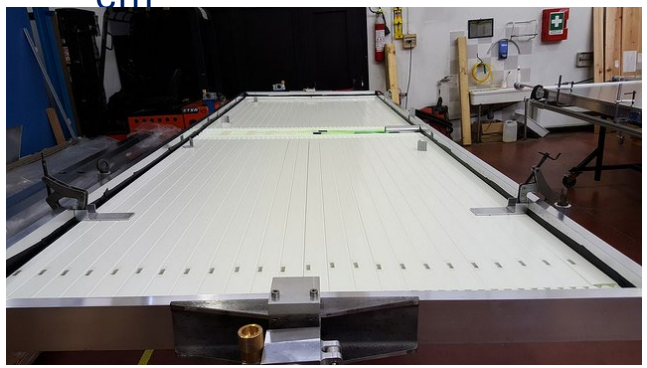
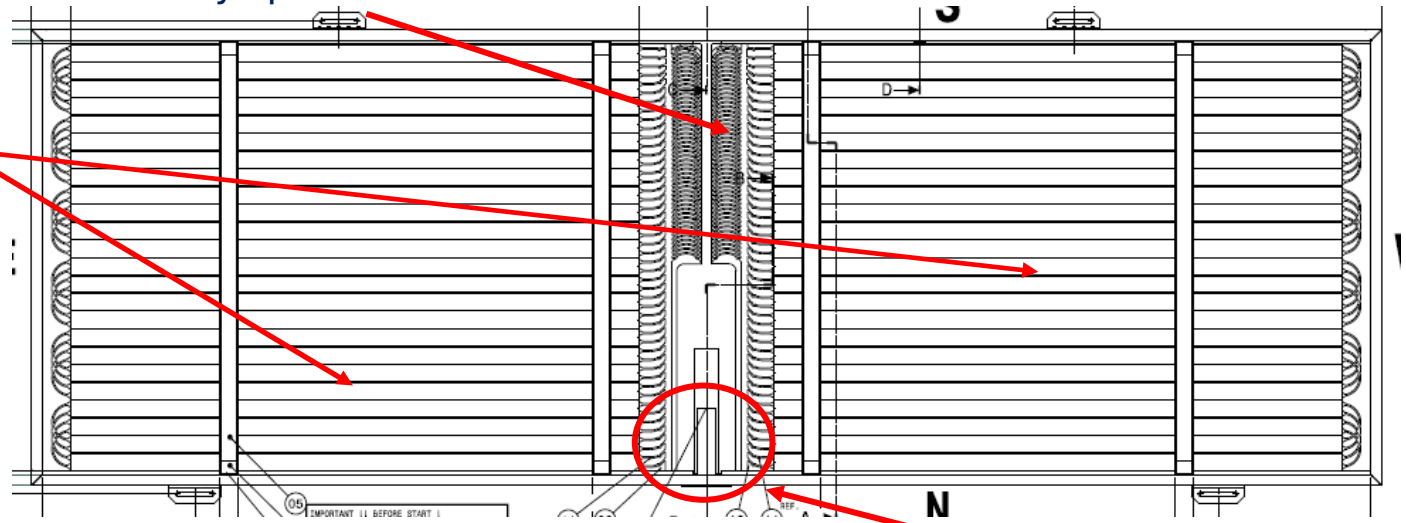
# AugerPrime
# Scintillator Surface Detector
# OPERATIONS READINESS REVIEW
# The Detector

# SSD: The Scintillator Surface Detector

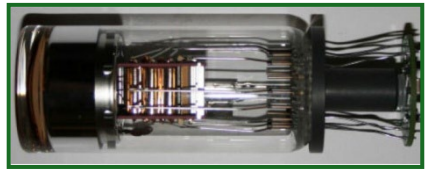
Light collected by optical fibers

Two panels of extruded scintillator of 120 cm X 160 cm





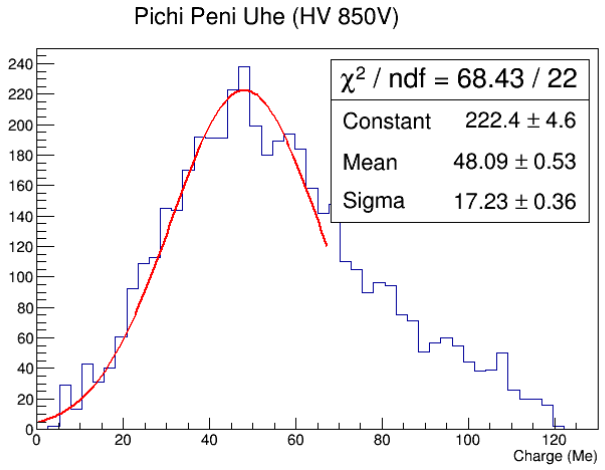
Large dynamic PMT





Aluminum Enclosure

Calorimetric Particles Counting thanks to online calibration.

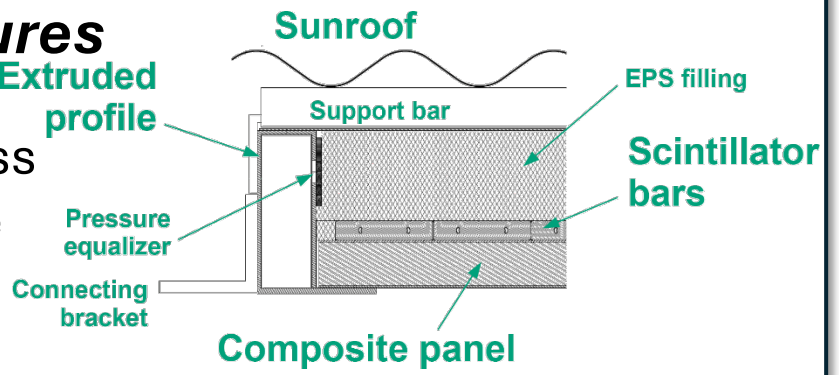



$$\text{N. Particles} = \frac{\text{Tot. Charge}}{\text{MIP Charge}}$$

# SSD: The Scintillator Surface Detector

## *The enclosures*

- Robustness
- Light tightness
- Maintenance




Combination of aluminum bars and composite panel.
Two separated volumes
PMT easily to extract.

## *The active detector*

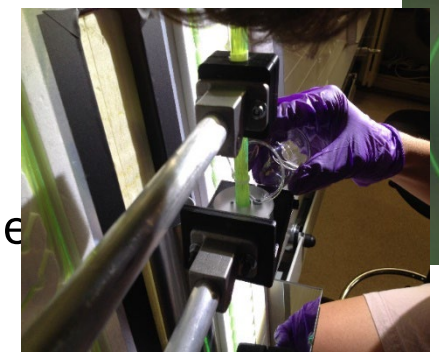
- Uniformity
- Dynamics
- Durability
- Low maintenance
- Cost

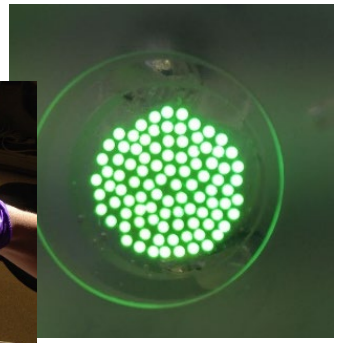



Plastic extruded scintillator with holes.
Optical fibers to collect the light
Foam “routers” for easily assembling and robustness

## *The active detector*

- Uniformity
- Dynamics
- Durability
- Low maintenance
- Cost

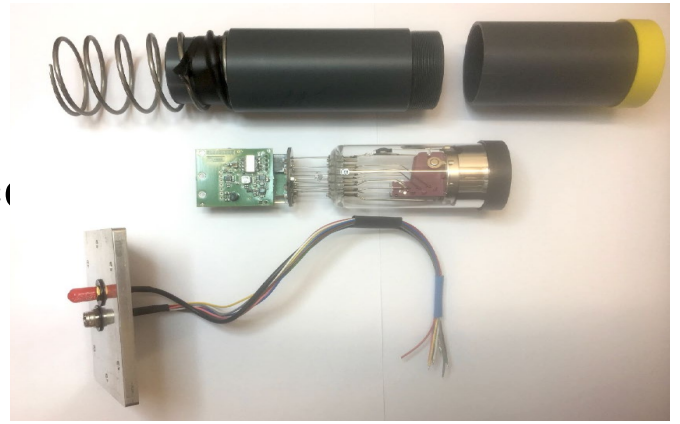




Fibers Kuraray Y11(300)M read from both ends.
Fibers bundled and glued in a PMMA cylinder

## *Light collection*

- Large dynamics
- Easily maintenanc
- Stability



Hamamatsu R9420 eight-stage dynode linear up to 120 mA with modest gain of $5.0X10^5$

# AugerPrime
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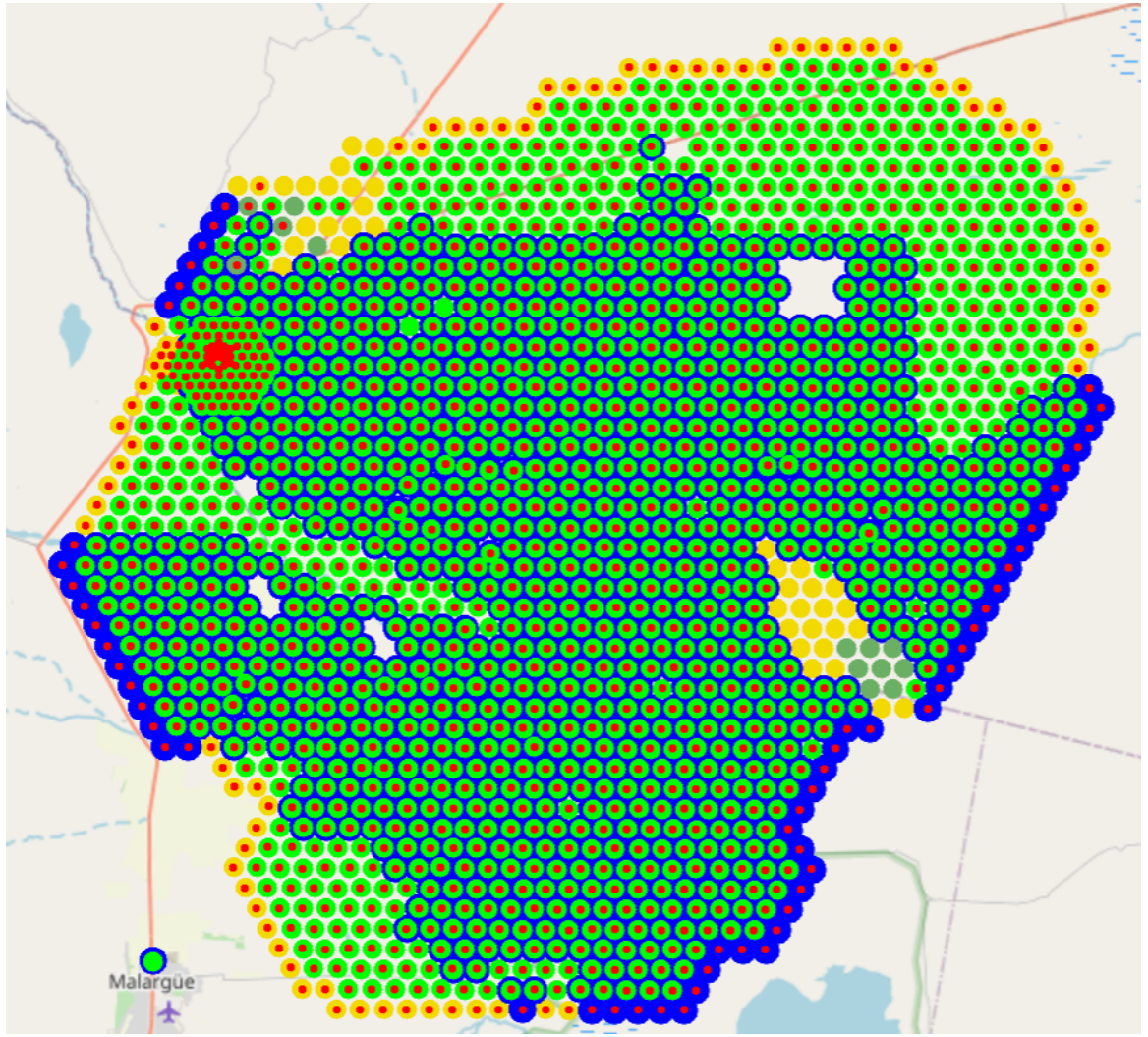
# The Status

**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

**Components: Almost Yes.**

1518/1519 detectors produced
1471 detectors deployed
1460 detectors with PMT installed
Still two regions not completed. (23 detectors)




7 Detectors with problems.

- 4 production problems (not deployed)
  - 3 fixed: March 2023
- 1 damaged during shipping (not deployed)
- 1 fire problem in the field (removed)
- 1 water problem in the field (removed)

17 spare detectors + 3 fixed.

**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

**Components: Almost Yes.**

PMTs problems mainly production:

- 9 PMTs fault during installation (production)
- 1 PMT removed for water problem
- 1 PMT has to be removed for lightning strike.
- 20 PMTs in the field with problems
  - 12 not working since 1° day (production)
  - 6 stop to work after at least 10 days

1580 PMTs shipped to Malargue
1460 PMTs in the field (23 stations need PMTs)

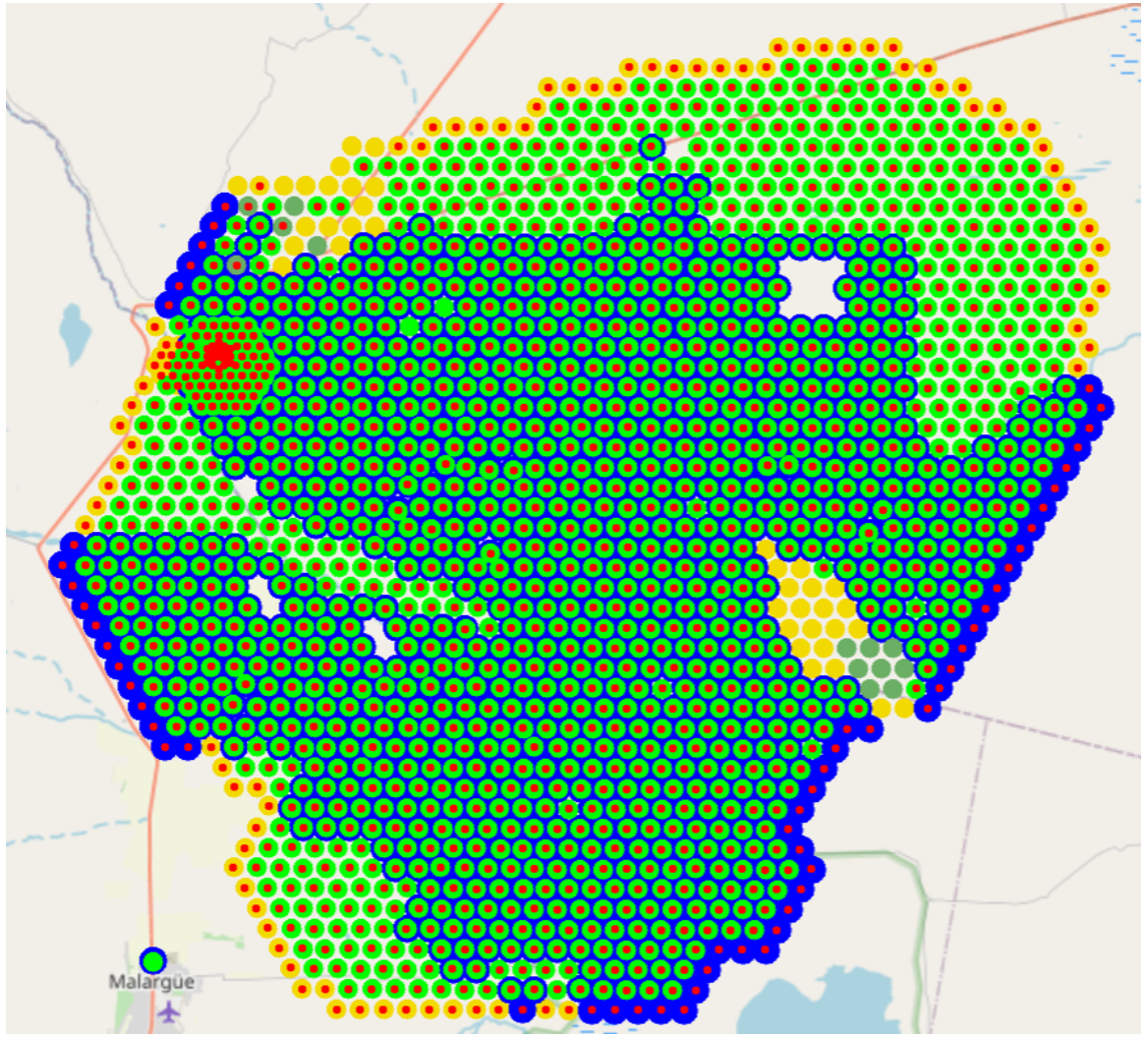
PMTs with production problems 21

- 9 PMTs fault during installation
- 12 installed but not working

PMTs fault in the field 10

- 2 for external reasons
- 6 (check need)

Spare PMTs at Malargue 66 (....)



