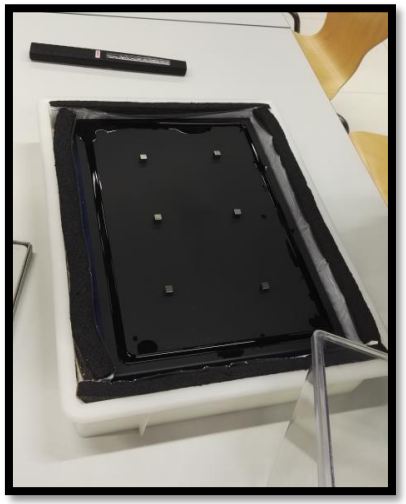
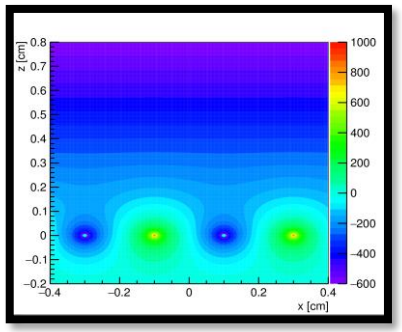


Gaseous particle detectors

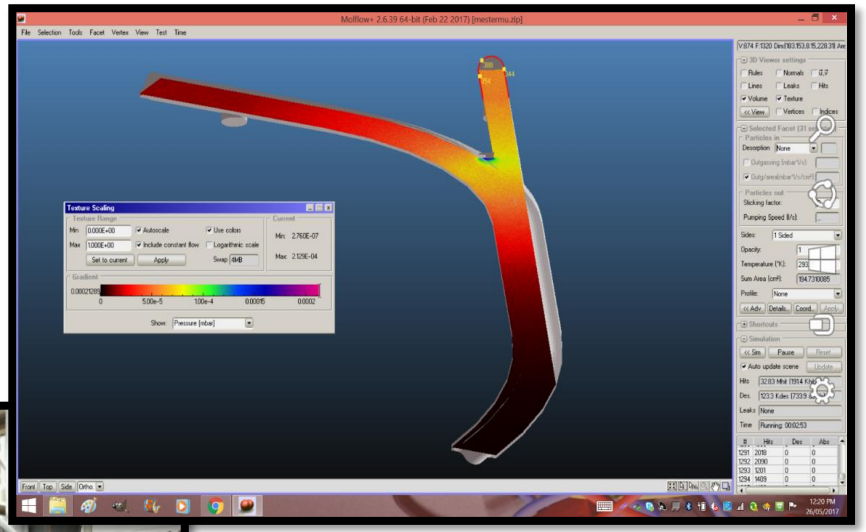


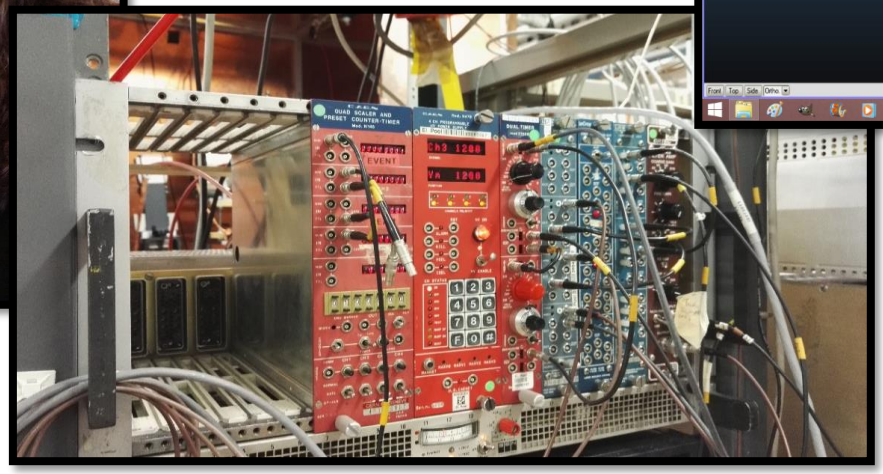
High-School Students Internship Programme

