AIV general status

NectarCAM F2F
On line, 6-7 April 2021

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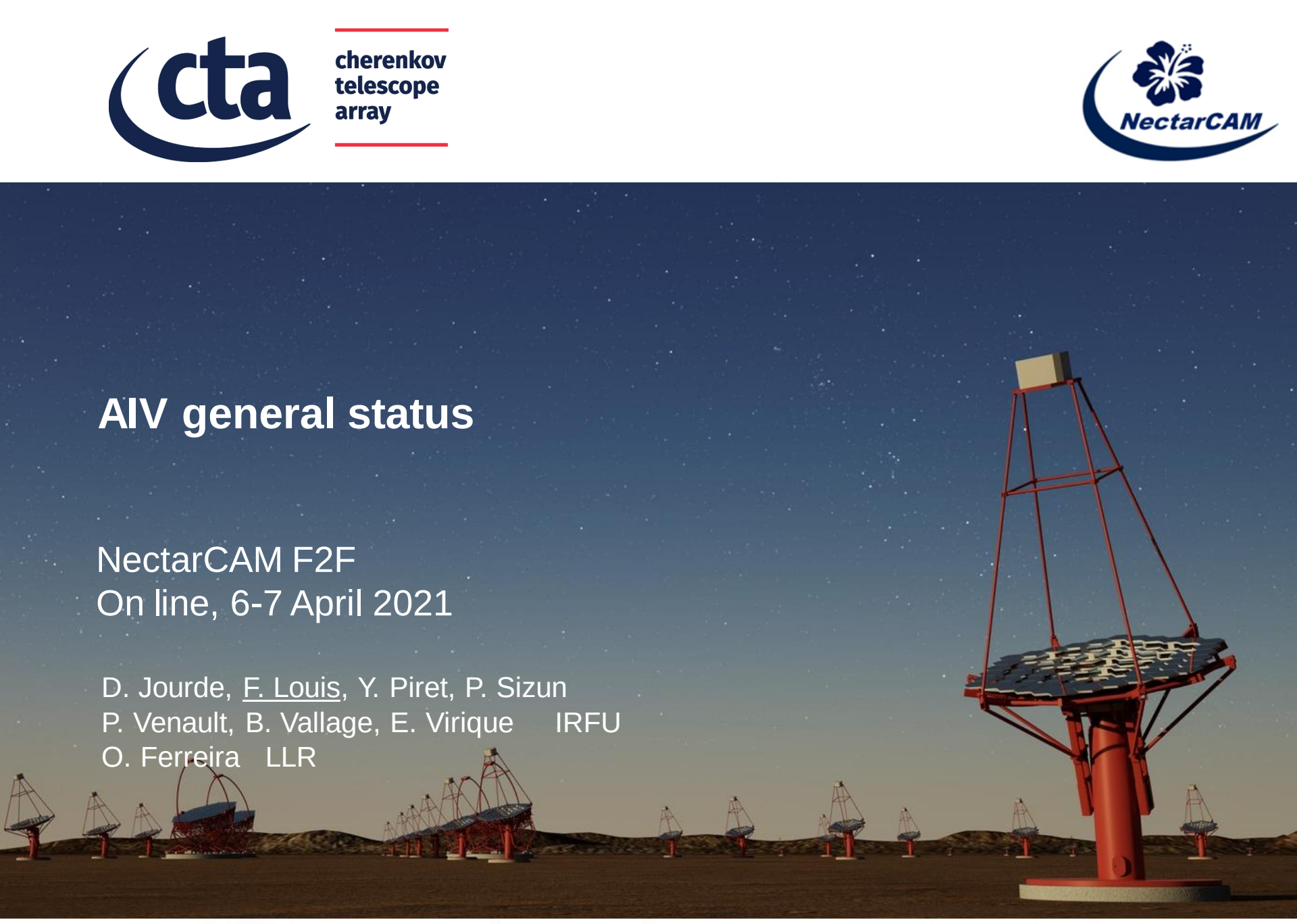
O. Ferreira LLR



Status of the camera & facilities

Status of the camera beginning 2020

- All elements of the Berlin experiment had been removed from the camera
- The structure of the camera was ready to be sent to the manufacturer for modification

As a reminder, the objective of installing a prototype camera in Berlin meant that many elements could not be in their final version

Since that time, many changes and improvements have been made in the following areas

- Camera
- Camera handling tools
- Dark room and camera cooling facilities
- Test and calibration tools

Camera Status

The camera is in the same condition as if it had just been delivered by the mechanical subcontractor, with the following elements assembled:

- the structure is equipped with its cluster holder
- the cooling circuit, with heat exchangers with the fans ready to be connected, is completely instrumented and tested
- the closing panels of the cooling system are in place
- the back top and bottom supports are equipped with cables trays
- the sliding systems for the cabinets are fixed

In addition, the following elements have been added:

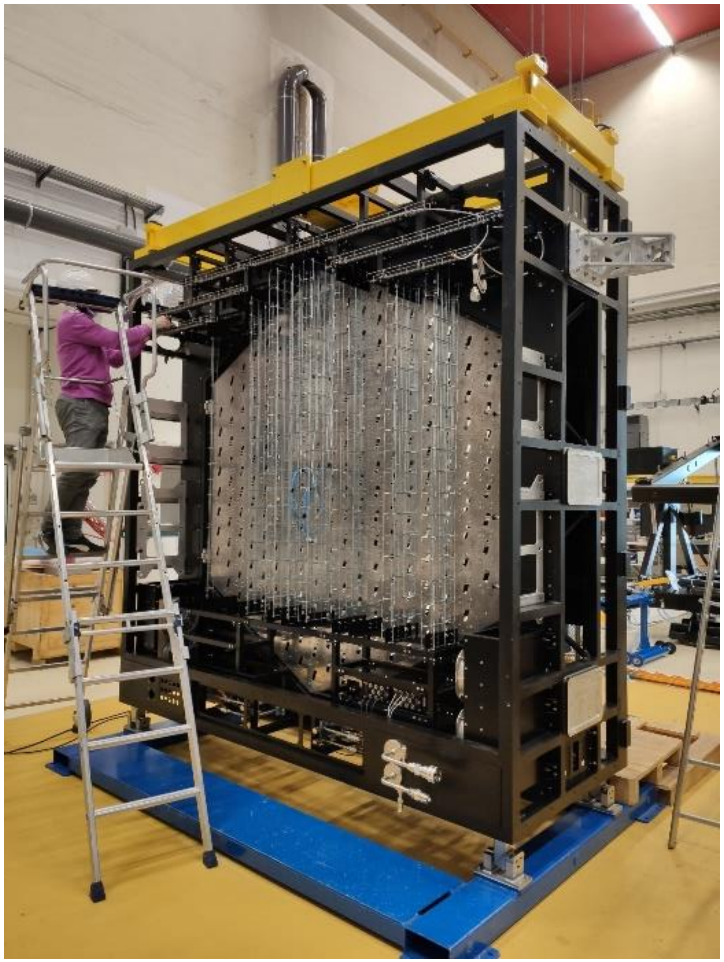
- sensors with their supports
- distribution boxes

