

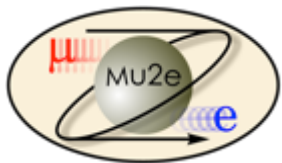
WP4

Calorimeter Software

State of art

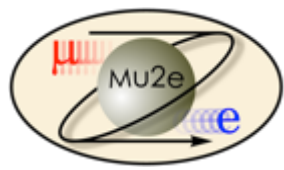
R.Donghia, LNF-INFN

SB meeting
July XX, 2018



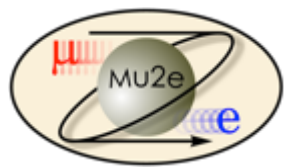
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Main tasks

- Improvement in calorimetry geometry description
 - Following CAD files
 - Good state achieved
 - Few things missing
- Code clean up
- Cosmic rays calorimeter calib: new Module-0 test

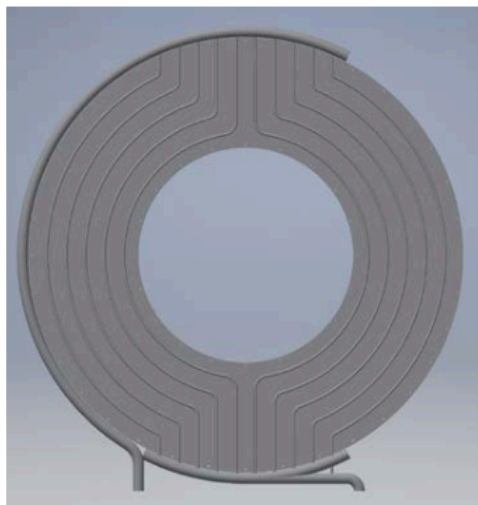
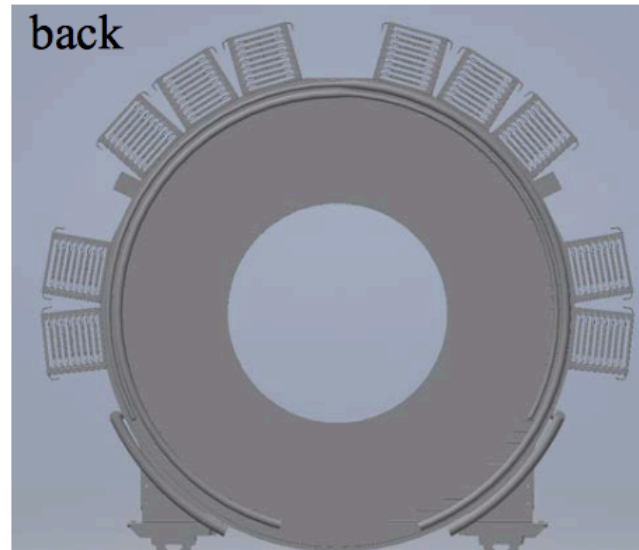
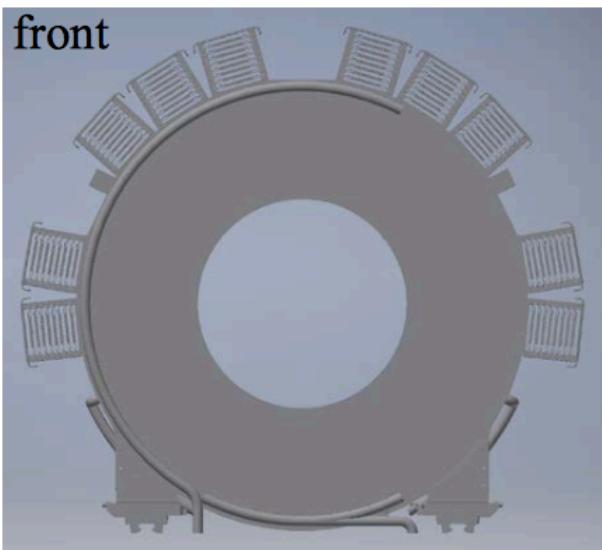


