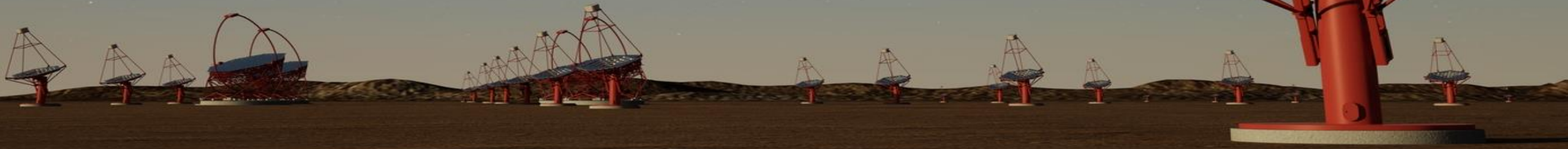


# Camera Window & Shutter

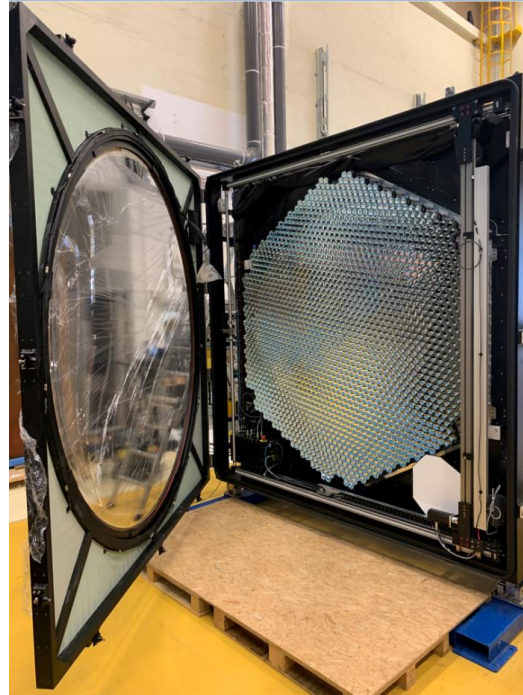
NectarCAM F2F, BORDEAUX, 12 october 2022

Mathieu ROCHE – Sean PERARD – Thierry REPOSEUR – Denis DUMORA (*LP2iB*)



# Status Camera Window 1

➤ **Delivery** at IRFU on June 2022 without Shutter



➤ **Window leak test**

- **performed and validate** before shipment of the window to IRFU





## ➤ LEDs

- Tests validated on the window @ LP2iB.(connection SUBD37 & operation).
- Lower intensity on 2 LEDs identified at IRFU → no requirement on this topic ?

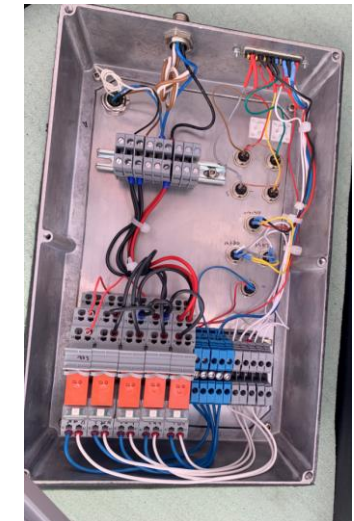
└→ If necessary, test bench to check intensity could be performed.

- Cable tray must be optimized (solution proposed and validated)



## ➤ ECC software and control shutter box

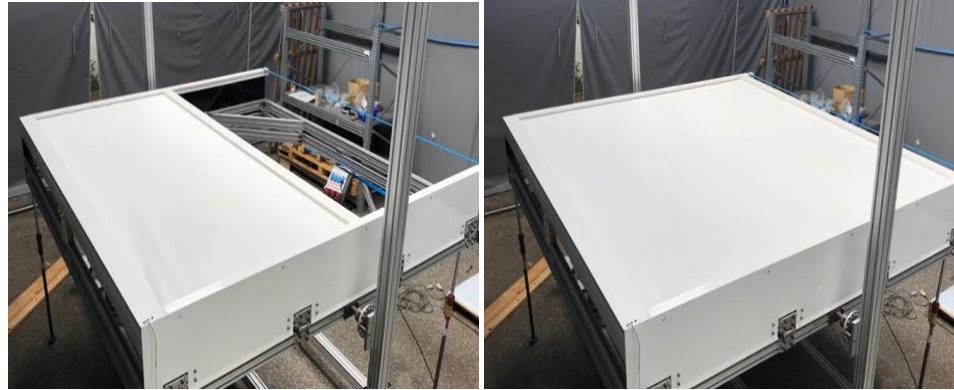
- Shutter ECC software (D.DUMORA) tested and validated @LP2iB .  
→ No test with all NectarCAM ECC software.
- Control shutter box integrated and tested with shutter, sensors and ECC @LP2iB.