The next steps are the implementation of:

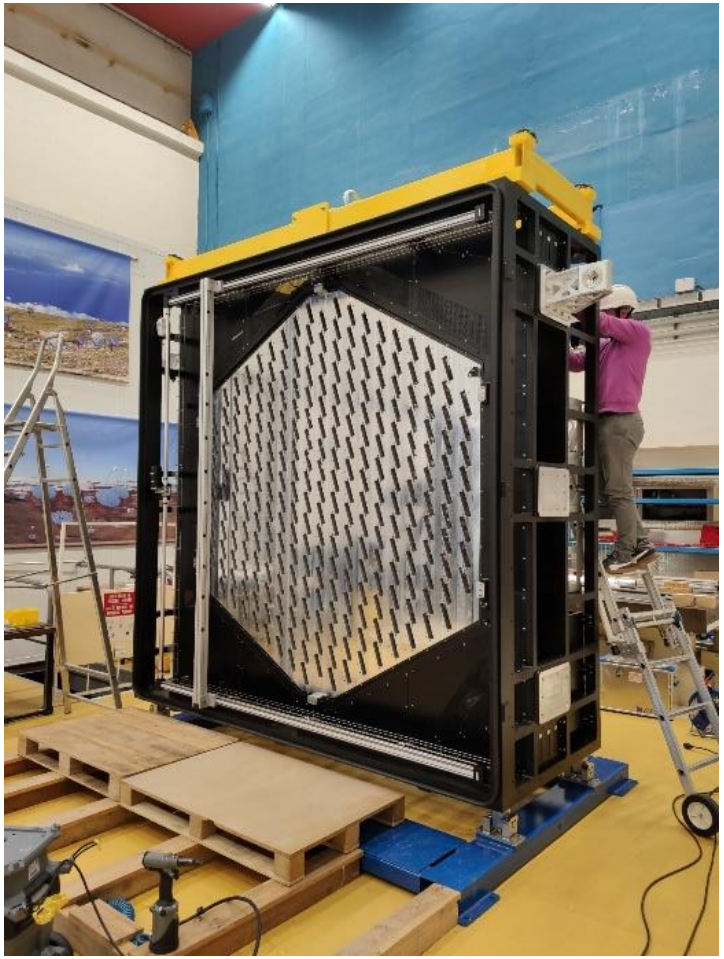
- the backplanes with their associated FEBs
- the cabinets (DTC, PDB, PSBs), DTC, Switches, TIB et UCTS

After the implementation of these elements, the cabling can begin followed by testing

Camera Status



Back view

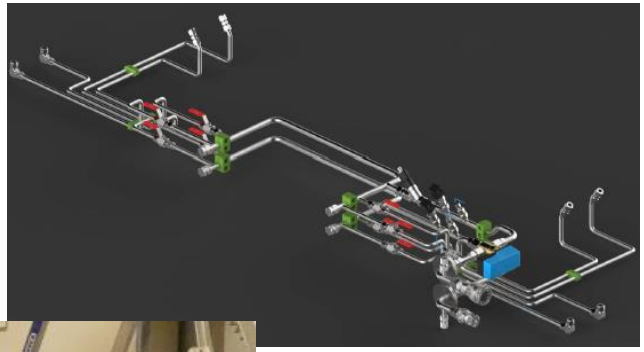


Front view

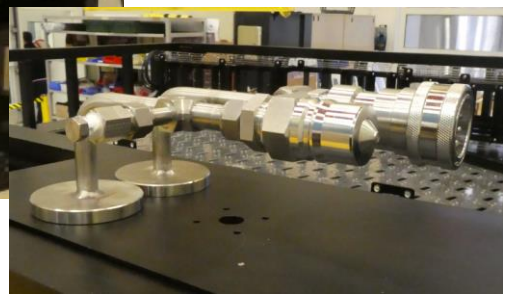
Camera Status

Cooling circuit

- The cooling circuit has been completely redesigned with a 3-way valve to control the camera temperature
- The instrumentation has be updated



Zoom on the 3 ways valve

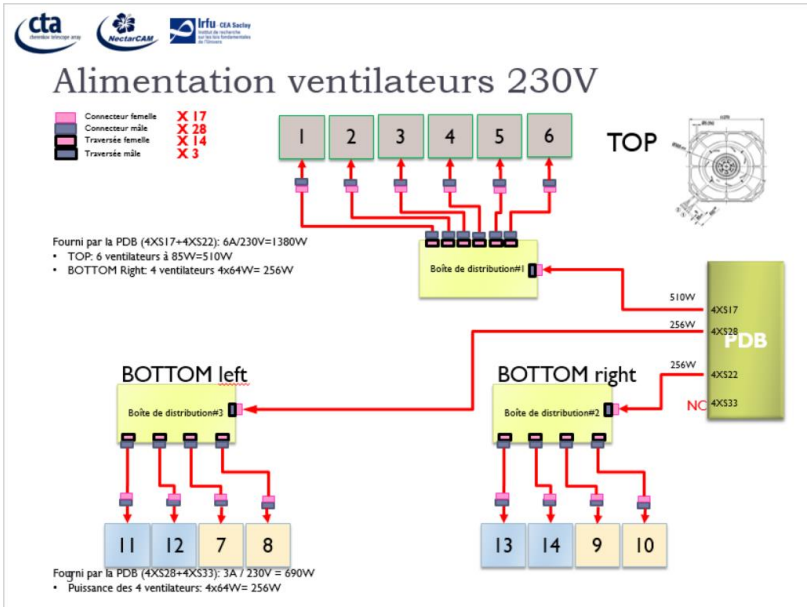


External connectors of the cooling circuit

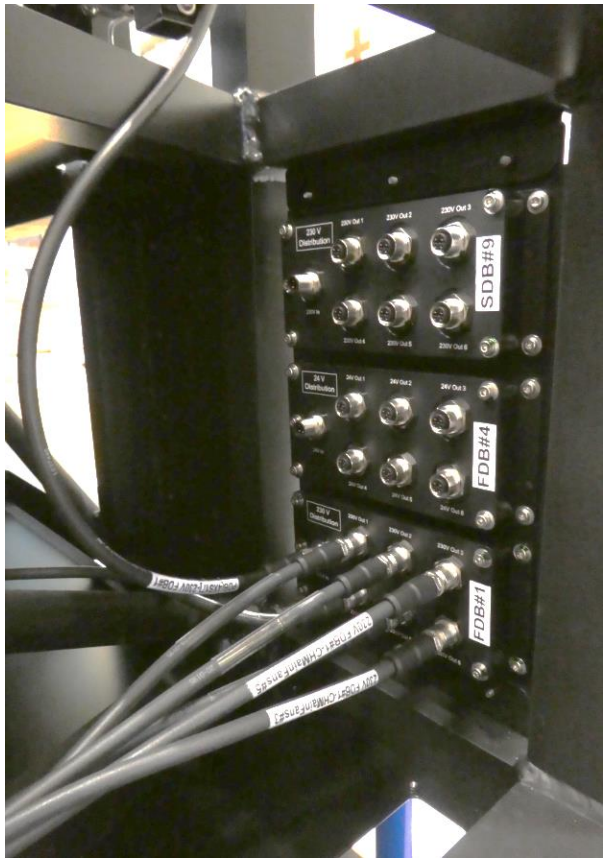
Camera Status

Distribution boxes

- For easier cabling maintenance, eleven boxes (located at each corner of the camera) of 6 different types have been realized to distribute the power (24V and 230V), the control and the sensors signals.



