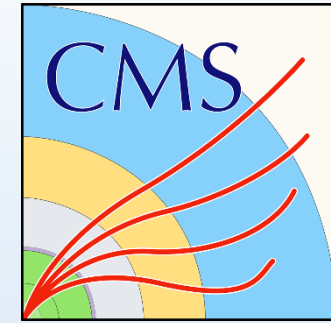


CMS EXPERIMENT SYSTEMS
GROUP
ROMANIAN HSSIP 2021

by Radu Ionut Bolborea

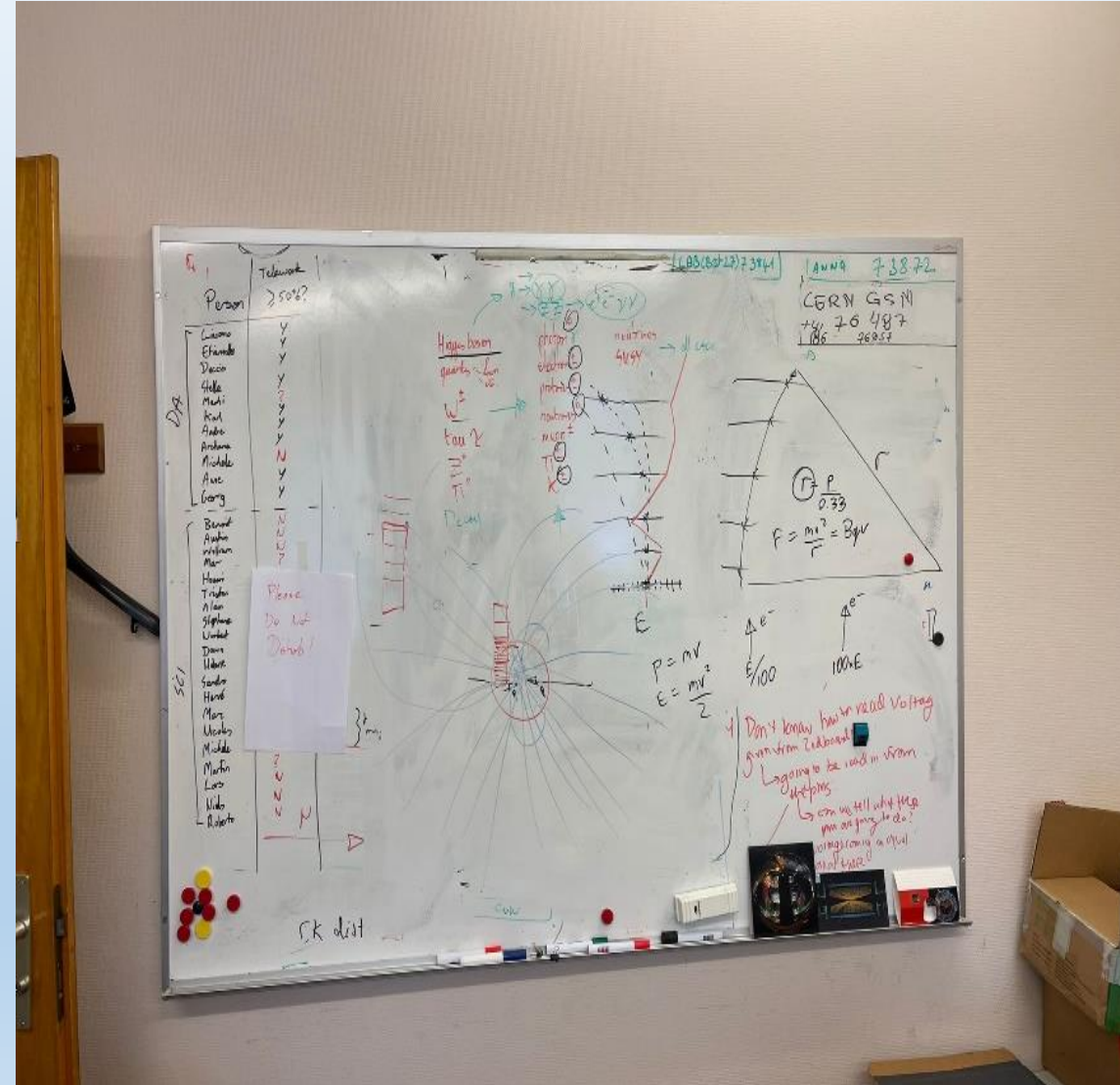
Introduction



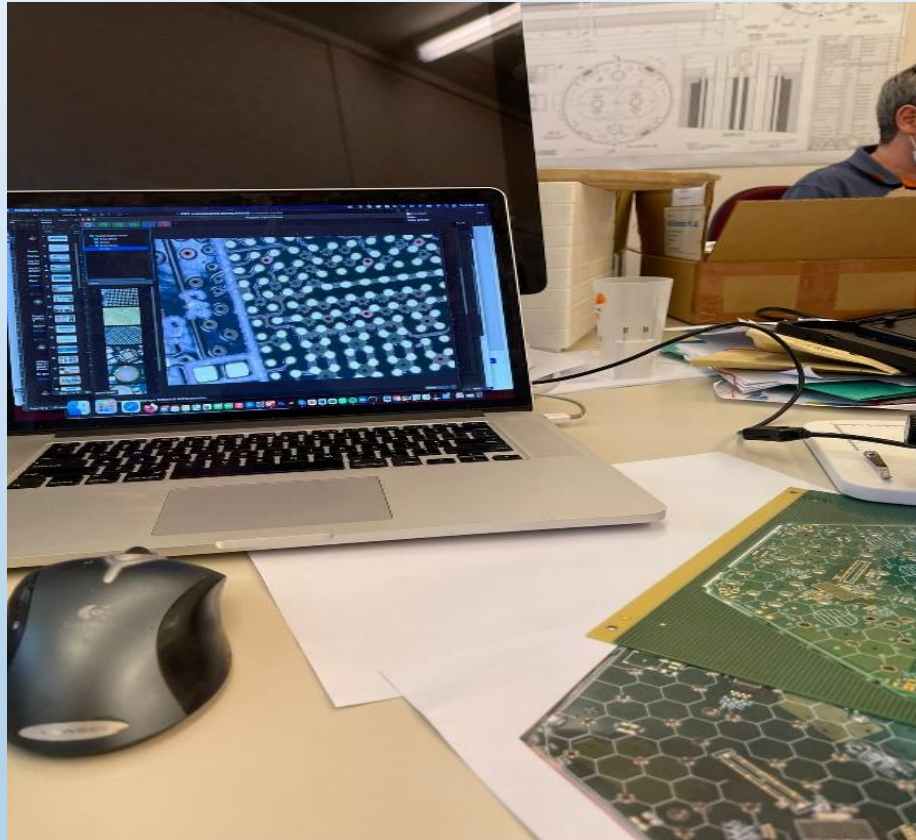
- Hello! My name's Radu Bolborea and I was a participant in the Romanian HSSIP 2021. During my stay at CERN, I was assigned to project no.12 regarding the CMS Experiment, lead by David Barney.
- This presentation will describe all the activities I have taken part in by day.

Day 1-9 Nov. 2021

- During my first day, the detector system of a particle accelerator has been described to me. Thus, the method of backtracking particles such as the Higgs Boson have been described to me.
- Also, I have seen how the silicon and pixel detectors work as well as their importance being very thin, allowing for an accurate interpretation of the particle's route.