Eszter Zita Szatmari, Glenda Dora Egervari

Mentor: **David Lucsanyi**

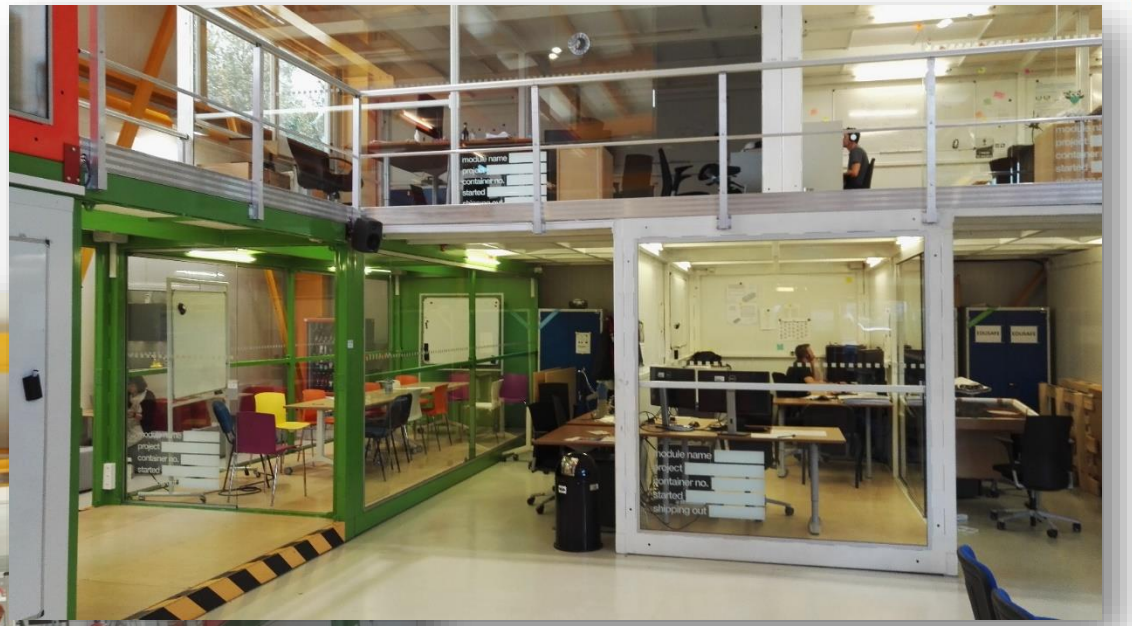
2017





Our office: The **Bus** at **CERN** IdeaSquare

- Free coffee ☺
- Ideas
- 3D printer

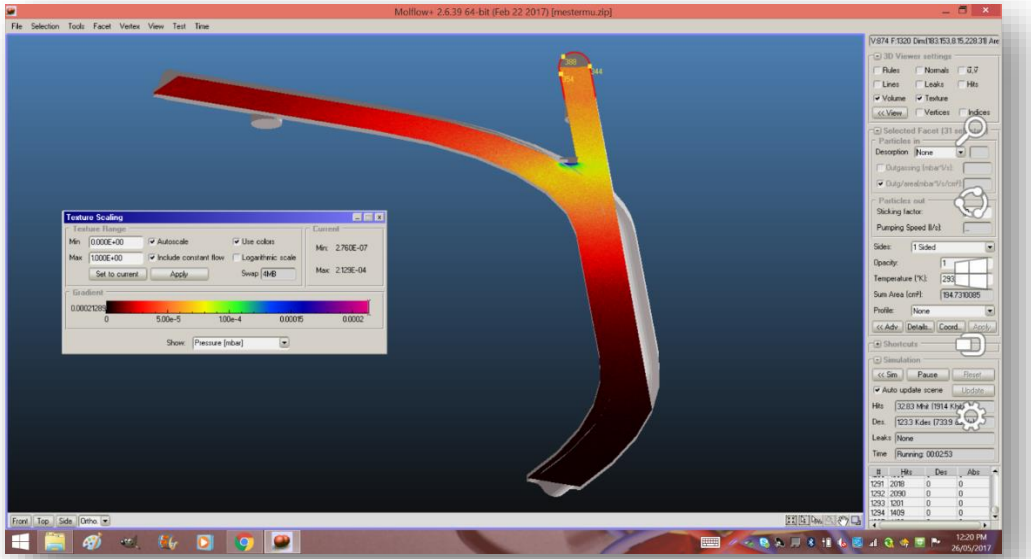


Vacuum technology

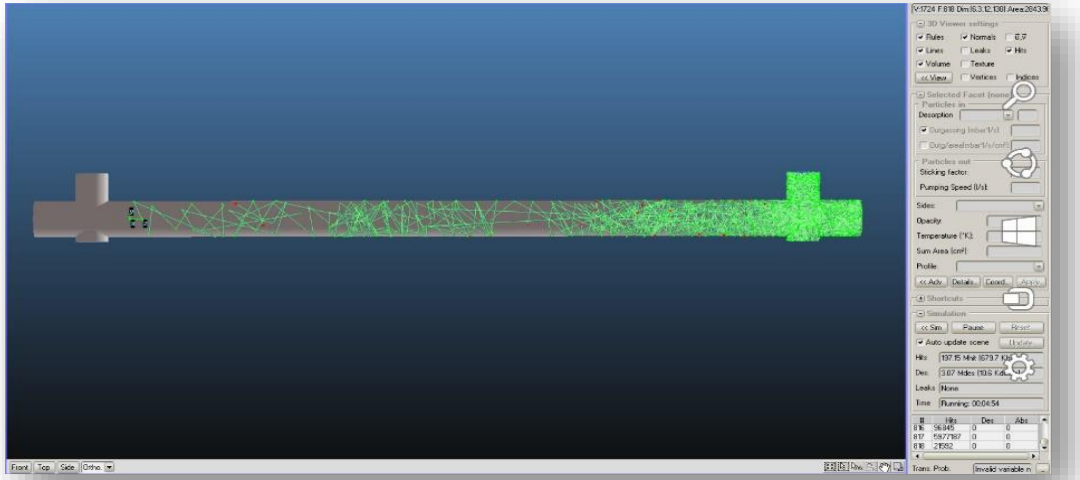
- Simulations of vacuum
- Lab experiments

