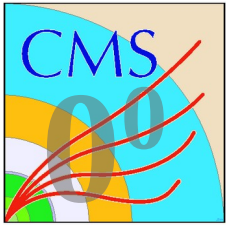


# CMS ZDC Status And Plans

**TREX 2024.12.06**

**D. Lazic**  
Boston University



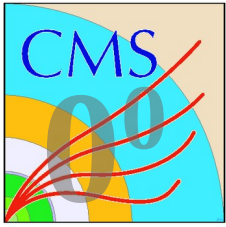
# Last time...

... I reported how the CMS ZDC was repaired.

It was followed by extensive tests on surface!

Then, just before the p-p reference run the ZDCs were installed in TANs.



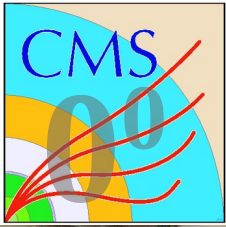


# Installed...

Not as smoothly as we would like, but - it is never smooth with tight clearances and non-smooth inner walls of the gap!



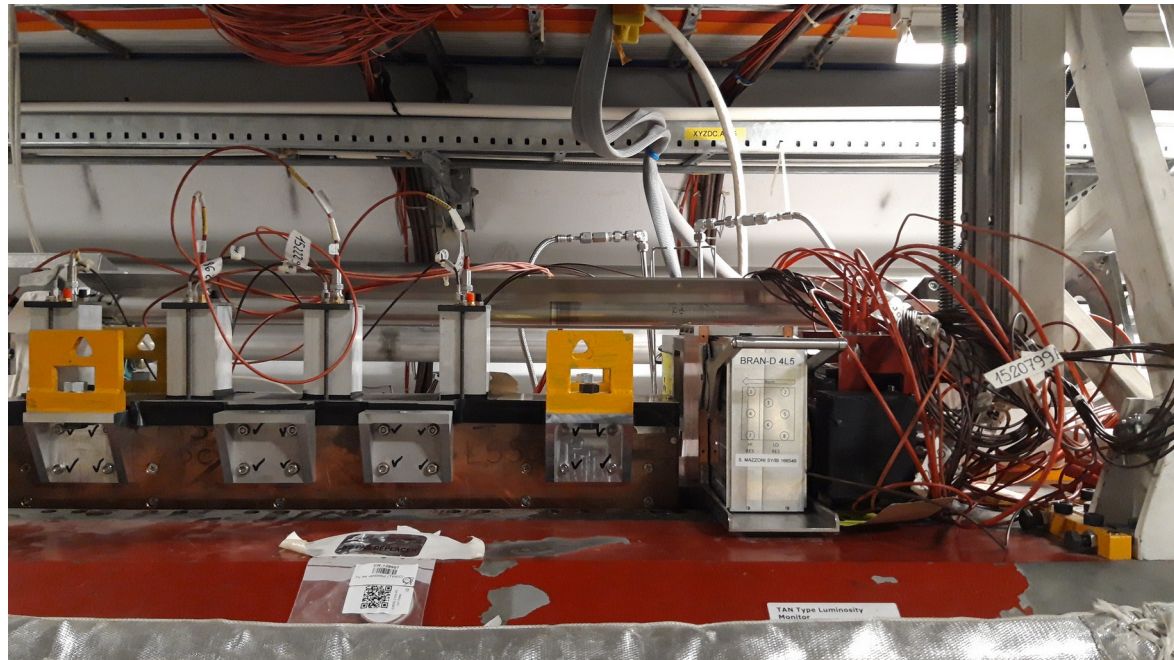
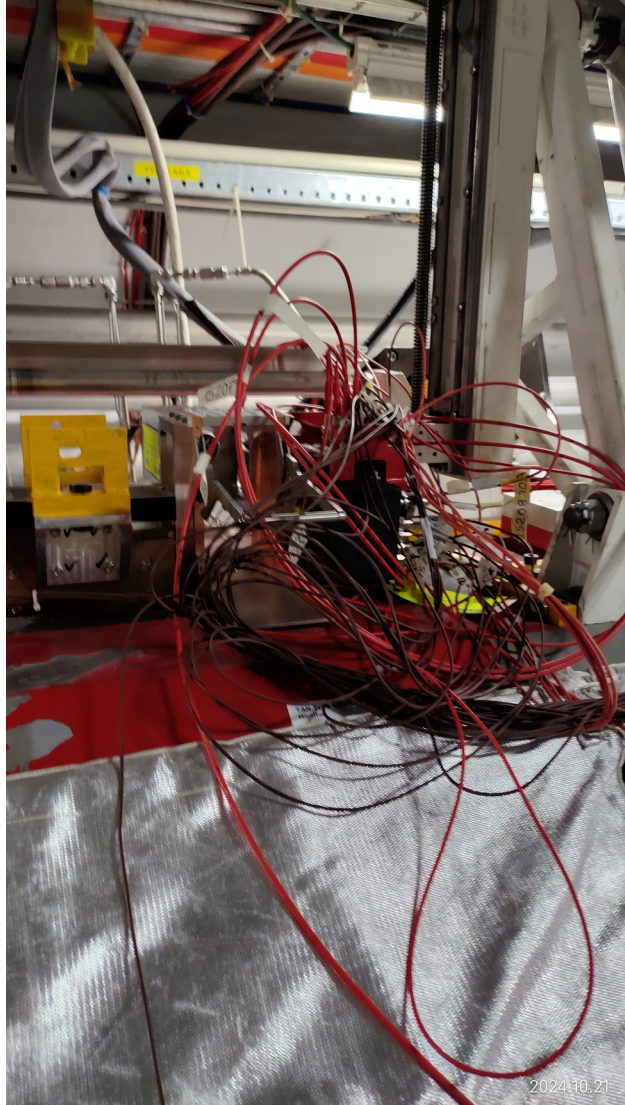
Competence and patience of the Transport team was very much appreciated!