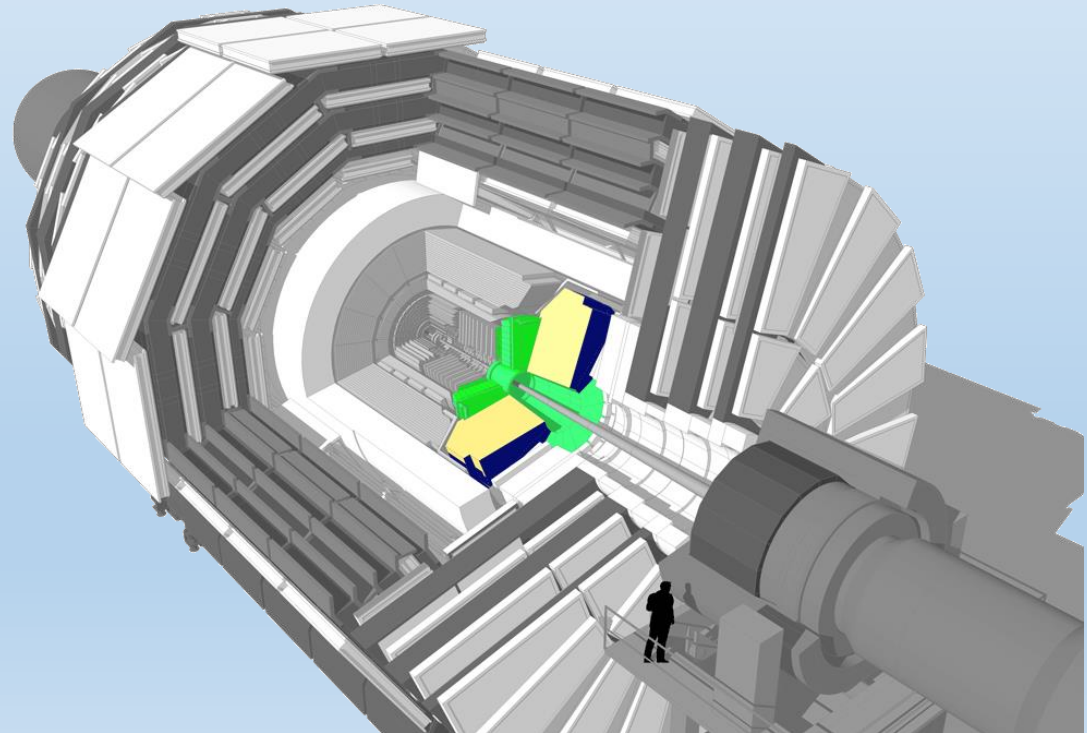
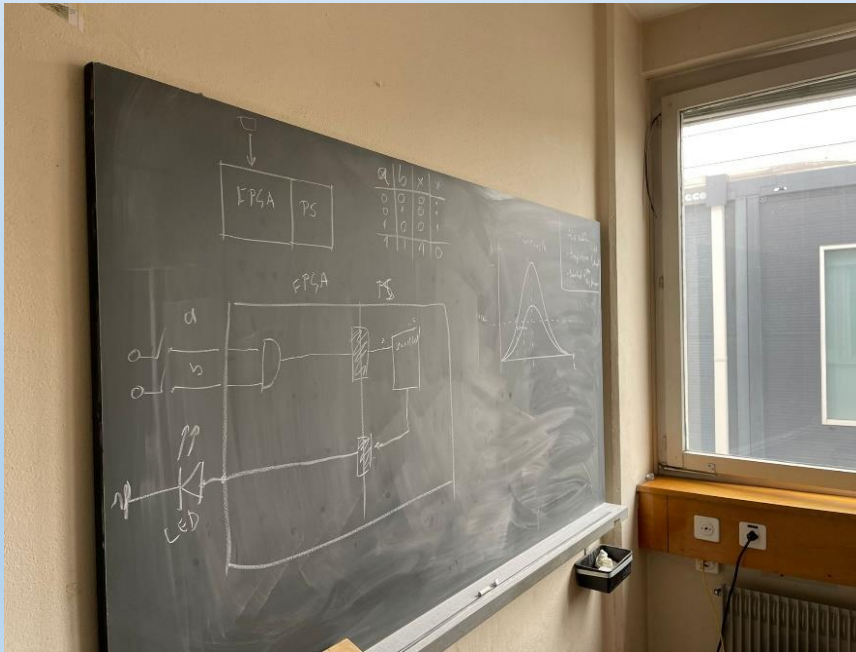


- Lastly, I have worked on quality analysis of a Hexaboard, the analyzing part of an accelerator detector.

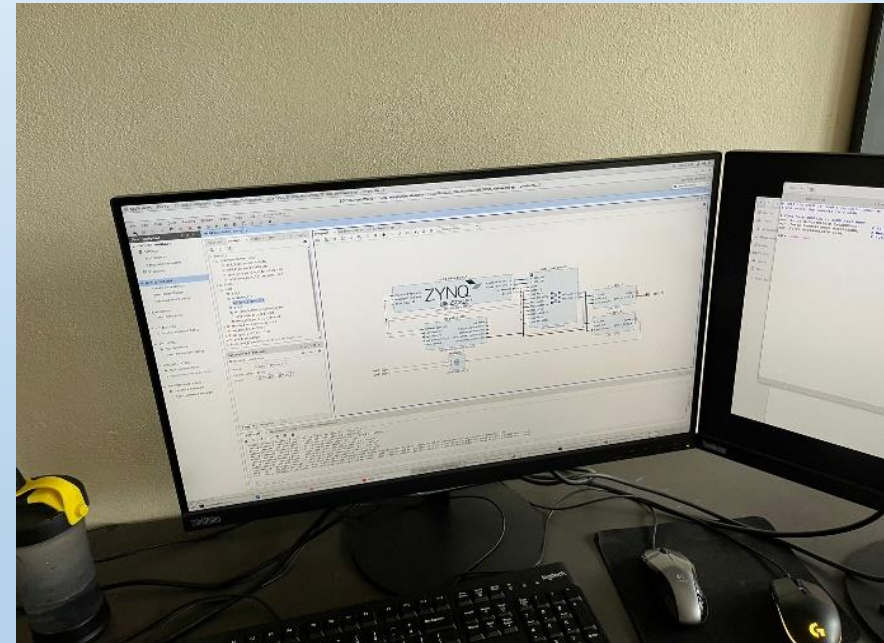
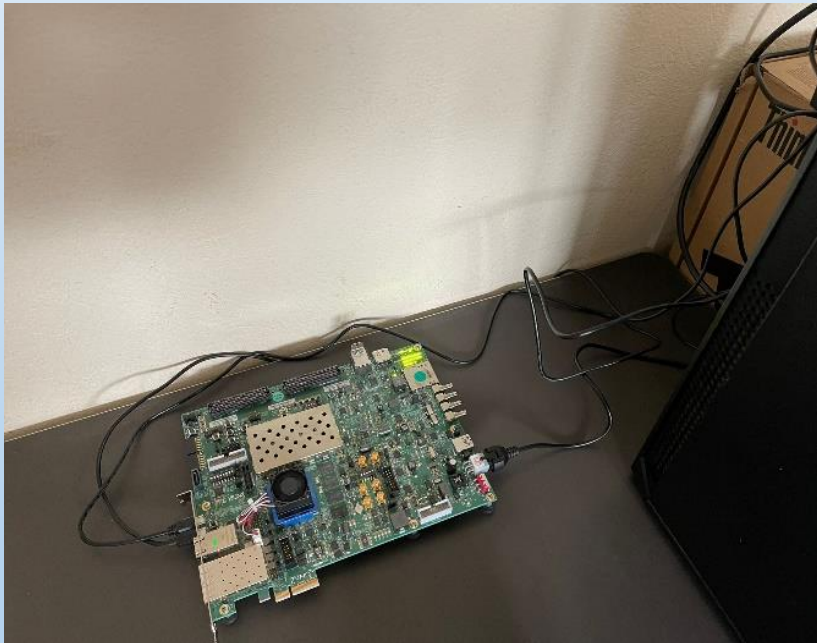


Day 2-10 Nov. 2021

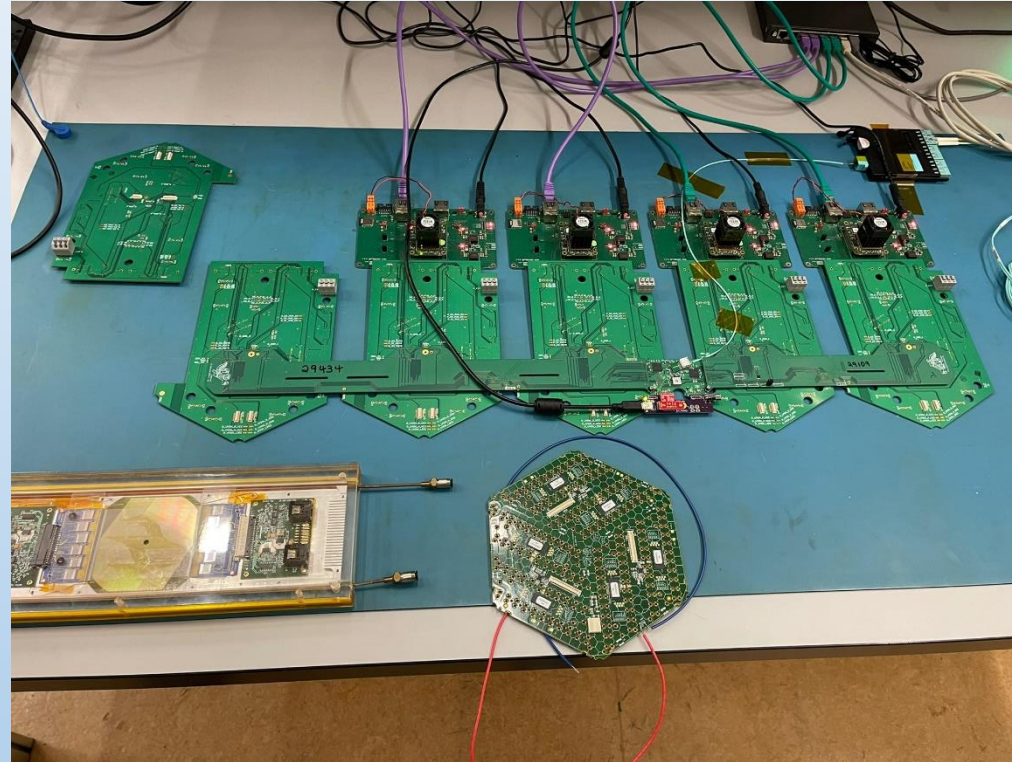
- On the second day, I've worked with Milos and Alexander, on electronical systems. I've learned about how transistors work and their development from the beginning of the PS until now.



- I've also seen firmware with Milos, and programmed it using Vivaldo Software.