For example, cabling of 230V for fans with 3 distribution boxes



3 distribution boxes located at one corner of the camera

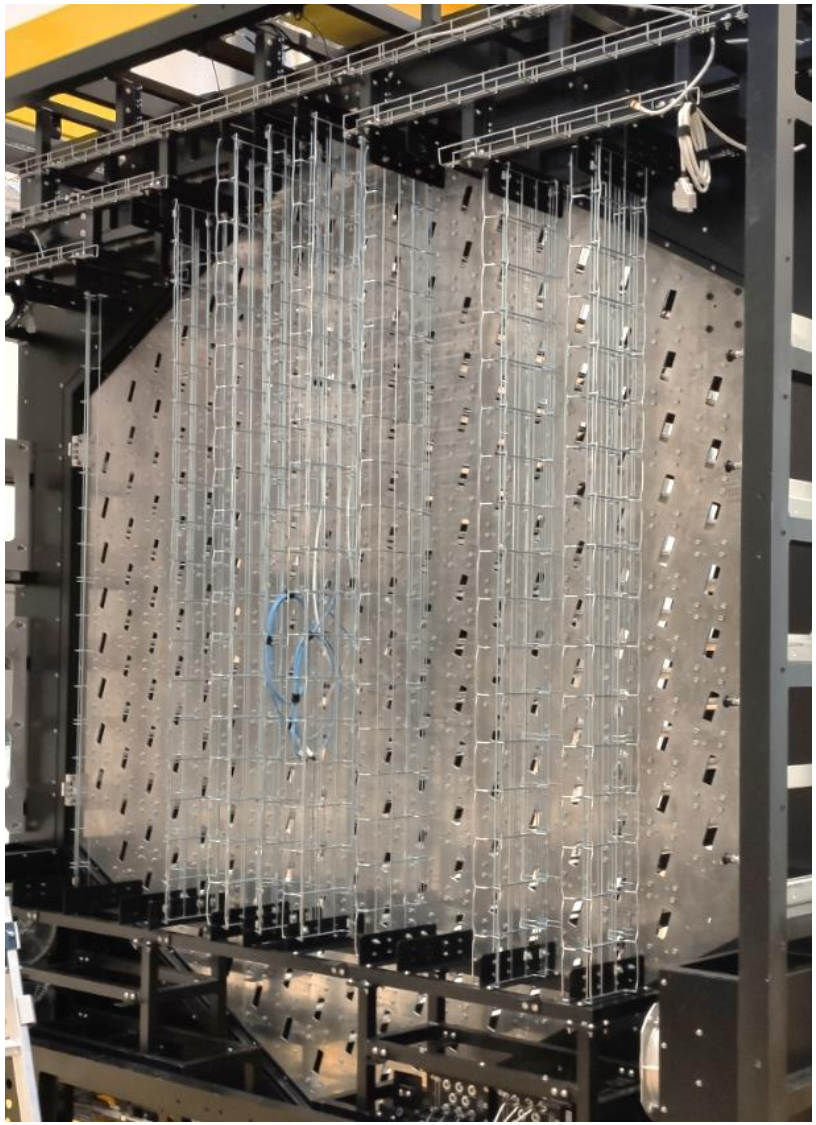
Camera Status

Electronic and cable tray supports

- Two mechanical new support structures have been added (top and bottom)

Top mechanical support for Ethernet switches, TIB and UCTS

Bottom mechanical support

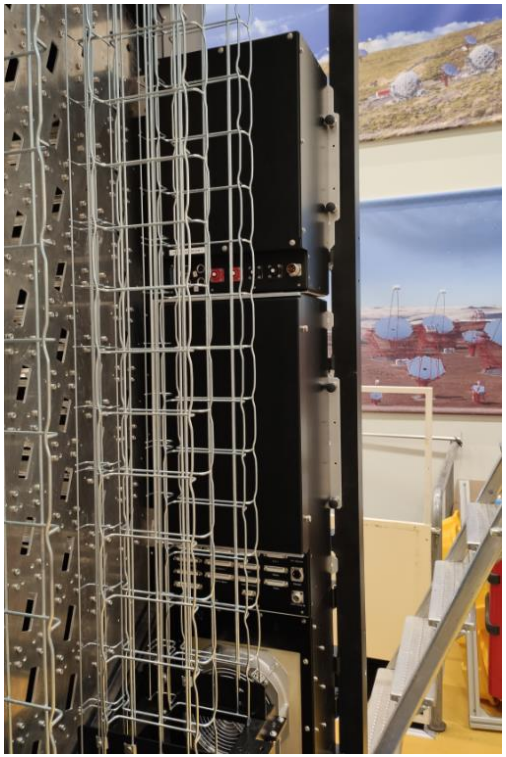


Vertical cable trays for data and trigger distribution links

Camera Status

Cabinet sliding system

- All cabinets will be fixed in the camera with sliding systems for easy maintenance



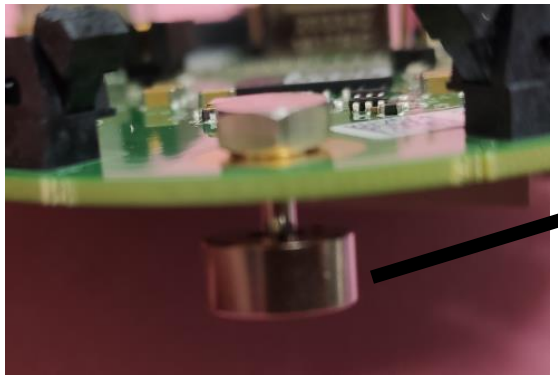
Cabinets (PSB right and ECC) in retracted and extended position

