



Mission Status

Anna Maria Di Giorgio

INAF IAPS

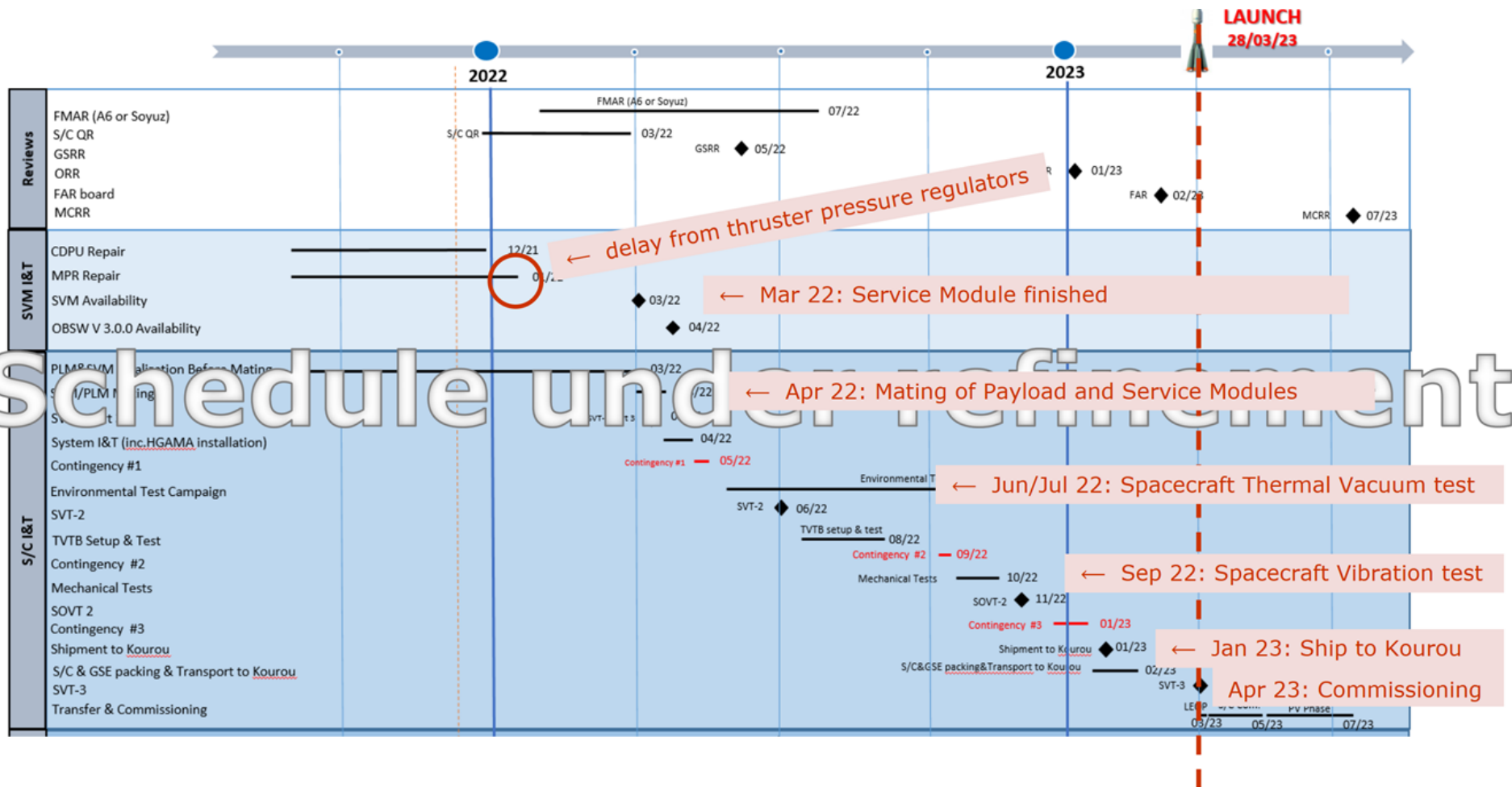
Meeting Nazionale Collaborazione Euclid 2022