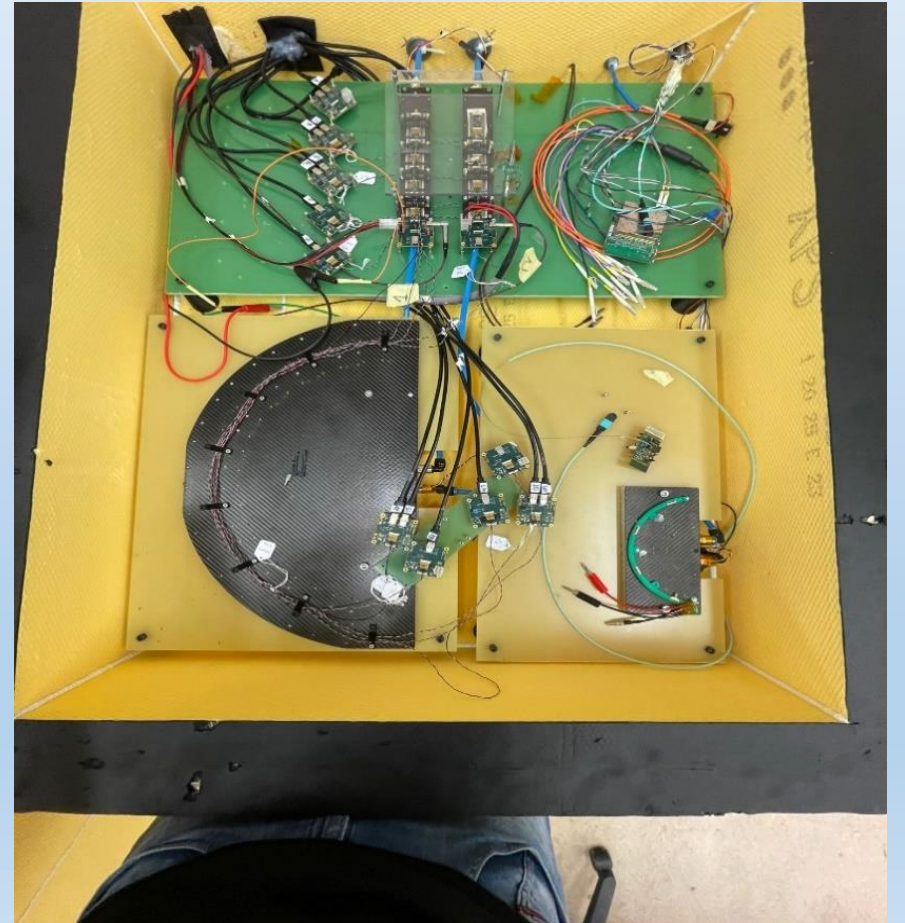
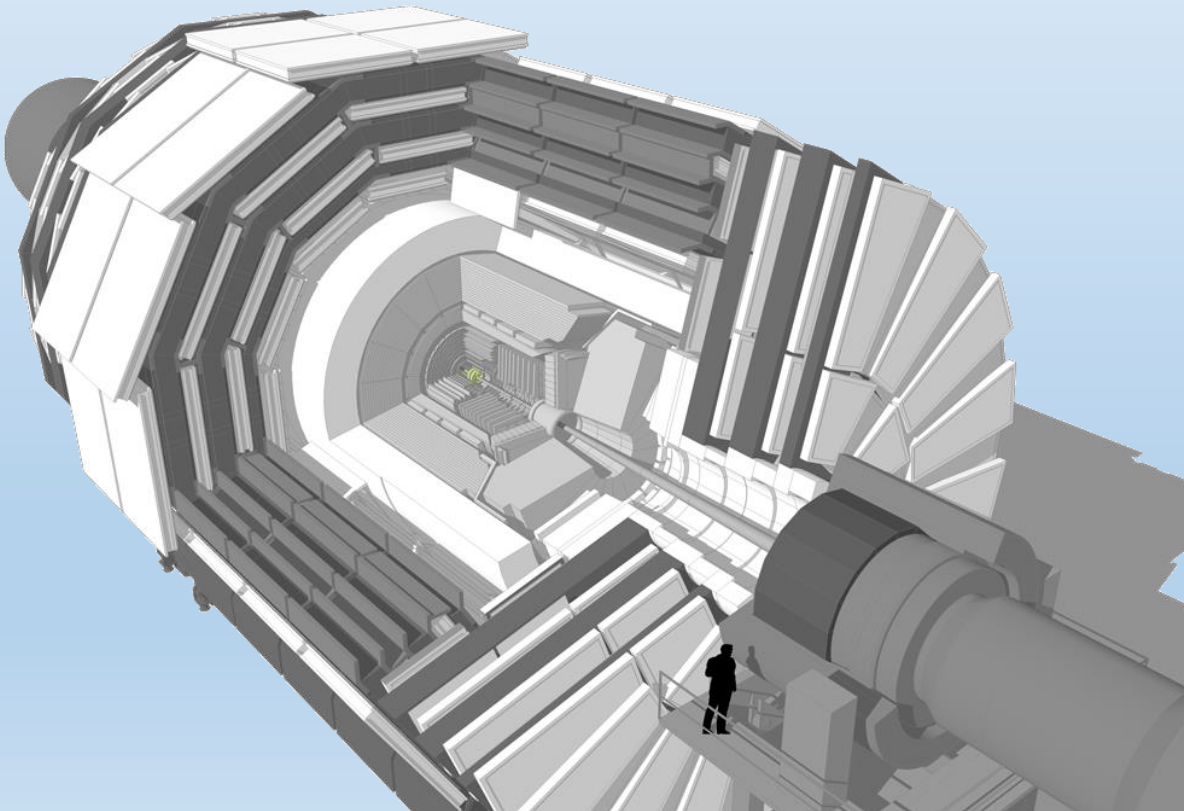


- Lastly, I worked on software and saw how the boards are programmed in order for them to recognize what's necessary to record or not.

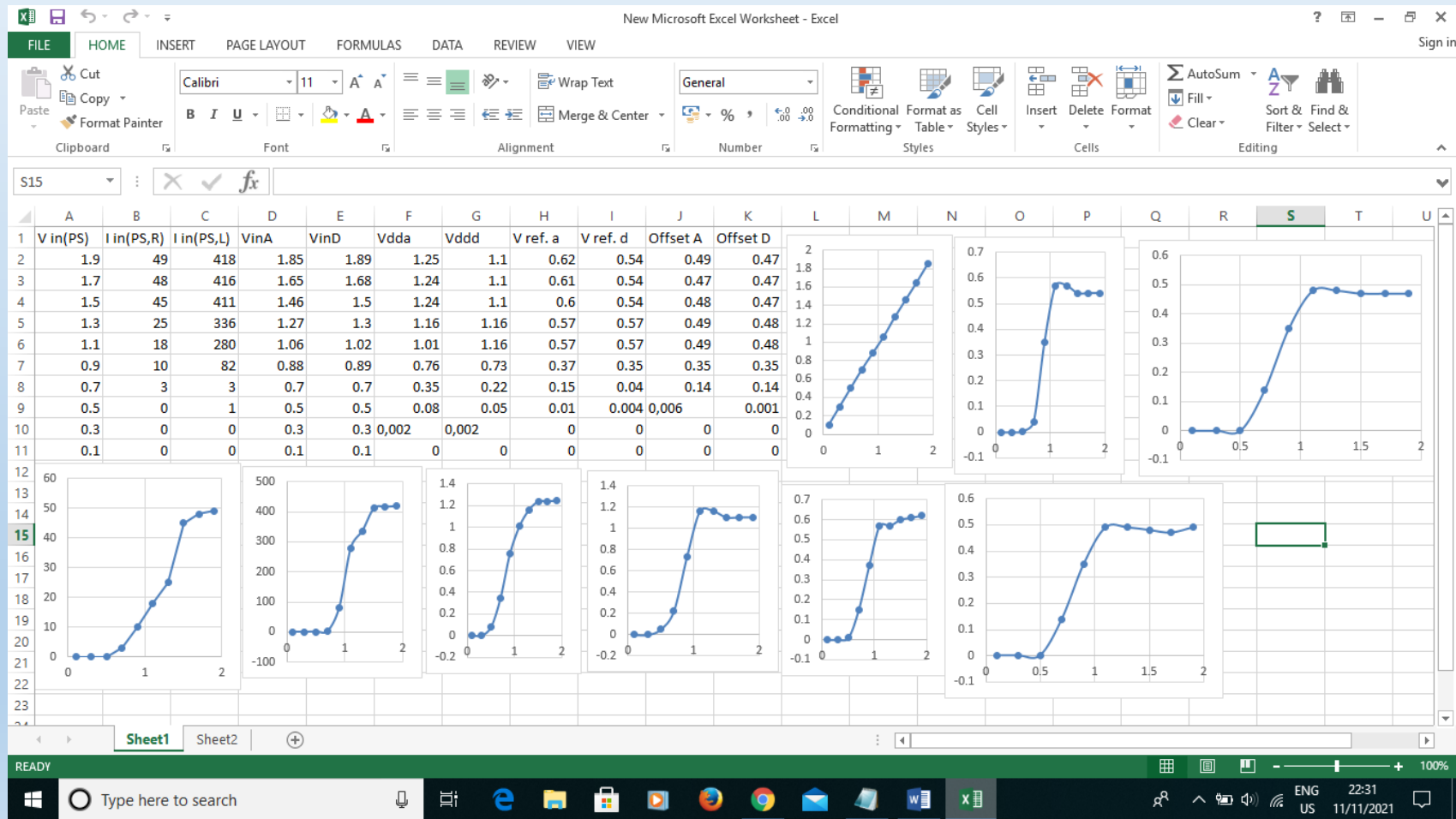


Day 3-11 Nov. 2021

- This day I've worked with Stella who showed me the roles of electronical systems in the Inner Tracker.