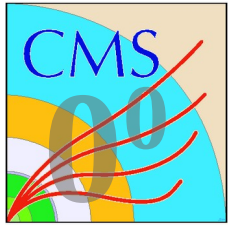


# Cabled...

... and re-cabled the next day!

The first day we reached the maximum of the collective dose and had to leave before the calorimeters were properly connected. Situation remedied the next day!

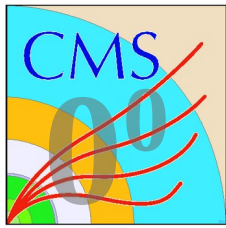




# Lesson #1

People installing the detectors are not the same ones doing cabling and commissioning!

We should probably **split the IMPACT into two separate ones** - there are two different activities done with two different teams!

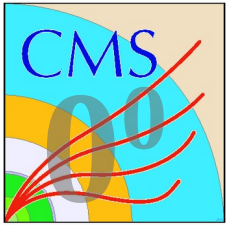


## Lesson #2

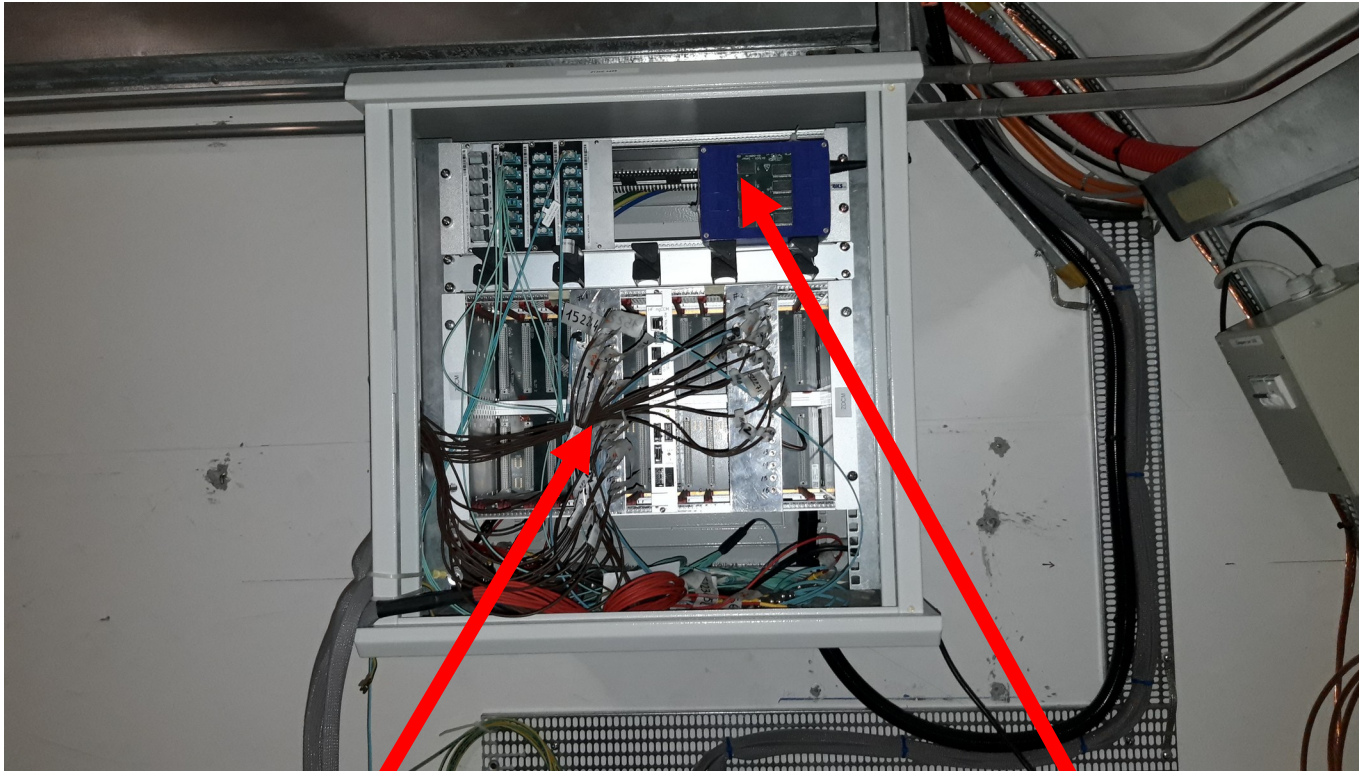
*Radiation levels during TS2 were much higher than during TS1! We were under much more pressure to hurry things along!*

**The installation procedure must be optimized for speed!**

*Useful detail: first interventions should be done in S56 - there is less radiation in the bunkers than in S45!*

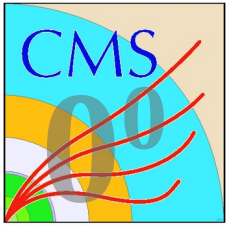


# Readout was installed



QIE front-end electronics

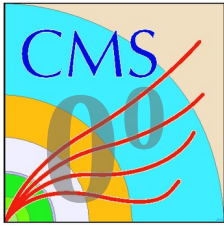
BatMon - until now radiation levels in the bunkers were obtained by extrapolating FLUKA simulations. A measurement will give us a much better idea of what can and what cannot be kept in the bunkers during both p-p and Pb-Pb runs.