# History of Shutter Camera Window

## Reminder :

- Why canvas roller shutter ?
- Possible horizontal operation.
- Minimized space and mass.



**Sept 2020 :** procurement of 1st shutter ( selected for its minimum size and its validated horizontal operation).  
Issue : no guarantee for wind resistance requirement.

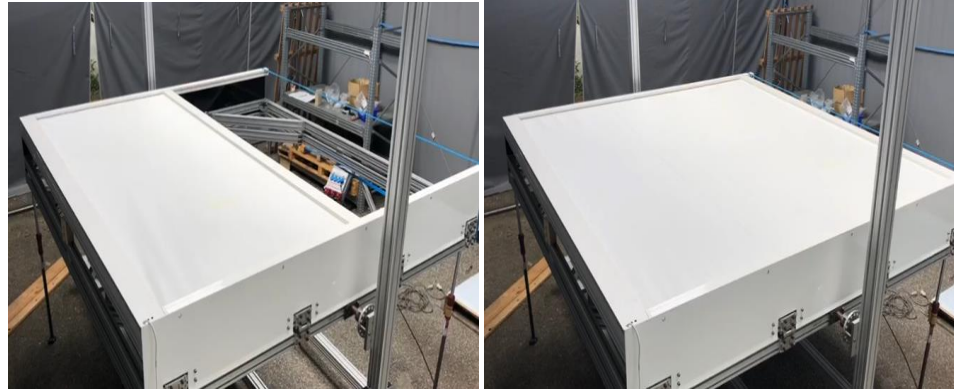
**April 2021 :** test procedure based on EN 13659



**September 2021 :** requirement to integrate manual control → need to change shutter.

**November 2021 :** test validation from CTAO

# History of Shutter Camera Window



**Jan 2022** : supplier announce delay of 2months

**March 2022** : supplier announce other delay → **May 2022** : New delay.Suspended order.

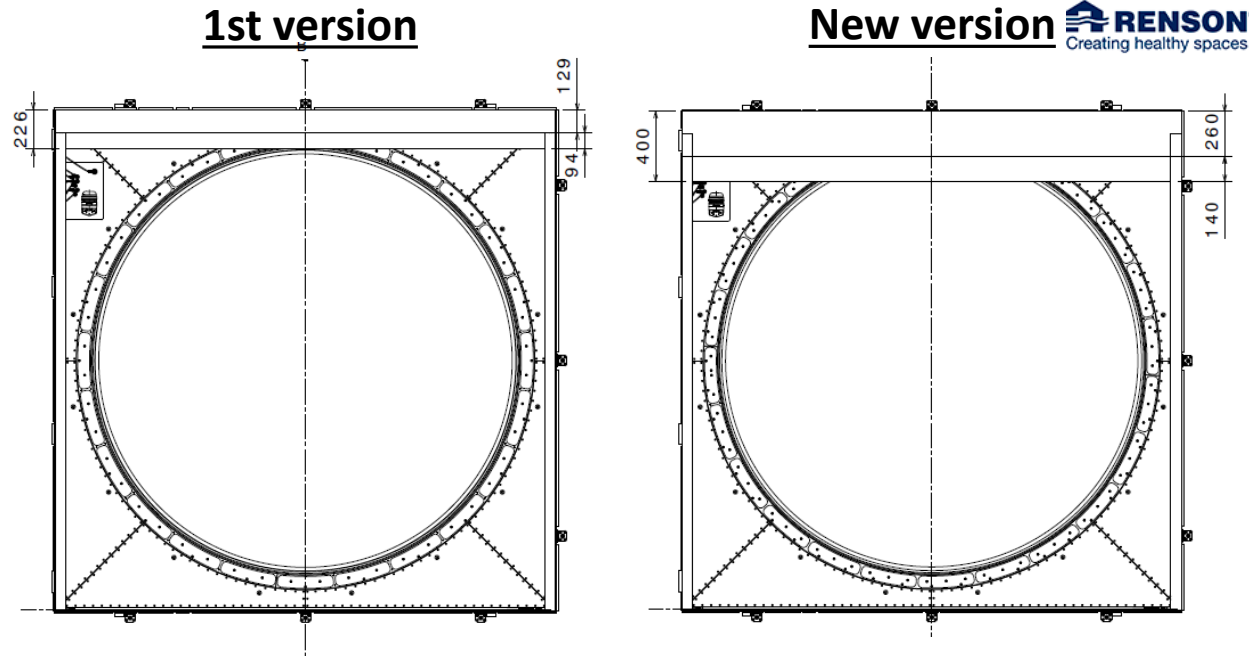
**July 2022** : new supplier found → requirement certified by tests from supplier.