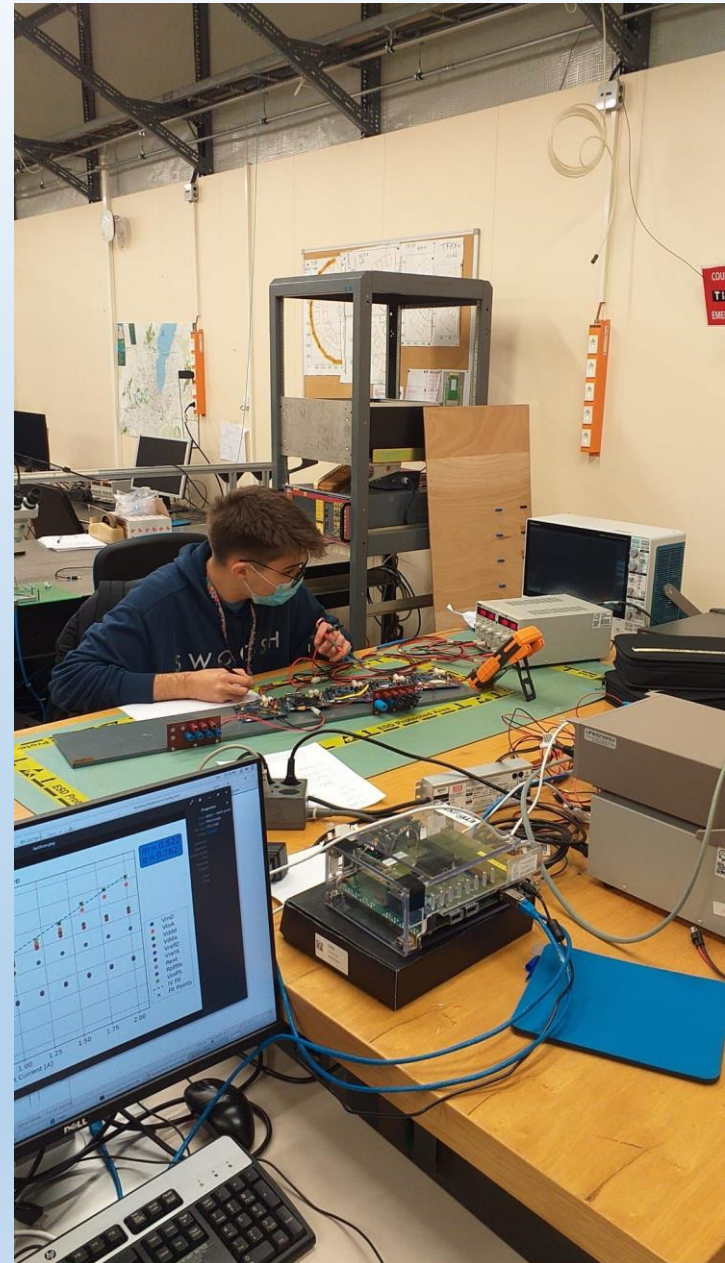
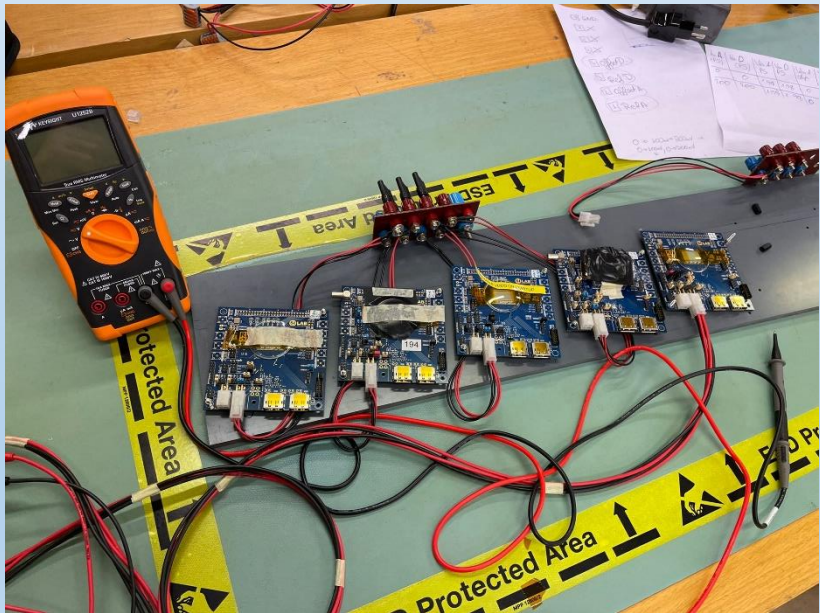


I've also done measurements on this electronic systems on a board.



DAY 4-12 Nov. 2021

- I've again worked with Stella on electrical systems, doing measurements on a system of boards.



New Microsoft Excel Worksheet - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW Sign in

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Color, Background Color

Alignment: Wrap Text, Merge & Center

Number: General, Percentage, Decimals

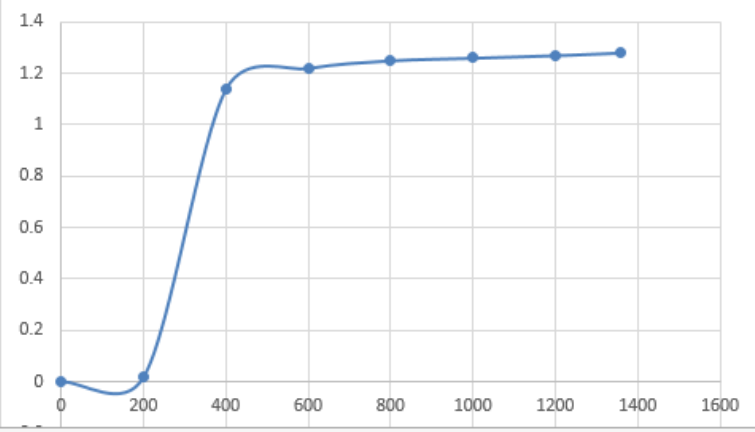
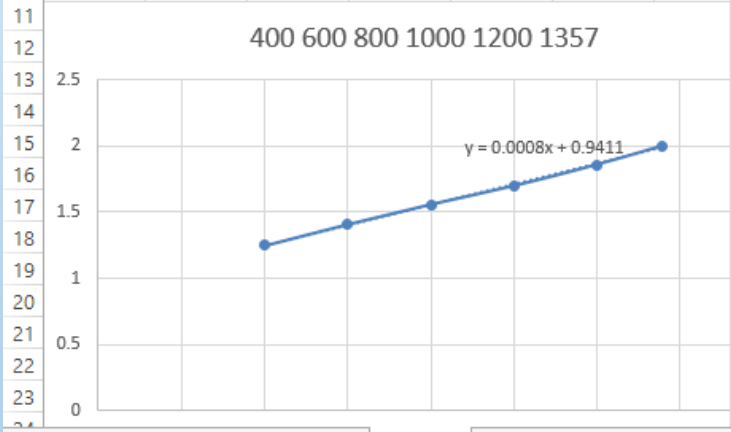
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Cells: Insert, Delete, Format