Camera Status

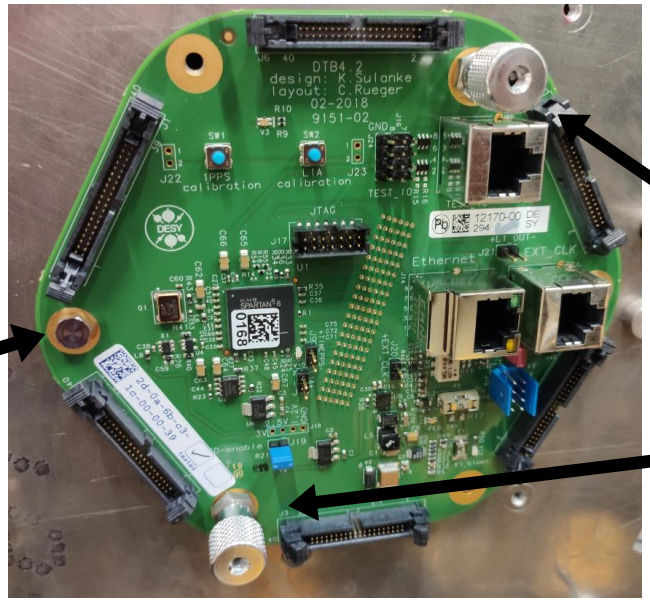
Backplanes fixations

- The backplanes are now fixed with captive screws. The fixation of the FEBs are also realized with captive system.

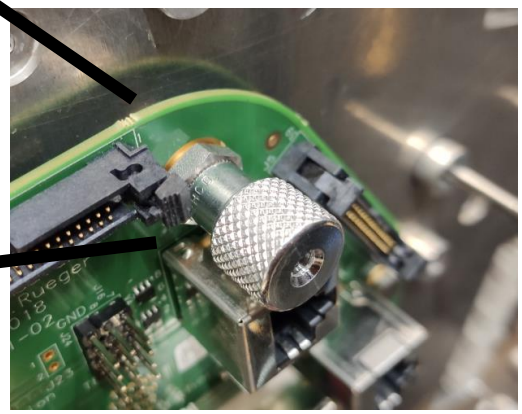
No more lost screws in case of disassembly



Captive screw to fix the backplane



Backplanes



Captive system to hold the FEBs

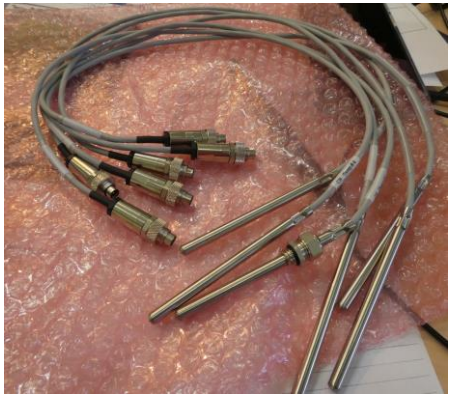
Camera Status

Cable production

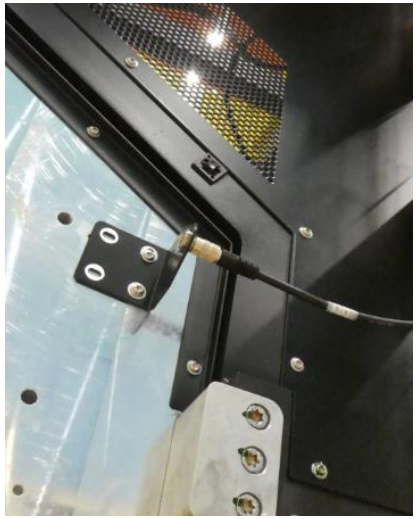
- The production of the cables (24V, 230V, 400V, sensors and control) for the first camera has been completely subcontracted as will be done for the following cameras

Sensor production and fixation

- The same production method has been applied to the cabling of the sensors.
- All sensors are equipped with their connectors (placed on mechanical support) to facilitate the maintenance



Thermal sensors equipped with their connectors



Mechanical support with its intermediate cable for a thermal sensor

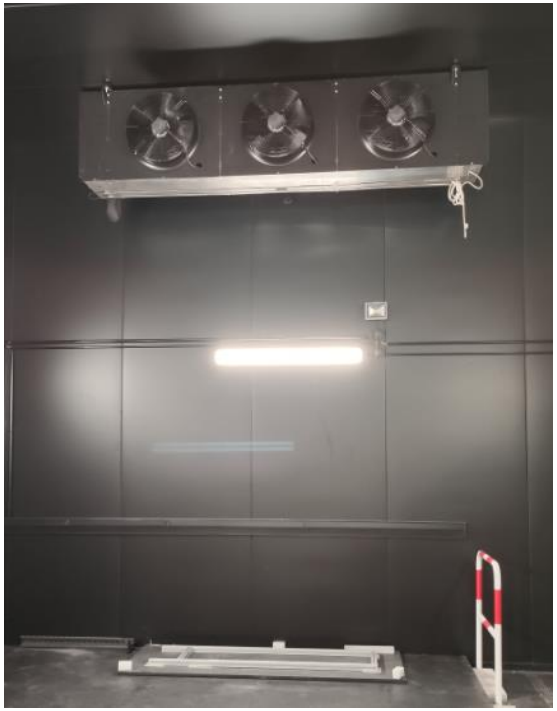
Leak detector with connector located on its mechanical support

Dark room and camera cooling facilities

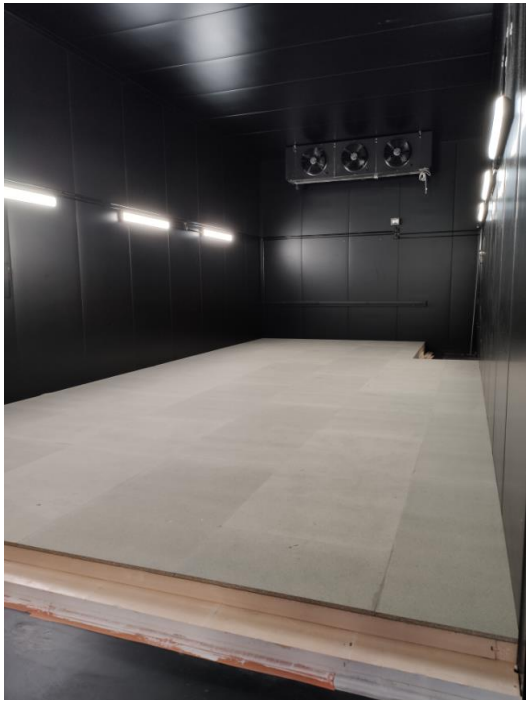
Dark room

- The cooling system intended for the dark room will allow to test the camera down to -15°C
- The floor must be thermally isolated to obtain this very low temperature

The cold group is installed on the roof of the hall



The evaporator is installed in the dark room



Floor insulation installed
The next step is the black painting

Dark room and camera cooling facilities

Camera cooling

- A tender is ready to be sent for the installation of an external cooling unit for the camera to replace the existing Lauda cooling unit
- This decision was taken after several repairs on the Lauda unit which was placed outside under a shelter and can no longer guarantee good reliability over time for future camera tests.
- The Lauda unit will then be used for camera tests during assembly, while a complete camera will be calibrated and checked in the darkroom (cooled by the new cooling unit).