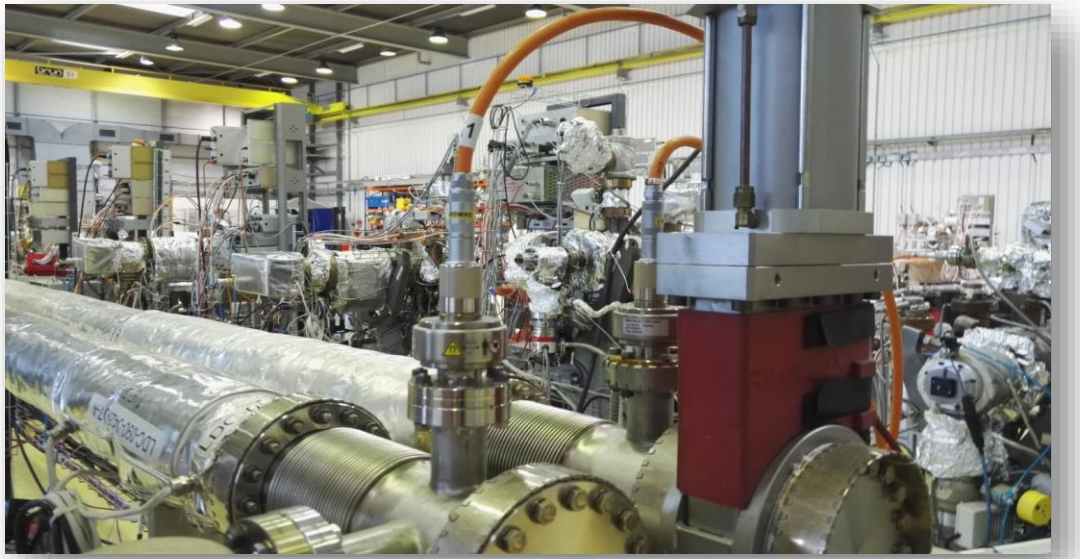
Here you can see how the vacuum pump works.