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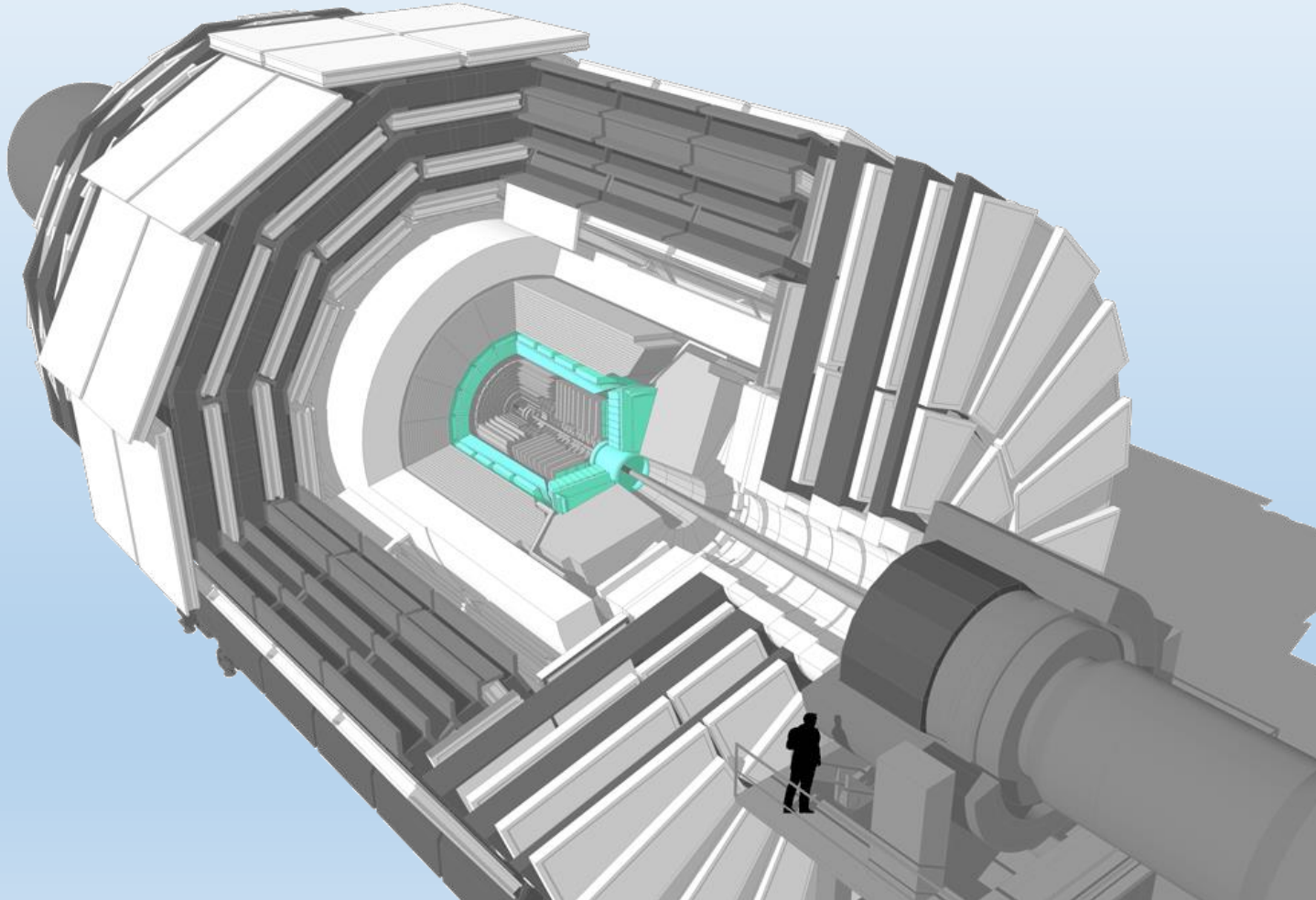
L9: 0.46

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	InA	InD	VinA(P.S)	VinD(P.S)	VinA	VinD	Vdda	Vddd	VrefA	VrefD	Offset A	Offset D									
2	0	0	0.52	0.52	0.52	0.52	0	0	0.02	0	0.02	0									
3	200	200	0.79	0.88	0.77	0.85	0.02	0.93	0.2	0.48	0.2	0.2									
4	400	400	1.25	1.25	1.18	1.21	1.14	1	0.24	0.52	0.25	0.25									
5	600	600	1.41	1.41	1.32	1.36	1.22	1.09	0.6	0.54	0.49	0.48									
6	800	800	1.56	1.56	1.48	1.48	1.25	1.1	0.62	0.54	0.61	0.45									
7	1000	1000	1.7	1.7	1.61	1.62	1.26	1.11	0.63	0.55	0.62	0.46									
8	1200	1200	1.86	1.86	1.76	1.76	1.27	1.12	0.63	0.55	0.62	0.46									
9	1357	1357	2	2	1.87	1.87	1.28	1.13	0.63	0.55	0.63	0.46									

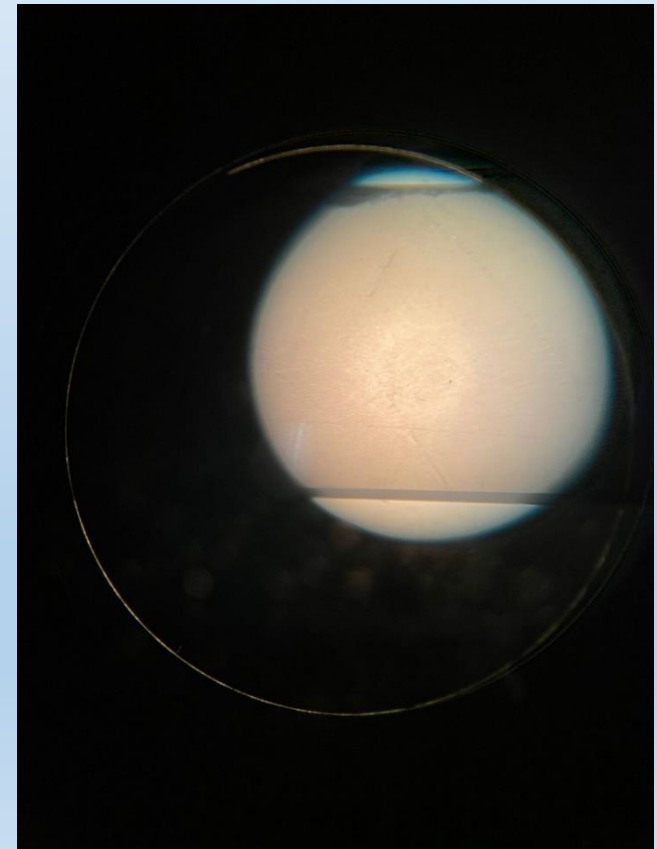


Day 5-15 Nov. 2021

- I've worked with members of the ECAL team of CMS.



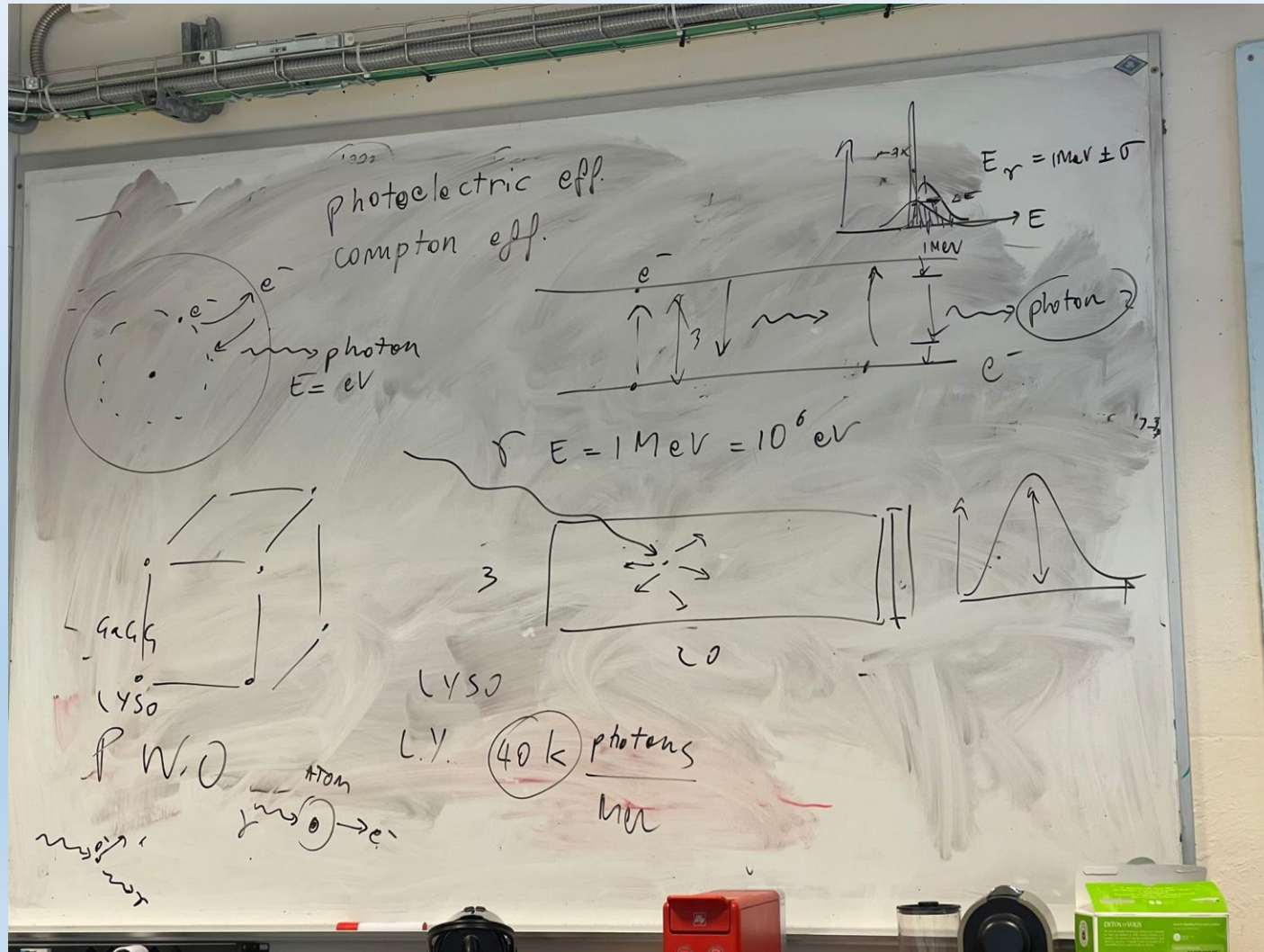
- I started with Dominique on crystal cutting and polishing.



- After, I've went to the room where they make superconductors.

