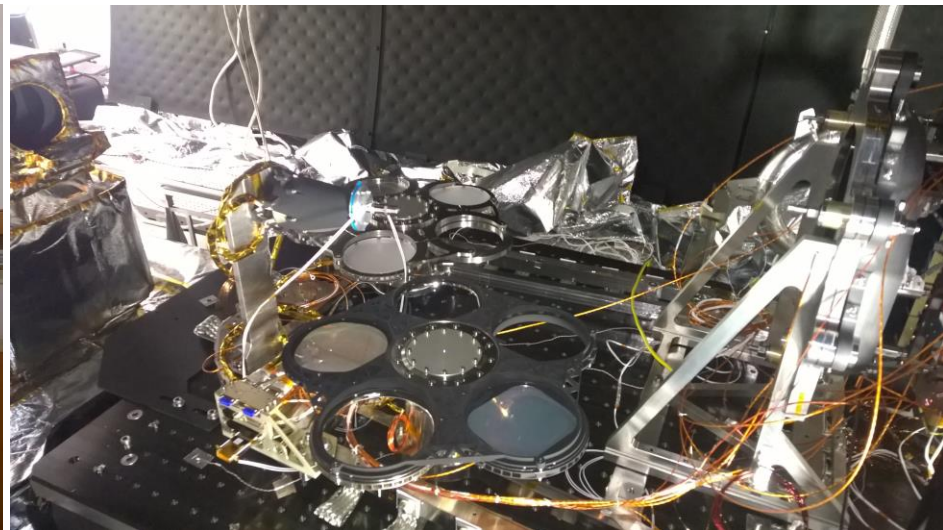
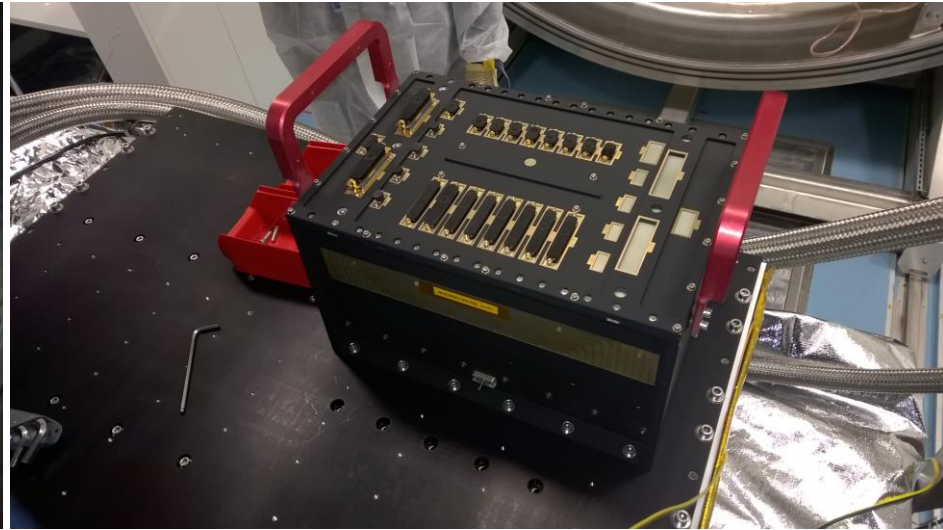
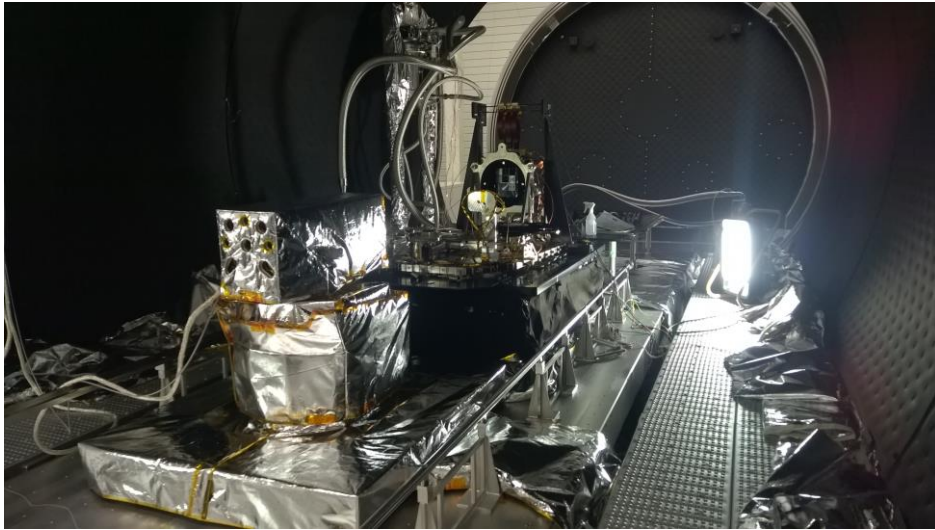
Natalia Auricchio ⇒ **PA & AVM/EM test support;**

Gianluca Morgante, Adriano De Rosa ⇒ **NISP design and thermal modeling**

Filomena Schiavone ⇒ **Clean Room support**

Gian Paolo Guizzo ⇒ **Electrical Architect**

Luca Valenziano, Paola Battaglia, Elisabetta Maiorano ⇒ **Operations**



- DPU/DCU functionalities: **detector control, data acquisition and processing, science data delivery to S/C**
- DPU/DCU units: 2 identical, each composed by 2 DPU sections and 8 DCUs

- Each DPU section hosts:
 - 1 Data Processor board (DPB)
 - 1 Data Router board (DRB)
 - 1 Data Buffer board (DBB)
 - 1 Power Supply board (PSB)

- Cold redundancy

- 8 DCUs powered by the PSB of the active section, not redundant

- Total daily produced data: ~4 TBytes