**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

**Components: Almost Yes.**

Cable protection problem:

## Cable protective jackets

Sewing thread is not UV resistant, so it breaks

A temporary solution: use UV-resistant zip ties to keep the jackets closed

Possible alternatives identified, but not available in Argentina – work in progress

New cable protection installed in few SD

**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

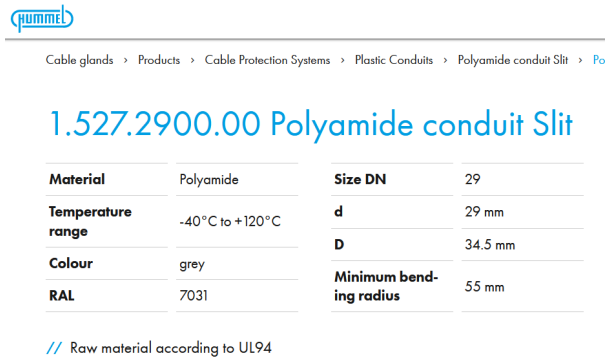
**Components: Almost Yes.**

Aging test in specialized laboratory in Lecce.
Reproduced the damage due to combination of temperature change and UV exposure in the lab.

The string is destroyed after an equivalent time of exposure 10.2 months at Malargue with an uncertainty of 20%. This result is well in agreement with the experimental evidence in the field.

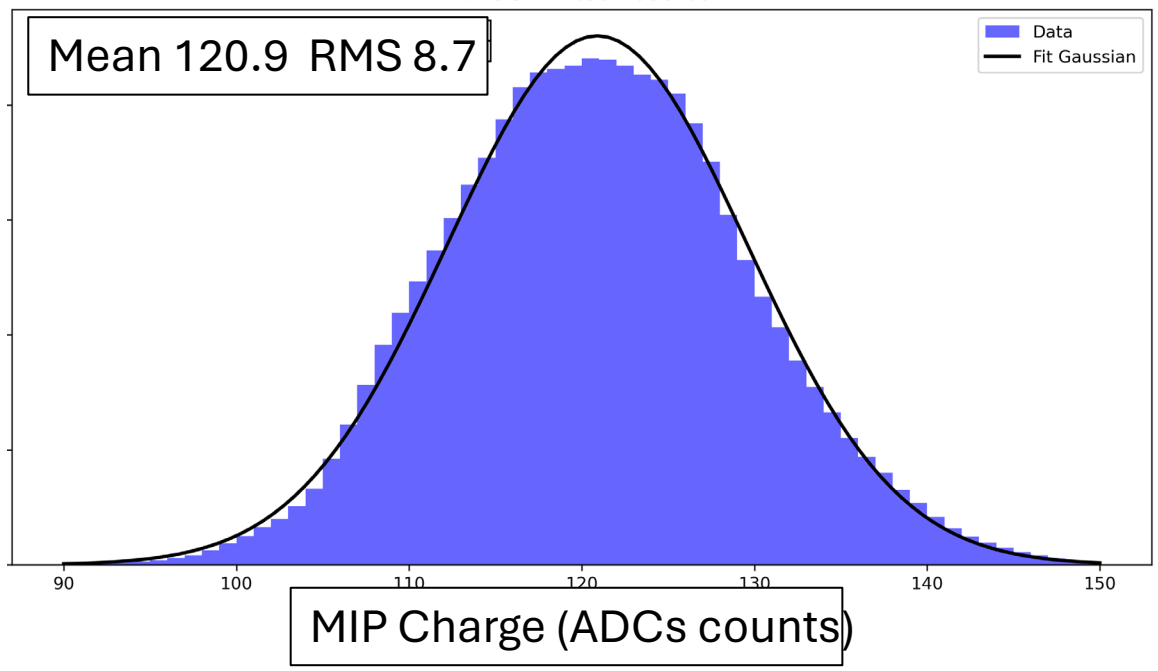
The new tube lost its mechanical property in a time 10 times longer.

Tube protections for all the detectors have to be shipped to Malargue.

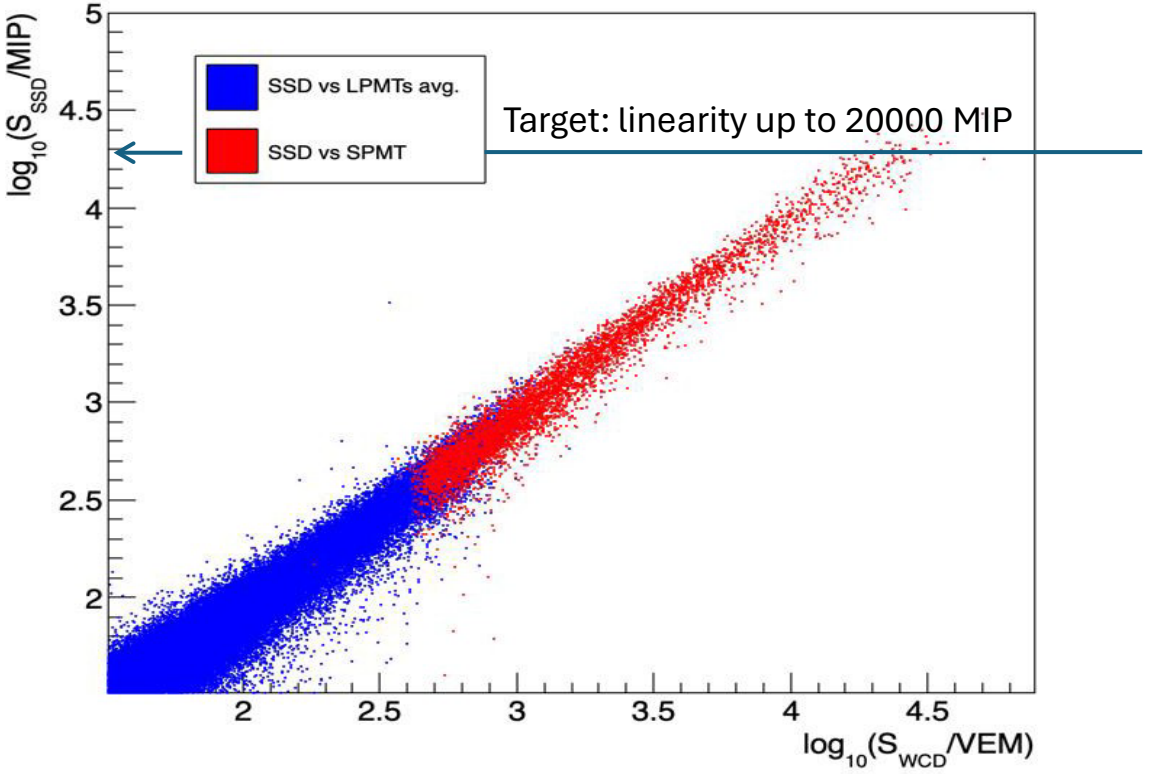



**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

**Operation and performance: Yes.**




MIP distribution of the SSD in acquisition

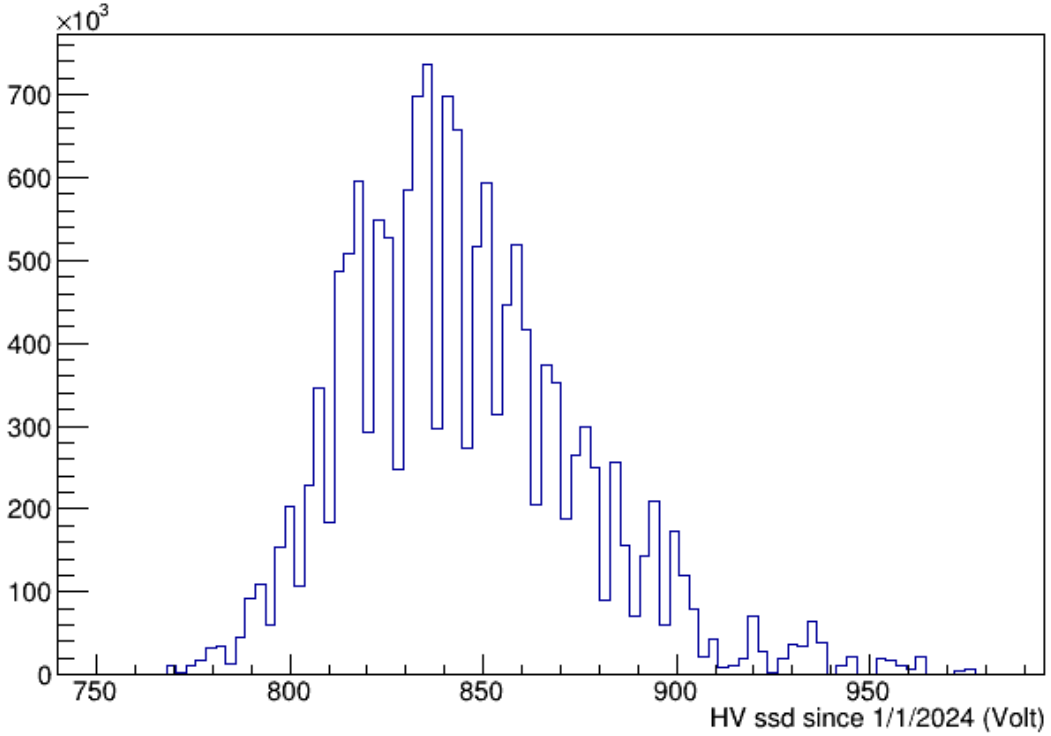


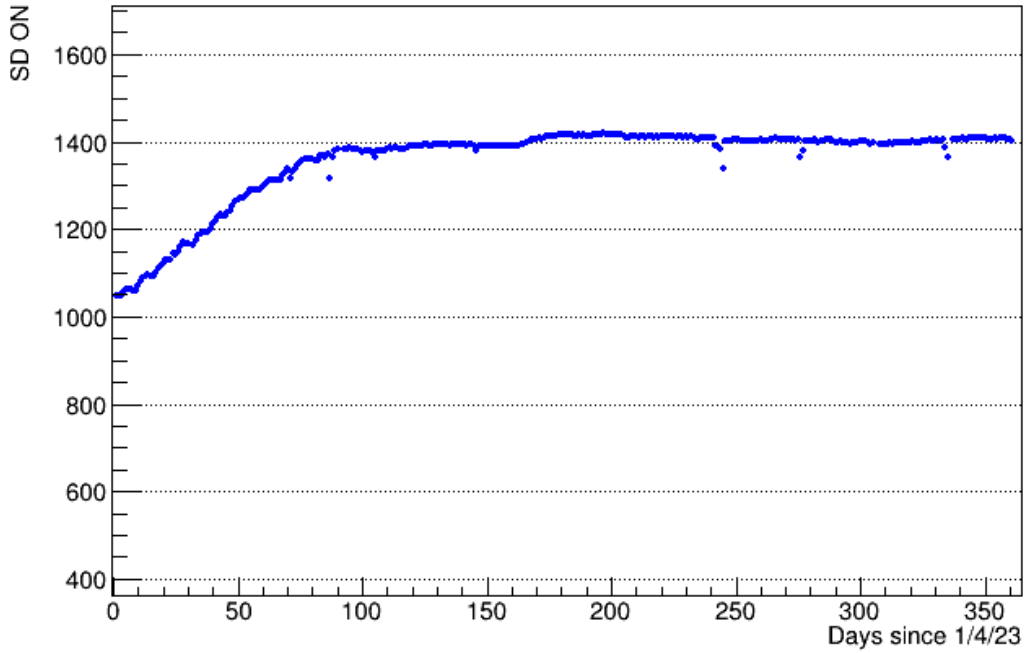

SSD linearity check with WCD and sPMT

**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

**Software**: Setting of the HV in UUB, done! The **calib** code inside UUB sets the HV at expected values.
The HV of the PMTs shown a excellent stability.

MIP determination and calibration in Offline.

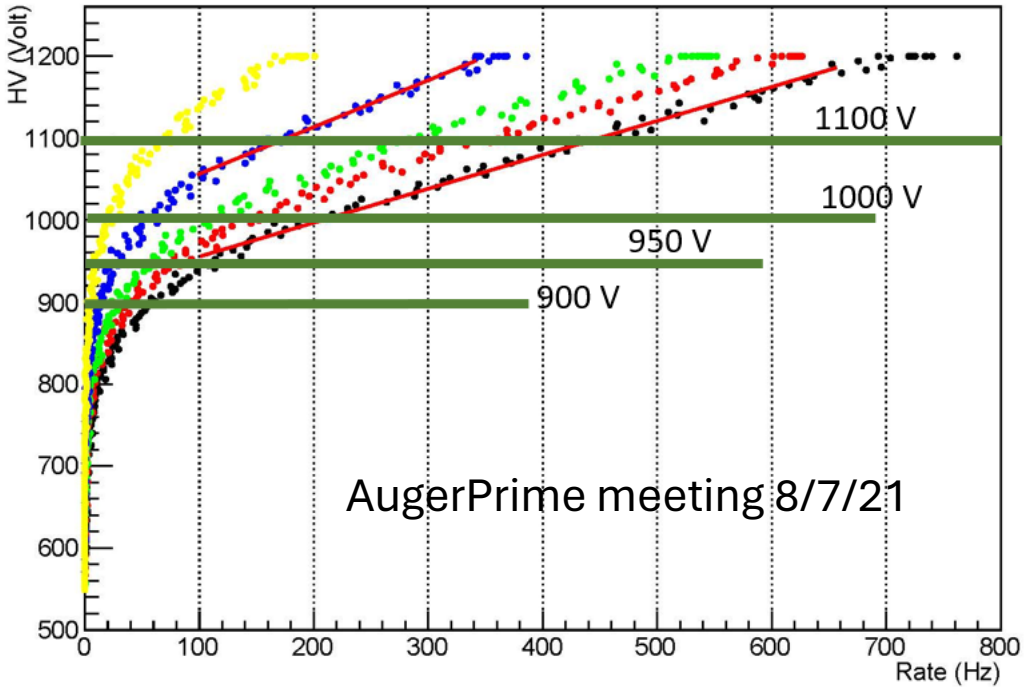


**Are components and software fully commissioned, operating reliably, and meeting performance requirements?**

**Software**: Setting of the HV in UUB, done! The **calib** code inside UUB set the HV at expected values.
The HV of the PMTs shown a excellent stability.

The reference value of the routine to correctly fix the HV has been identified in 2021




Software rate_dm

HV scan with fixed threshold

- THR 55 ADC above baseline
- THR 65 ADC
- THR 75 ADC
- THR 100 ADC
- THR 150 ADC

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# Maintenance and Spares

**Are special tools and testing equipment required for routine maintenance present and available to the Observatory staff?**

**The detectors do not need regular maintenance. The detectors seem very robust and stable.**

It is still necessary to fix the cable protections (see previous slides). We need to define a strategy to fix this problem

Only two detectors with problems in the fields up to now:

- 1 detector damaged by fire
- 1 detector with water problem (production?)