23 - 25 Febbraio 2022

Presentation outline

- Schedule
- 2021 activities
- PLM and Thermal Vacuum Tests
- SVM status
- Ec management changes

Schedule



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EC Main activities since March 2021



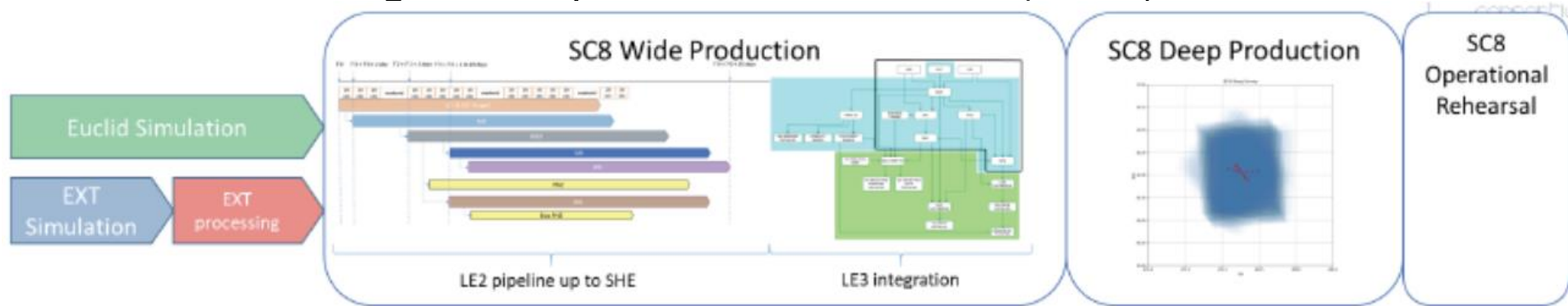
- VIS and NISP performances at CSL
- EC SGS : and continued with a very successful
 - Ground Segment Implementation Review (GSIR) close out passed successfully
 - Completion of SC8
 - Spacecraft Validation Test (SVT), a test under the responsibility of ESOC connecting Mission Control to the spacecraft, with the involvement of the Science Ground Segment, both SOC and the IOTs: long mission scenarios were run simulating various on-orbit phases. The test campaign was successfully completed Nov. 2021
- ECSURV: RSD optimised



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IOTs: long mission scenarios were run simulating various on-orbit phases. The test campaign was successfully completed Nov. 2021