Quality of the vacuum



Particle`s Trajectory



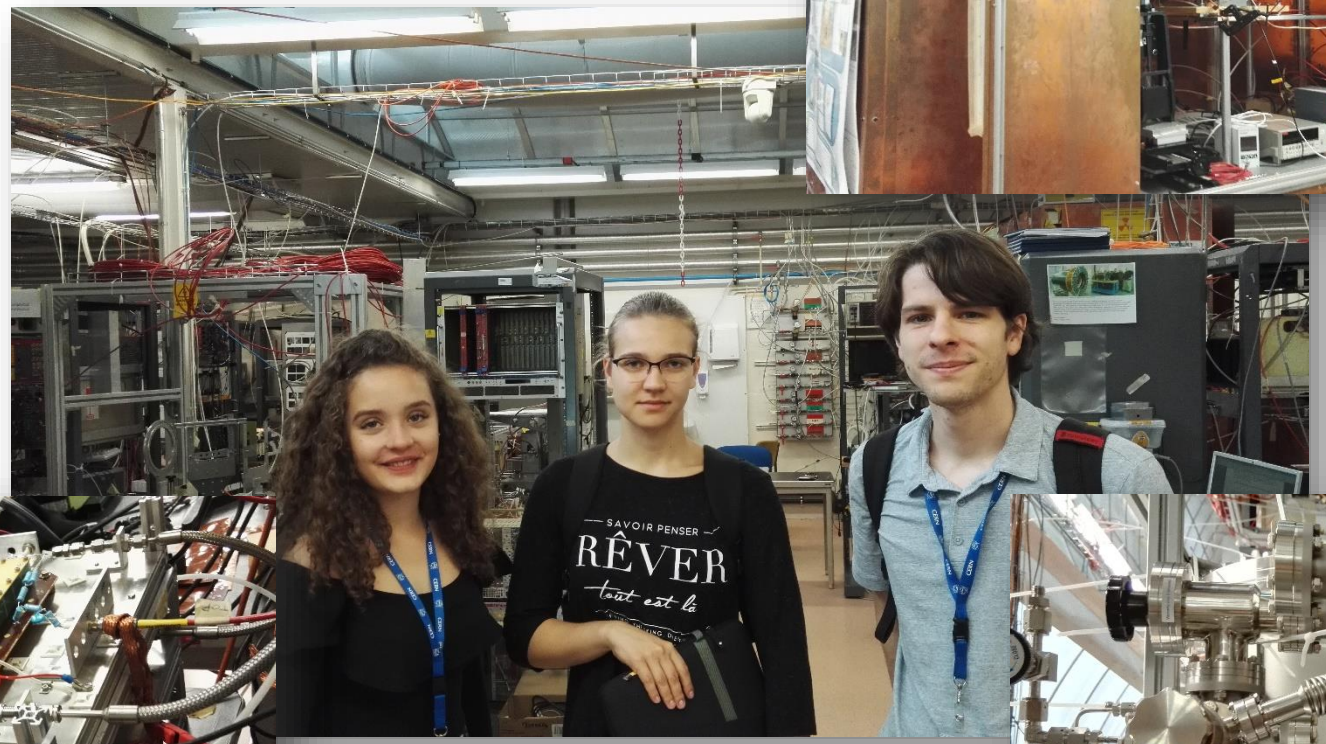


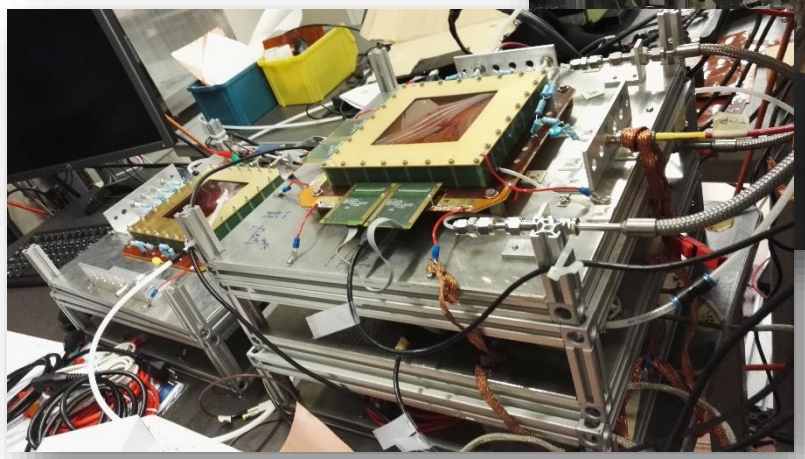
RD51 collaboration

GAS DETECTOR DEVELOPMENT LAB

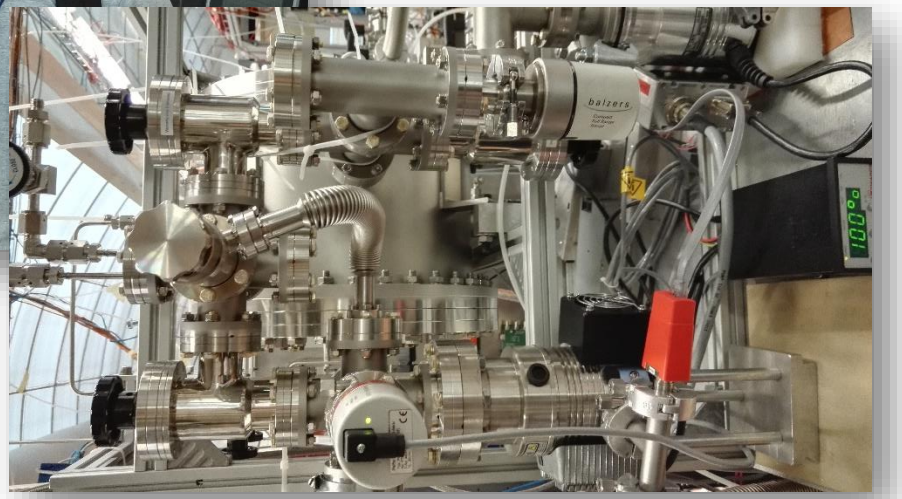
Micro-pattern Gas detector

Bat



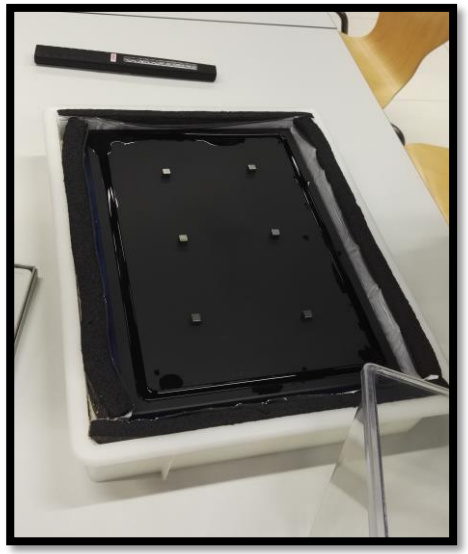