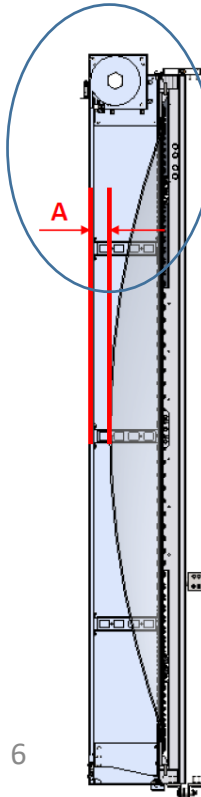
**Sept 2022** : Order ready for new shutter  
Identification new issue → order in stand by.

# New Shutter Camera Window

- New issue → Shutter masks pixels and weight bar collide window



## LST cam Shutter



- **Solution** : Investigation in progress if the shutter cannot be advanced and raised  
(see LST Cam Shutter)

*this shutter can be available on december*

# PMMA Window

- **Need 4 more PMMA shinkolite sheet for NectarCAM window 5 to 9**
  
- **Several Contacts for PMMA Shinkolite sheet :**
  - Mitsubishi chemical corporation / **inconvenience** minimum order 25 sheets.
  - Masahiro Teshima from LST / 4 sheets may be provided (spares from LST).
  
- Forming window company ready.Waiting for our supply.

## 10 normal RIXes assigned :

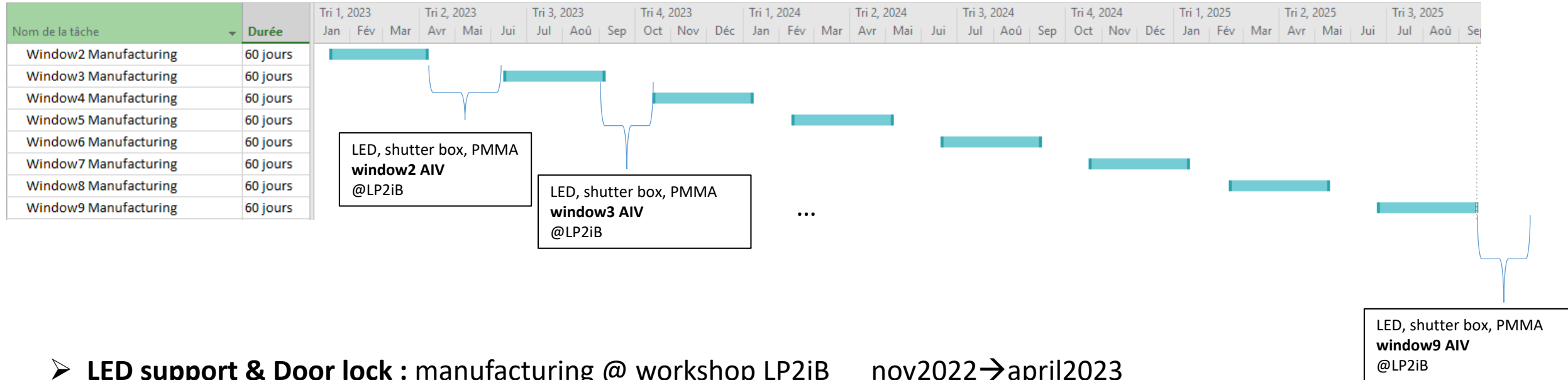
- Couple of requests related to the shutter:
  - Friction test (Canvas-PMMA window) & Risk of shutter touching  
→ **test bench under construction**
- Update Camera Design Report & other docs.
- Incomplete or missing maintenance documentation:  
major task to write the maintenance manuals

44210	Duty	Assigned	Normal	DD064 Marked up version
44208	Duty	Assigned	Normal	DD063 Marked up version
42939	Duty	Assigned	Normal	RIQ: maintenance of the front ...
42937	Duty	Assigned	Normal	RIQ: scratch resistance of PM...
42933	Duty	Assigned	Normal	RIQ: risk of shutter touching P...
42929	Duty	Assigned	Normal	RIQ: Sealing of camera housing
42928	Duty	Assigned	Normal	RIQ: mounting interface camer...
42827	Duty	Assigned	Normal	DD061 NectarCAM front door ...
42815	Duty	Assigned	Normal	DD061 NectarCAM front door ...
42664	Duty	Assigned	Normal	DD060: Front Door Design rep...
42641	Duty	Assigned	Normal	Comments on DD059
42568	Duty	Assigned	Normal	DD060 Ch 2.4 Shutter
42540	Duty	Assigned	Normal	DD067 NectarCAM Front Door...

