

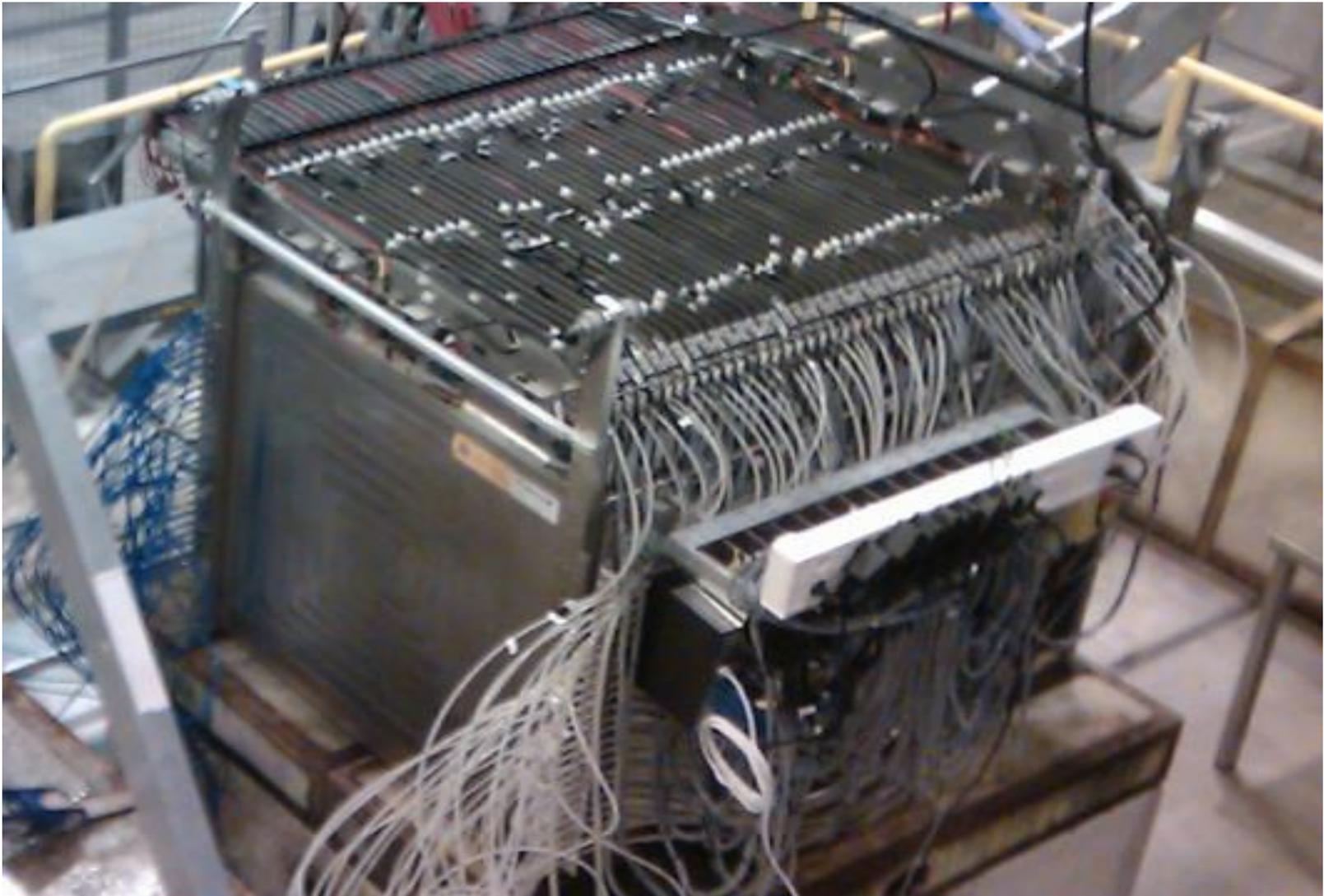
SDHCAL Status

I.Laktineh

For the SDHCAL groups

Hardware

Present technological prototype (since 2011)



Hardware

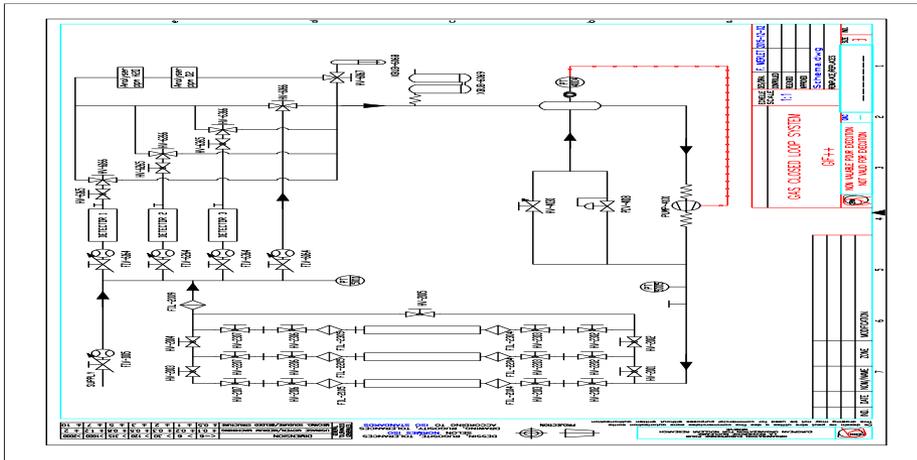
Present technological prototype

-Of the 48 layers of the SDHCAL 10 were taken for home security+ volcano muography application.

-38 layers are to be used in September TB were tested. They are almost ready to go for TB. The presence of the ECAL in front will provide the lost interaction length.

-We successfully tested the recycling gas system.

