

SDHCAL → T-SDHCAL

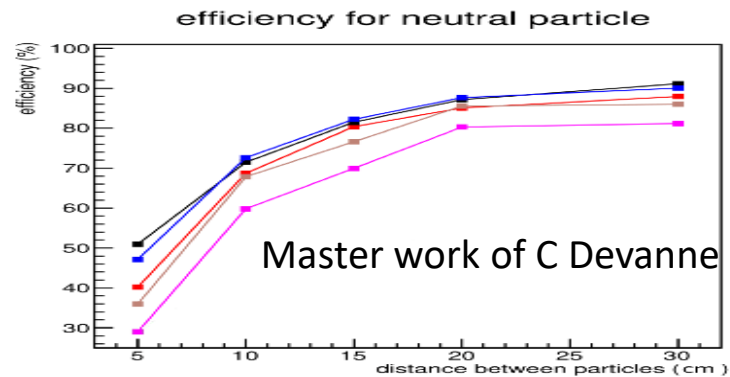
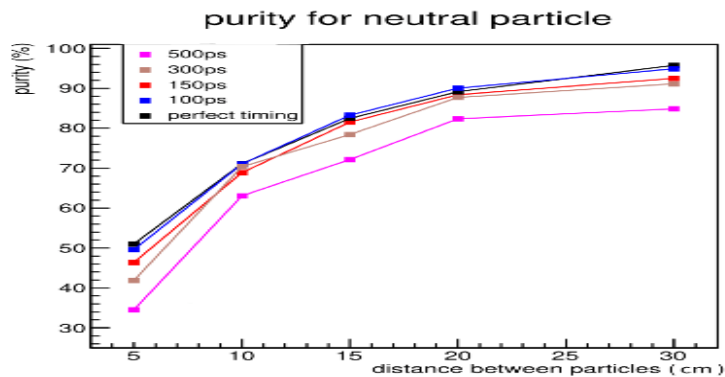
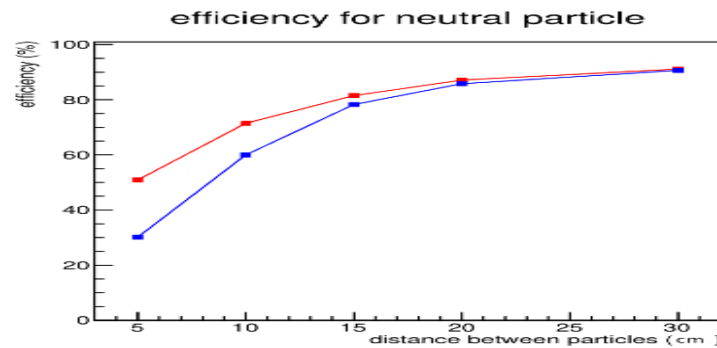
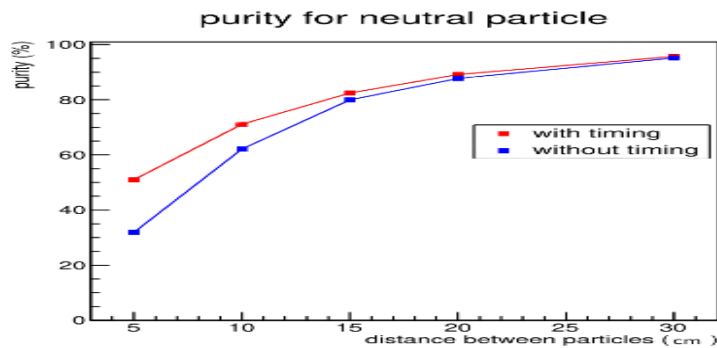
From present to future

I. Laktineh

On behalf of the CALICE SDHCAL groups

- SDHCAL was developed for the ILC: low rate and power pulsing
- SDHCAL needs to be adapted to cope with circular collider requirements
 - ❑ Continuous readout
 - ❑ Higher rate

In addition recent studies show time information could improve significantly hadronic showers separation at lower distances.



Master work of C Devanne

T-SDHCAL is thus proposed.