PMTs problems mainly production:

- 9 PMTs fault during installation (production)
- 1 PMT removed for water problem
- 1 PMT to be removed removed for lightning strike.
- 20 PMTs in the field with problems
  - 12 not working since 1° day (production)
  - 6 stop to work after at least 10 days

**First detectors deployed in 2018!!**

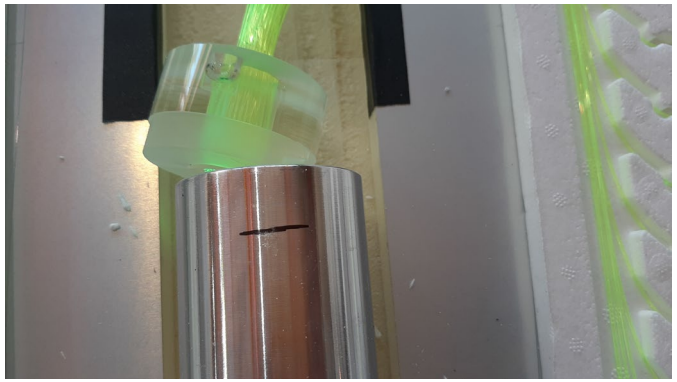
**Are special tools and testing equipment required for routine maintenance present and available to the Observatory staff?**

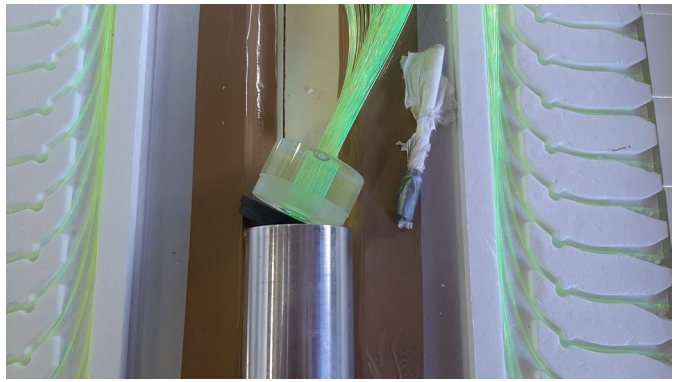
**The detectors do not need regular maintenance. The detectors seem very robust and stable.**

Possible maintenance routines:

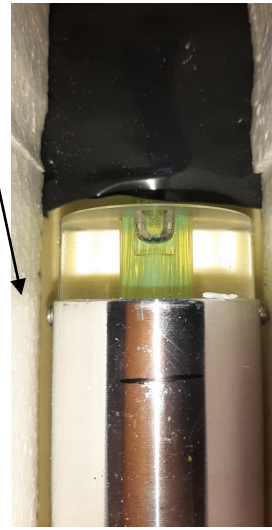
1. Substitution of a PMT
   Not a problem for the staff. Not special tool required. Needed only same alu tape.
2. Substitution of an SSD.
   Procedure know to the staff. NEEDED the truck used for the deployment. NEEDED the transportation supports used for the deployment. Few standard tools for removing and installing.
3. Fixing a PMT in SDECO. **Procedure not implemented**.
   The rate of PMT failure very low (about 7 up to now). Without a relevant change of the failure rate there are enough spare until 2035. A test facility is in preparation in Wuppertal.
4. Fixing a SSD in the Assembling building.
   Three detectors has been open and fixed in the AB with the help of the staff. The fixing is possible. The procedure depend on the damage. Necessary the help of experts from EU.

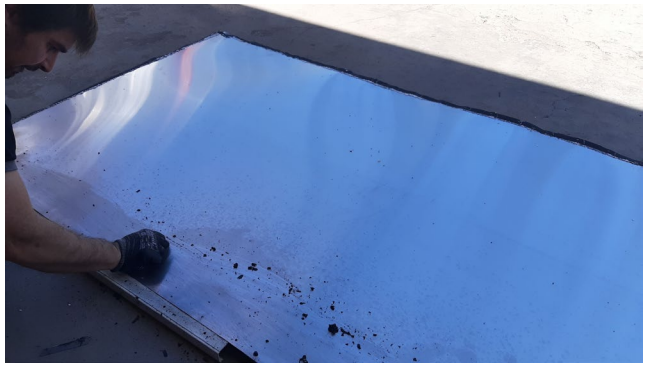
**Case 2 and 3** Cookie problem: cookie misplaced.



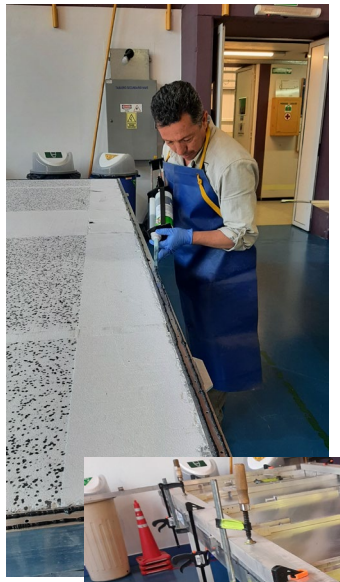


Simple repair (placing screws)

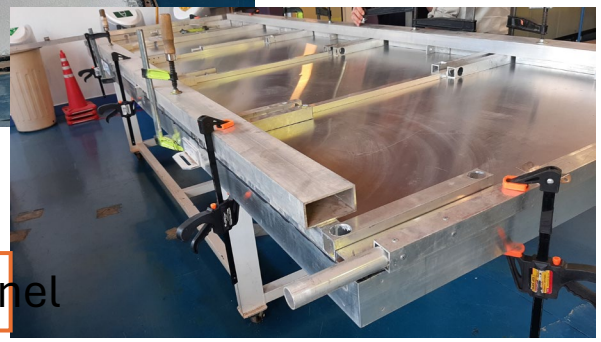




Cleaning and Flattening the top cover (long and tedious work)



sealing



Some difficulties to optimize the curing given the presence of the bars on the upper panel

**Are spares available on site as required? Have reliable sources for all spare parts, tools, and consumables been identified for future procurements? Is there a long-term plan for component repairs or replacement?**

See also previous slides.

Detectors: There are 17+3 spare detectors. The estimation of the detector damage (excluding the production problems) is below 1 detectors per year. Therefore, there are enough spare until 2035.

PMTs and ISEG base: almost 66 spare PMTs already in Malargue. In addition, 34 PMTs assembled + 21 with only ISEG base in EU (thanks Ioana). **Assuming a failure rate of 7 PMTs per year we have spare for more than 10 years.**

Roof: there are 150 spare roofs in Malargue. The roof is time to time damaged by the hail. Also if the roof is deformed the detector is not affected. So, substitution is not necessary. More serious problems with stealing of the roofs near roads.

Cables: only 10 spare. Same situation for alu-box
(**Critical**) Not easy procurement of the cables.

**Evaluate the annual requirement of resources (person-power & costs) for routine operation and maintenance for each subsystem, including materials, equipment. Discuss anticipated rates of failures and frequency of repairs and replacements.**

Failure rate very low. Frequency of repairs manly due to external factors. It is low. The impact on the Observatory of the maintenance could be minimal.

Assuming that the current failure rate is underestimated by a factor F there are spare parts for…

| | | | Understimation Factor | | |
|---|---|---|---|---|---|
| Component | Failure Rate | Spares | 1 | 2 | 5 |
| | | | Years with spares | | |
| SSD detector | 1 | 20 | 20 | 10 | 4 |
| SSD PMT | 7 | 121 | 17 | 9 | 3.5 |
| Cable | 2 | 10 | 5 | 2,5 | 1 |
| AluBox | 1 | 10 | 10 | 5 | 2 |

# AugerPrime
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# Documents

**Is a complete list of equipment and components including part numbers and vendor contact information available?**

**Yes: minor update necessary in document saved at CERN.**

Vendor of protection cables and vendor of the gasket.

| | |
|---|---|
| **Document:** | SSD Production Plan |
| **Version:** | 2.0 |
| **EDMS ref.:** | 2042064 v.2 |

### 5.2 Procurement of the parts

Several institutions in EU collaborate in the procurements of the parts. Each institution is responsible of quality check and specification checks following documents R1 and R2. The larger fraction of the small mechanical parts is procured from each AIT and PMTAT. More relevant parts or parts that are more sensitive are procured or produced by one or two only institutions for logistics or opportunity reasons.

List of the more relevant parts with the Institution in charge for the procurement or production and company of origin (if applicable)

| Component | Responsible Institutions | Company |
|---|---|---|
| Scintillator bar | IKP-KIT | FNAL , Fermilab Chicago US |
| Optical Fiber | IKP-KIT, INFNLE, RWTH | Kuraray, Jp |
| PMT | BUW | Hamamatsu, Jp |
| PMT bases | BUW | ISEG, Germany |
| SSD mechanical support | NIKHEF | MCB, Netherland |
| Sandwich panels | IFIN-HH, LPSC-IN2P3, INFNLE | WESS Chemie Germany, CEL Italy |
| S610 OttoColle | AIT lines | Otto-Chemie Germany |
| Optical Cement Eljen-500 | AIT lines | Eljen Technology, Texas, US |
| Optical terminal (cookie) | IKP-KIT | Local workshop |
| Welded Frame | IFJ-PAN | GRUPA KETY S.A, Poland |
| Routers | INFNMI | Termoblock, Italy |
| PMT flanges | IFJ-PAN | Local workshop |

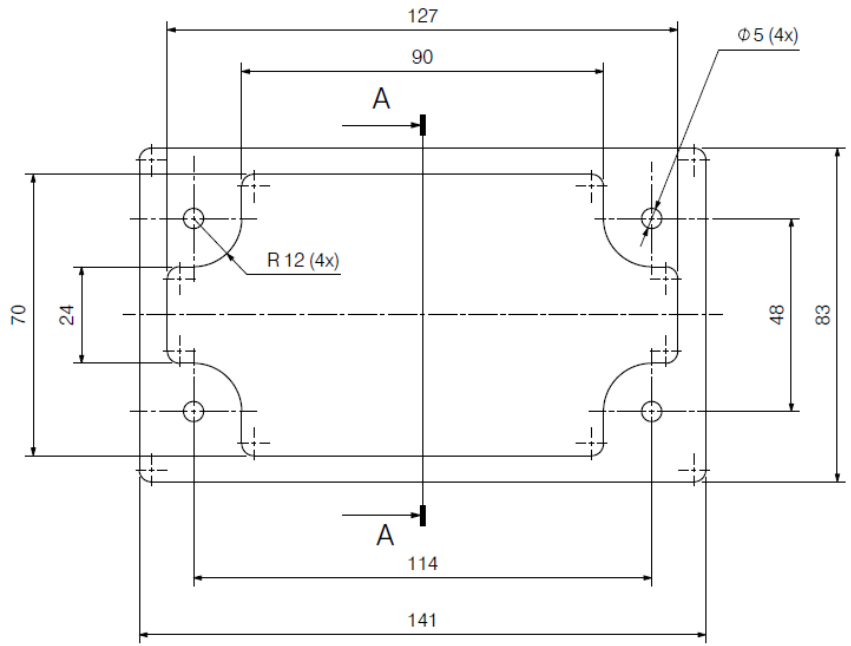
Continue...

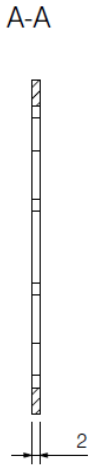
**Are drawings, schematics, and any other relevant documents complete and posted to CERN EDMS and/or PMS?**

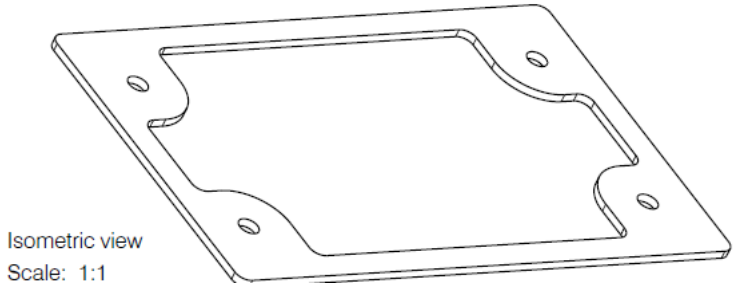
Comparing the documents present in EDMS (Review 2018) there are two differences in the design due to problems found during/after deployment that need to be included in documentation:

1. The new solution adopted for the cable protection (previous slides)
2. A gasket added between the alu-box and the detector to protect the alu-box from water.

The material used for the gasket is EPDM with hardness 60. Drawing available.



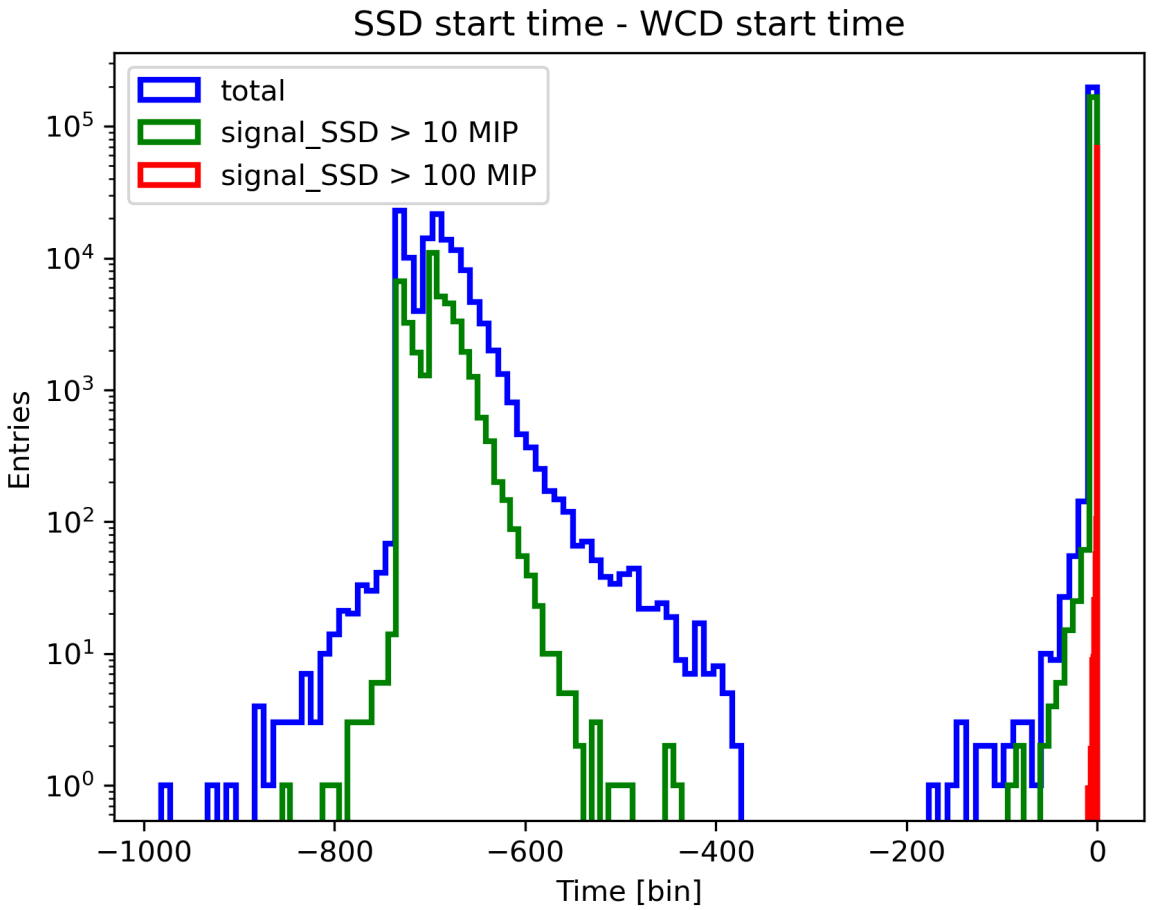
**Are instructions for operating and maintaining software code, as well as the code itself, available and organized?**

Only operation software is the **calib** routine inside UUB. Routine well know to Ricardo. The routine adopt the same algorithm used to fix the HV of the WCD PMTs.

Maintenance: we have not implemented maintenance software because up to now maintenance is not needed. With the Wuppertal PMT-test facility we plan to develop PMT validation software and procedures.

Monitoring the array: the software is in my PC! **Critical situation** need to transfer the duty to the SD shifters

**Are all the hardware, power and software interfaces fully functional, compatible and operational?**




Only an example

Connection with the UUB is working. The data are collected and stored.

The analysis software (Offline) is under development, **not all the reconstructed quantities in Offline are correct.**

About cables and connectors see previous slides.

**Procedures. The following procedures must be complete:**

- General operation.

There is not a specific operation procedure. The only operation needed is the HV setting with the **calib** routine. See before.

- Hardware and software troubleshooting and maintenance.

The possible maintenance are:

Substitution of the PMT
Substitution of the roof
Substitution of the detector
Fixing of the alu-box

All this operation has been done by the staff and are well know. **A "manual" where this procedure are summarized has to be written. Something exist in Malargue.**

- Process for handling major repairs.

See the slide before.

- Inclusion of safety considerations in all procedures.