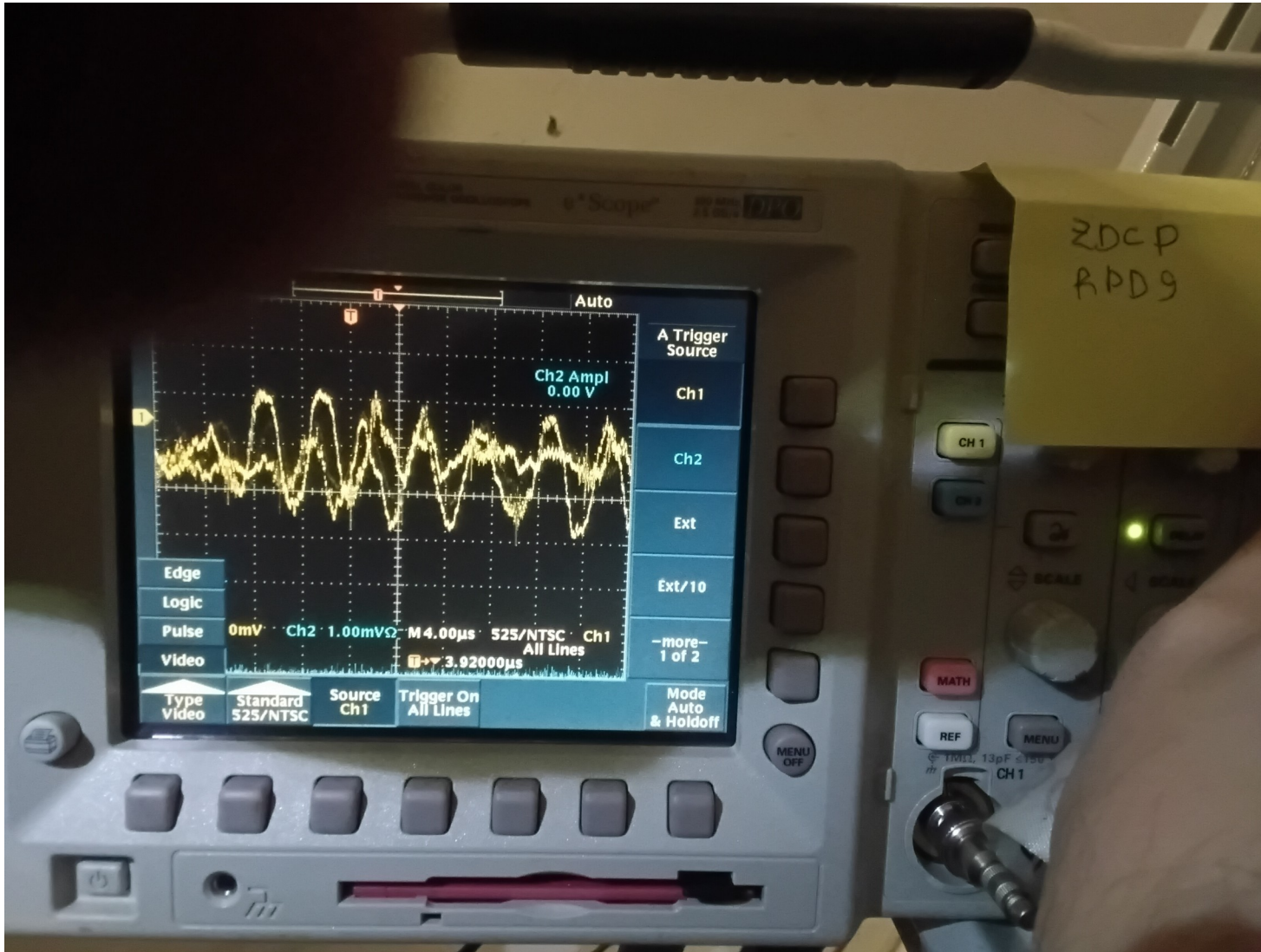
# ZDCs were connected, powered ...

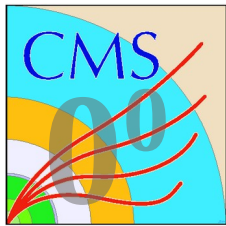






# ... and found noisy!





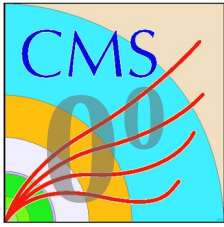
## Lesson #3

Not really surprising, but: **LHC tunnel is electrically much more hostile environment than surface buildings! Shielding and grounding are very important aspects of the installation!**