It consists of a few steps

- Replacing the RPC with MRPC. Low resistive materials could /should be used to increase the rate (Low resistivity glass, PEEK doped with Carbon Nanoparticles)
 - We need to study how many gaps taking into account the cost on the cassette thickness

- Replacing the Hardroc with a new ASIC (continuous readout + Internal TDC)
 - We started with PETIROC but we need to go further (Liroc+TDC)

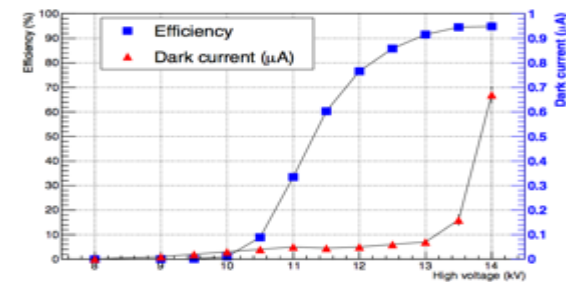
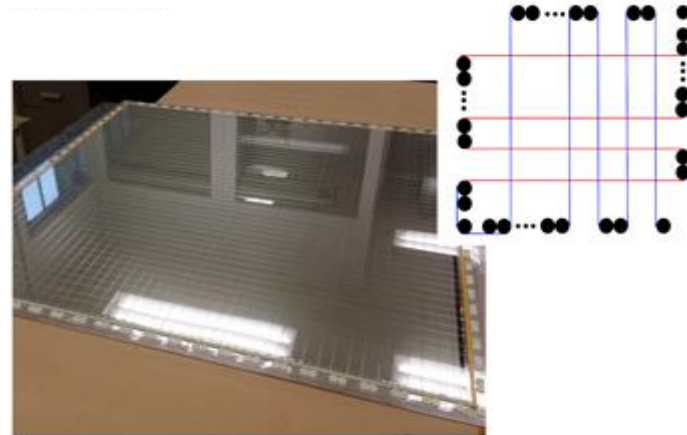
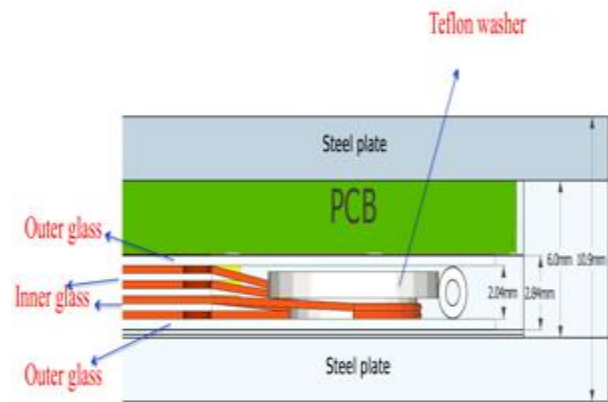
- Developing a cooling system.
The cooling system should not add too much dead zone. Could we use it with the present SDHCAL mechanical with limited efforts?
 - we have already some studies on this topic

MRPC:

We built small and large 4-gap RPC of 1 m² using fishing lines. Efficiency > 92%

We built small and large 4-gap RPC of 1 m² using a new technique that renders the fabrication process if very easy. First results show good efficiency (> 90%)

Excellent time resolution obtained with small size MRPC (Guillaume's talk) using eco-friendly gas mixture



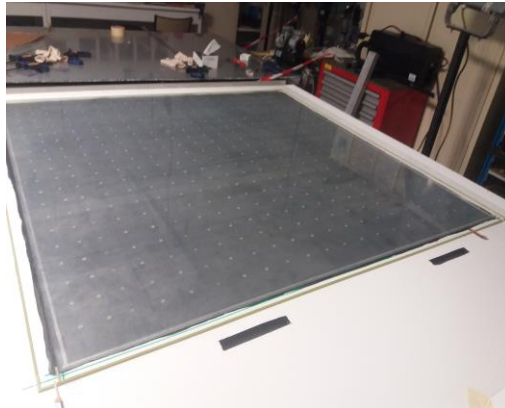
Threshold sets at 114 fC

MRPC:

We built small and large 4-gap RPC of 1 m² using fishing lines. Efficiency > 92%

We built small and large 4-gap RPC of 1 m² using a new technique that renders the fabrication process if very easy. First results show good efficiency (> 90%)

Excellent time resolution obtained with small size MRPC (Guillaume's talk) using eco-friendly gas mixture