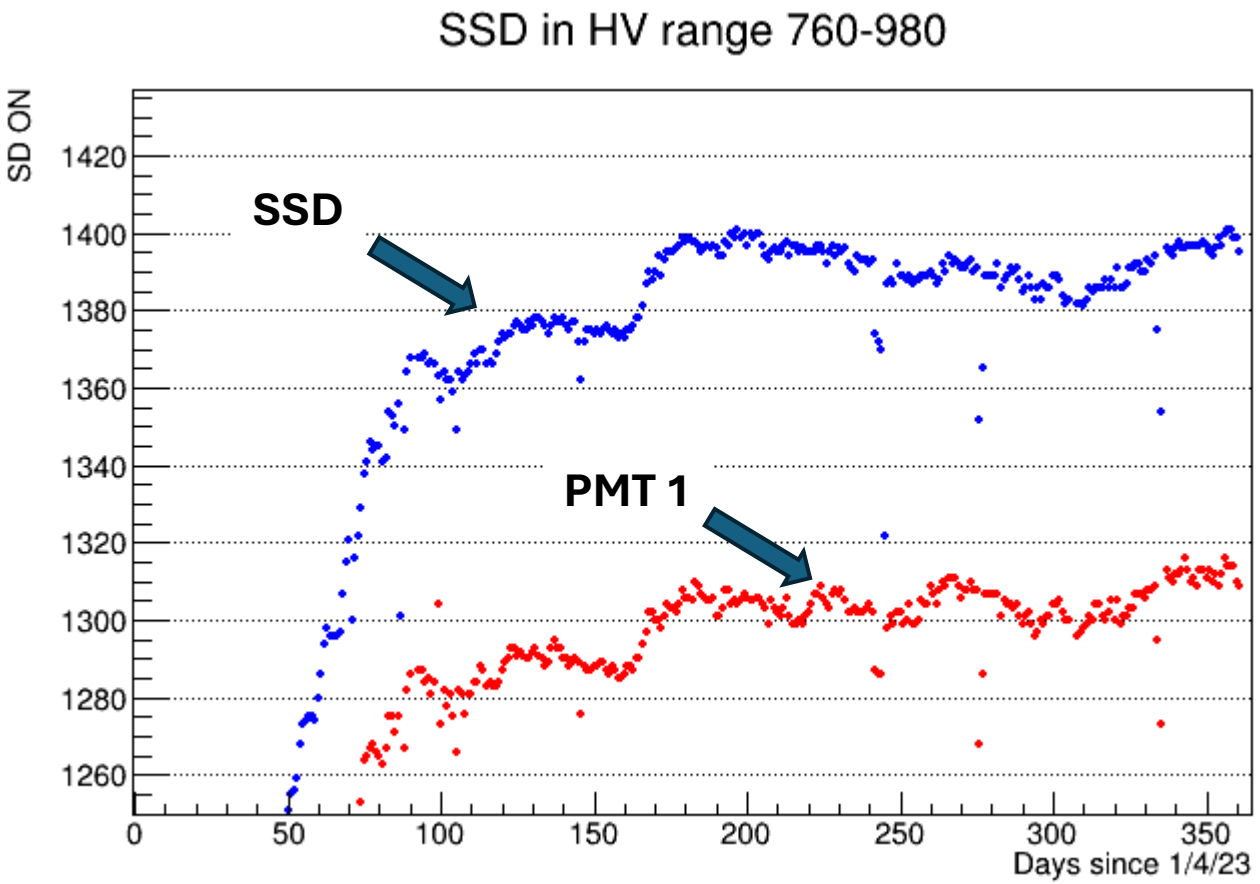
There are not serious safety risks in all the operations. Anyway some safety instruction are necessary to mount/unmount SSD in the field and in case a SSD has to be open in the laboratory.

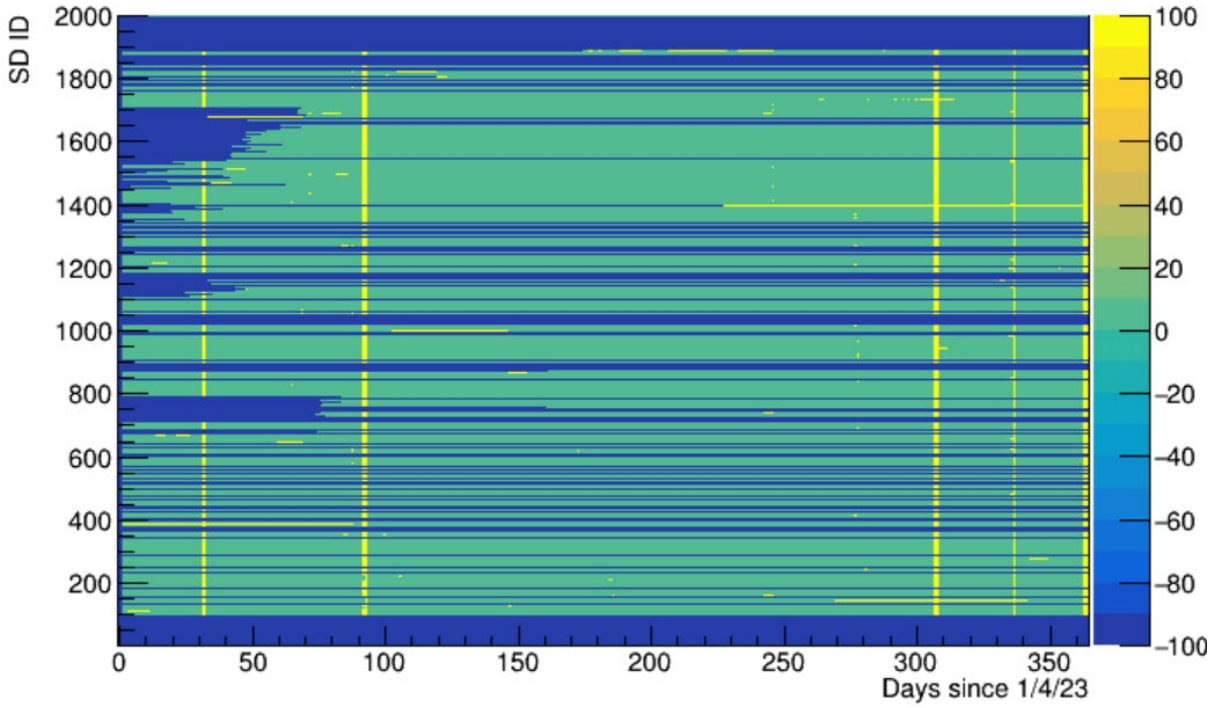
**Has an appropriate number of observatory personnel been trained to operate and provide routine maintenance?**

**The staff is trained in the deployment and parts substitution.**

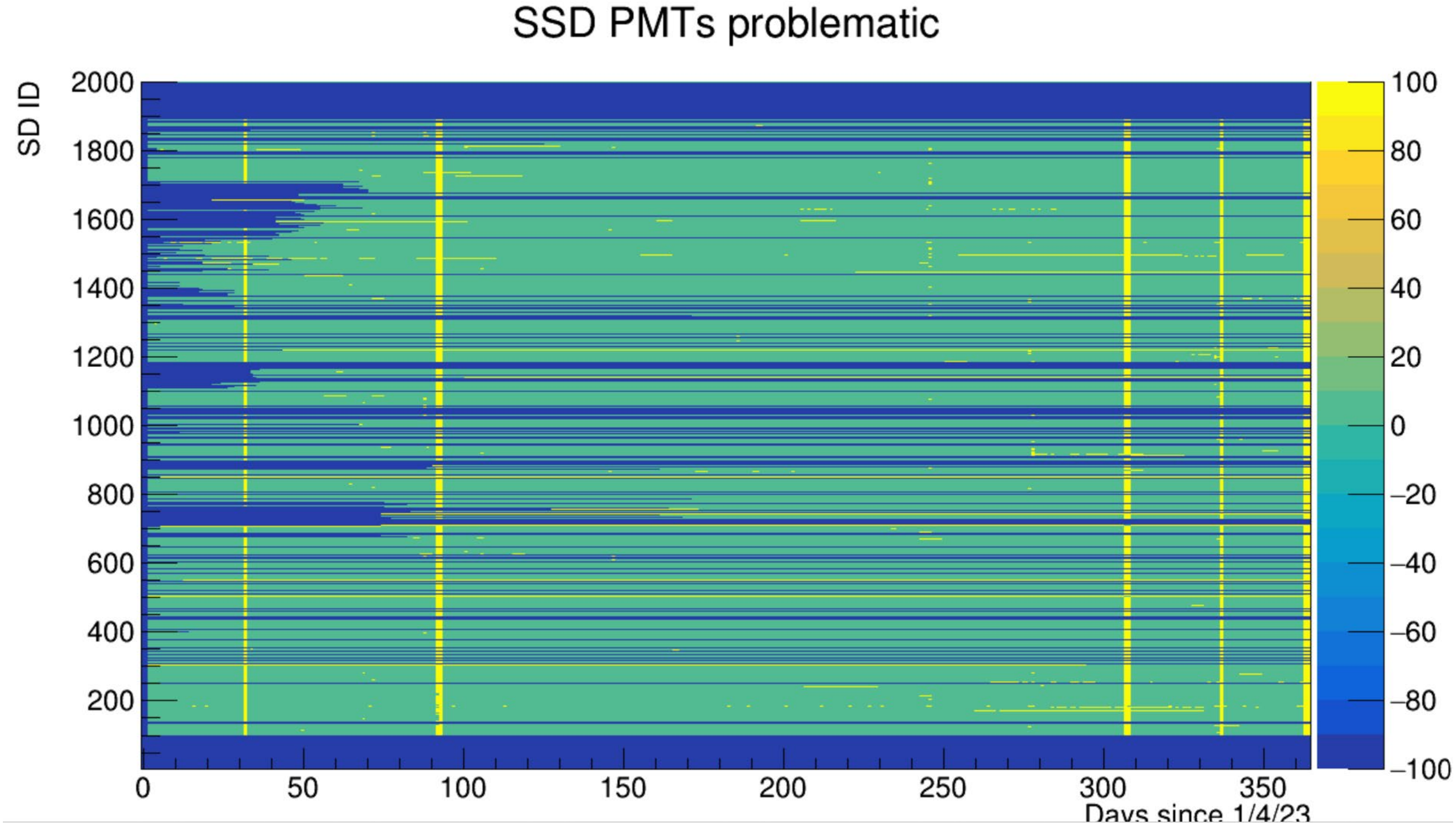
# Backup

## Monitoring Instability




```
Number of SSD PMT with (maybe) problems for at least 10 consecutive days 45
 SSD PMT with (maybe) until the last day
529 from day 168
552 from day 14
734 from day 234
937 from day 336
1447 from day 224
1784 from day 227
 SSD PMT not working from the first day 12
505 total N. of day 363
712 total N. of day 290
745 total N. of day 290
803 total N. of day 199
851 total N. of day 363
1025 total N. of day 58
1062 total N. of day 286
1221 total N. of day 321
1270 total N. of day 363
1335 total N. of day 340
1400 total N. of day 137
1621 total N. of day 296
```


SSD PMTs problematic
SD ID
2000
1800
1600
1400
1200
1000
800
600
400
200
0
50
100
150
200
250
300
350
Days since 1/4/23
100
80
60
40
20
0
−20
−40
−60
−80
−100

Why Check and Repair campaign

The main idea at the design stage of SSD was to have a fully sealed detector that did not require opening and maintenance.
The “active part” of the SSD detector (PMT and electronics) is accessible externally (PMT Housing and Electronics AluBox).

The “repairing campaign” are aimed mainly to recover production problems, to recover damages raised during the transport and or to evaluate and eventually repair specific issues (detectors subject to fire, presence of water/humidity).

The “failure” sample is fairly small 7 modules (detectors)

4 with cookie problems
1 replaced from the field for being in a fire
1 with a screw problems in the external flange (damage during the movement)
1 with water inside the PMT site

Reason for the only PMT failure up to now

Materials for the assembly check list in Malargüe:

- OttoCol and manual dispenser for OttoCol (from EU)
- Screws and small specific parts for the assembly (from EU)
- The cookie «optical cement» is the same used in AMIGA
- Rivets already available in Malargüe.

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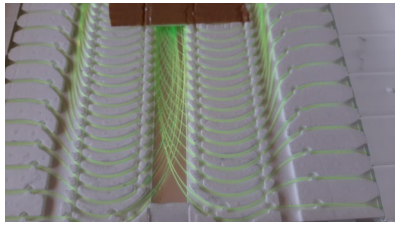
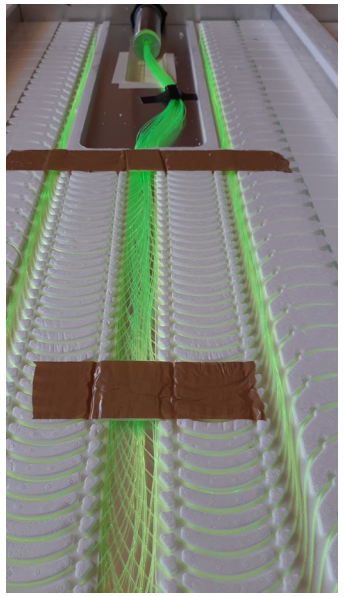
First campaign: @november meeting and one week after

Case I - The detector suffered a fire in the field. The lower panel appears deformed and was in the Assembly Building to check if the interior is damaged.





Inside the detector was intact.
Apparently the fire was very intense but short lasting (cortadera) and the bottom panel insulated properly.
Although the “integrity” of the interior, the lower panel is certainly compromised and **we did not perform the closing procedure**.

The detector has been converted for OUTREACH

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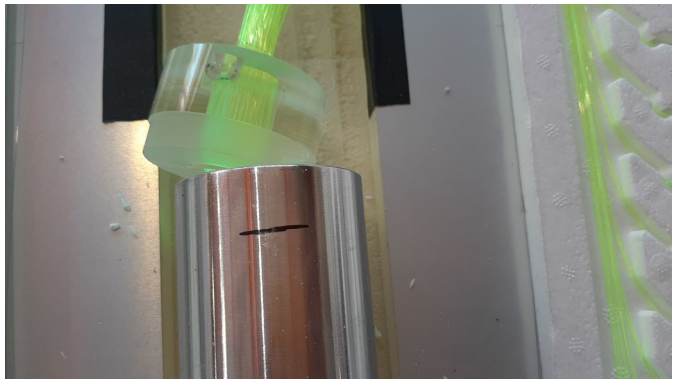
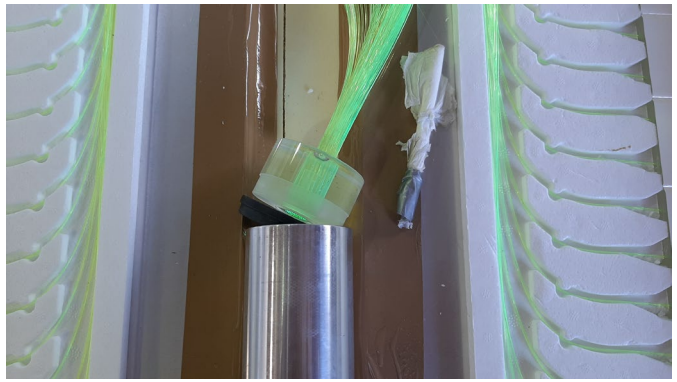
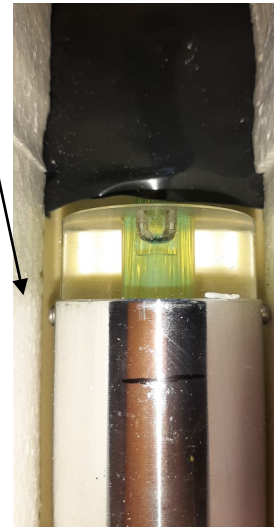
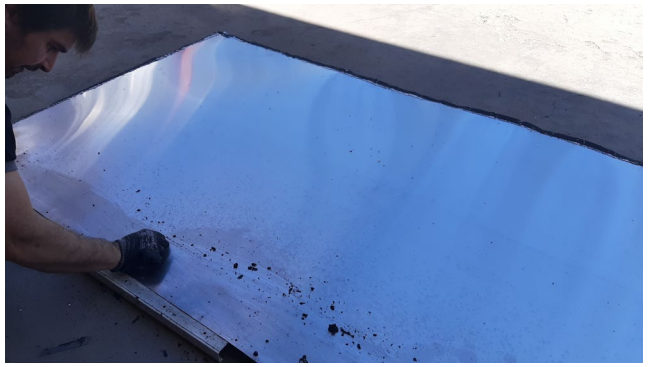
**Case 2 and 3** Cookie problem: cookie misplaced.