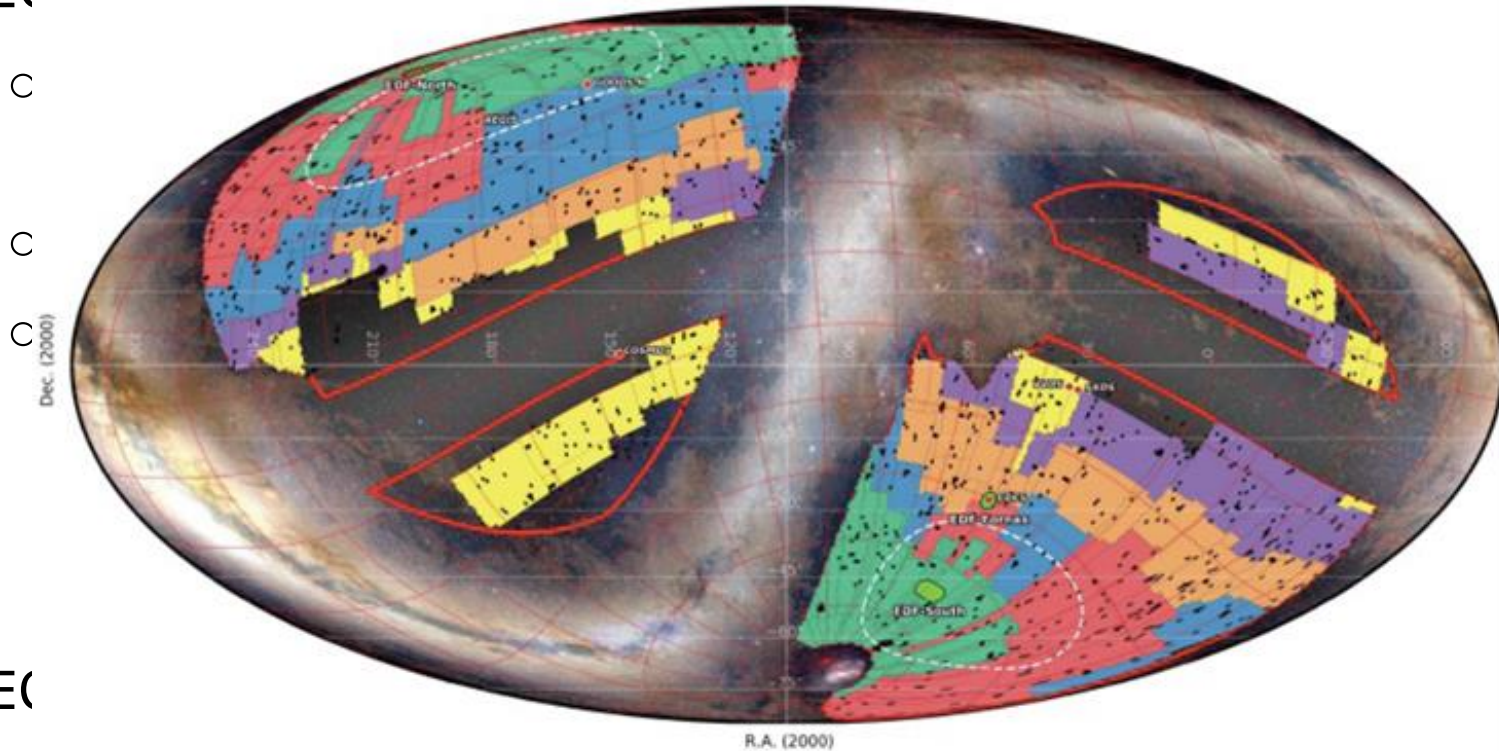
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ty of
the
orbit
2021

- EC

RSD 2022a ECTile realization of a Euclid Wide Survey within the 17 Kdeg.² RoI : 14,357 deg.² over 6 years in 251 patches

- Euclid Region of Interest (RoI) : 17 Kdeg.² core science compliant, with 795 blinding spots skipped [black dots]
- Best 1300 deg.² (white) SNR areas per galactic cap
- Euclid Deep Fields (EDF, from north to south): 10+10+23 deg.²

Euclid Wide Survey chronology (2.5Kdeg.²/yr)



Background image: Euclid Consortium / Planck Collaboration / A. Mellinger



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EC Main activities since March 2021



- VIS and NISP performances at CSL
- EC SGS
- ECSURV: RSD optimized
- SWG:
 - PSF characterization during the e2e tests at CSL confirmed that PSF and Completeness/purity requirements are still valid and can be met
 - SWG: Flagship simulation FS 2.0 (wide) close to completion
- IST: BlueGrism team set and started to work

EC Annual Meeting: Oslo Apr 26-29, 2022, Garage Day on Apr 25.



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Payload Module Integration Status



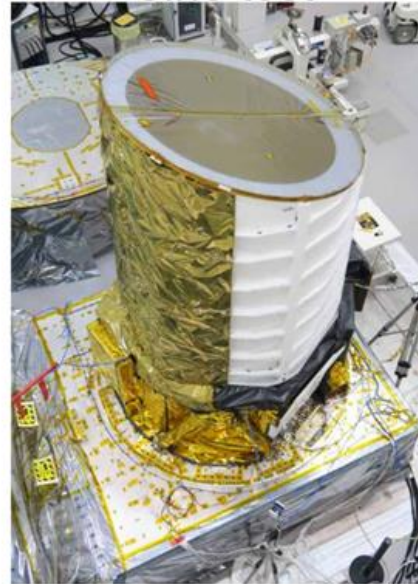
PLM has been completely integrated and tested:

- PLM conducted ElectroMagnetic Compatibility test performed, including NISP Sensor Chip System susceptibility test;
- PLM vibration test (sine + acoustic) completed successfully;
- The e2e PLM test has been completed, globally successfully;

The noise levels generated at launch can reach levels up to 150 decibels (dB) or higher inside the fairing and cause structural damage of instruments and subsystems.