Example of an external cooling unit

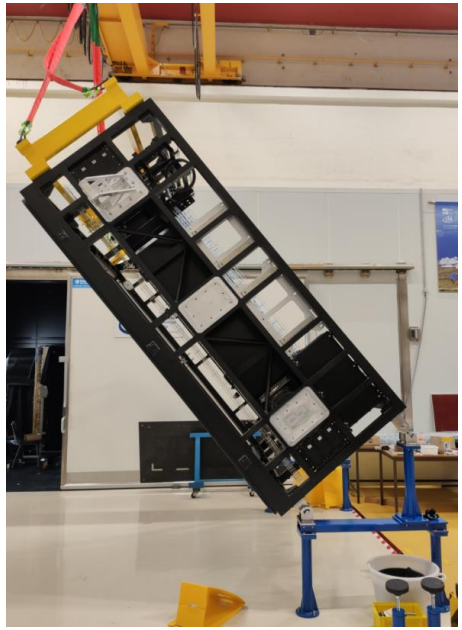
Laboratory Lauda cooling unit

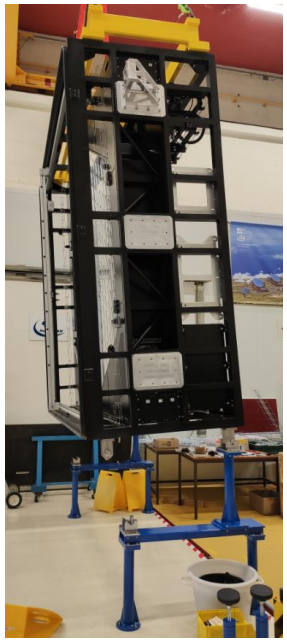
Camera handling tools

Lifting beam

- The lifting beam (in yellow) will distribute the load over the four fixing points to reduce the effort on the structure during the different handling
- With the upgraded legs system (in blue), there is no more shock related to the tilting of the center of gravity

The camera is in horizontal position. The lifting beam (yellow) in at the left





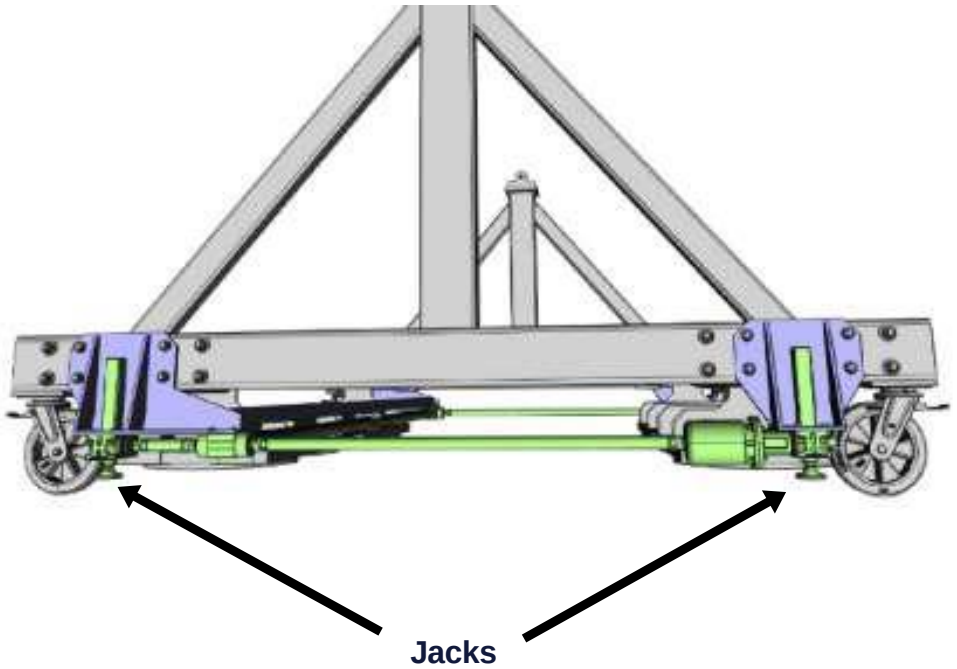
The camera rotates around the axis of the highest legs (blue)

Camera handling tools

Rotating support

- A lifting system (based on the use of 4 jacks) must be added to allow the placement of thermal insulation plates under the rotating support for cold tests

Rotating support

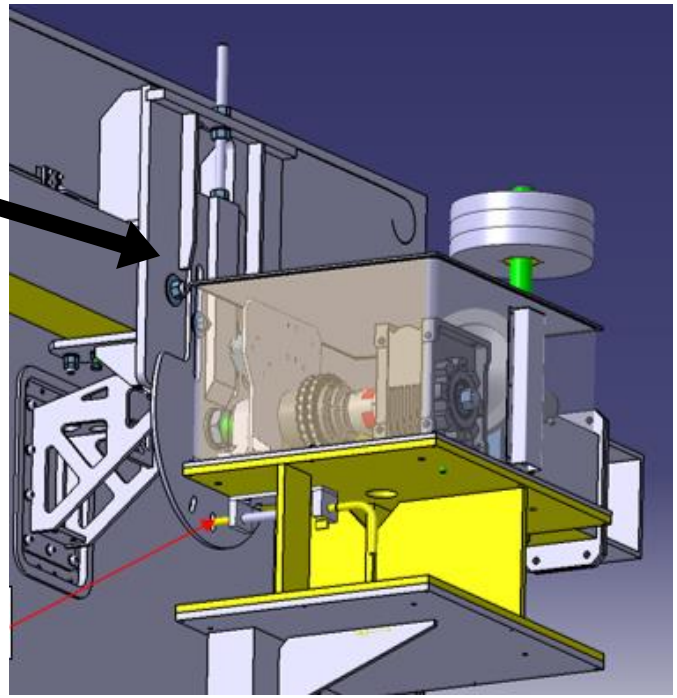


Camera handling tools

Rotating support

- The mechanical parts needed to equilibrate the camera on its rotating support are in manufacturing
- To install them, we will need to remove the frame, add two new adjustable support plate and two extension to the vertical posts