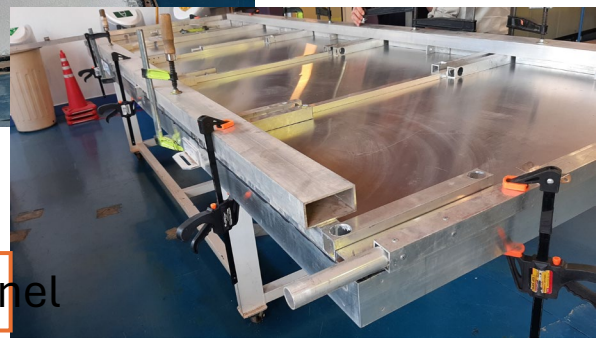
Simple repair (placing screws)





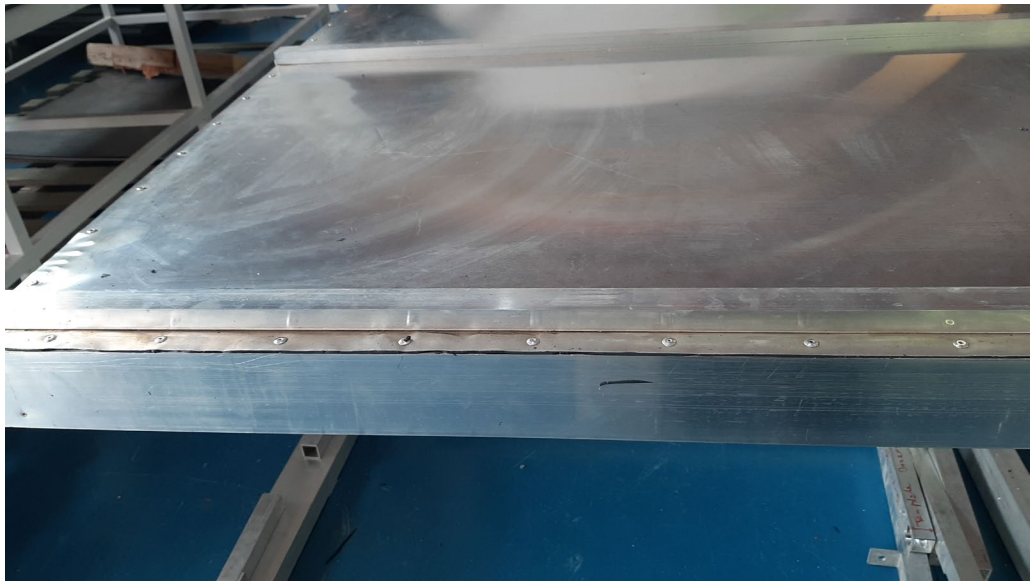
Cleaning and Flattening the upper panel (long and tedious work)

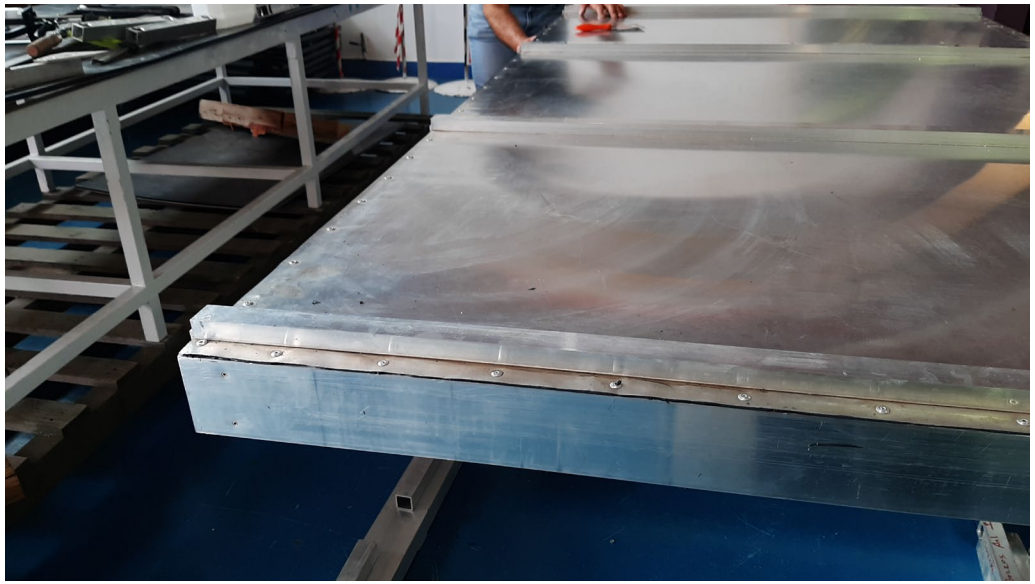
sealing



Some difficulties to optimize the curing given the presence of the bars on the upper panel

## Case 2 and 3 – closed detectors





We checked with PMT/UUB and the signal seems ok.

<u>What left</u>

1 detector is similar to case 2/3 and we will open next week

1 detector has a more serious problem and the cookie must be done again (optical cement uncured).

1 detector with water inside the PMT tube (when in site). We have submitted the detector to water pump, but we were not able to reproduce the problem (need more investigation)

1 detector with screw problem for a damage in the external flange (need more investigation)

# Check list for next week

Material for the assembly status in Malargüe:

- OttoCol and manual dispenser for OttoCol (EU)
- Screws and small specific parts for the assembly (EU)
- The cookie «optical cement» is the same used in UMD
- Unfortunatly for holding the cookie while curing some specific «new» tool must be arranged
- Rivets already available in Malargüe.

We have a part of the tool we used for Cookies in Lecce.
but:

- no degassing (vacuum)
- no way to put in vert

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Sezione di Lecce

# Cable protective jackets

Sewing thread is not UV resistant, so it breaks

A temporary solution: use UV-resistant zip ties to keep the jackets closed

Possible alternatives identified, but not available in Argentina – work in progress

# Plans for next week

Instrument 3 local stations with cable protection

Cable protection slit:

price € 2,60/m , moq 25metri

Instrument one detector

2 samples of spiral binding of different diameter with the idea of instrumenting one detector

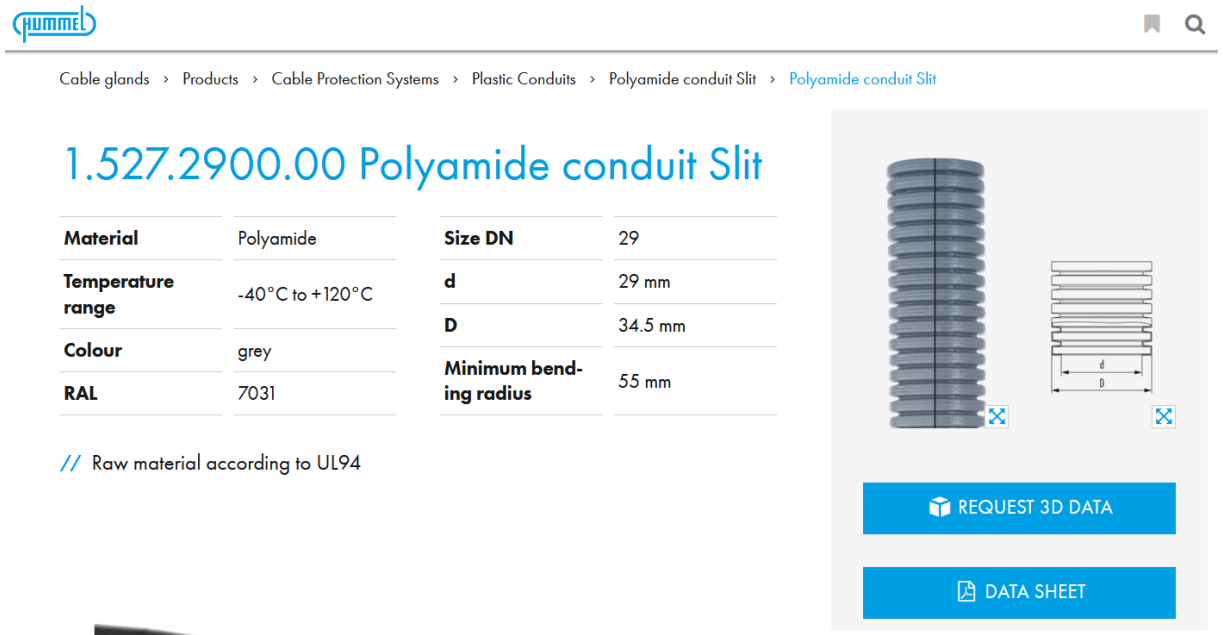
**Avvolgicavo a spirale RS PRO, Nero, in Polietilene, Ø cavo 4mm - 6mm, Ø interno 4mm, Ø fascio 25mm max**

Codice RS: **811-7639** | Costruttore: RS PRO

**Avvolgicavo a spirale RS PRO, Nero, in Polietilene, Ø cavo 12mm - 32mm, Ø interno 12mm**

Codice RS: **204-4427** | Costruttore: RS PRO

price € 1,50/m , moq 5 meters




UV-resistence only according to the manufacturer

Riguarda i cavi che collegano il PMT di SSD al «DOME» (dove si trova la UUB)

# Cable protective jackets

Problema evidente dopo 3 anni di installazione sulle camere SSD80

I copricavo utilizzati sono costituiti da una guaina plastica chiusa da un velcro.
Il filo della cucitura del velcro non è sufficientemente resistente agli UV.
La guaina dopo 3 anni ha iniziato ad aprirsi scoprendo i fili

SOLUZIONE EMERGENZA: utilizzare dei fermacavo (UV-resistent zip-ties) per chiudere la guaina.
CONTRO: Anche questi fermacavo non di facile reperimento in Argentina (materiale apparentemente resistente agli UV non lo è a lungo termine). Necessità cambio ogni volta che è necessario accedere al cavo (es. Durante installazione RADIO)

SOLUZIONE a lungo termine
Proposte:
1- Estendere il copricavo che dall'antenna RADIO scende verso il cavo SSD PMT. I due cavi tecnicamente dovrebbero poi viaggiare nello stesso copricavo. (il copricavo RD non ha un diametro che possa contenere entrambi)
2-Sostituire il copricavo SSD-PMT - Dome

SOLUZIONE a lungo termine

Proposte:

1- Estendere il copricavo che dall'antenna RADIO scende verso il cavo SSD PMT. I due cavi tecnicamente dovrebbero poi viaggiare nello stesso copricavo. (il copricavo RD non ha un diametro che possa contenere entrambi)

2-Sostituire il copricavo SSD-PMT - Dome

1- Purtroppo il copricavo RD non è sufficiente a contenere entrambi i cavi, inoltre l'ingresso del cavo RD nell'housing del cavo SSD costituisce già ora un punto potenzialmente delicato in quanto può convogliare acqua nella zona «BOX elettronica»

# copricavo SSD-PMT – Dome: possibili opzioni:

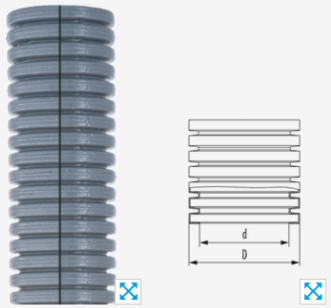
COSTI: 2.6 Euro/metro + IVA

Cable glands › Products › Cable Protection Systems › Plastic Conduits › Polyamide conduit Slit › Polyamide conduit Slit

## 1.527.2900.00 Polyamide conduit Slit

| | | | |
|---|---|---|---|
| **Material** | Polyamide | **Size DN** | 29 |
| **Temperature range** | -40°C to +120°C | **d** | 29 mm |
| **Colour** | grey | **D** | 34.5 mm |
| **RAL** | 7031 | **Minimum bending radius** | 55 mm |

// Raw material according to UL94




REQUEST 3D DATA

DATA SHEET

COSTI: 1.5 Euro/metro + IVA

**Avvolgicavo a spirale RS PRO, Nero, in Polietilene, Ø cavo 4mm - 6mm, Ø interno 4mm, Ø fascio 25mm max**

Codice RS: **811-7639** | Costruttore: RS PRO

COSTI: 2.6 Euro/metro + IVA

A MARZO 2023 abbiamo installato il copricavo corrugato su 4 Local Station. Tempo di installazione circa 3 minuti, installazione molto semplice.

COSTO TOTALE SOLO MATERIALI
6.24+IVA

COSTI: 1.5 Euro/metro + IVA

A MARZO 2023 abbiamo installato il copricavo elicoidale su 3 Local Station. Tempo di installazione circa 5 minuti, installazione non particolarmente difficile.

COSTO TOTALE SOLO MATERIALI
4.4k

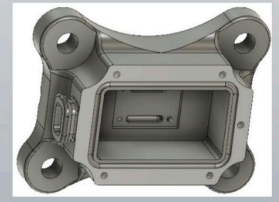
# OVERVIEW

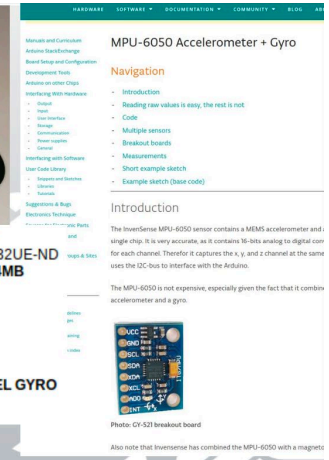
**General Features**

Credit to J. Rautenberg, P. Hagemann

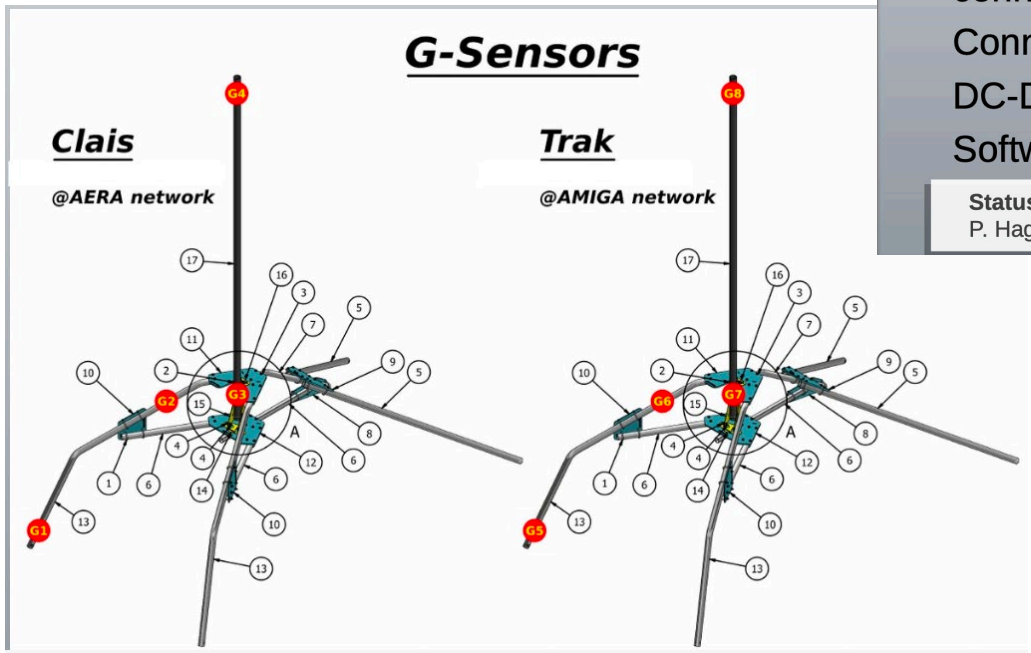
## G-Sensor devices – 2.0

- MPU-6050 sensor on arduino
- Simple USB-A connector with USB-hub
- 3D printed case with fixing for U-bracket or zip tie
- Water-resistant with heat shrink tubing
- USB-cable with 5m
- (no driver on UUB for usb-connection)
- BananaPi 4M (no SD-card but flash)
- connected to 4 g-sensors (USB)
- Connected via eth (hub at Trak and Clais)
- DC-DC converter for 5V
- Software pre-installed for automatic startup