Geometry improvement

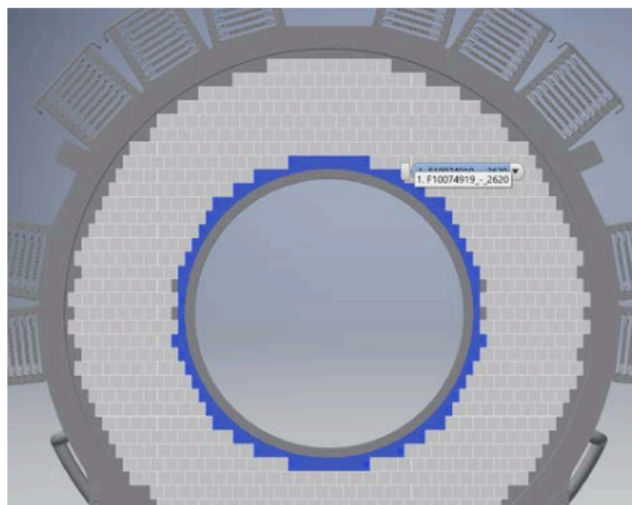
CAD drawing



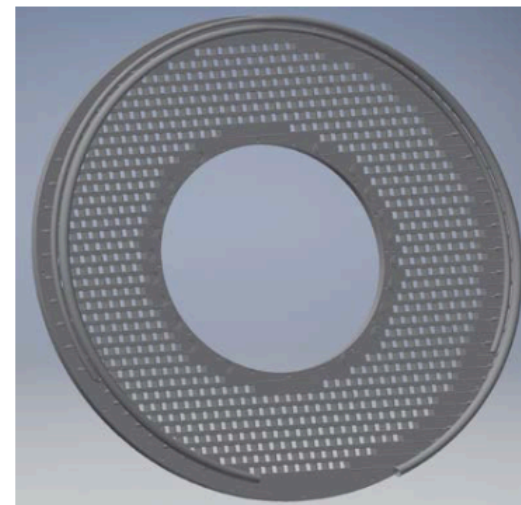
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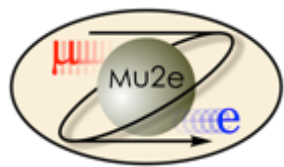