New adjustable support plate

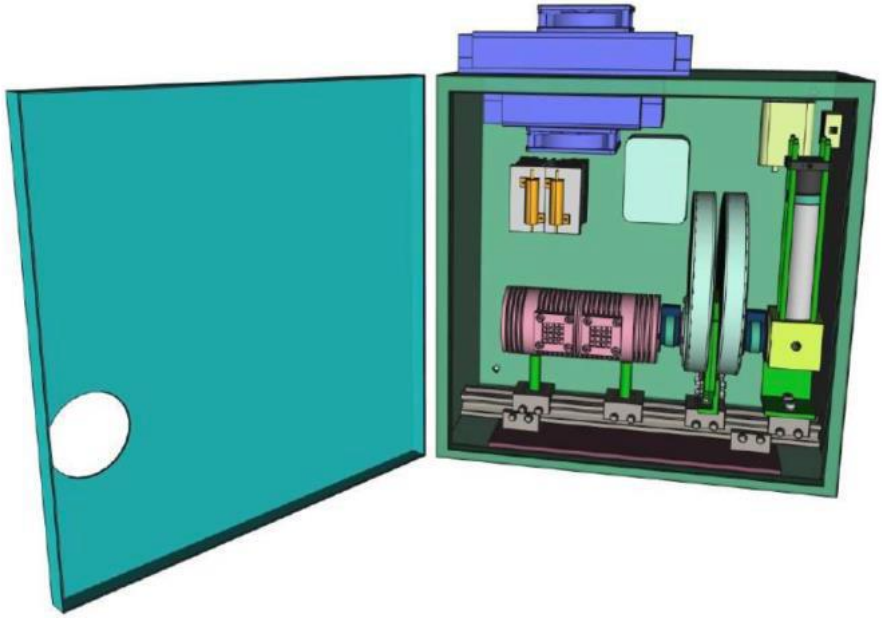


Extension to the vertical pole (yellow)

Tests and calibration tools

Laser flat field light source

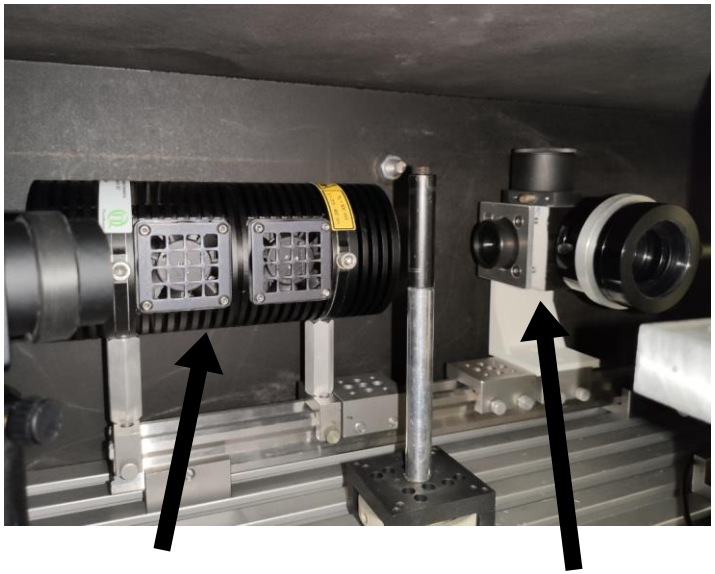
- A light source based on a Picoquant LDH-I laser head (8.0 mW Max, 375 nm, FWHM pulse < 50 ps) controlled by a Taiko PDL M1 driver is under development.
- The laser beam, followed by two motorized filter wheels (equipped with neutral density filters) is injected in a light integrating sphere to generate a flat field light source in a range of 1 to 500 photons by pixel/pulse.
- This system, located in a temperature-controlled box, will be used for camera tests over the whole temperature range.



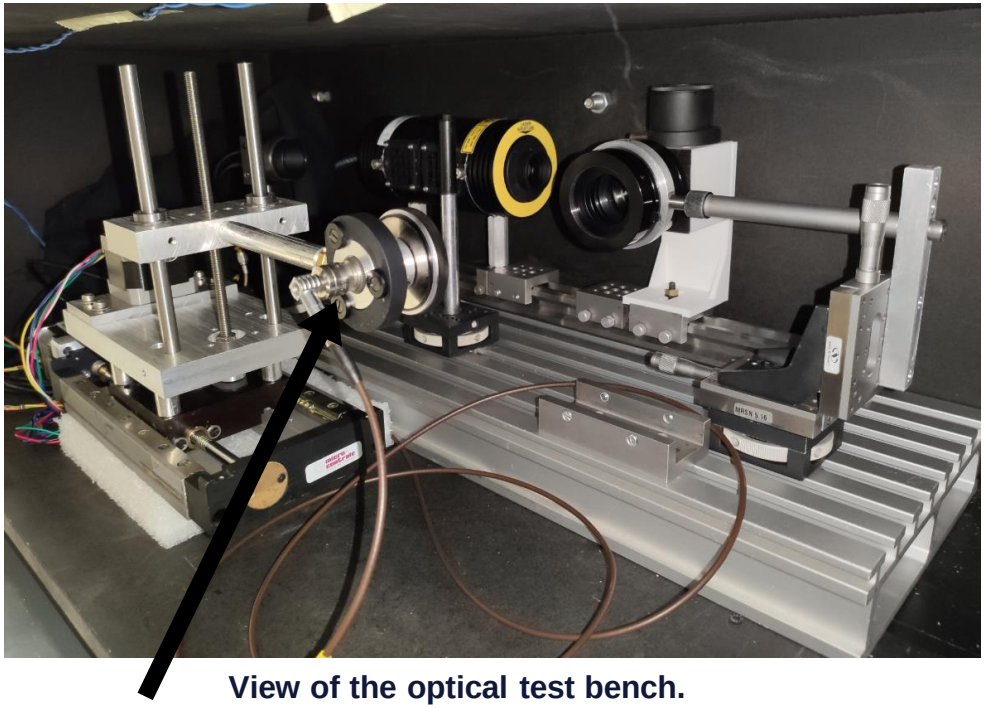
Tests and calibration tools

Laser light source

- Test bench of the integrating sphere followed by a diaphragm



The Laser head and the integrating sphere



View of the optical test bench.
A pin diode is placed on a mobile platform (X& Y) to monitor the profile of the optical beam