→spacecrafts shall be qualified for acoustic loading The whole satellite is tested and exposed to acoustic pressures expected during lift-off and subsequent mission phases.

Sine test



Acoustic test



PLM test campaign completed on Sept. 28th, 2021

PLM arrived in TAS-I on Oct. 7th, 2021

AIRBUS
DEFENCE AND SPACE



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Thermal Vacuum Tests



Thermal vacuum testing simulates a space environment, by removing air and pressure and cycling very high and very low temperatures.

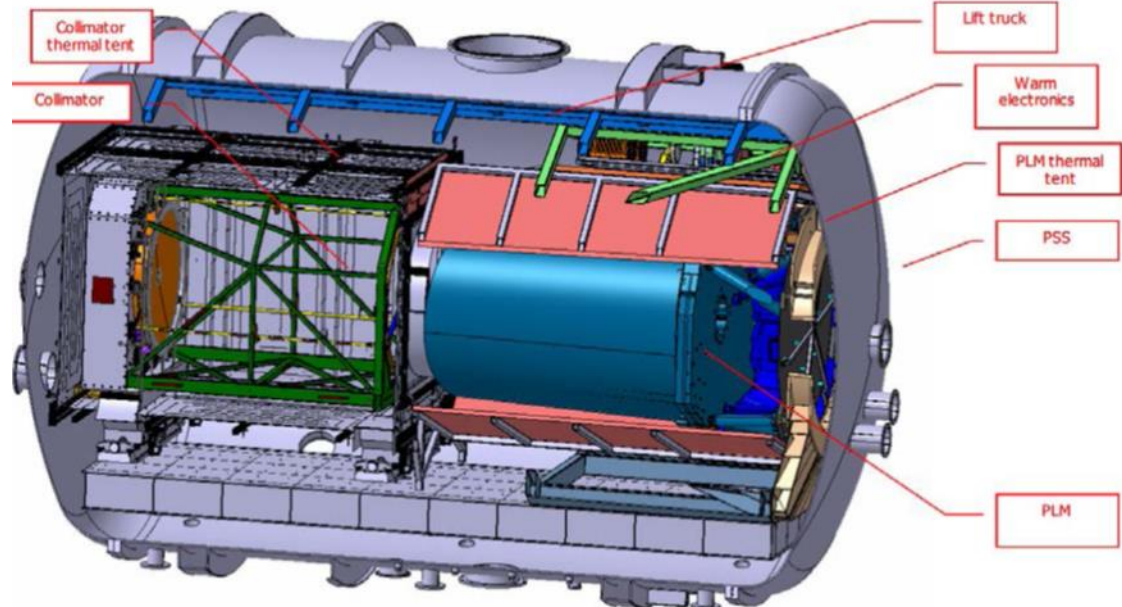
The test simulates the temperature changes the satellite will encounter in space, as well as worst case scenarios of whether the instruments can come back to life in case of a shut down that exposes them to even colder temperatures.

- **Thermal vacuum tests (TV): Thermal function tests** in high vacuum conditions, both of complete systems and individual thermal control sub-systems at changing temperatures.
- **Thermal balance tests (TB): Thermal equilibrium** tests in the vacuum with different temperature levels allowing the verification of thermal model calculations.
- **Thermal vacuum cycling tests (TC):** Tests that expose the test item to a certain number of temperature cycles with a given minimum and maximum temperature as well as with pre-defined holding times and temperature ramps.