Dating with the detectors



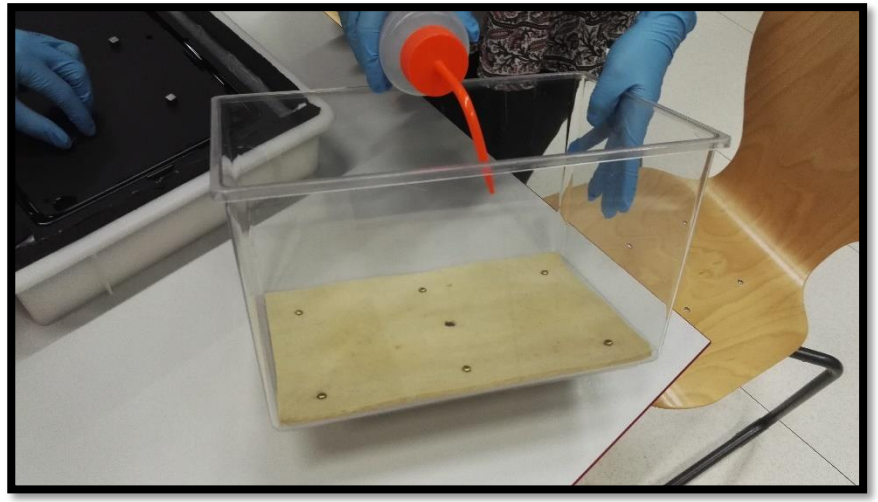
Special cloud chamber

Cloud chamber with charged balloon and neodymium magnets

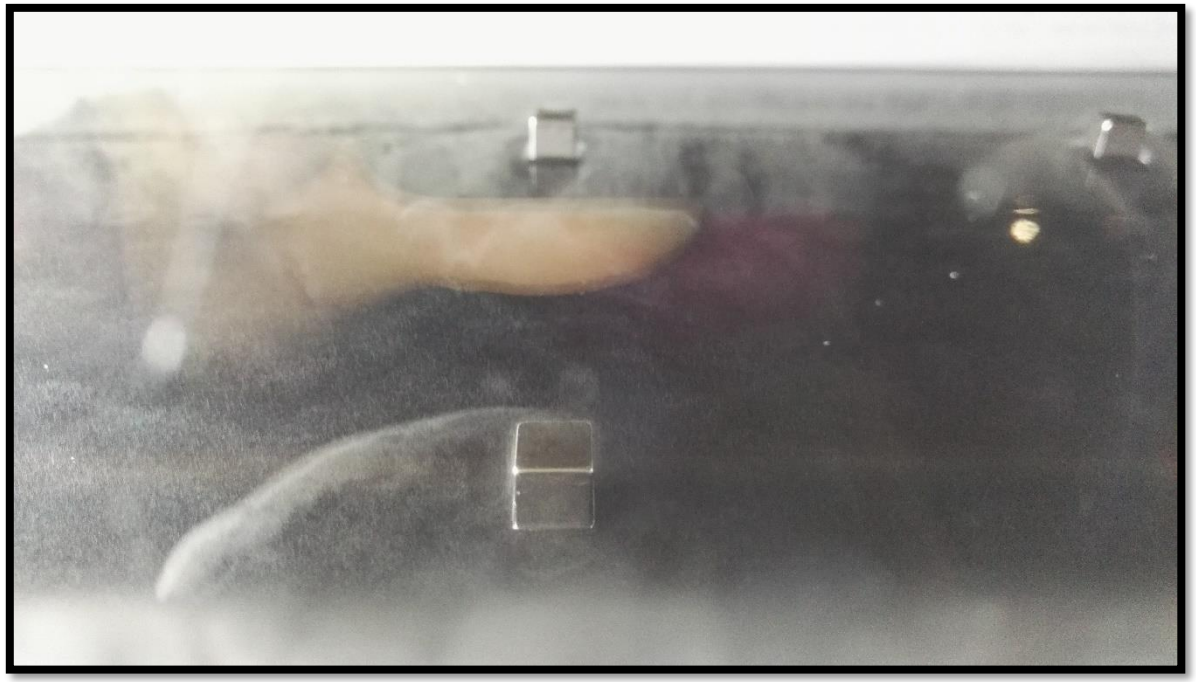


Rub a balloon to your hair and then put it on the top of your ☺

Do you know what happens?