Planning schedule

12 janv. 2021	8 mars 2021	3; 5
19/03/2021	29/03/2021	6
9 mars 2021	12/03/2021	
31/03/2021	26 avril 2021	7; 8
31/03/2021	20 avril 2021	
19/03/2021	19/03/2021	
31/03/2021	9 avril 2021	11
1 avril 2021	9 avril 2021	14DD-7 jours
12 avril 2021	13 avril 2021	12
14 avril 2021	16 avril 2021	14
19 avril 2021	22 avril 2021	15; 18
22/03/2021	2 avril 2021	8
12 avril 2021	15 avril 2021	12; 17
16 avril 2021	29 avril 2021	18
4 mai 2021	7 mai 2021	16; 19
10 mai 2021	4 juin 2021	10; 17; 20
29/09/2021	30/09/2021	27
1 oct. 2021	8 oct. 2021	22
11 oct. 2021	12 oct. 2021	23
29/03/2021	9 avril 2021	
12 avril 2021	7 mai 2021	25
7 juin 2021	28/09/2021	10; 21; 26
13 oct. 2021	1 mars 2022	24
19/03/2021	19/03/2021	12DF-8 jours
8 sept. 2021	8 sept. 2021	22DF-15 jours
31/03/2021	31/03/2021	14DF-8 jours
28 avril 2021	28 avril 2021	21DF-8 jours
28 avril 2021	28 avril 2021	21DF-8 jours
31/03/2021	31/03/2021	14DF-8 jours
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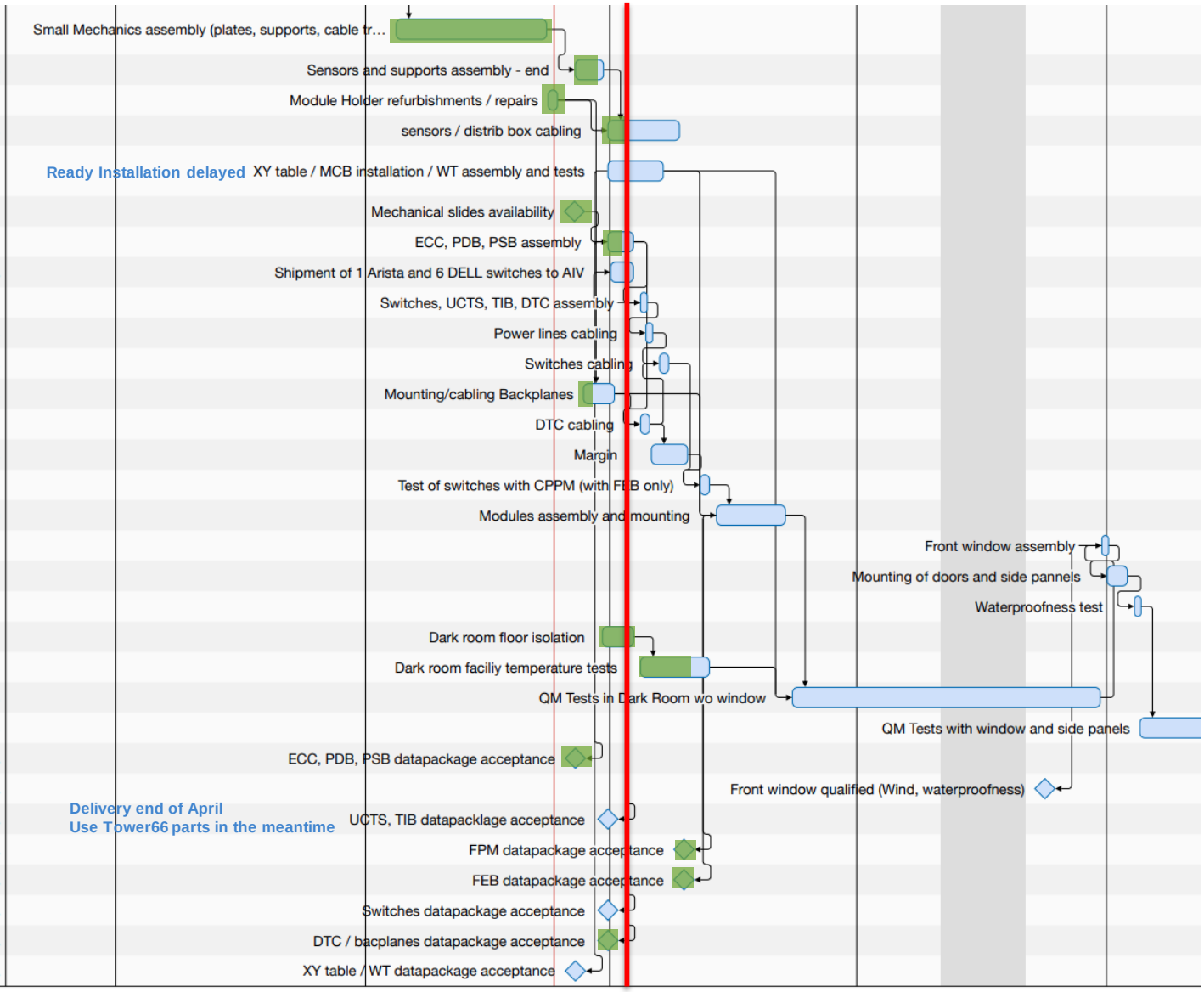
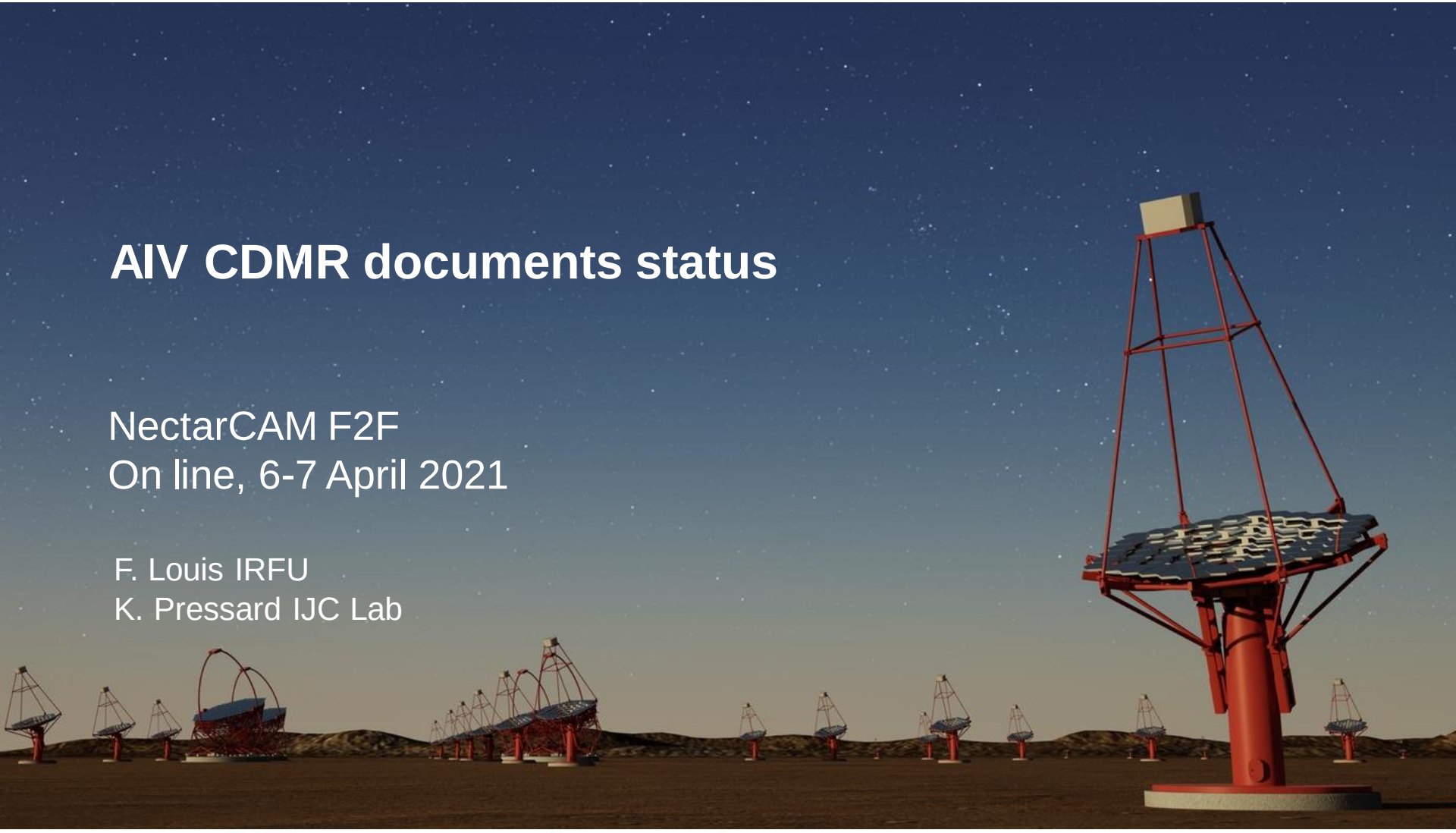
19/03/2021	19/03/2021	10DF-8 jours