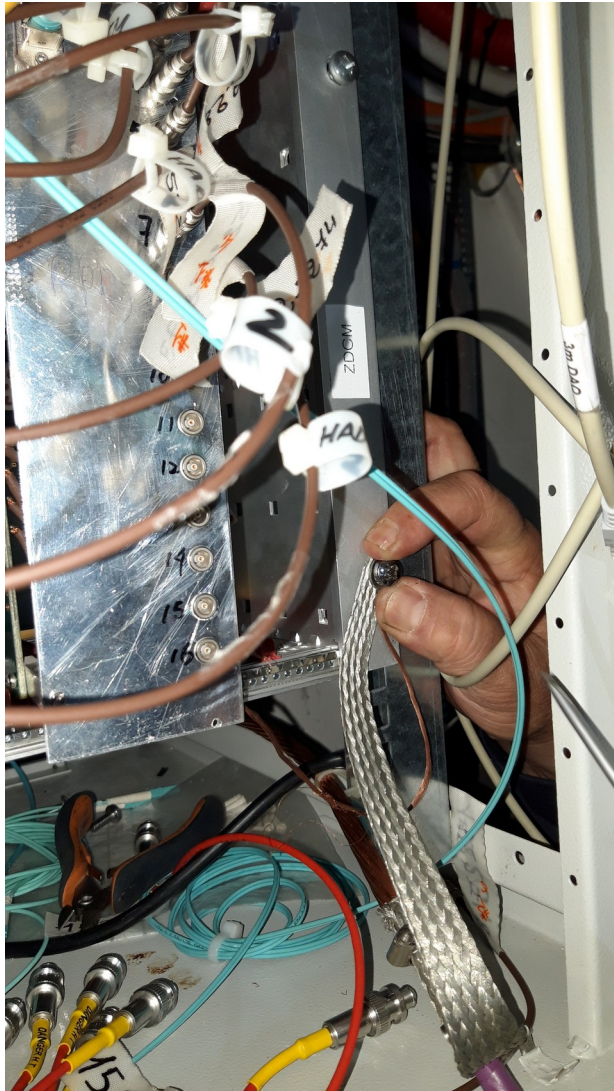
### **Important:**

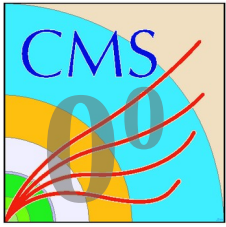
Tests done during TS1 used short high-voltage cables installed between TAN and the bunkers. During TS2 we powered the ZDCs from USC55 through long, old and potentially damaged cables! We expected more noise, but not this much!

*Lesson learnt in 2023 - do not put HV mainframes into the bunkers!*

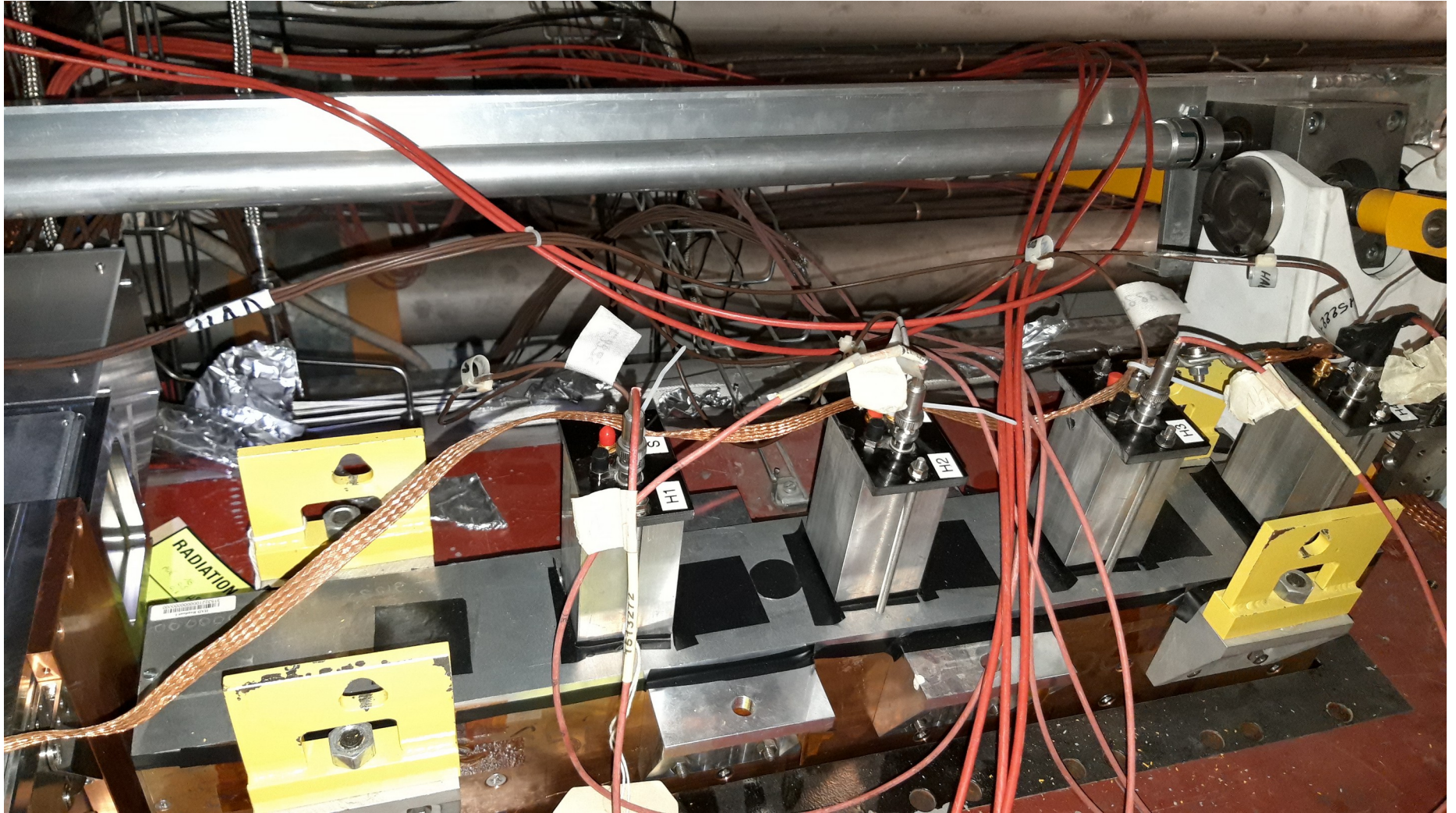


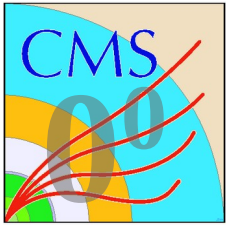
# Another intervention made...