A reduction of gas consumption by a factor up to 7 was achieved on a subset of the prototype. We intend to use this system in TB to reduce the cost



We bought 2 HF1234ze bottles and we intend to replace the TFE in the near future. The operating voltage needs to be increased to achieve the same efficiency.

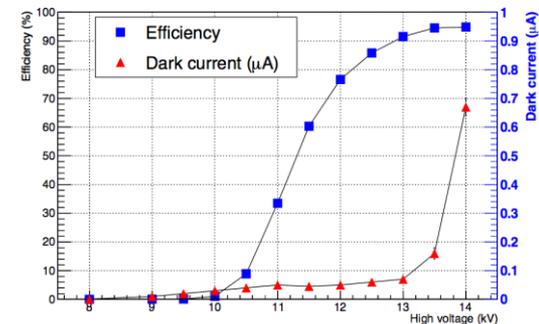
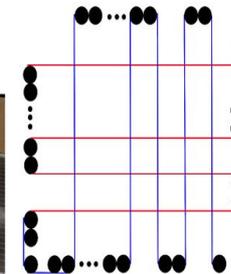
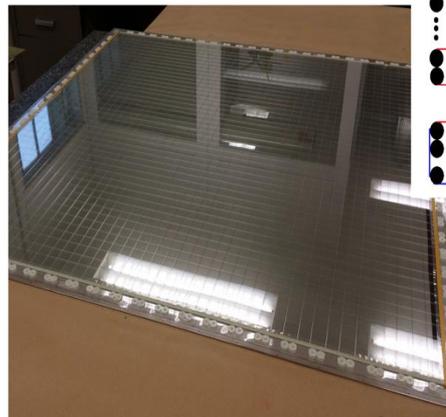
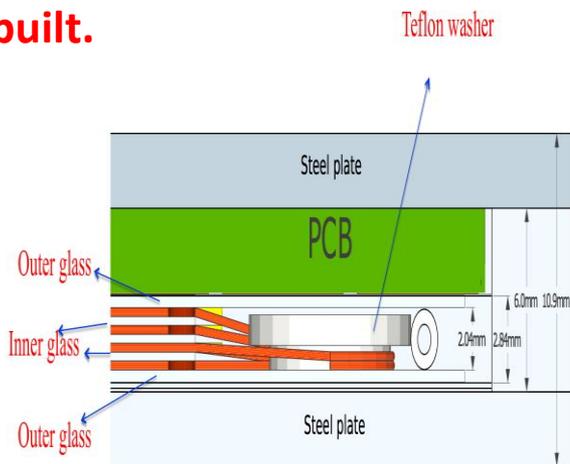


Hardware

Present technological prototype

- We developed 1m² multi-gap RPC (Gangneung+IPNL) : 4 gaps with a total thickness similar to the single gap one (3 mm) and test them using the SDHCAL electronics. Similar efficiencies to those obtained with the single gap one were found.
- We would like to produce more MRPC to equip as many as possible of the SDHCAL layers.
- We would like to exploit the time resolution of the MRPC for PFA studies. For this we propose to use the PETIROC (developed by OMEGA) and successfully tested within the CMS RPC upgrade project TB, to equip the MRPC in the future.

A collaboration on MRPC between French, Belgian, Chinese and Korean groups is to be built.



Threshold sets at 114 fC

- Water-based cooling system is being designed. We intend to have a demonstrator by the end of the year to validate the use of SDHCAL in **CEPC**.

Hardware

New technological prototype

-ASICs HR3: 732 were produced and tested. Yield of 85%

-PCBs-ASUs : **100x33** cm² hosting each 48 ASICs were conceived, produced and electrically tested. In total 13 ASUs were produced to equip two 2x2 m² RPC
Additional ASICs were recently produced. They will allow equipping two additional long detectors to complete the New technological prototype.

-Long and thin DIFs designed and produced.

Connectors : DIF-ASU, ASU-ASU are identical. Designed and produced

-ASU's sent from Lyon to CIEMAT for full test with the new Firmware (hopefully this will be achieved before the end of the year)

-Mechanical structure for the new technological prototype using EBW method has been built

-Detectors : 2 Glass plates of 2m x 1m were coated. We will build RPCs once the cassette structure is defined.

-Bakelite RPC could be an option (thin Bakelite plates and thin gas gap) to cope with the higher rates. New CMS RPC were tested up to 2kHz/cm² with an efficiency higher than 95%

TB with ECAL 26 Sep.-12 Oct.

- First time for the SDHCAL to run with ECAL.
- In addition to study the combined response of the two calorimeters to electrons and hadrons we want to try to complete study of the difference of the SDHCAL response to pions and protons. To do this runs with negative pions and then with positive pions will be requested.
In the case of positive pions we will use the Cerenkov information to have proton sample. If the Cerenkov efficiency is not as high as desired then we can use the difference between negative pions and positive pions to understand the difference between pions and protons since the positive pion beam is contaminated by protons.
- We will also try to finalize the homogeneity/uniformity of the SDHCAL study after using different threshold values that equalize the detector response in efficiency and pad multiplicity and check that this improves the energy resolution.

Analyses

- Simulation: Simplification and closer to data than before (Guillaume)
- Energy estimate using standard methods improved by using the density information in addition to the thresholds (Guillaume)
- PID and energy reconstruction using MVT (Bing).
- Pion-proton separation using Cerenkov information (Antoine).
- Hadronic shower separation : Arbor paper is stopped for the time being. Rémi is busy with his new tasks and the referees are requiring many things to modify/check We should discuss this with Rémi and probably ask Bo to take over.

Next steps

For the large detectors (2 m²) we should ask for a TB at DESY when the DAQ is ready and the detector&electronics are successfully tested in Lab.