AIV CDMR documents status

NectarCAM F2F
On line, 6-7 April 2021

F. Louis IRFU
K. Pressard IJC Lab



CDMR Report

Lists of RIXs that the panel recommends are completed before the first acceptance review (normal priority).

AIV RIXs, IRFU

42581 DD212 LOUIS Frédéric RAMS
"Proposed action: All **documents to be delivered in English**."
To do : Improve documentation

42618 DD069_MSTCAM-ICD-0399-IRFU_ICD_Camera_patch_panel_V1.2.pdf LOUIS Frédéric
Mechanics and Cooling
"Please add these references to the document with little text so that it's clear in the document too"
Done: **The references are added in the new version** of the document CLOSED

42542 DD204 MST CAM TN 0386 IRFU Harness GALDEMARD Philippe AIV
"I do not see the **hazard analysis** to verify the need of an emergency stop button"
To do : AI NectarCAM follow up with Karl Tegel

CDMR Report

Camera loading and maintenance tools RIXs , IJC Lab

42635 Comments on DD202 LOUIS Frédéric AIV

"The **acceptance of the retractable tunnel** as permanent component of the telescope infrastructure shall be done once a design fulfilling the specifications is presented."

Wind : lots of discussions between Kevin and Markus about how to anchor the fixed structure to the foundation

UV: best UV-proof tarp found is guaranteed for 10 years

Hailstone: when folded, the tunnel tarp lies on the aluminum tunnel structure

42639 Comments on DD209 LOUIS Frédéric AIV

True that DD209 is so far a list of the applicable requirements for the **Mounting and maintenance tools**

"The verification of the design vs. the requirements shall be completed before starting the production."

Need wait for final ICDs of the trolley to finalize the structure calculation

42579 DD208, DD209, DD210 and maybe DD211 LOUIS Frédéric RAMS

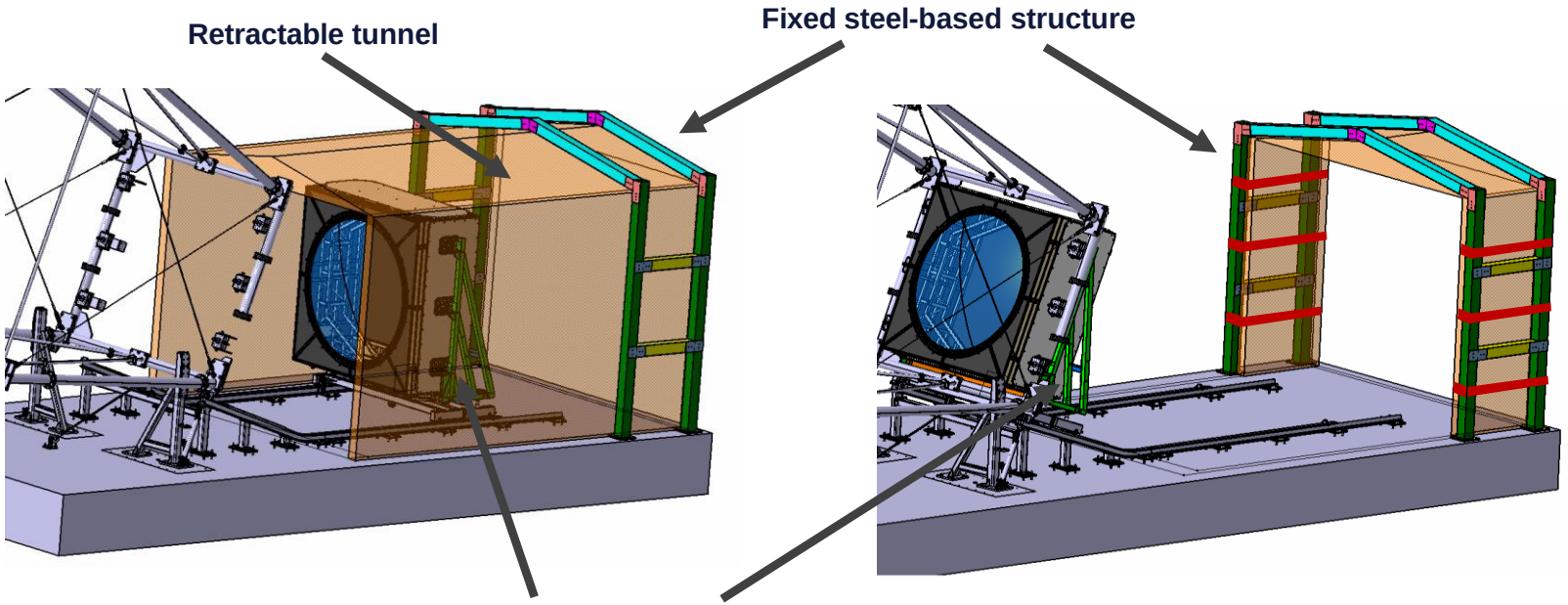
"All 3-4 documents contains references to each other, containing **design, performance verification, manual and manufacturing of the Berlin mounting tools**. Difficult to follow. I suggest to have one document to combine in a structural way all info needed."

To do : Improve documentation

CDMR Report

Tunnel used for
- tests after the arrival of the camera on site
- standard preventive and corrective maintenance
- major maintenance
- all operations will be performed with a good sunlight protection for the optical modules

When not used the tunnel is folded and held by straps (in red)
- minor rear camera maintenance doesn't require to dismount the camera from the MST structure.
- standard scaffold is plan to be used to access the components



Camera – CSS – CMS interface (in green)

Design of the NectarCAM – MST mechanical interface to be updated from Berlin.
Number of the NectarCAM – MST mechanical interface to be defined (discussions with MST structure).