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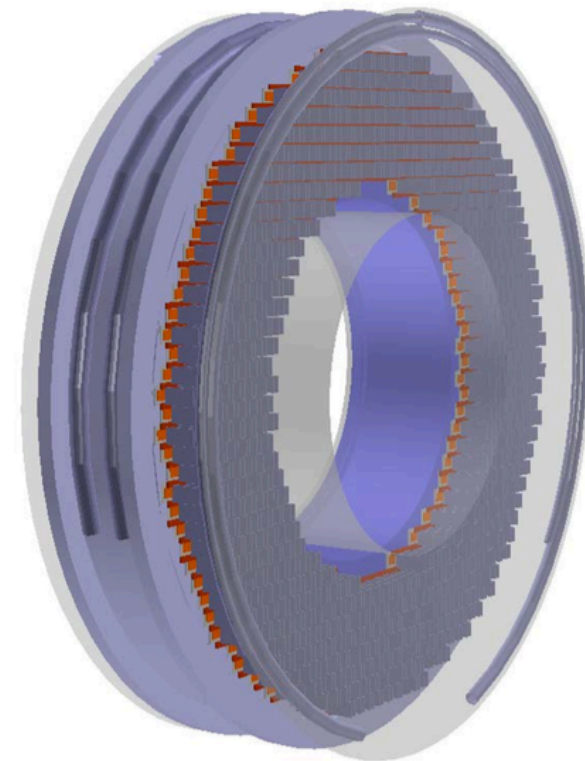
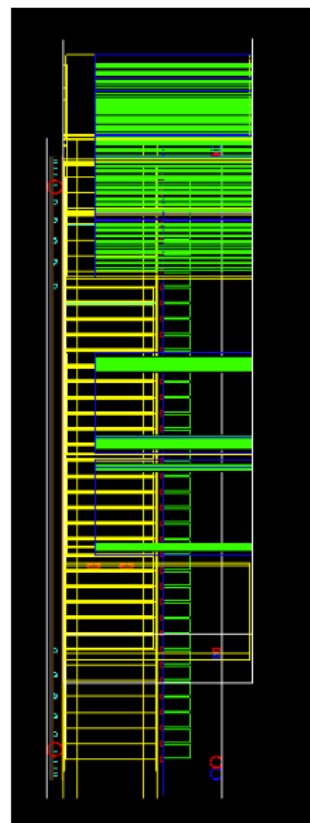
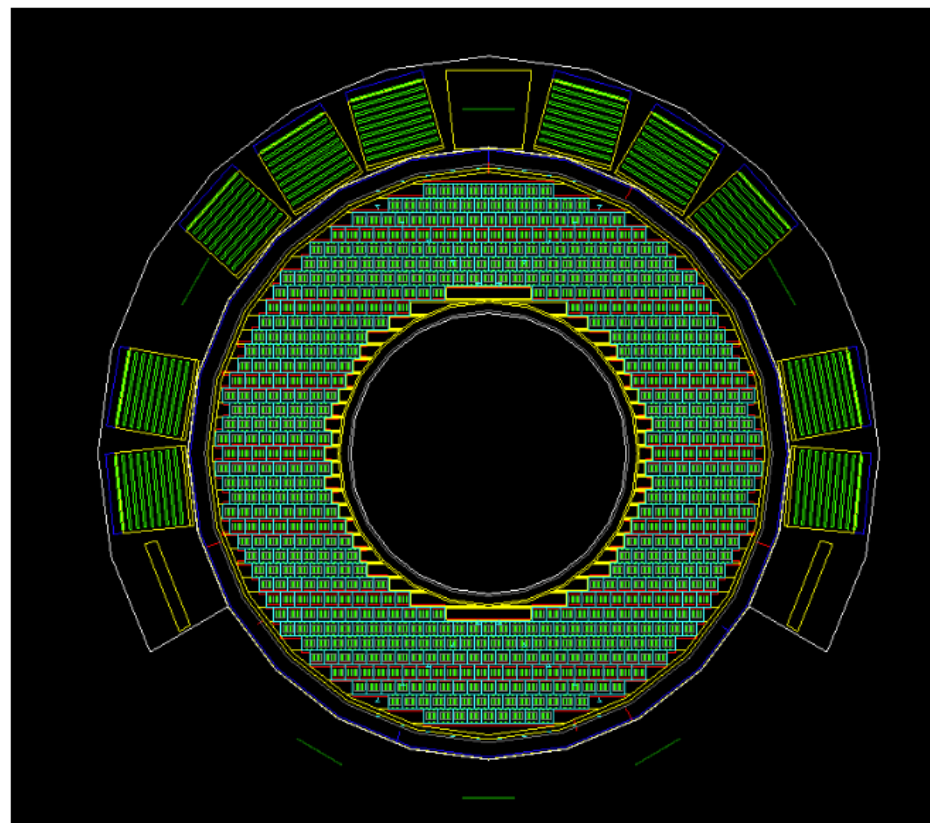