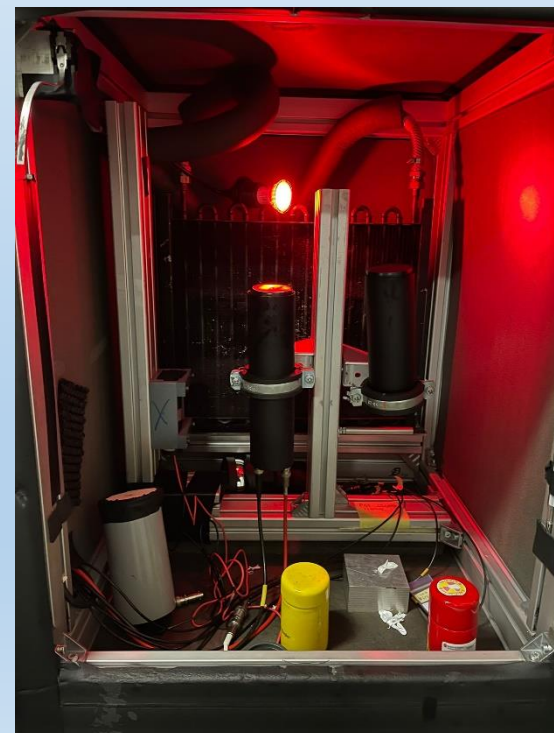
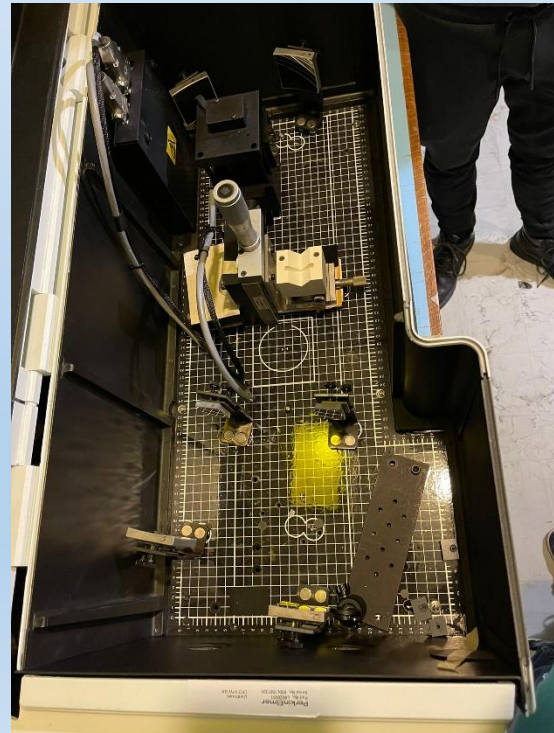
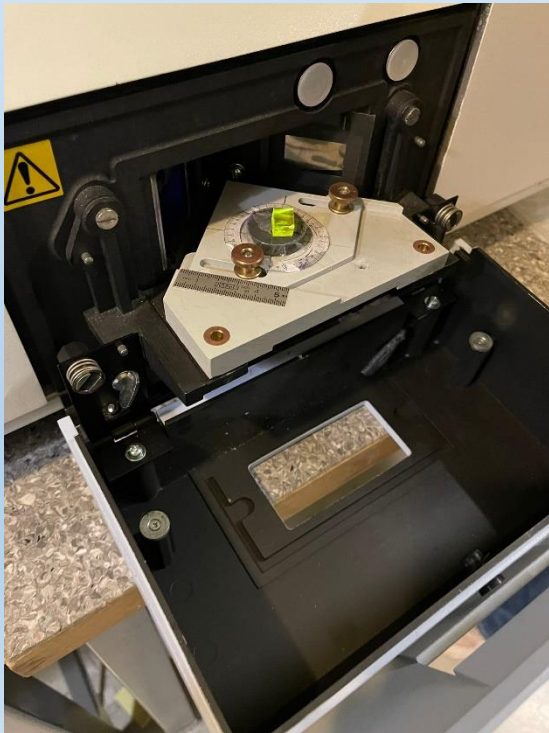


- Lastly, I've worked with Andreea who showed me the roles of crystals in the LHC detectors as well as in medical imaging such as PET.

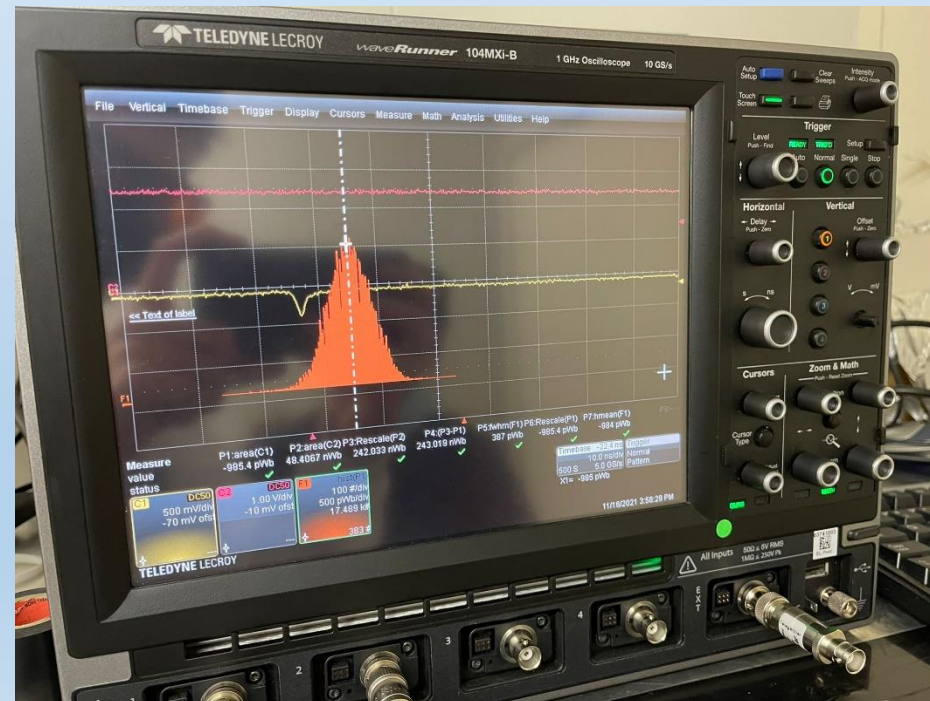
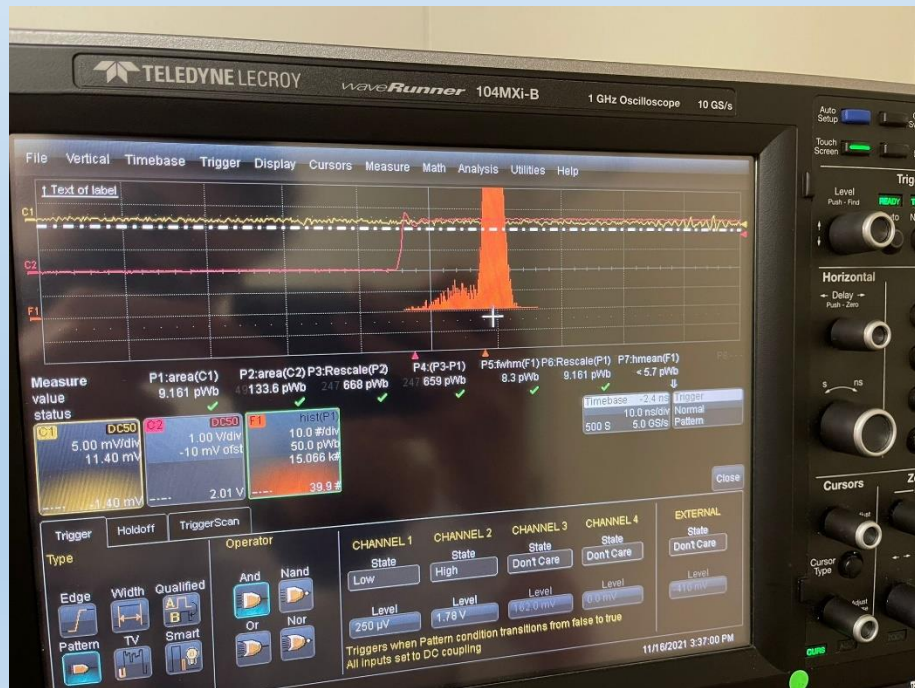


Day 6-16 Nov. 2021

- I've worked with Roberto and Mateo on crystal properties testing.
- I've also learnt what properties are essential for a crystal (GAGG, PBO and LYSO) such as density, radiation hardness and light output.