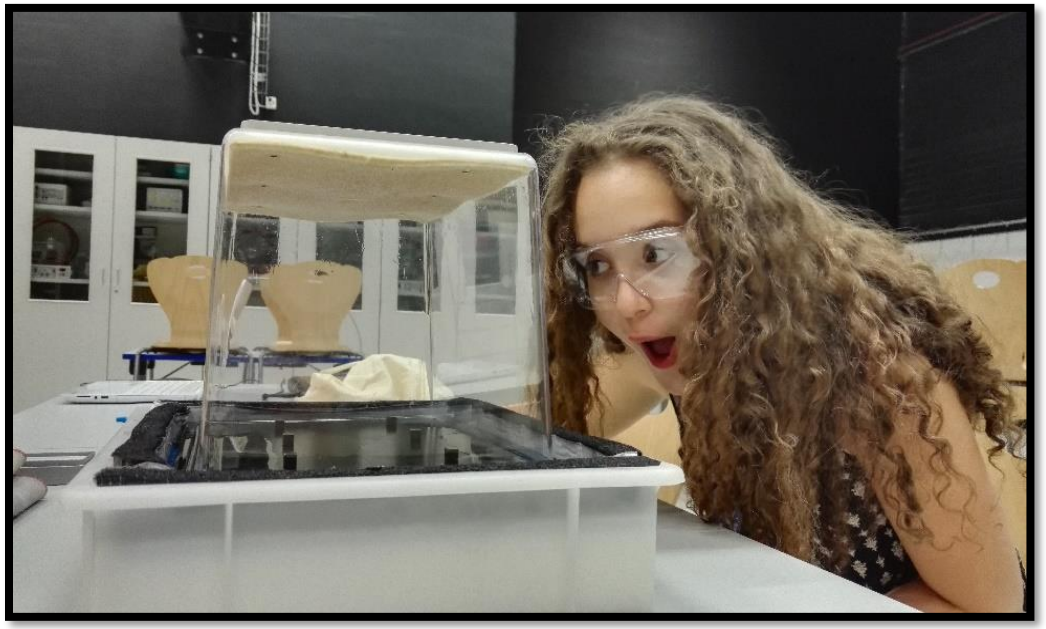


The results



The noise decreased by the balloon

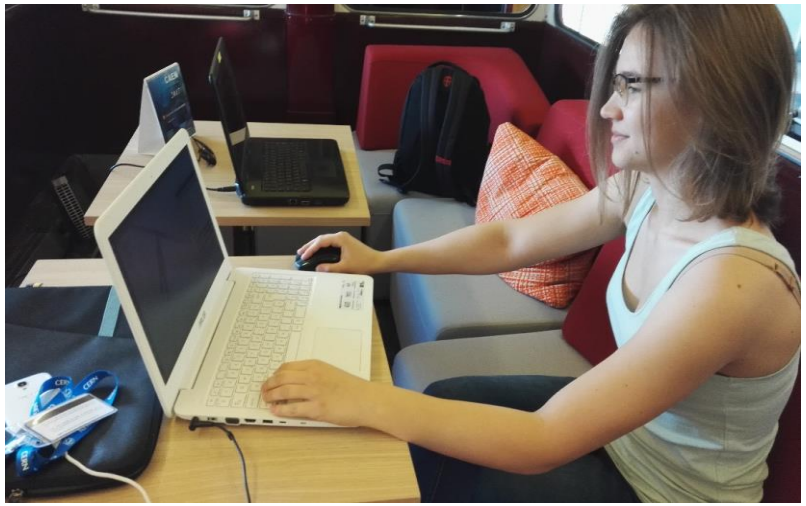
The particles goes into the magnet



Advantages of simulations

-If you want to change something on your detector you have to build a new detector

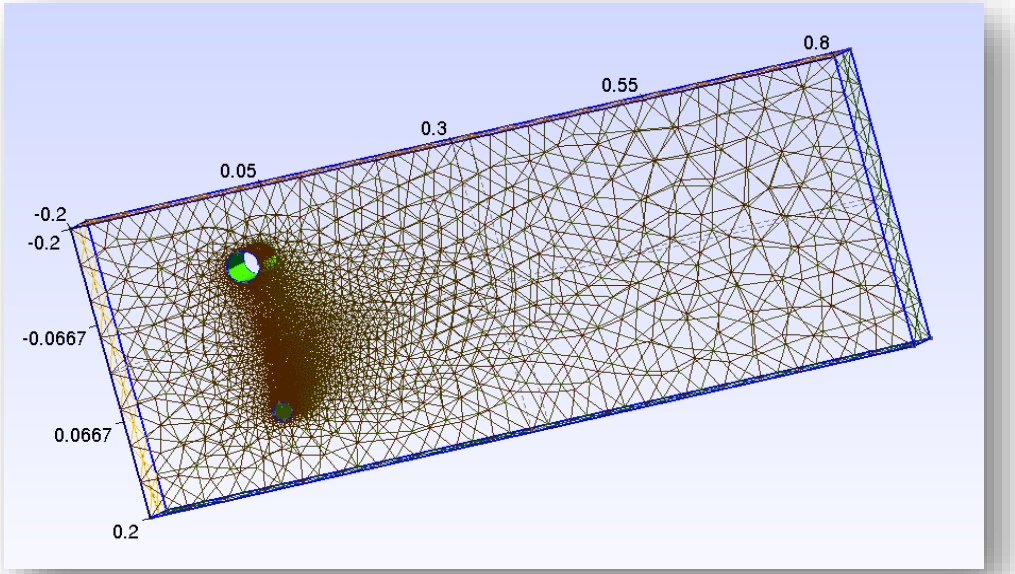
-Using simulations:
you can optimize the detector parameters before building it
(like distance between the wires or the properties of the gas)