Geometry improvement

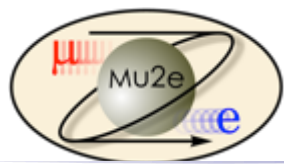
Geant 4



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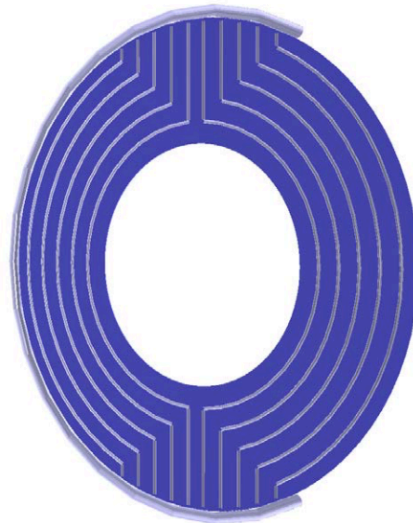
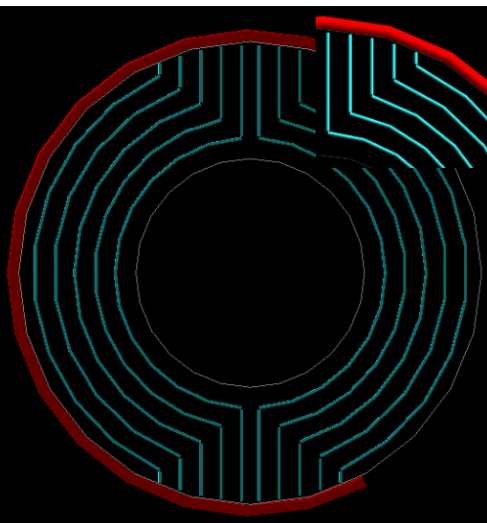
Full disk separated in four components:
front plate, crystal case, back plate and crates



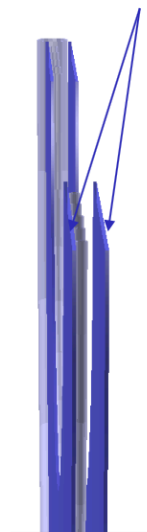
Geometry improvement



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Carbon fiber



Front plate is composed of the following layers:

- carbon fiber cover
- aluminum foam
- carbon fiber cover

The aluminum pipes are inside the foam, the manifold is outside

(dimensions/positions taken from CAD file)

Crystal case

Inner ring, steps (hollow), crystals, steps, outer ring and outer rails

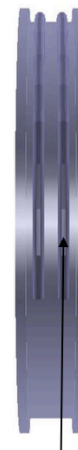
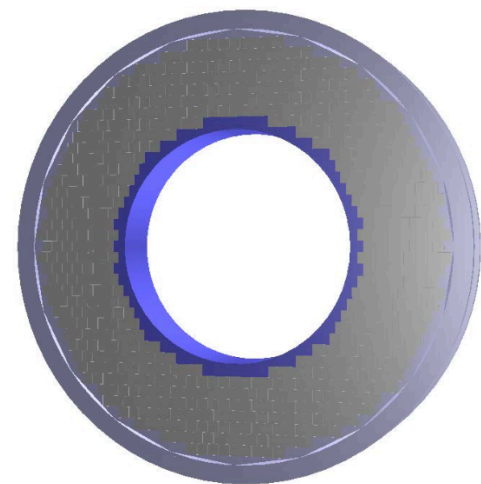
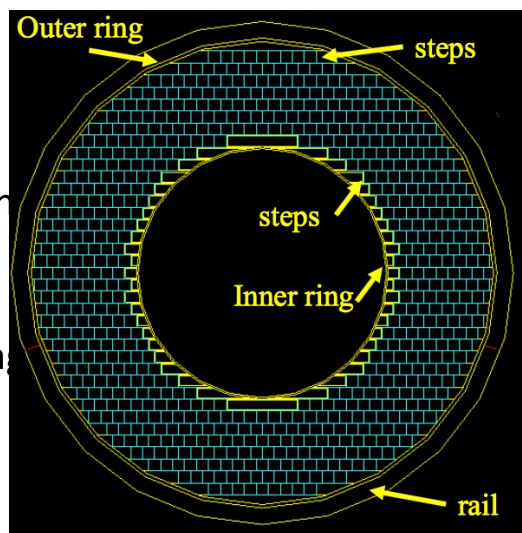
Inner steps are hollow, outer steps are plain