Status g-Sensors for RD
P. Hagemann, J. Rautenberg, BU Wuppertal OCM 18.11.2

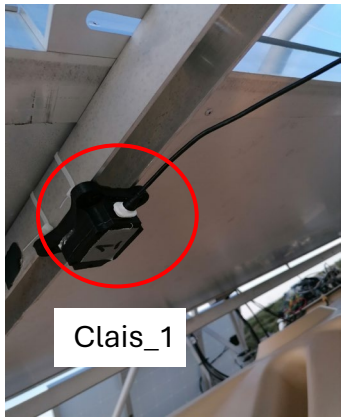


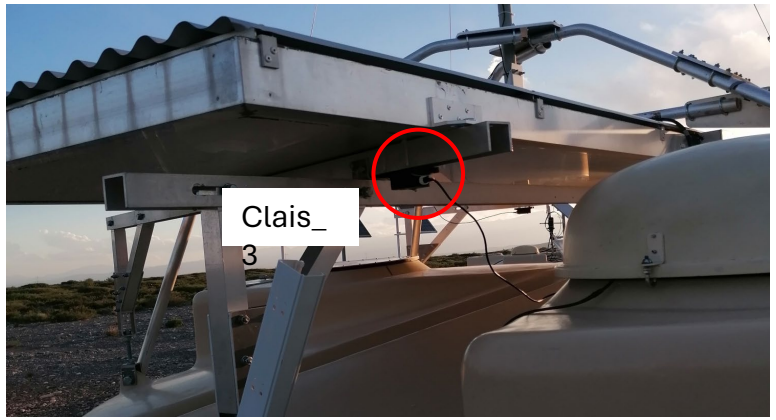

**First Placement**

4 sensors per antenna on 'CLAIS' and 'TRAK' stations to deal with the challenge of how much wind the RD can hold

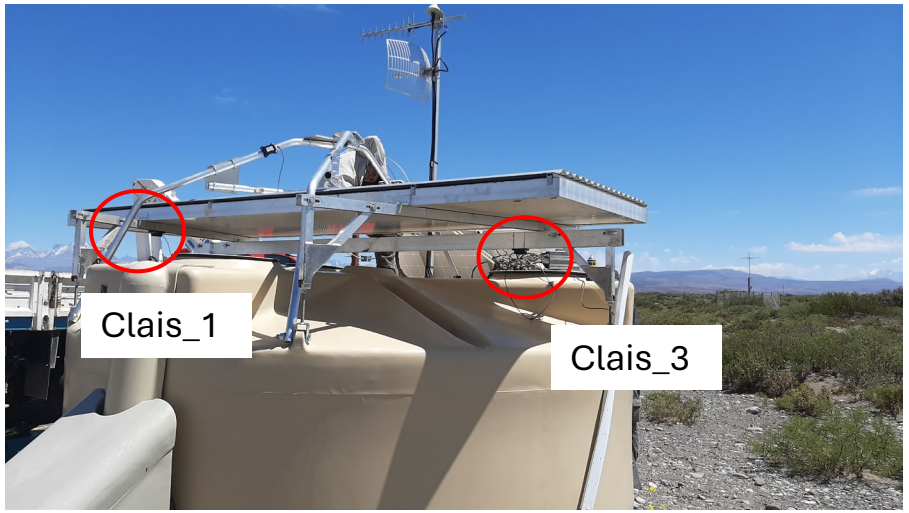
# SSD setup

**Since March 2022 two g-sensors were moved to the SSD scaffolder for 'Clais'**

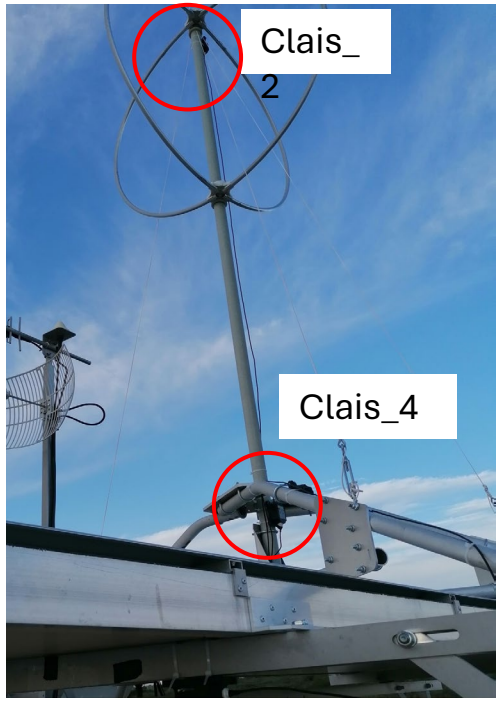



**Moved again last November (after the meeting), when the old support was replaced with the new one**



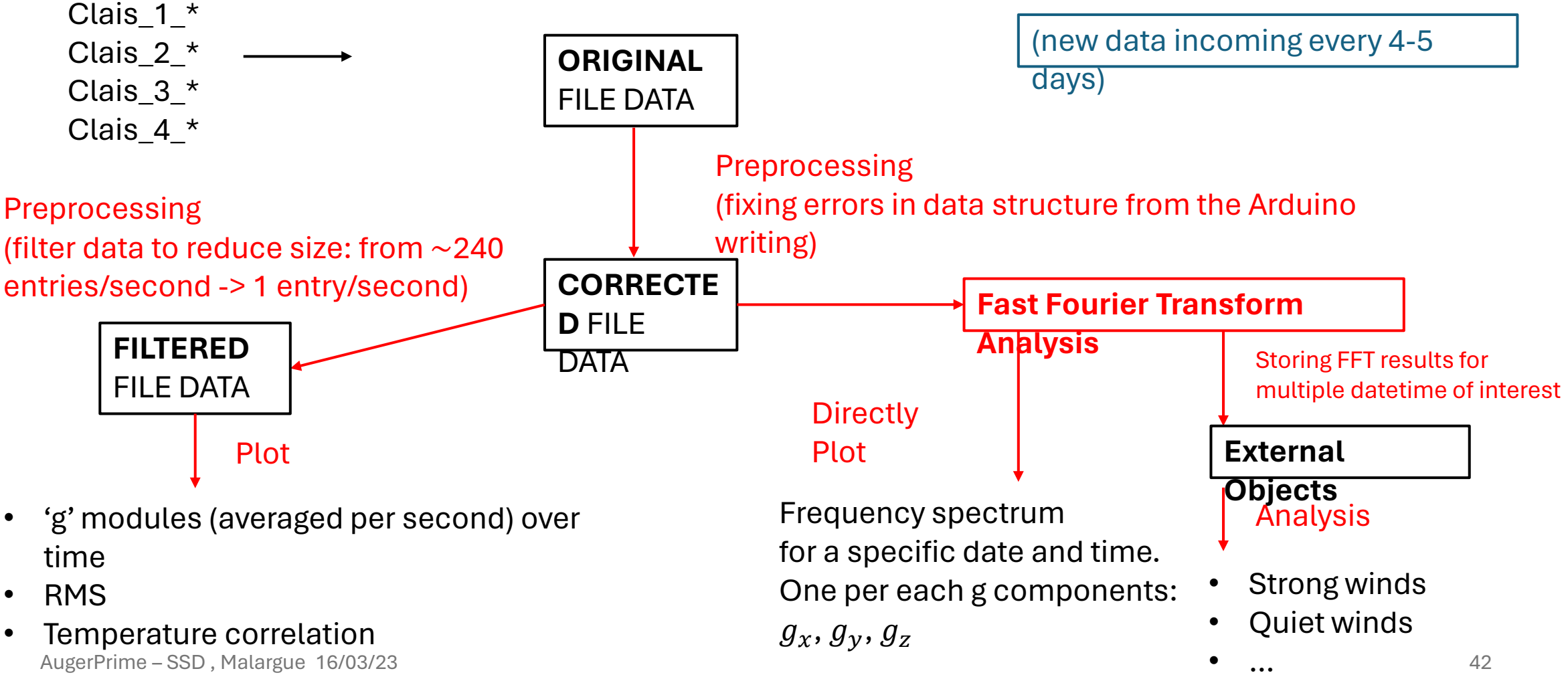

# Antenna setup



# Data organization and processing

Currently all data are collected here: https://uni-wuppertal.sciebo.de/s/Rv8XkjssswhGwss and are organized by senso

Clais_1_*
Clais_2_*
Clais_3_*
Clais_4_*



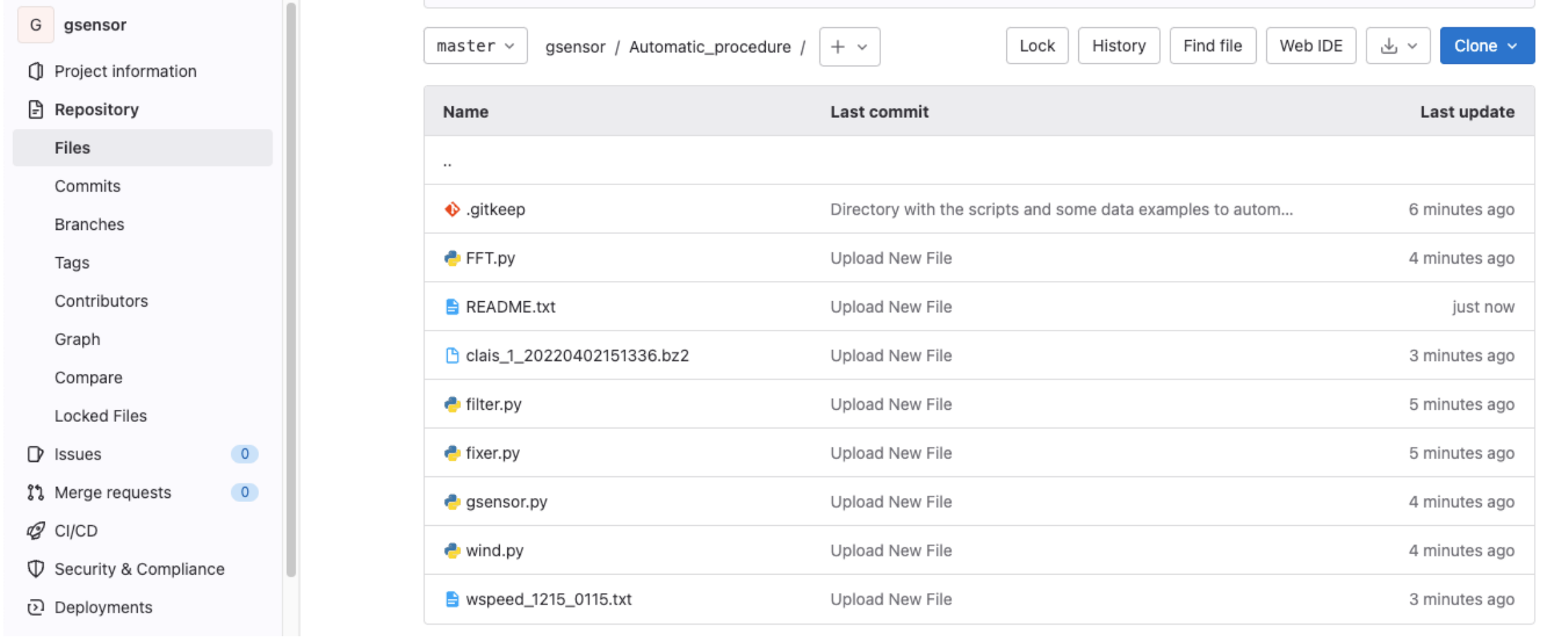

- 'g' modules (averaged per second) over time
- RMS
- Temperature correlation

Frequency spectrum
for a specific date and time.
One per each g components:
$g_x, g_y, g_z$

- Strong winds
- Quiet winds
- …

We’re currently working on automating each one of the previous steps.

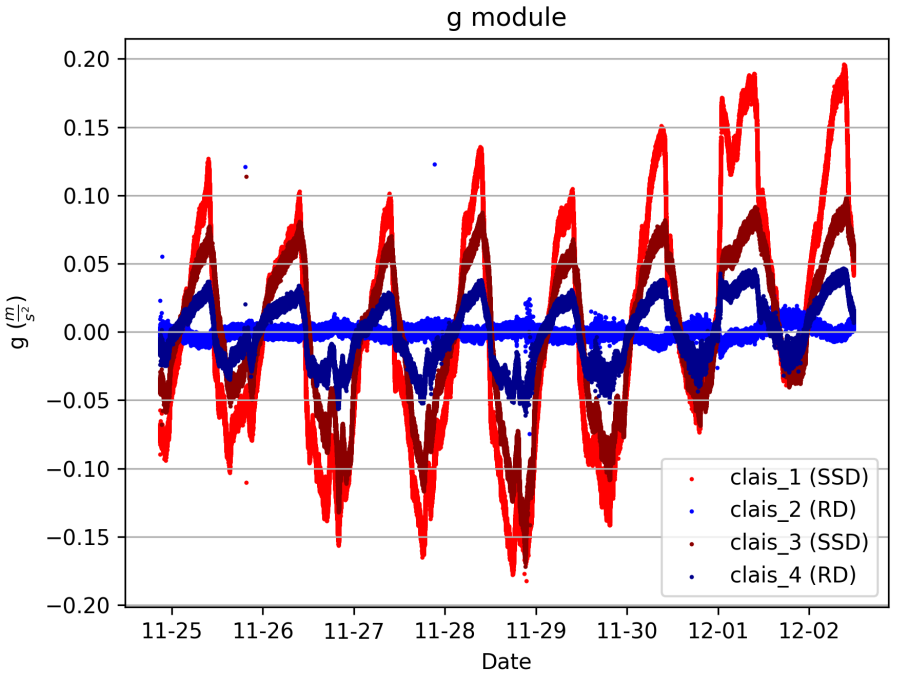
Scripts in the gitlab page (https://git.uni-wuppertal.de/buw-auger/gsensor/-/tree/master/Automatic_procedure)




… but still have to upload the updated versions

# G-sensors Data

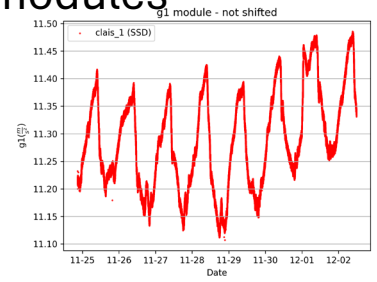
First week since the change of the SSD support
From 2022-11-25 to 2022-12-02