Thermal Vacuum Tests

Test configuration:
collimator VS PLM



Collimator and PSS with
PLM thermal tent on the
Focal 5 optical bench during
blank test preparation



Image credits: Airbus



Image credits: Airbus

Electrical configuration



E-PLM ELECTRICAL SETUP FOR ART #1 (AMBIENT REFERENCE TESTS):

VIS INSTRUMENT HARNESS DETAILS (1/2): VI-CDPU AND VI-PMCU

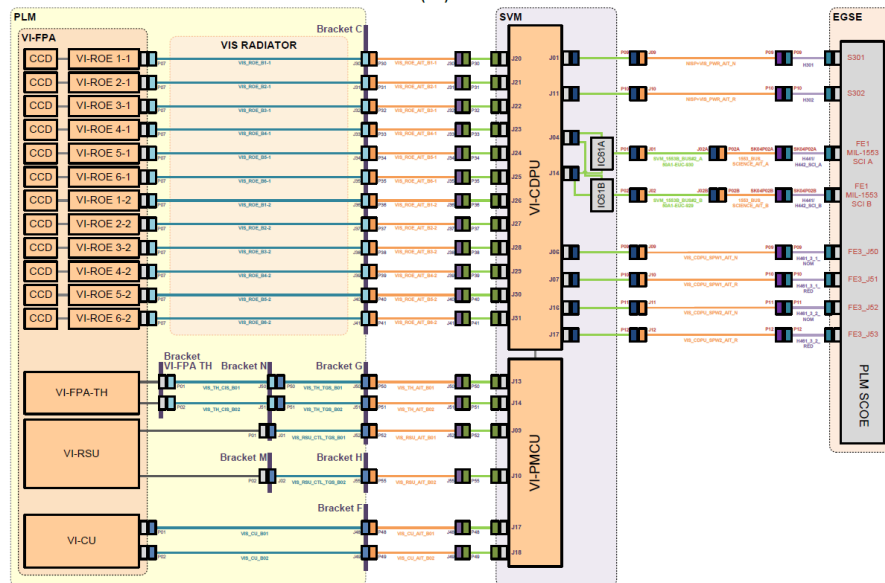


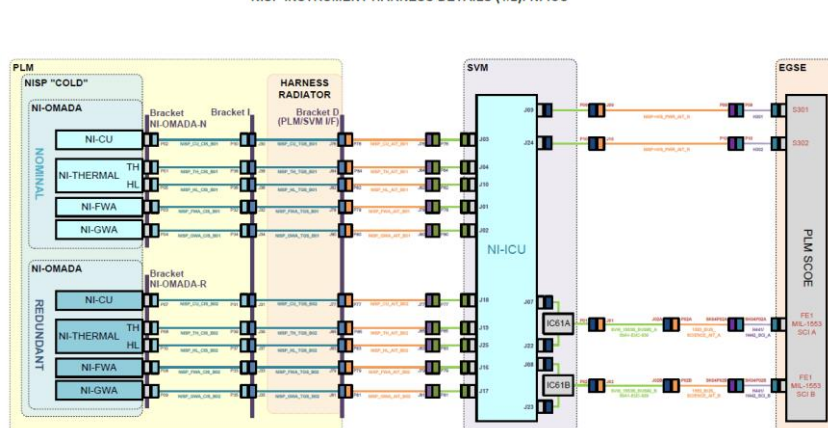
Image credits: Airbus

E-PLM ELECTRICAL SETUP FOR ART #1 (AMBIENT REFERENCE TESTS):