Two cooling pipes outside the outer ring

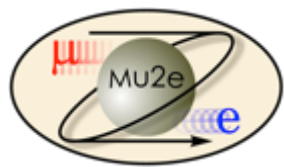
Cooling pipes

Crystal unit = Crystal + wrapper + plastic ring at both ends

Ideal crystal size/position, realistic size/location as upgrade later



Cooling pipes

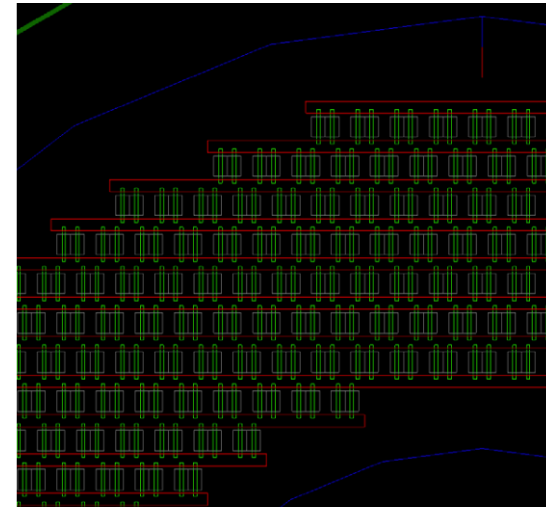
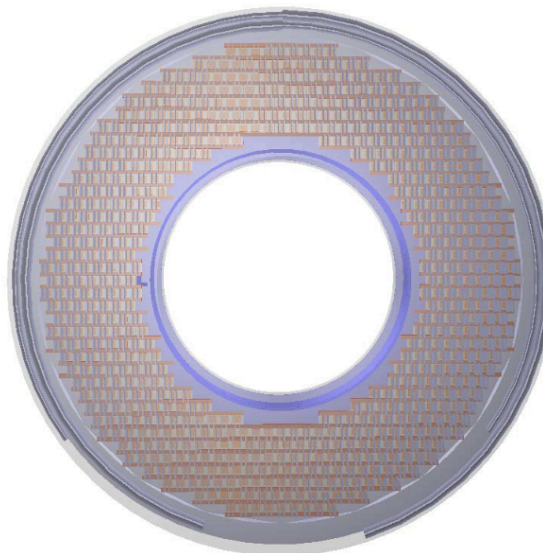
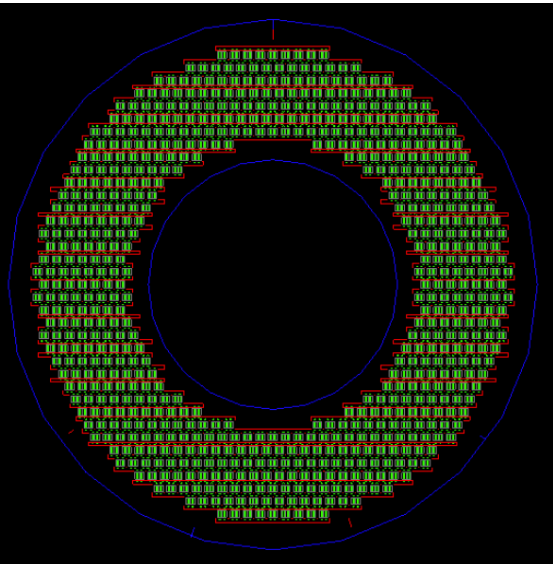