# Grounding improved wherever we could...

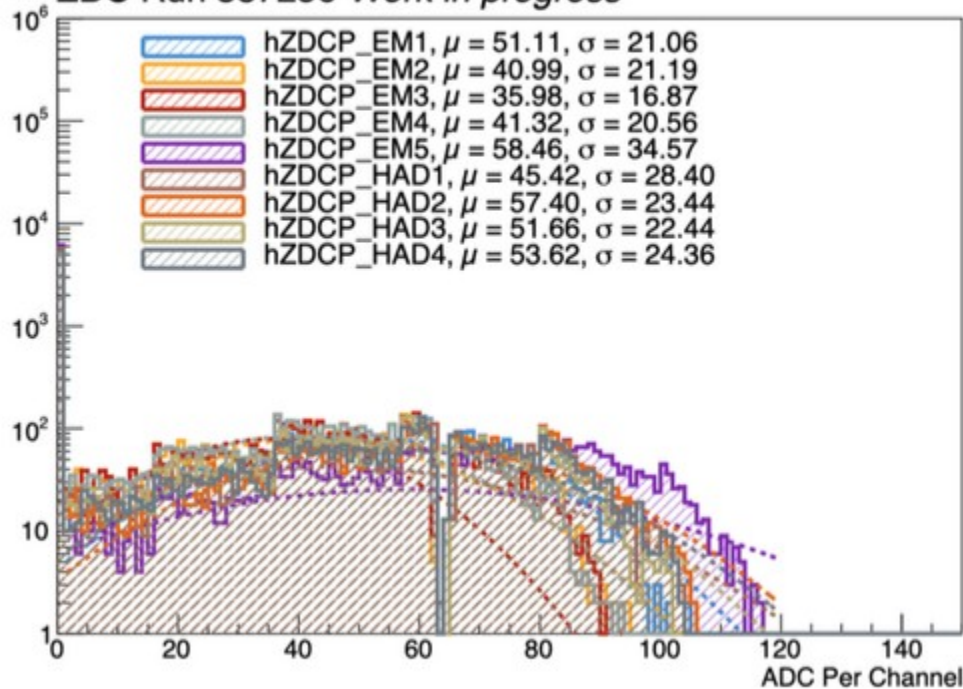




# ...and reduced the noise!

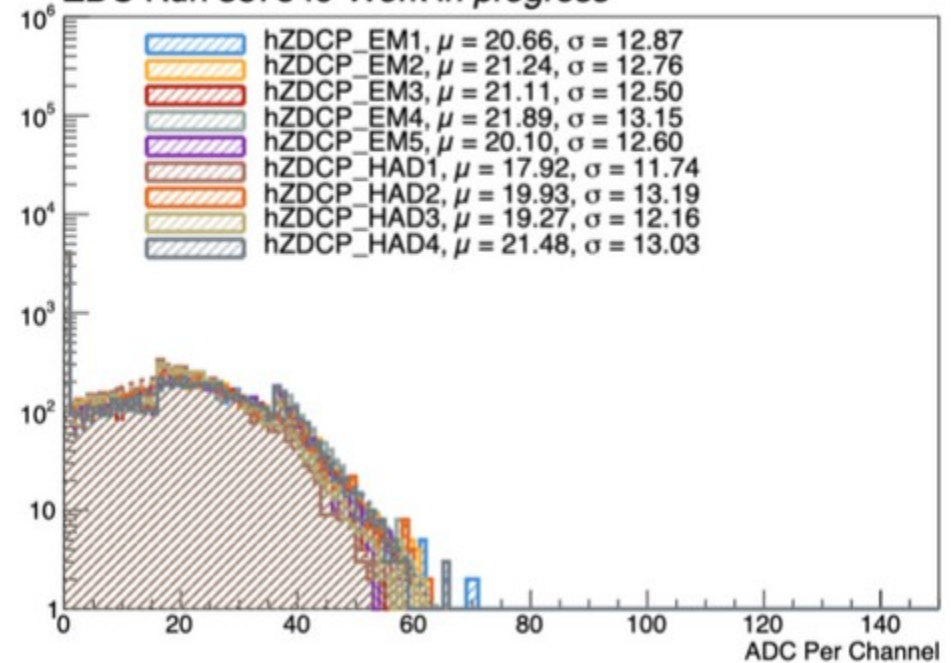
whatever you did seemed to work 😊

ZDC Run 387256 *Work in progress*

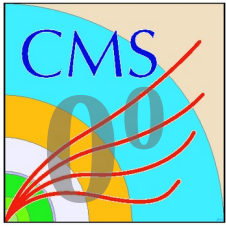


**Before Access Baseline**

ZDC Run 387549 *Work in progress*

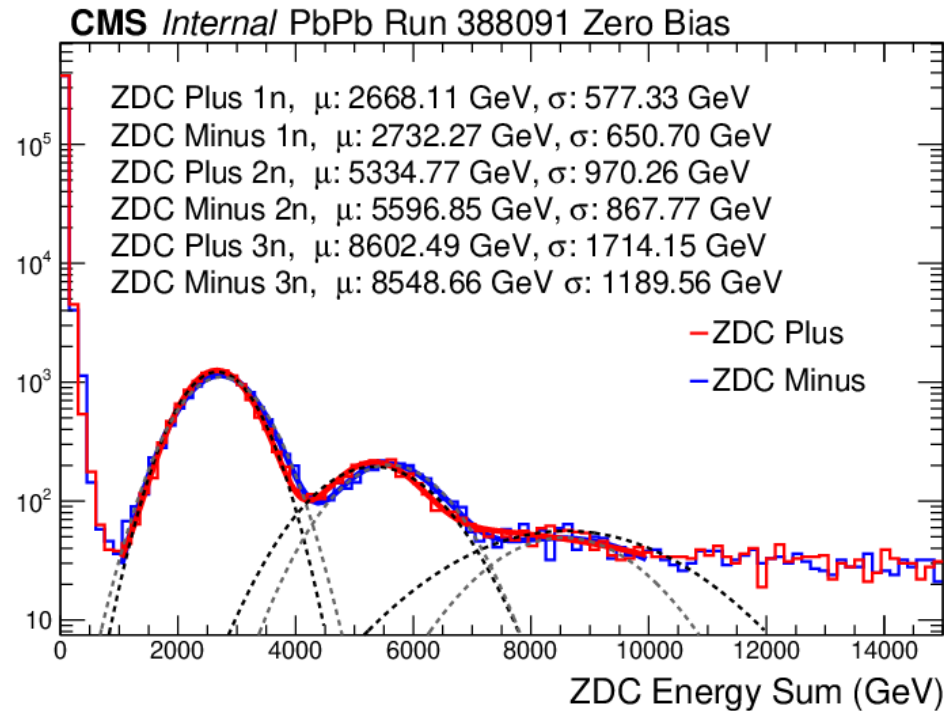


**After Access**

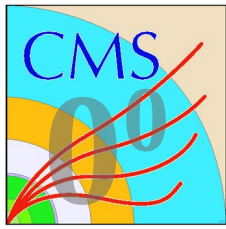


# Result

The calorimeters behaved correctly and did their fair share of work!