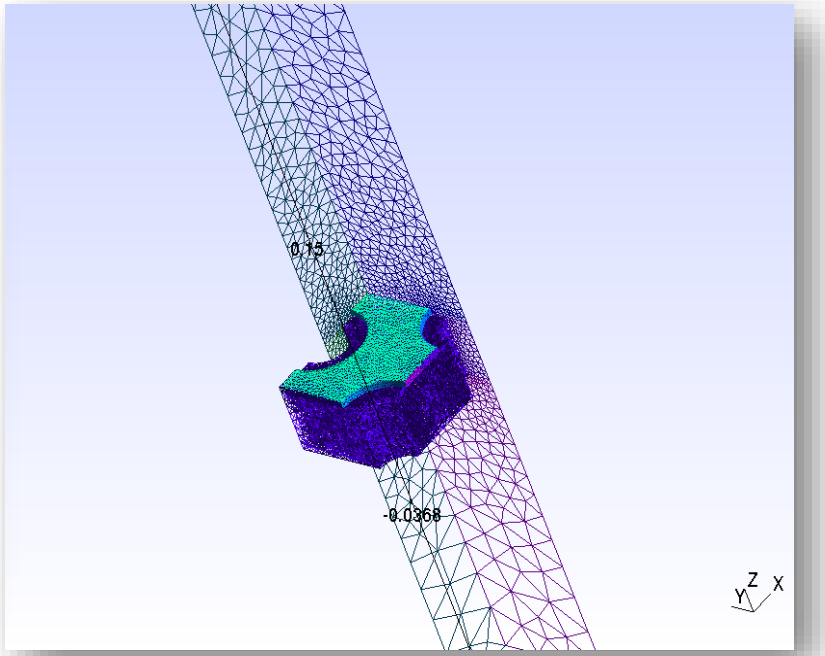
-You can understand the physical processes better

Building our virtual detector

We used Gmsh software to model and mesh our detector with points, lines, surfaces and volumes.