Geometry improvement

Back plate



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Cooling strip

FEE card

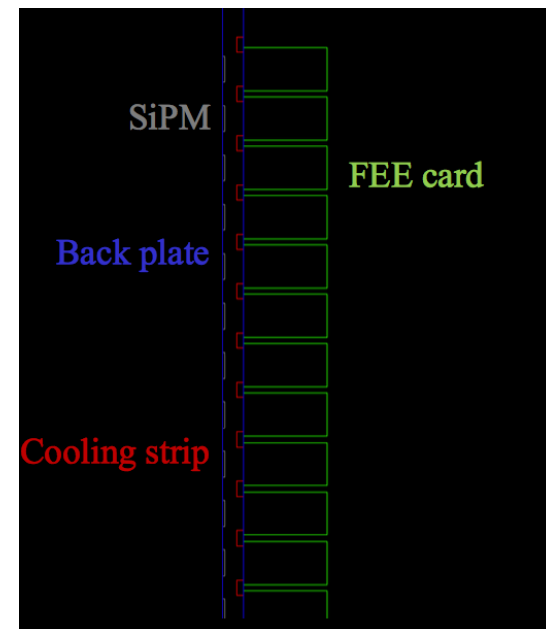
SiPM

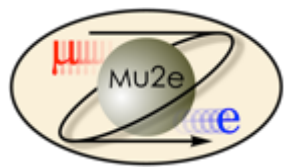
Back plate has holes with SiPM inside

Cooling strips, FEE cards and copper box at the back