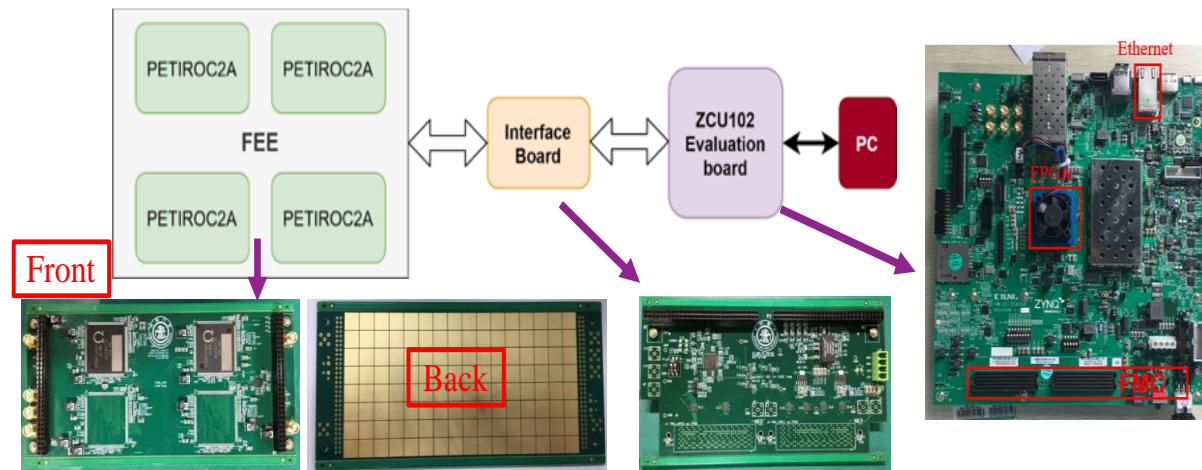


Readout electronics:

PETIROC was proposed for iRPC@CMS. Excellent performances are obtained with doublet RPC using pickup strips

We designed small ASU with pickup pads (1 cm x 1cm) and excellent results based on injection are obtained and will be hopefully confirmed by putting them on small MRPC → Weihao's talk

Larger ASUs hosting PETIROC have been designed and will be soon be produced with (1.5 cm x 1.5 cm) pads



Within the DRD6 project we would like to develop the **Liroc+internal TDC**

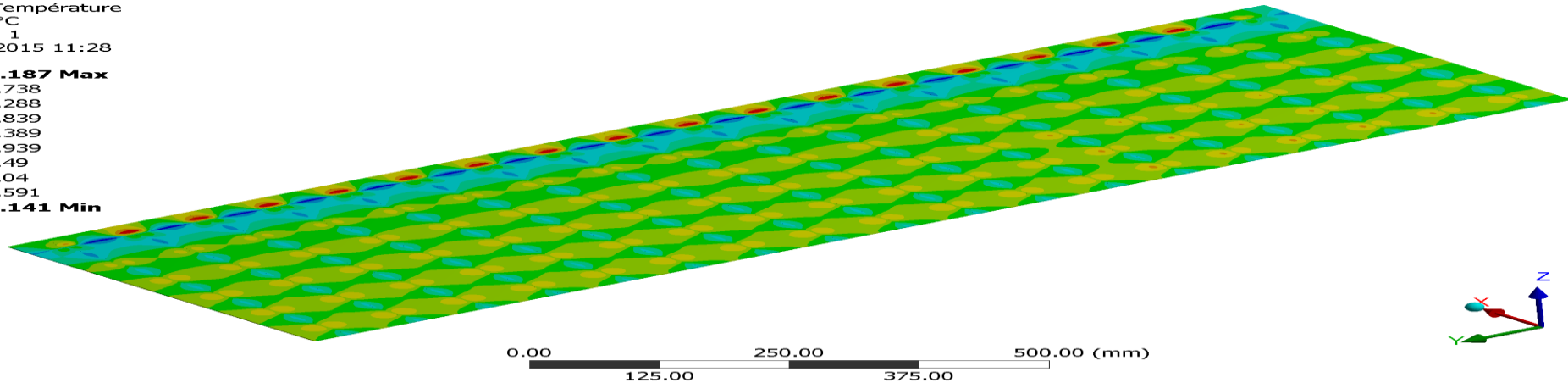
Cooling:

Previous studies were performed on Hardroc (full regime)

We have to do the studies with the new ASICs and the mechanical structure in mind

C: sans power pulsing
Température
Type: Température
Unité: °C
Temps: 1
31/07/2015 11:28

27.187 Max
26.738
26.288
25.839
25.389
24.939
24.49
24.04
23.591
23.141 Min



High-rate capability

Low resistivity materials

Low-resistive PEEK ($10^9 \Omega \cdot \text{cm}$)



Next steps

In 2024

- Large MRPC equipped with PETIROC (1 or 2 M²)
- Coolin system
- New cassette

Also find resources to finalize DAQ system for HR3.