**Closure of the RIXes: currently not the priority for Mech. WP.**



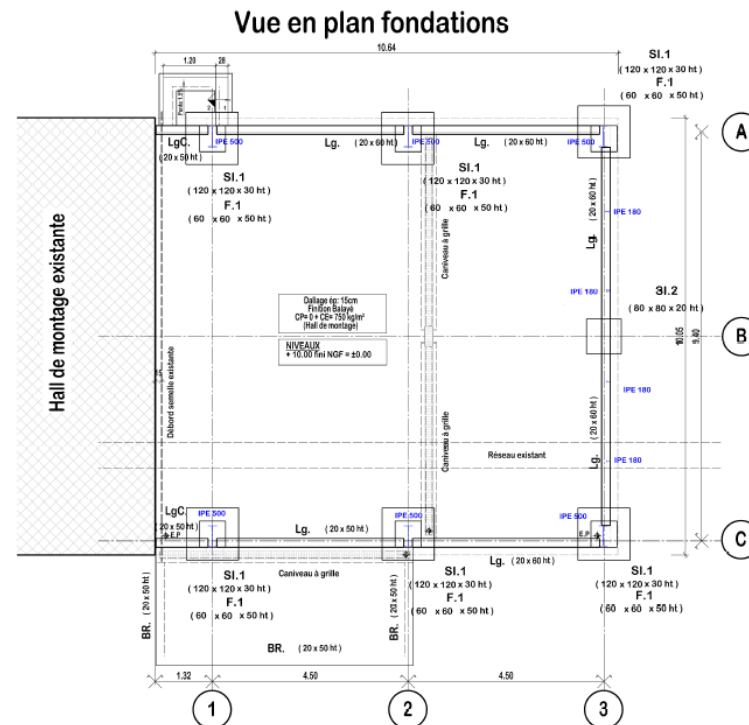
# Production planning NectarCAM 2-9



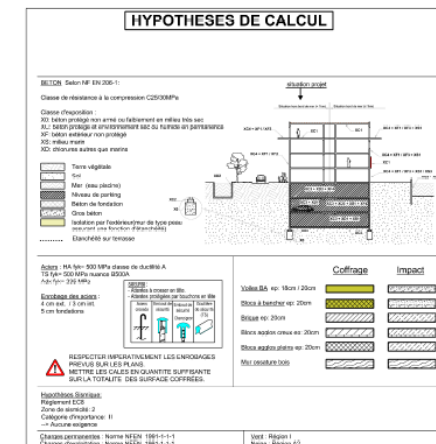
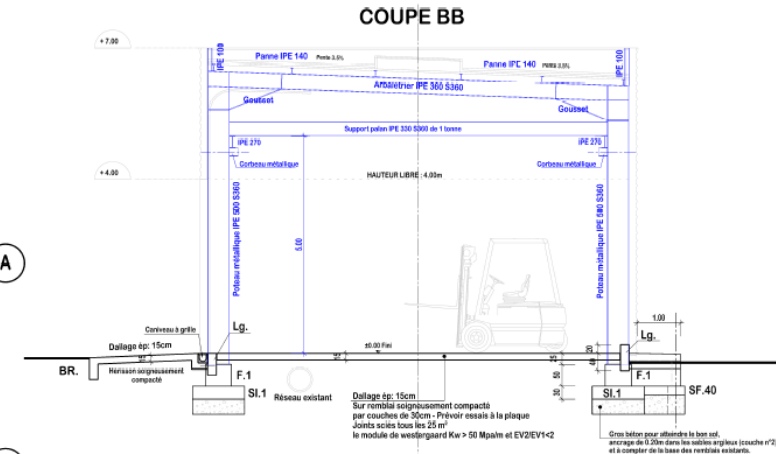
Delivery @IRFU  
NectarCAM window9  
Nov 2025

- **LED support & Door lock** : manufacturing @ workshop LP2iB    nov2022→april2023
- **Sensors,connectors,LED and Control Shutter box Cabling** : call of sub contractor.
- **Assembly, integration & test @LP2iB** : PMMA window, shutter,LED , sensors, Control Shutter box ...

- **Production building ready for beginning 2023**
- 100m<sup>2</sup> with Hoist for assembly and integration.



### Vue en plan Charpente métallique



# Call for tender status

- CCTP for Window structure ready. Need to discuss with Oscar.F for details
- DR15 CNRS aware
- Expected publication for November.