Main cooling pipes (no connectors between strips and cooling pipe)

A lot of small pieces are not included (part of FEE card in hole, small connectors), but this should have a minimal impact on the simulation



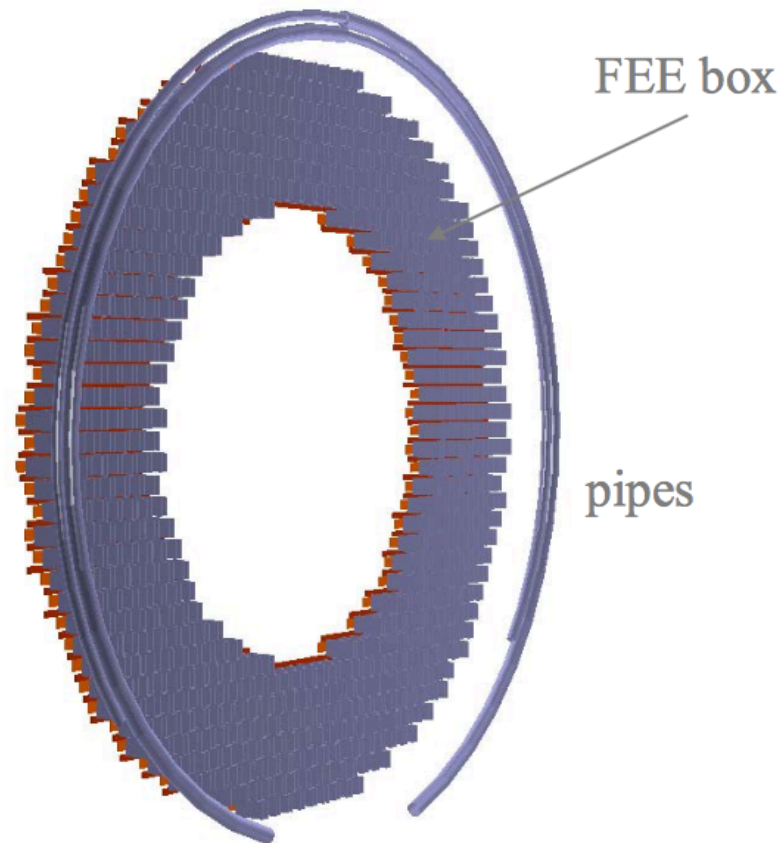
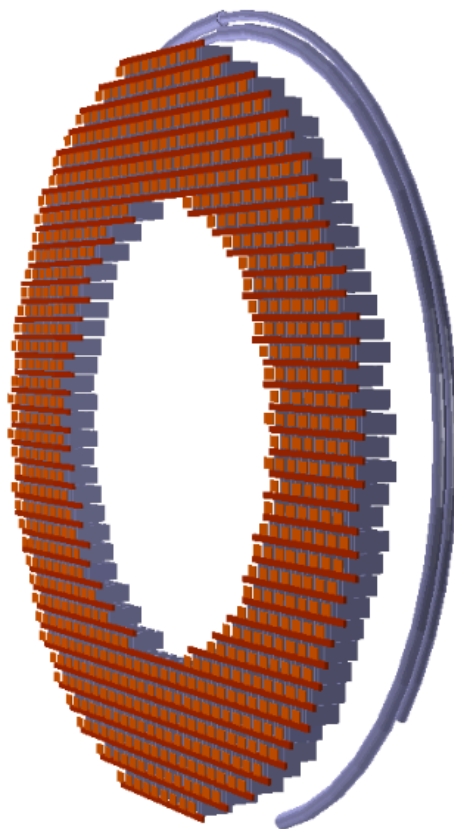
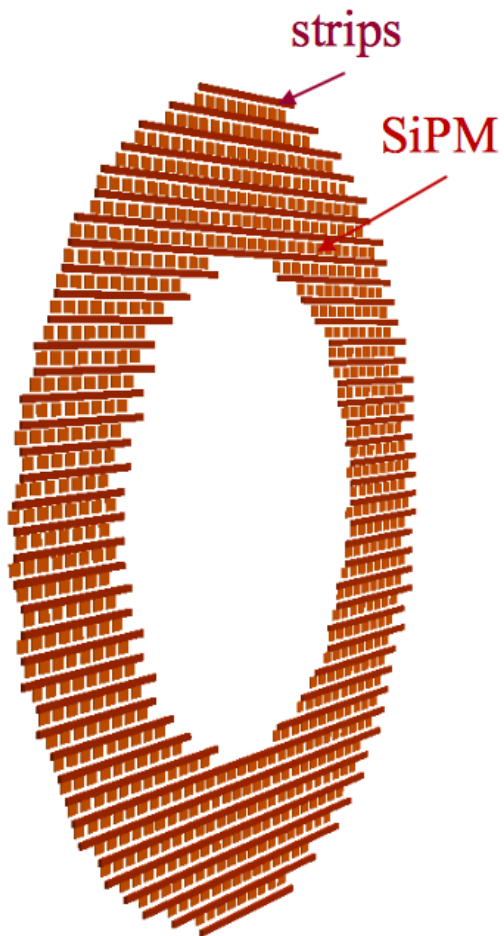