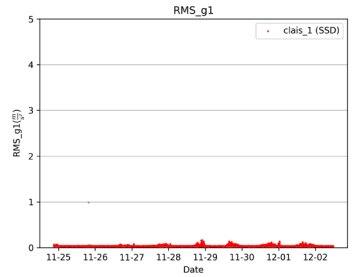



Not shifted g-modules

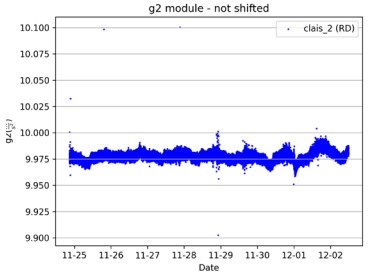
RMS

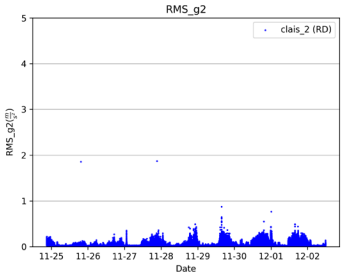
SSD



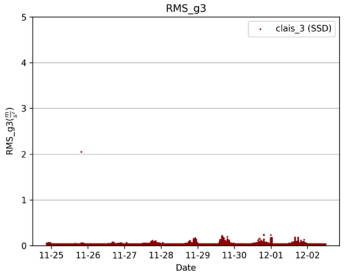




Top Antenna

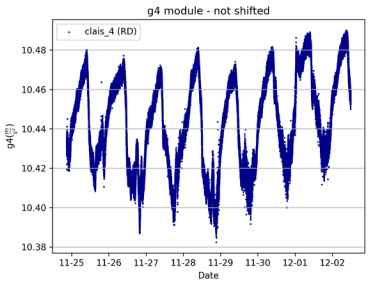


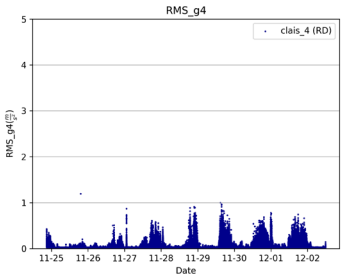



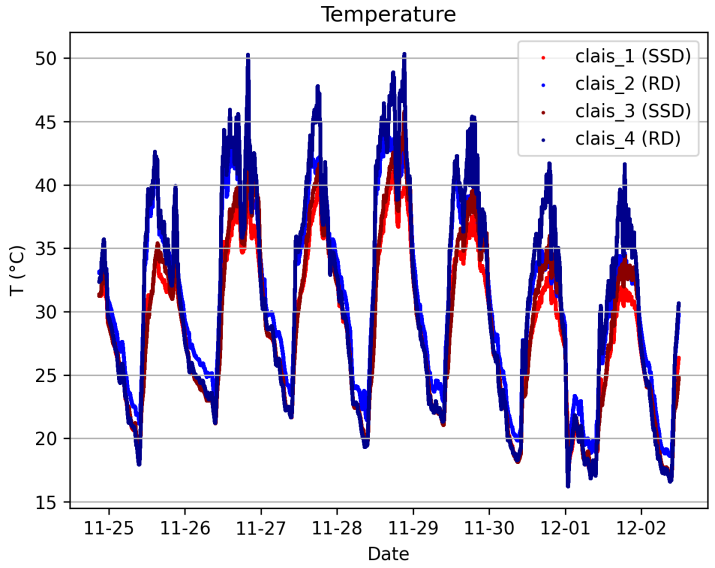

SSD

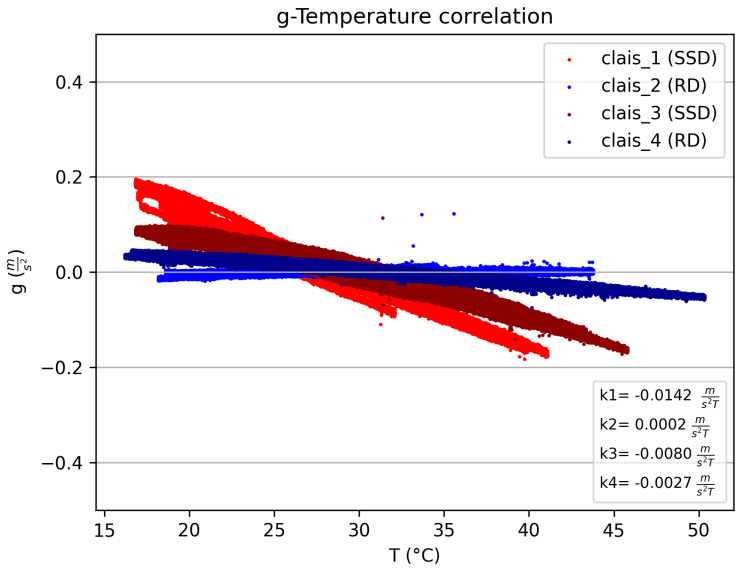



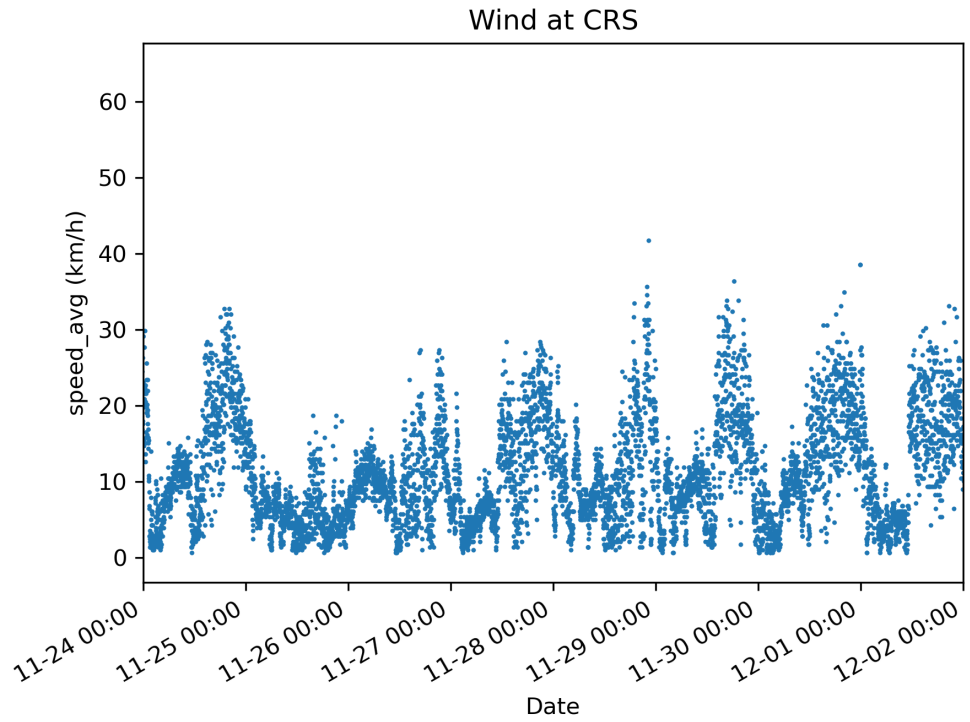

Bottom Antenna






The g modulation can be correlated to thermal winds, even though it differs from sensor to sensor.
A stronger correlation with the temperature is indeed oddly found for both the SSD g-sensors, which, however, are subject to a lower
thermal excursion as seen from the Temperature plot.
We can try to switch one SSD sensor for one Antenna sensor and check.

# Fast Fourier Transform Analysis

The data **sampling** is usually ~240 entries/second, even though sometimes it can drop down.
The FFT analysis is done in one second, covering a frequency range up to 110/120 Hz.

```
(vibrazioni) [mtconte@login clais1]$ python FFT.py clais_1_20221124205034
Clais number 1
Enter the chosen day (YYYYMMDD): 20221125
Enter starting time (HHMMSS): 120000
Enter ending time (HHMMSS): 120100
################################################
FFT analysis for clais 1
Date: 2022-11-25
Time from 12:00:00 to 12:01:00
Averaged in a time interval of: 60 seconds
################################################
```

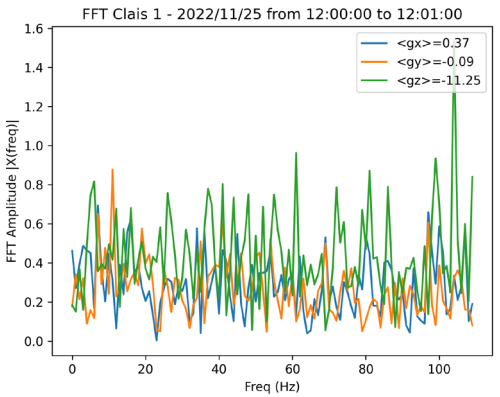
Select data file for specific sensor

Choose date and time interval

Summary

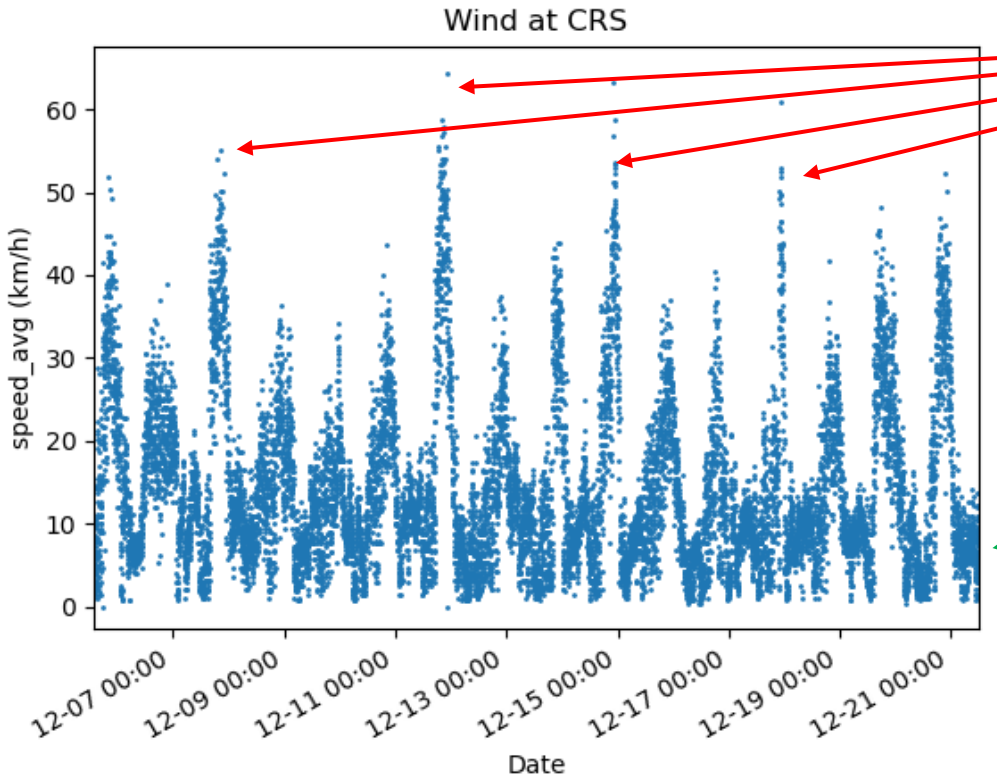
This number is equal to the times the FFT analysis has been done, then the results are averaged. We usually use a short time interval: 1s, 10s , 30s, 1min

Example Output:
fft_1_2022-11-25_120000_120100.png



# SSD and Antenna behavior under strong or quiet winds

To look for specific weather conditions (quiet/strong wind) you can check the WIND @CRS (close to 'Clais' )




STRONG WIND (>40 km/h)

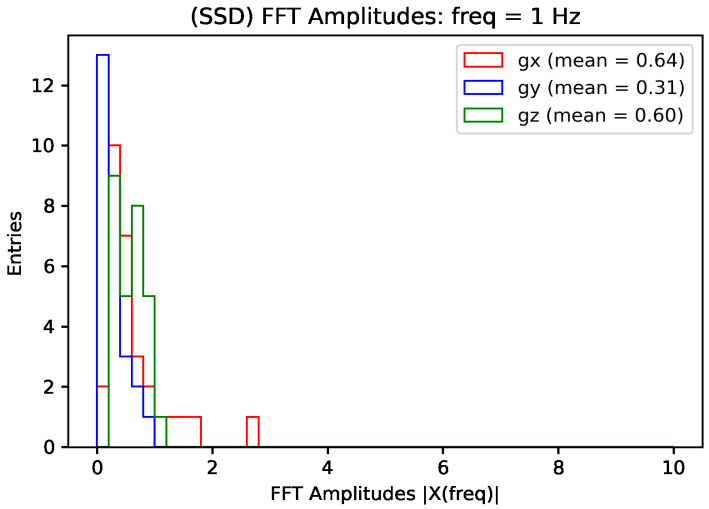
Selected around **30** different times with strong wind in the period: 2022/11 – 2023/03

QUIET WIND (<10 km/h)

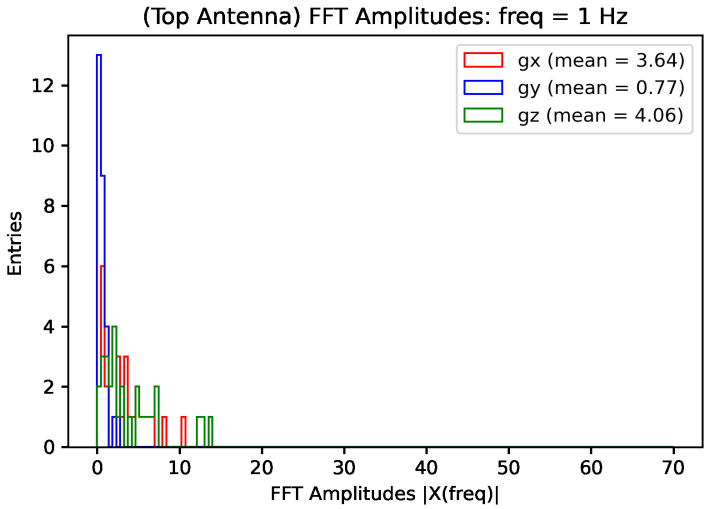
Selected different times with quiet wind in the period: 2022/11 – 2023/03

STRONG WIND (>40 km/h) **30 events**

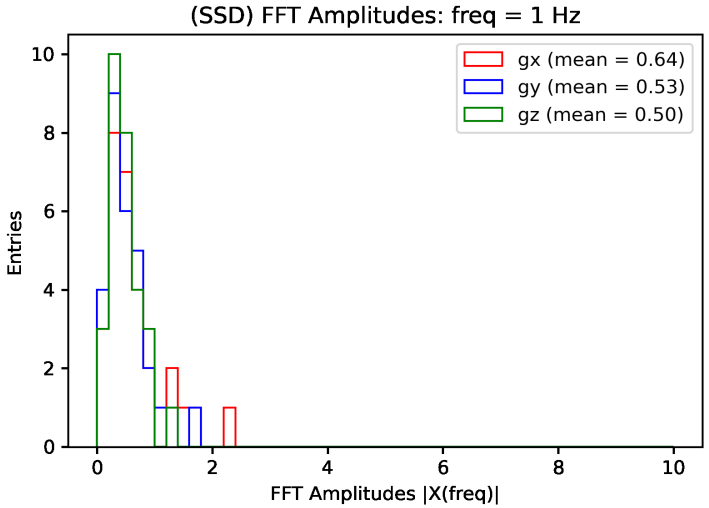
## CLAIS 1



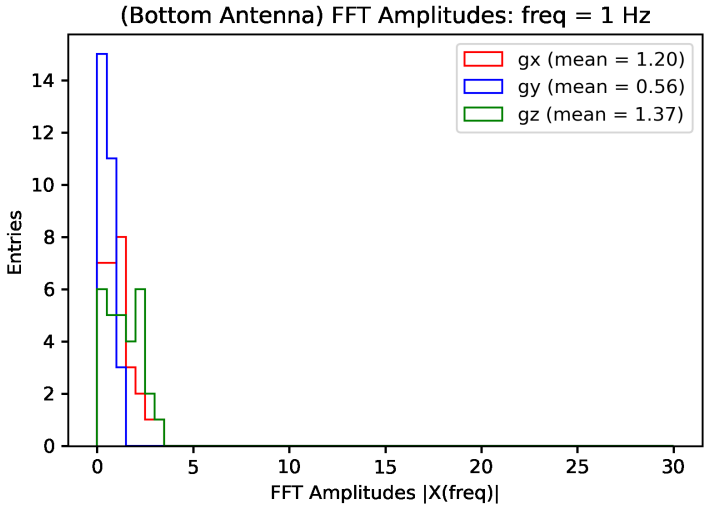

## CLAIS 2




## CLAIS 3



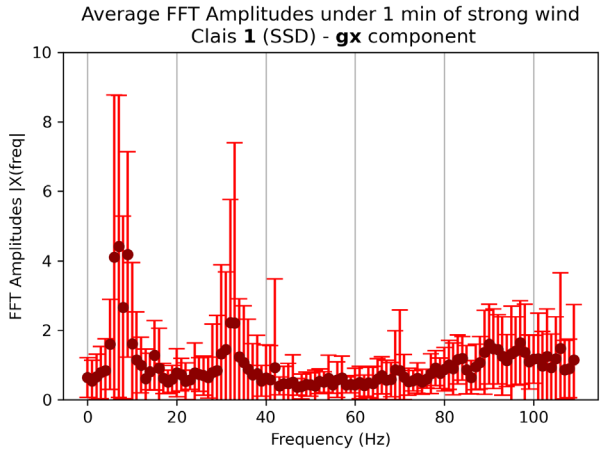

## CLAIS 4

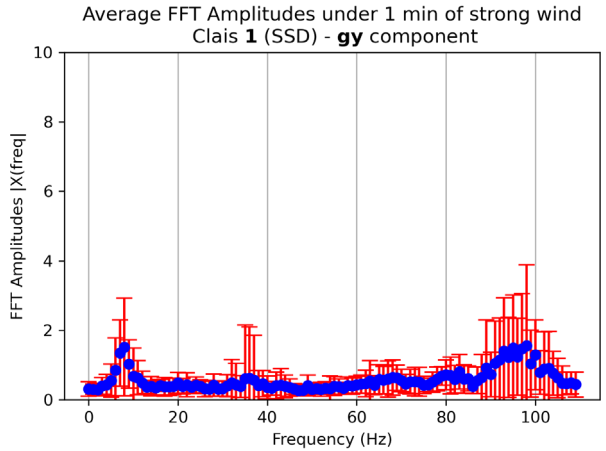


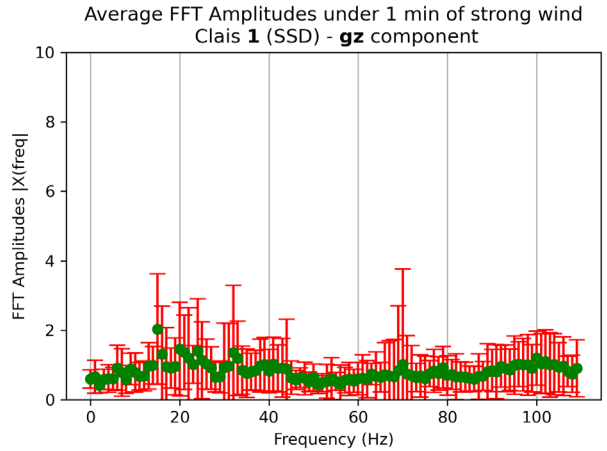
STRONG WIND (>40 km/h)