NISP INSTRUMENT HARNESS DETAILS (2/2): NI-DPU1 AND NI-DPU2

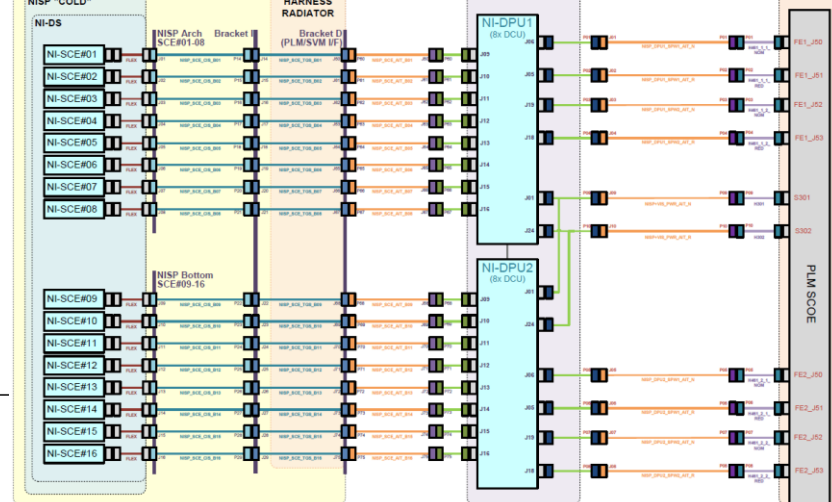
E-PLM ELECTRICAL SETUP FOR ART #1 (AMBIENT REFERENCE TESTS):

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NISP INSTRUMENT HARNESS DETAILS (2/2): NI-DPU1 AND NI-DPU2



TBTV thermal phases – temperature profile



Euclid PFM thermal vacuum test		Ambient	Phase 20 : Pumping & Outgassing				Phase 40 : Safe cold		Phase 50 : Op Tmin		Phase 60 : Op Tmax		Phase 70 : Decontam.		Phase 80 : warm-up to ambient.		Phase 110 : Op Tmin 2		up to ambient.	Pressure recovery
		Ambient pressure Specific Health Checks (SHC)	Pumping	PLM settling verification - reference test	Moisture release - Tmax. PLM TB5	Cooldown to SAFE mode	SAFE mode TB3	Transition to Operational Tmin	Operational Tmin TB1 (Optical performance test)	Transition to Operational Tmax	Operational Tmax TB2 (Thermo-elastic check)	Transition to Decontamination	Decontamination mode TB4	PLM heat-up transition to ambient (end thermal cycle 1)	PLM settling verification test	Cool down to Operational Tmin	Operational Tmin TB1* (settling effect check)	PLM heat-up transition to ambient (end thermal cycle 2)	Pressure recovery	
		10	20	21	22	40	41	50	51	60	61	70	71	80	81	110	111	120	200	
		SHC	Pumping	Settling Ref RT	PLM Tmax	Cooldown To SAFE	SAFE mode	GO To OTmin	Perfo OTmin	GO To OTmax	TE check OTmax	GO To Decontam	Decontam mode	WarmUp To RT	Settling ChK RT	Cooldown Cycle2	Settling ChK OTmin	WarmUp Cycle2	Pressure Recovery	
PLM SUB-ASSEMBLIES	VI-FPA-ES I/F T°	Tamb	Tamb	<30°C	[30,40]°C		>243K		>250K		< 290K		>243K	+20°C	<30°C		>250K		Tamb	
	VI-FPA-DP I/F T°	Tamb	Tamb	Tamb	[30,40]°C		Tmin_Nop > 146 K		Tmin_Op > 150 K		Tmax_Op < 160 K		> 273 K	Tamb ±5K	Tamb ±5K		Tmin_Op > 150 K		Tamb	
	Baseplate	Tamb	Tamb	Tamb	[25,35]°C		Tmin_Nop 125 K		Tmin_Op 127 K		Tmax_Op 130 K		190 K	Tamb ±5K	Tamb ±5K		Tmin_Op 127 K		Tamb	
	NI-SSS I/F	Tamb	Tamb	Tamb	[30,40]°C		Tmin_Nop > 125 K		Tmin_Op > 135 K		Tmax_Op < 140 K		190 K	Tamb ±5K	Tamb ±5K		Tmin_Op > 135 K		Tamb	
	NI-CSS I/F	Tamb	Tamb	Tamb	<+40°C		Tmin_Nop > 80 K		Tmin_Op > 80 K		Tmax_Op < 95 K		> 200 K	Tamb ±5K	Tamb ±5K		Tmin_Op > 80 K		Tamb	
PLM thermal tent	Shroud Zone 2 : PLM Main shroud	Tamb	Tamb (no control)	+18°C (GHe)	[25,40]°C		<30K (GHe)		<30K (GHe)		<30K (GHe)		< 85K (GHe)	Tamb	+18°C (GHe)		<30K (GHe)		Tamb	
Pressure	Chamber pressure	Pamb	10 ⁻⁴ mbar		< 5.10 ⁻⁶ mbar		< 5.10 ⁻⁶ mbar		< 5.10 ⁻⁶ mbar		< 5.10 ⁻⁶ mbar		< 5.10 ⁻⁶ mbar	< 5.10 ⁻⁶ mbar	< 5.10 ⁻⁶ mbar		< 5.10 ⁻⁶ mbar		Pamb	