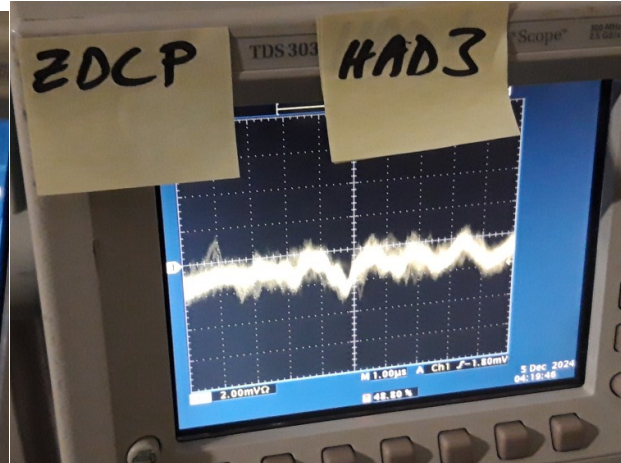
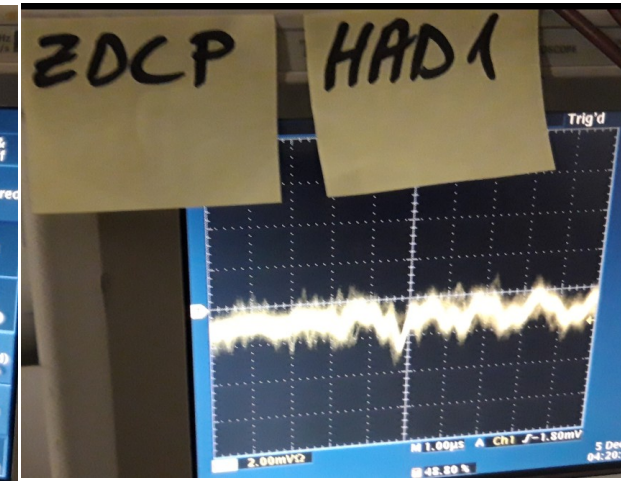
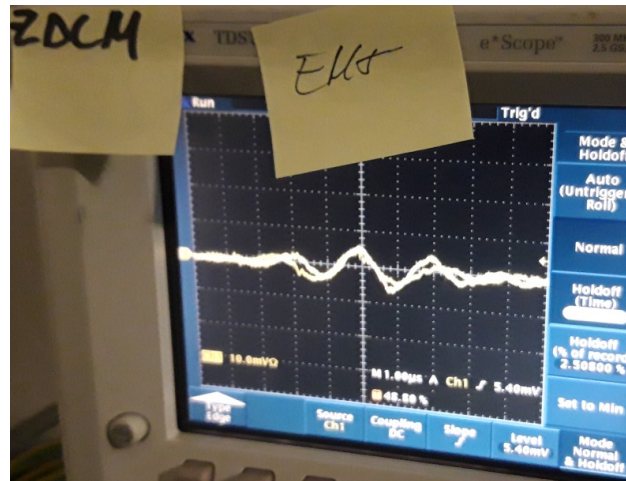
*Remember that in IP5 the beams were colliding in horizontal plane!*

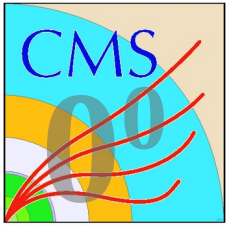


# Noise suppression..?

Some additional noise studies were attempted yesterday. We could only look at the signals on the scope - cooling of the USC55 is off for maintenance and we cannot use the data acquisition system.