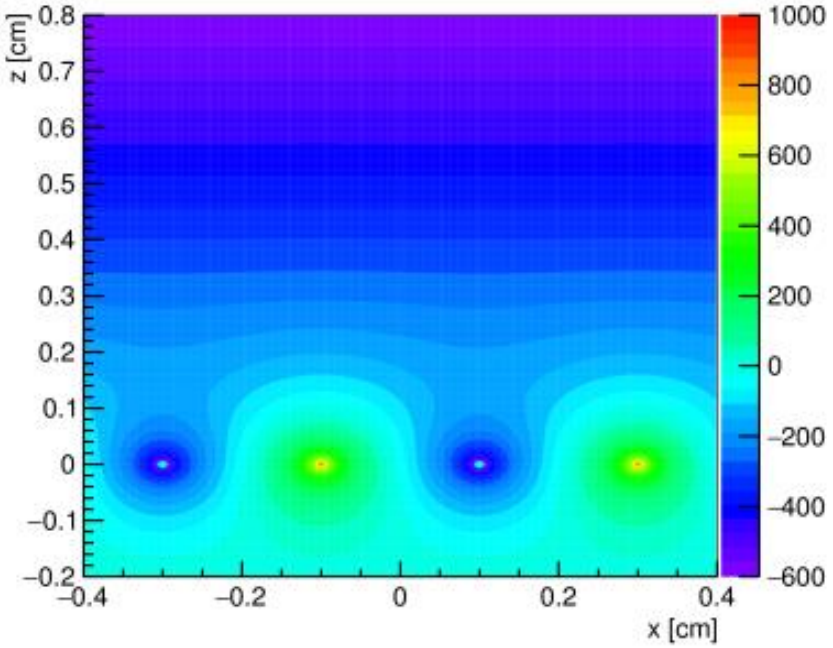


We made a **Multi-Wire Proportional Chamber**



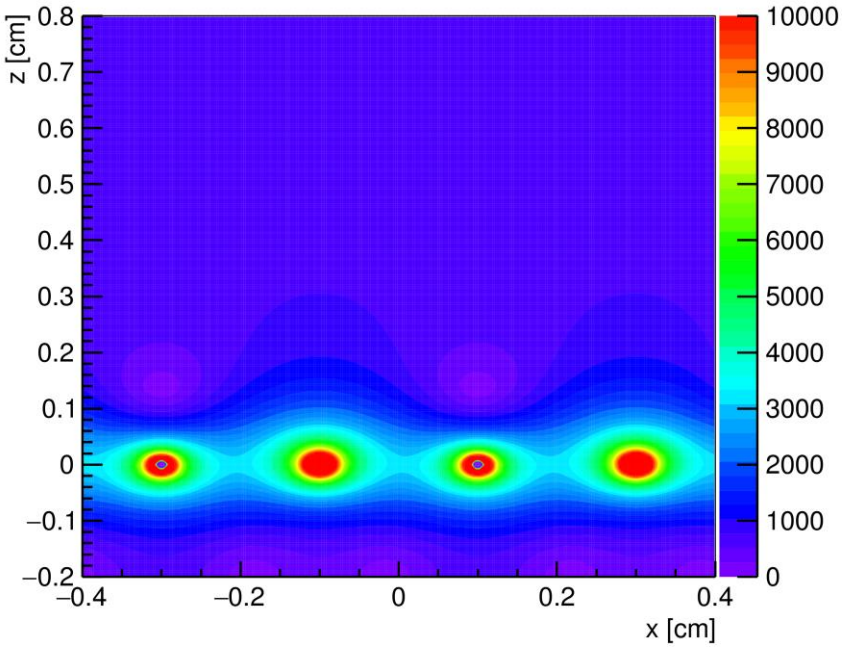
and a **Thick Gas Electron Multiplier**

Calculating the electric field inside the detector



Potential map

We used Elmer software to define potentials on boundaries

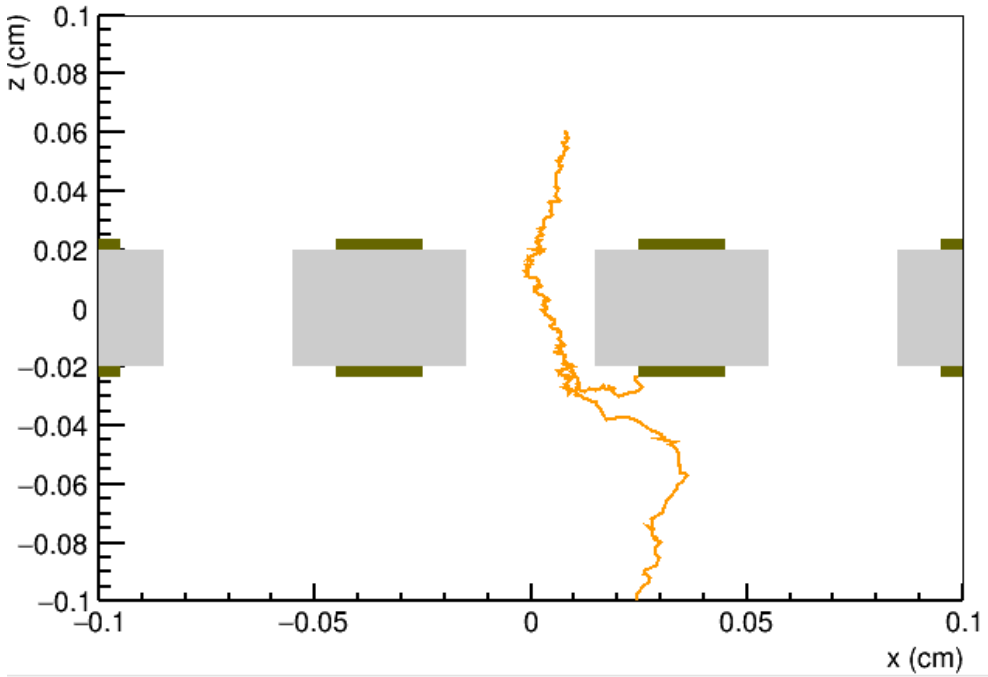


Electric field magnitude

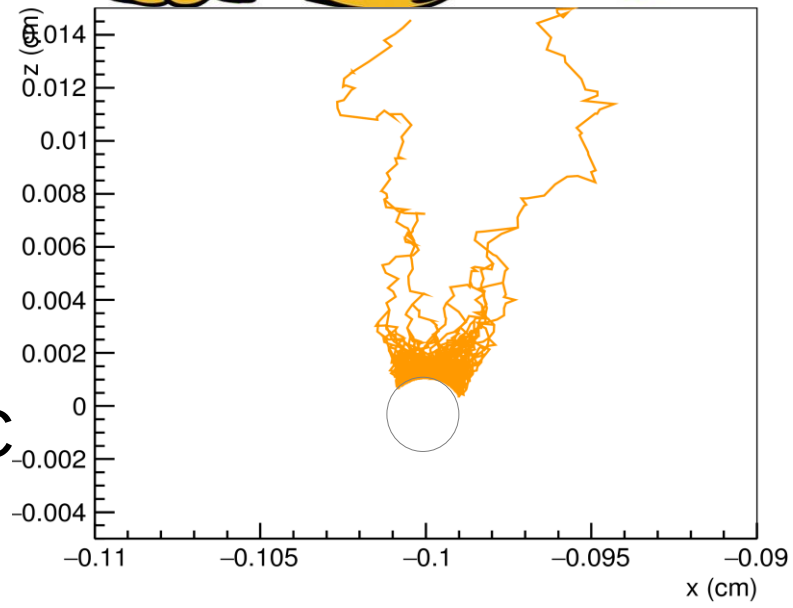
With this you can see if an electron can be losted between the wires

Simulating avalanches with Garfield++

Starting one electron which drifts towards the anode and creates an avalanche in the hole or around the wire



We can get the gain and efficiency of TGEM or MWPC



Acknowledgements

- High-School Students Internship Programme
- Our mentor, David Lucsanyi
- Florian Brunbauer
- Marton Ady