Measurement of the IQ performance for PLM settling verification : 1. reference before 1st cycle, 2. check after 1st cycle.

2nd cycle : only if out-of-limit PLM settling has been detected.



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Spacecraft at TAS-I

Sunshield and solar array

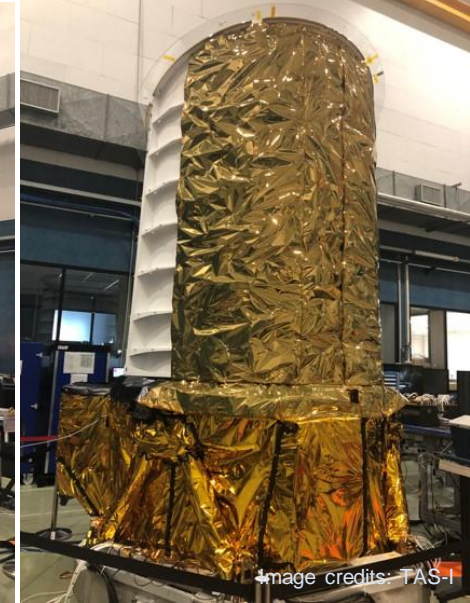
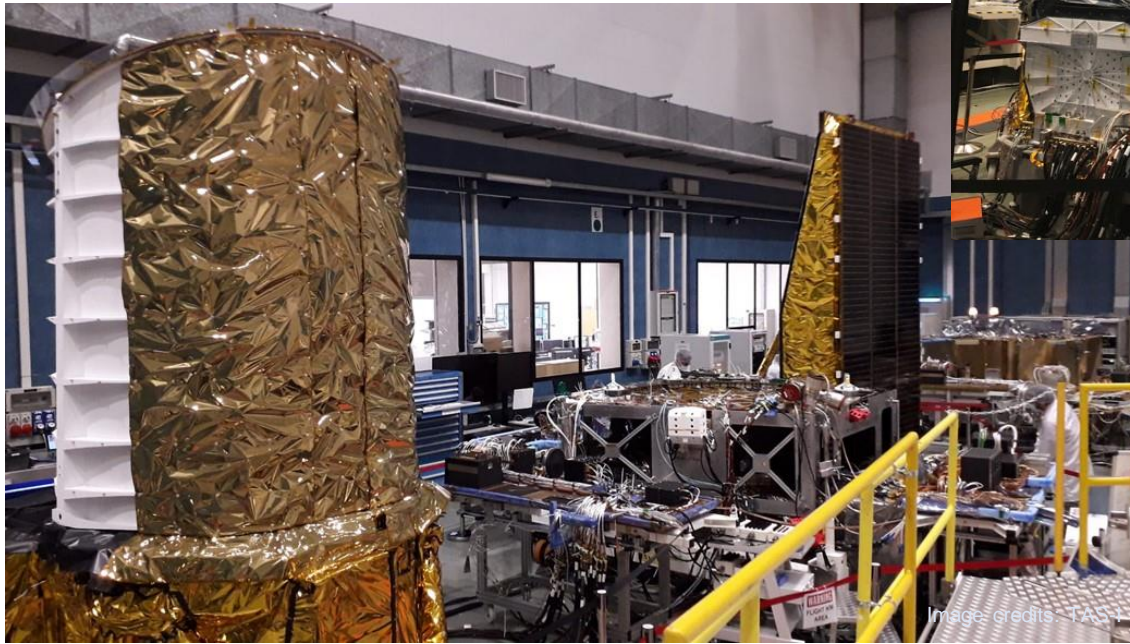


image credits: TAS-I

PLM

Service Module Integration Status



Avionics Model (AVM) : All Engineering Model (EM) subsystem tests completed

Flight Model (FM):