We also found that studying noise reduction measures **cannot be done without noise!** 🤔  
**Whatever was the source of the noise observed in TS2 is now switched off!**

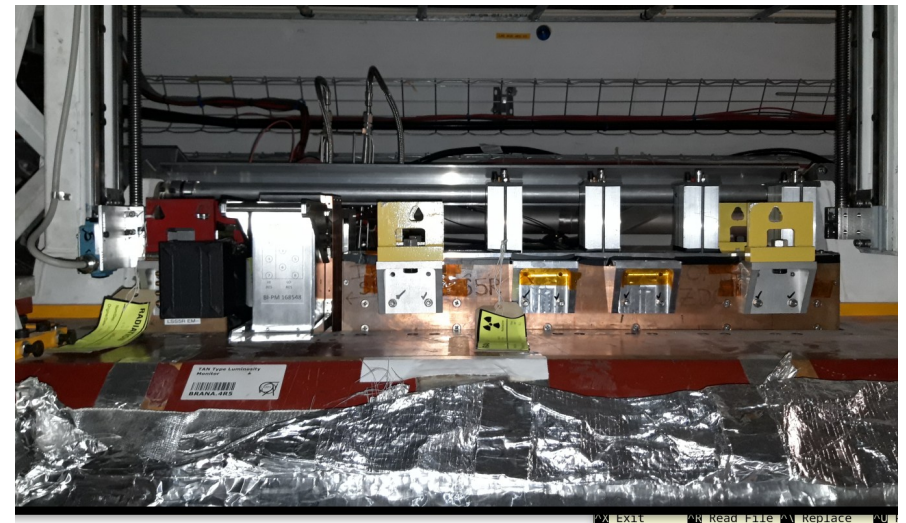




# Ready to roll!

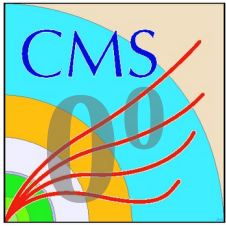
We cannot do much on the ZDCs in the tunnel any more, so we disconnected them and prepared for the move onto the surface.

When? TREC requests for the move were submitted today. When the Shipping Request get generated I will submit the IMPACT #242812. Then it is up to Transport and RP to choose the optimal date. Caveat - after CERN annual closure I will be absent till January 20<sup>th</sup>!



*My excuses to the people who will have to work on the platform during YETS - we did not have clearance to access it so the cables were just pushed to the other side of TAN!*



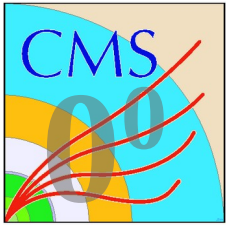


# Some more optimization!

Sometimes between the ZDC removal and the beginning of the bake-out (second half of January - early February?) we will ask for **two-three days of access to the platform behind the TAN!**

The most important task is to organize the cables in a way that they can be easily accessed for installation, if possible - without a need to work above QRL line!

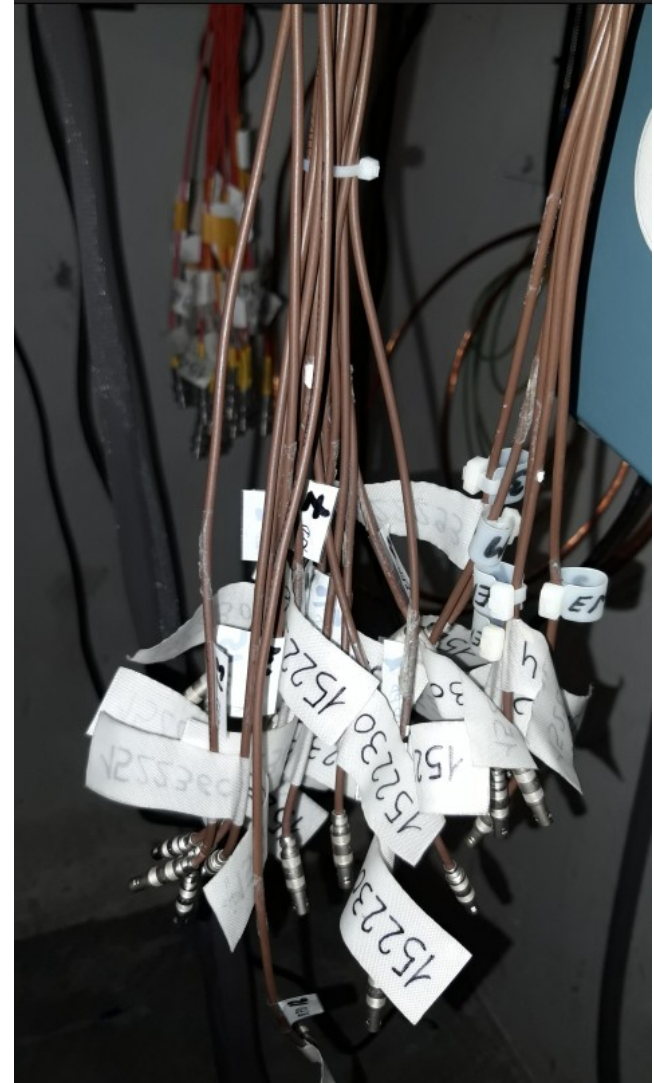


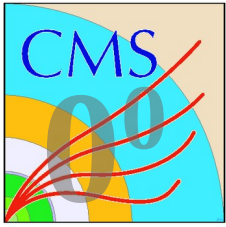


# Change labels...

For some reason the labels used by the cabling team are still there. They are big, clearly written, sturdy and - so bulky that they make connecting the cables very slow!