# EXPECTED SSD PROFILES:

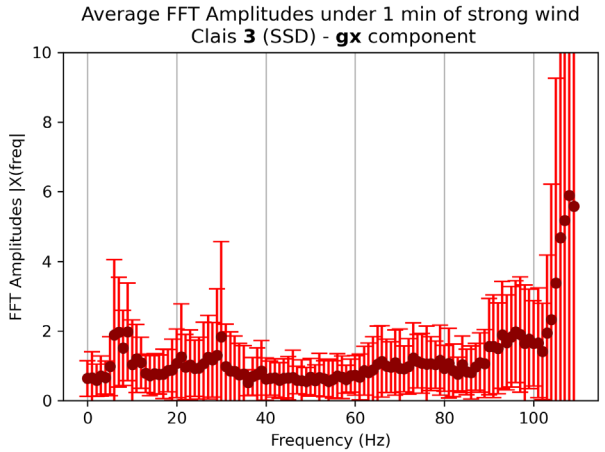
## CLAIS 1

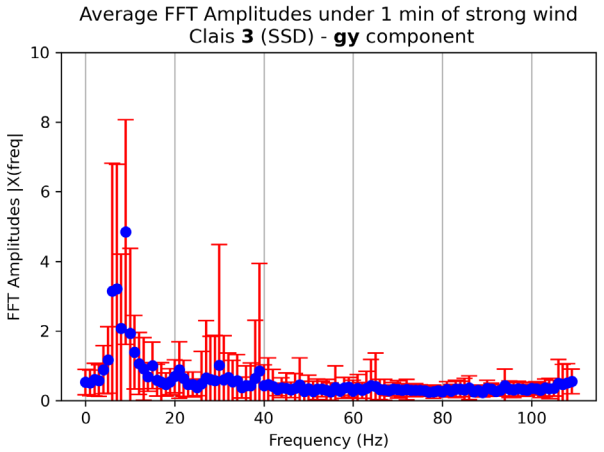


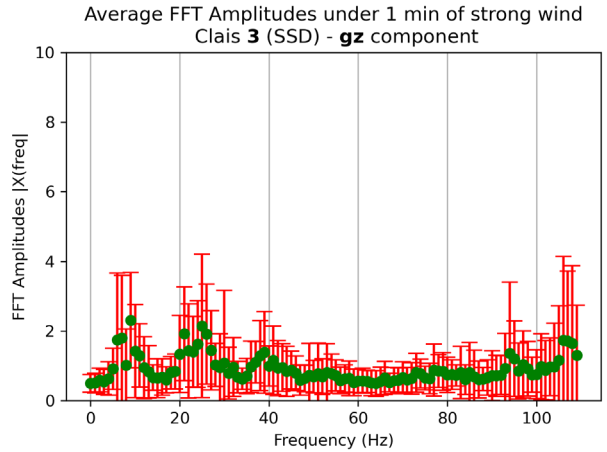




## CLAIS 3



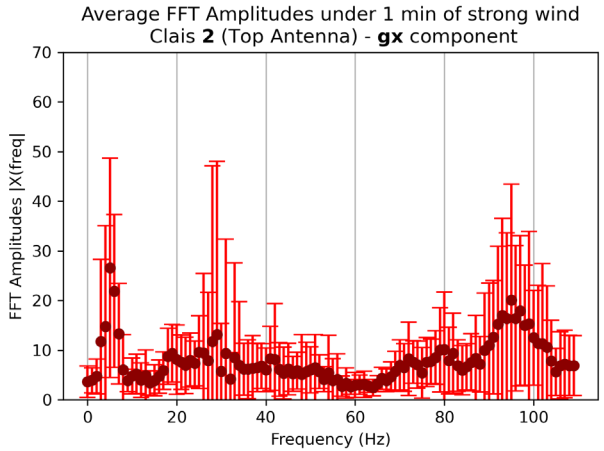



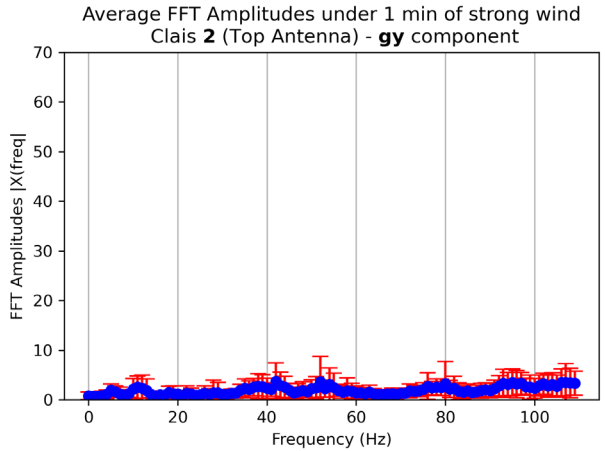



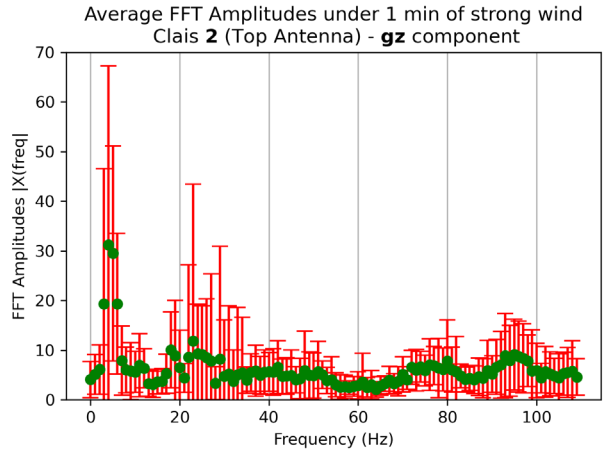
STRONG WIND (>40 km/h)

# EXPECTED RD ANTENNA PROFILES:

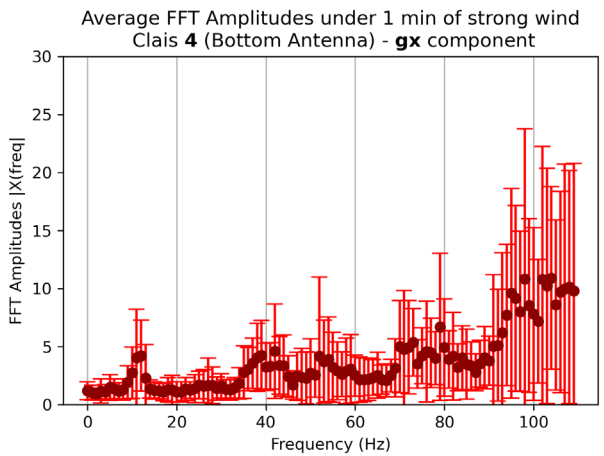
## CLAIS 2

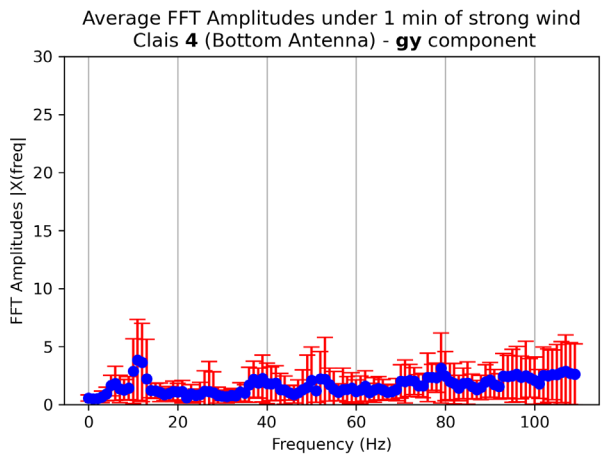


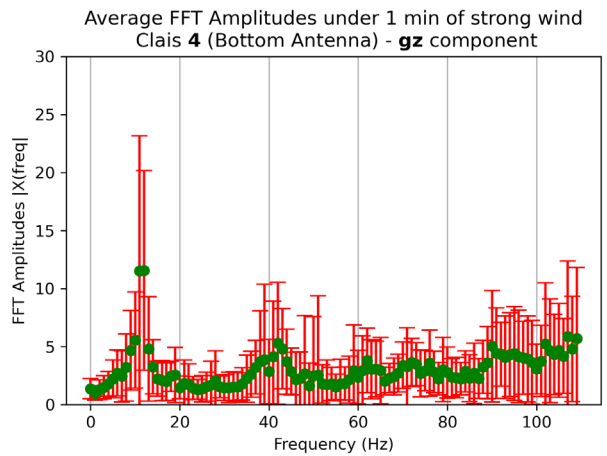




## CLAIS 4



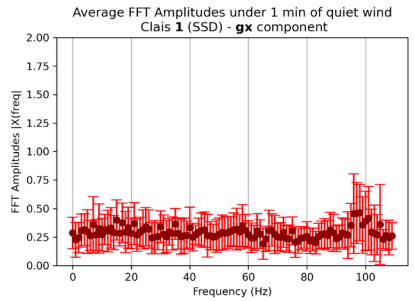



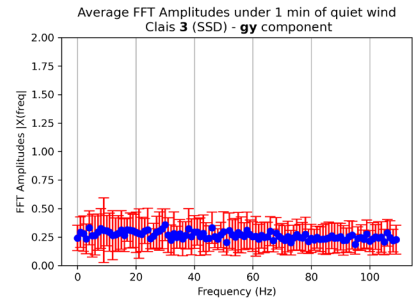



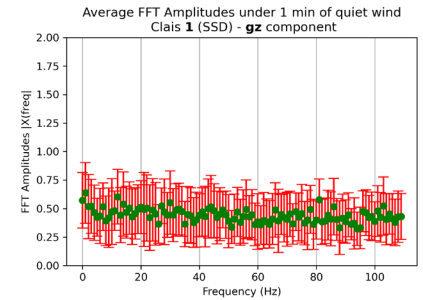
QUIET WIND (<10 km/h)

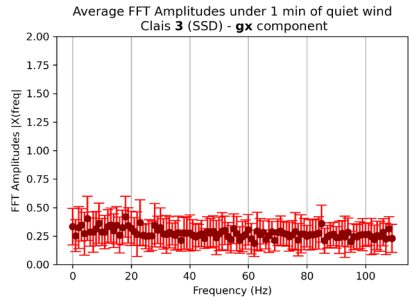
EXPECTED SSD PROFILES:

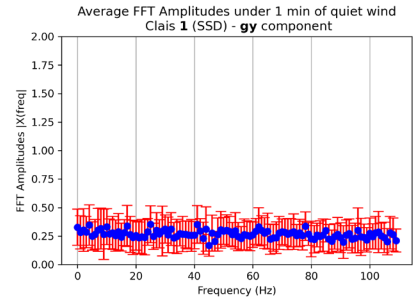
EXPECTED ANTENNA PROFILES:

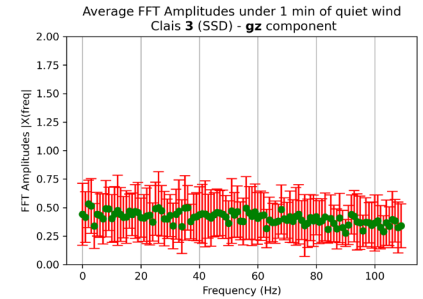


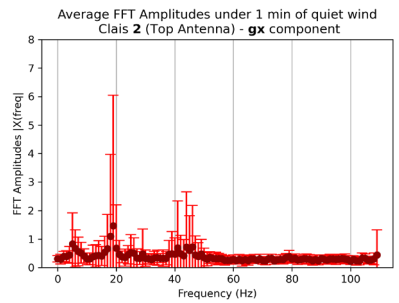



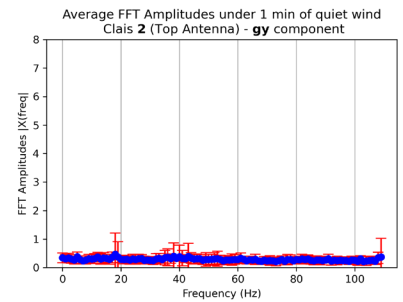



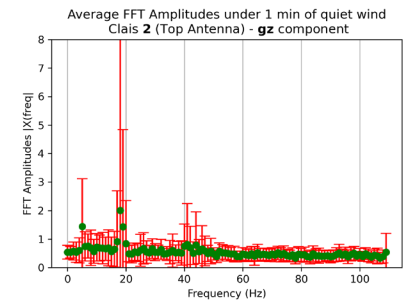



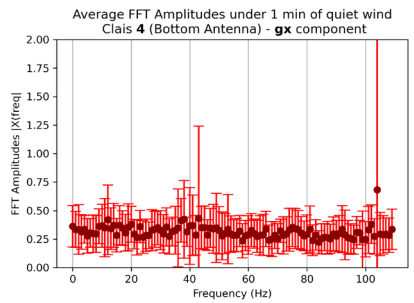



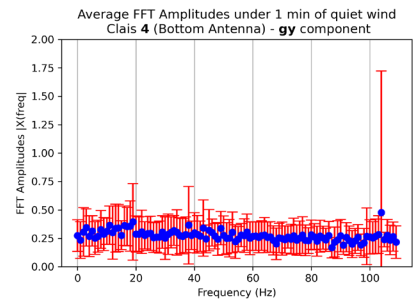



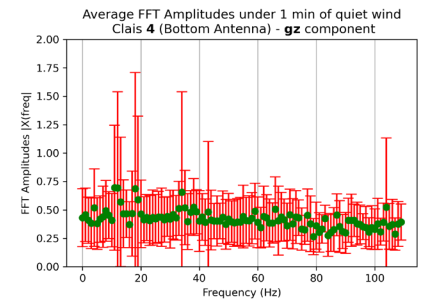



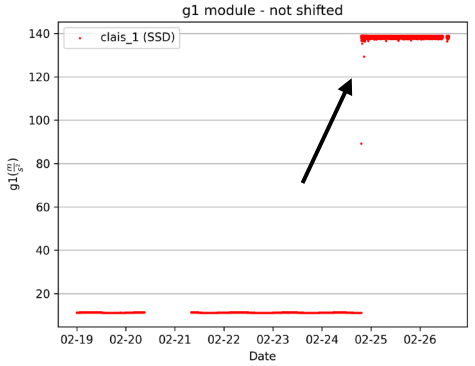
# ANOMALIES

Sensors status and position should be checked again after the meeting

Two different anomalies were detected on <u>both the SSD g-sensors</u>

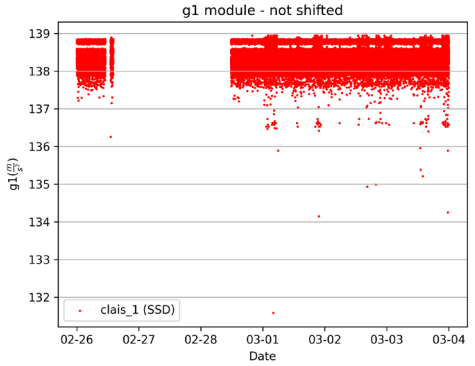
## CLAIS 1

Istant change in the g module on the 2023/02/25.
From ~11 to ~140 (m/s^2)



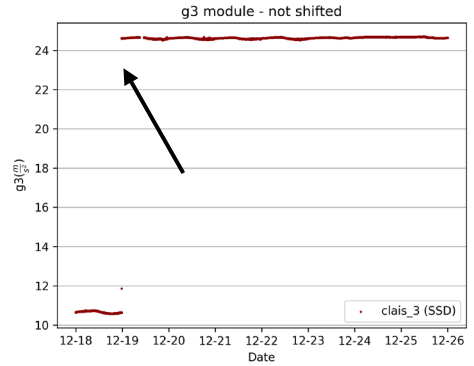

<u>Current status:</u>

It hasn't changed from then.
(Drifting)




## CLAIS 3

Istant change in the g module on the 2022/12/19.
From ~11 to ~25 (m/s^2)




<u>Current status:</u>

It hasn't changed from then.