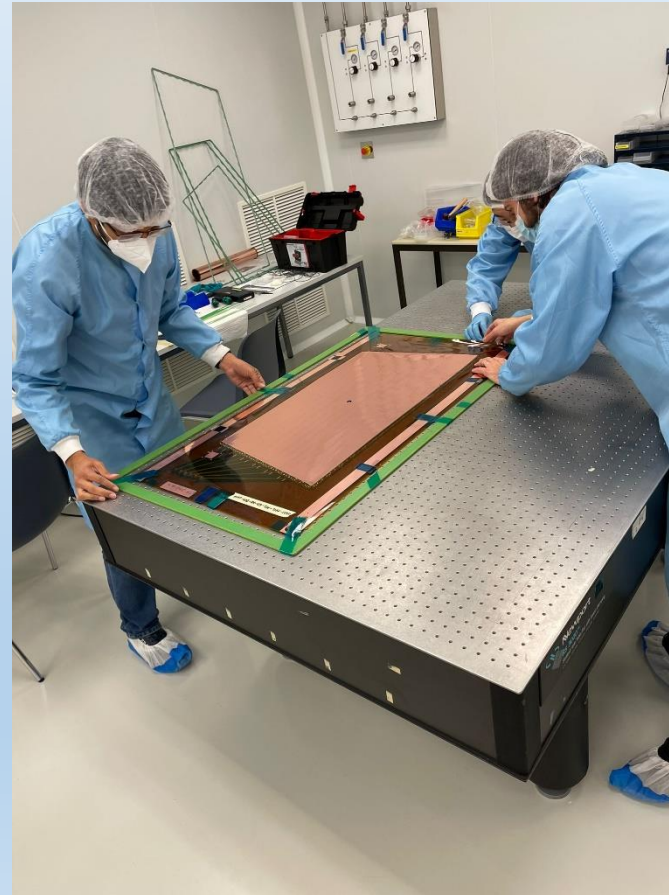
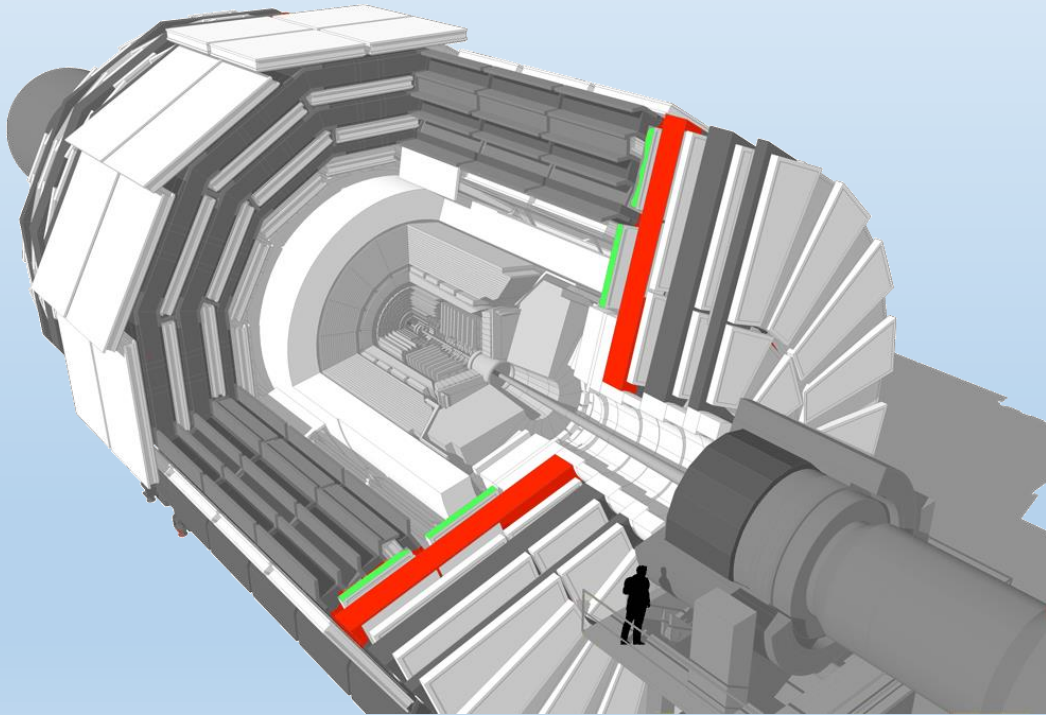


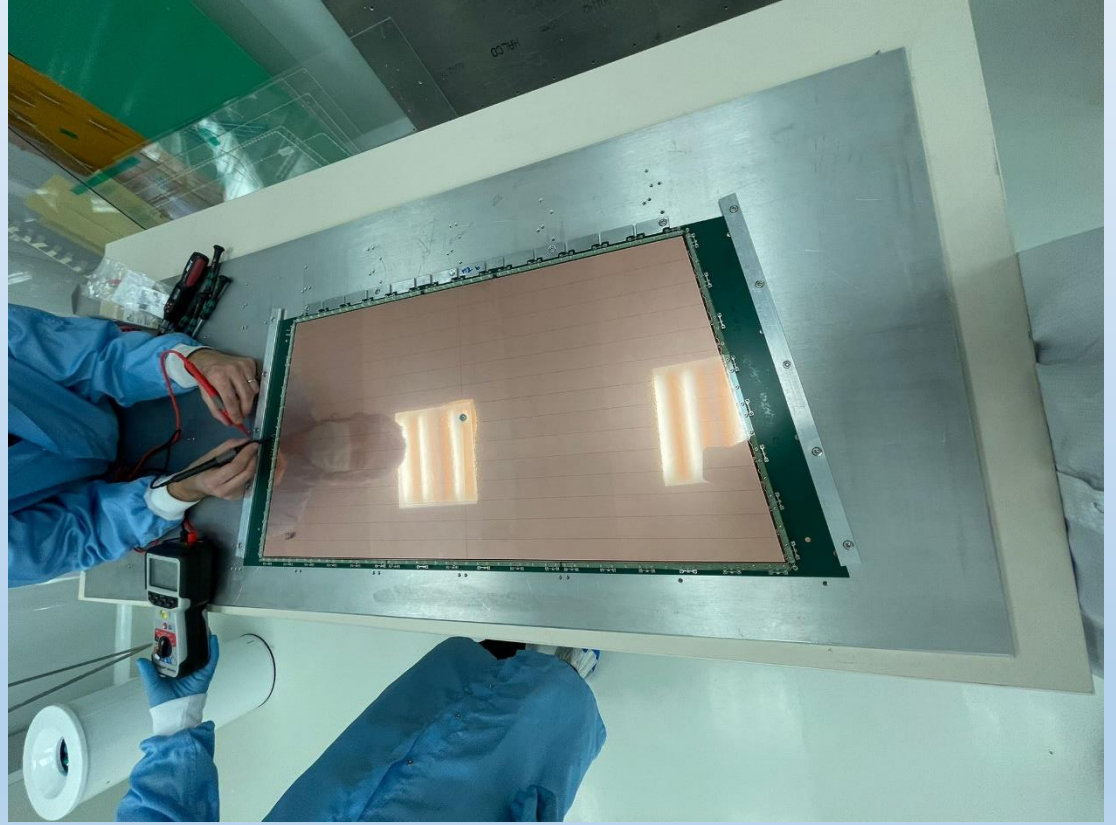
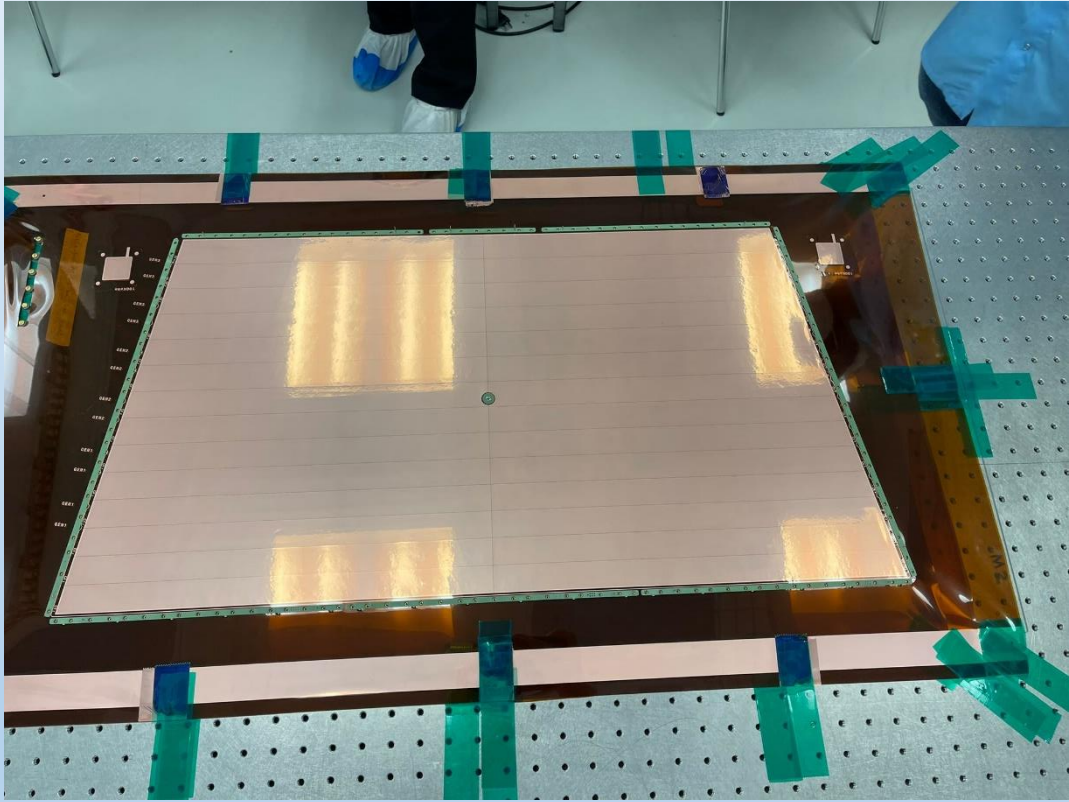
- With Mateo, I worked on PMT systems and the role of dinodes and optical filters in those measurements.
- I have also done some histograms on the spectrometer down below.