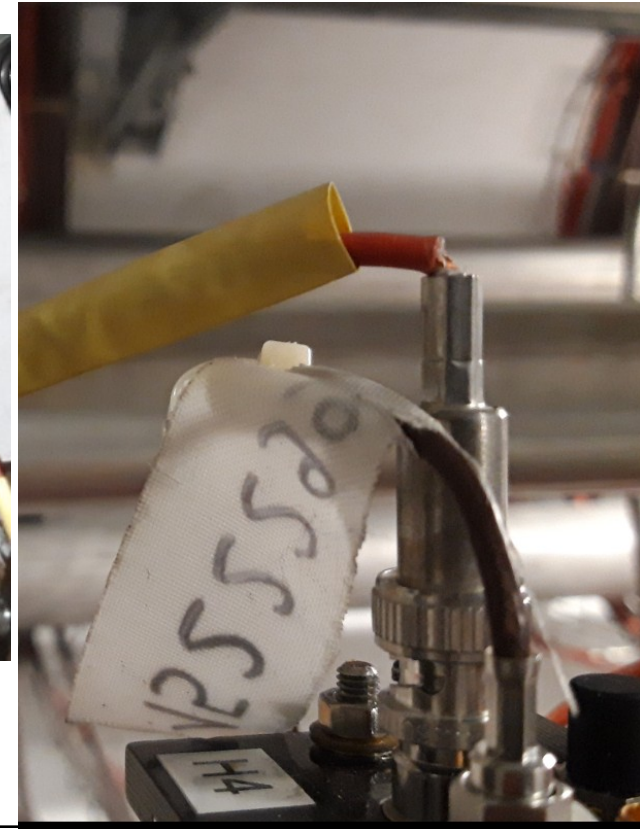
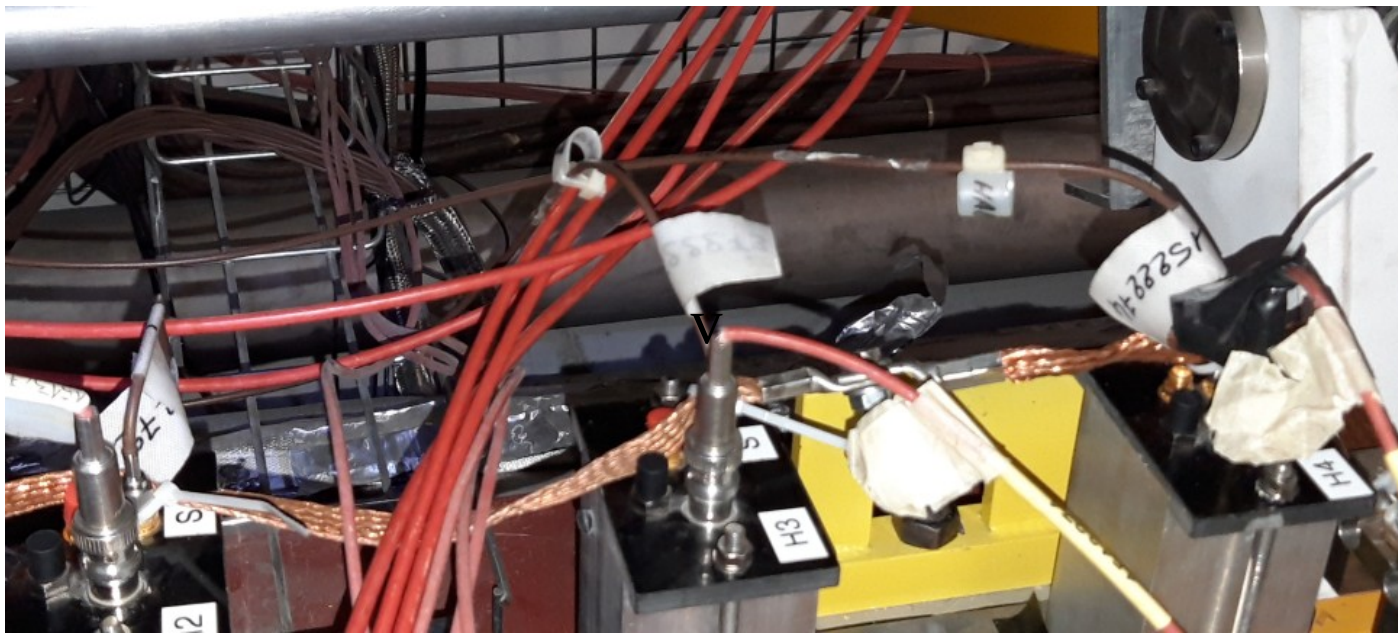
As the installation process must be optimized for speed we should remove them before the next physics run. There are many of them, it will take couple of hours of work!

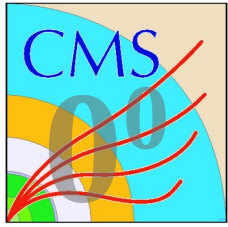




# Repair HV cables / connectors...

Some of the (rather old) HV cables going between the USC55 and TANs have damaged connections. Connectors to be replaced!





# Questions?

Comments?