- All FM equipment's delivered;
- Subsystem testing largely completed;
- Micropropulsion pressure regulator (MPR) leakage: last MPR delivered, testing started

System Operation Validation Test-1 (SOVT-1) successfully completed: ESOC/SOC/Spacecraft/ IOT involved.

Reference Observation Sequence run uninterrupted, calibration with instruments, science data and HouseKeeping ingested in SOC;



SVM (with open panels)
Image credits: TAS_I



Instrument Status

VIS:

VIS ReadOut Electronics ROE7 status: no failure occurred during the E-PLM e2e test; ***VIS ROE will be used as is;***

VIS ReadOut Shutter Unit lifetime test successfully completed;

VIS CDPU (Control and Data Processing Unit) failure to switch on the VIS PMACU (Power and Mechanisms Control Unit) at cold (-20°C) - CDPU shipped to OHB-I for analysis and repair on September 28th. Failure cause isolated but not completely understood; electronic boards refurbished and tested. CDPU with replaced boards shipped to TAS-I in Dec 2021 but some analysis of the circuit are still on going to understand the temperature dependence.

NISP:

NISP Instrument Control Unit HW fix to anomaly in home sensor search at cold (resistor in harness)

NISP communication issue (9/16 of NIR detectors did not work during the E-PLM e2e test). SW Bug fixed

NISP DCU HW issue detected on one component (design level). Units refurbished, presently under testing.



SVM/PLM/Instrument/Mission summary



- PLM test campaign successful:
PLM+ instruments at TAS-I
integration and test activities started
- **VIS and NISP performances tested during the PLM test show excellent performances (as good or better than requirements)**
- Still to check:
VIS Motor Power Supply/CDPU modelling
NISP DPU/DCU tests after boards refurbishment
- Micropropulsion pressure regulators leakage problem solved
- Ice decontamination is a critical issue

Launch date: not before March 28, 2023 (Launch readiness)



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EC Management



- ECB:
 - **Jason Rhodes** (JPL, US) new ECB chair, starting on Jan 1st, 2022,
 - **Marc Sauvage** new ECB Deputy chair, starting on Jan 2022
 - **Martin Kunz** (U-Geneva CH) new Swiss ECB representative (Jan 1st 2022), replacing Romain Teyssier
- ECL-SO
 - **Francis Bernardeau** (CEA/SPhT, IAP, FR) D-ECL for a second term 2022-2023
 - ECL-SO secretary: selection process expected to close in Jan 2022)
- SWG/IST
 - SCG: **Martin Kunz** leaving SCG, to be replaced in January 2022
 - SWG-TH: **Fabio Fineli** (INAF, U. Bologna, IT), **Alessandra Silvestri**, (U; Leiden, NL), **Valeria Pettorino** (CEA/DAP, FR) new co-chairs/deputy, replacing Luca Amendola and Matteo Viel
 - SWG-MW : **Soeren Larsen** (Radboud U., NL) new co-chair, replacing Eline Tolstoy
 - IST: BlueGrism: **Margherita Talia** (U. Bologna, IT) and **Claudia Scarlata** (U. Minesota, US) co-chairs
- ECPG-T:
 - Replacement of **Jean-Gabriel Cuby** (current chair, LAM, FR) in January 2022: selection in progress
- SGS
 - **Henri Triou** (CEA, FR) : EC MDB Manager
 - **Samuel Ronayette** (CEA/DAP, FR): EC PLM/SVM Instrument Model Owner
 - **Francisco Castander** temporary OU-SIM lead





End presentation



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