Day 7-17 Nov 2021

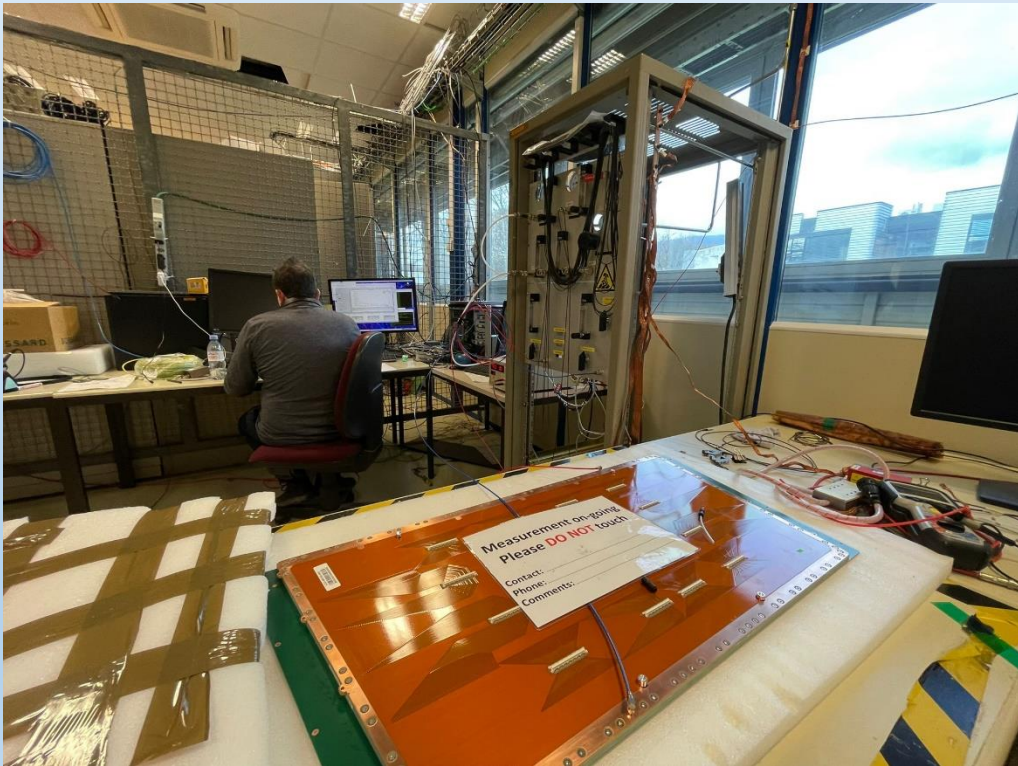
- Today I have worked with Michele's team for the GEM, seeing the construction of a GEM.



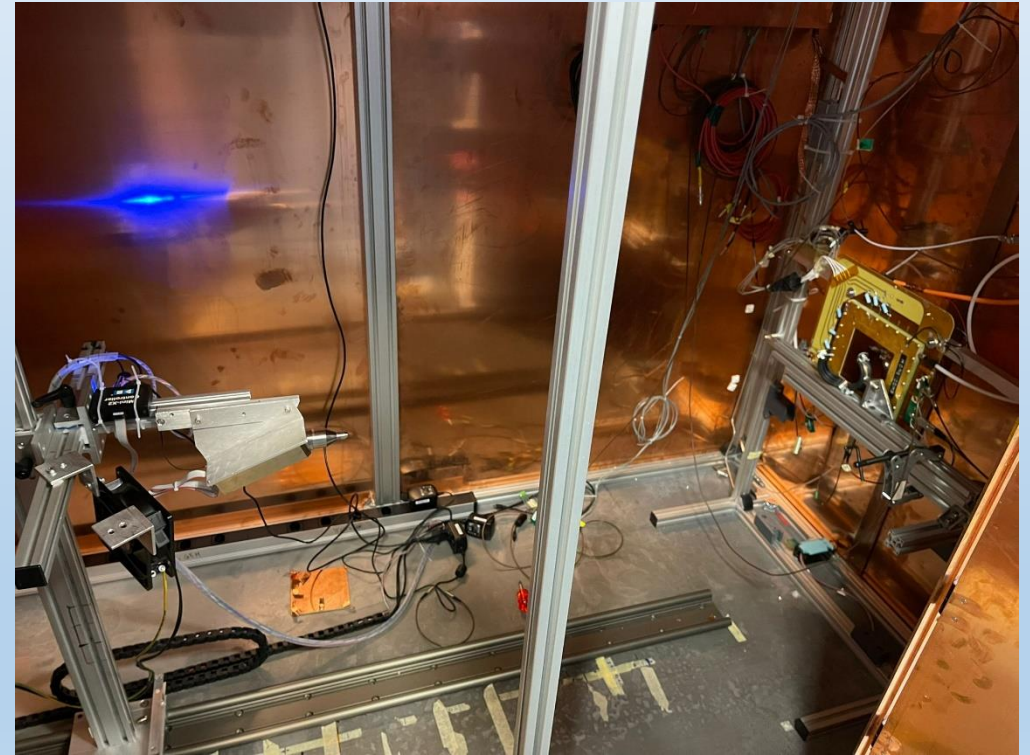


Day 8-18 Nov. 2021

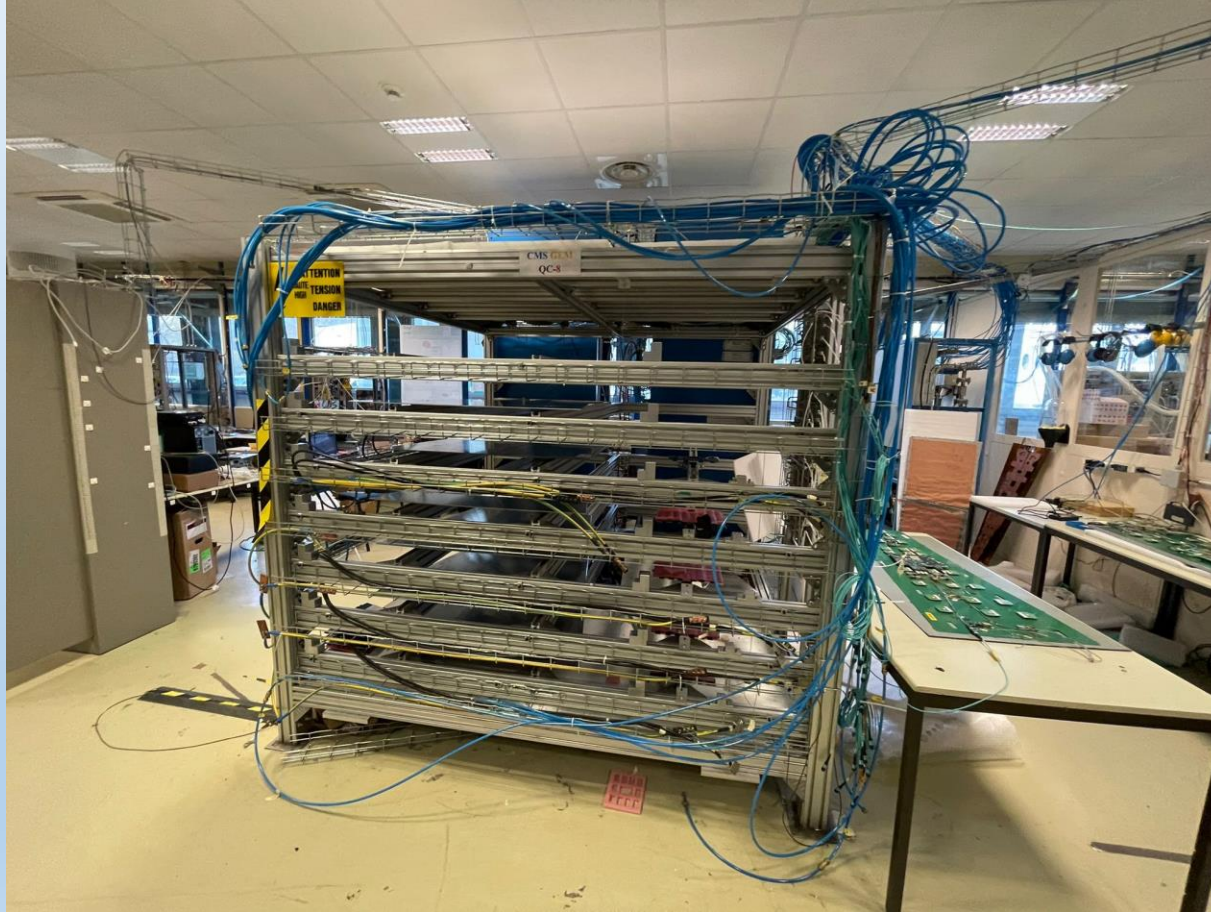
- On my last day, I've worked with Michele on GEM tests QC1-QC8.



QC3 TEST



QC5 TEST



QC8

- Lastly, I have visited the North Area.



- That was my project at the Romanian HSSIP-2021.

And this is just the beginning!