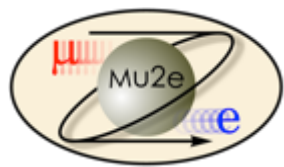
Geometry improvement

Back plate (2)



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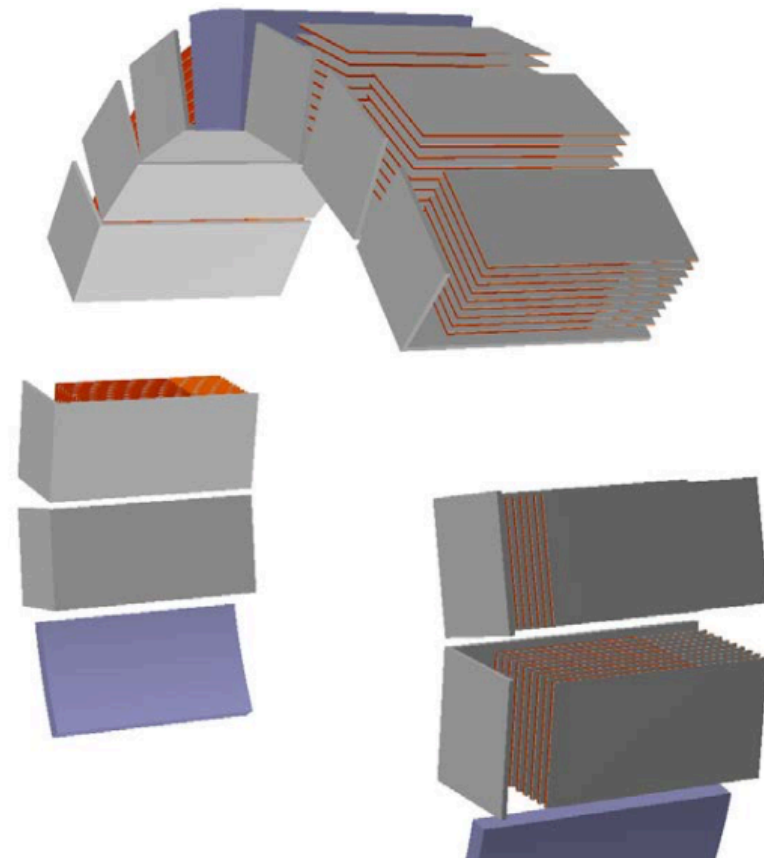
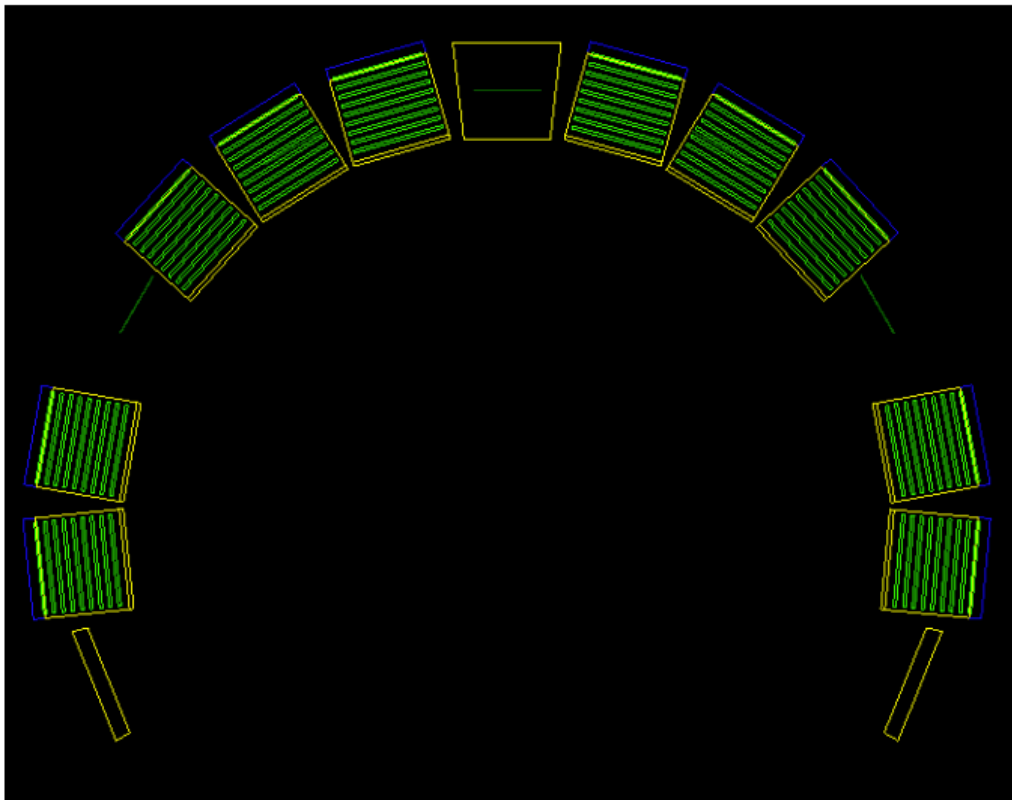


Geometry improvement

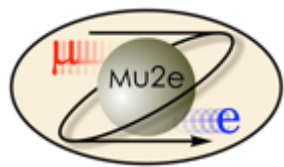
Crates



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Crates around disk, following CAD drawing specifications: front/bottom shield, electronics,



New Module-0 test

Cosmic Rays

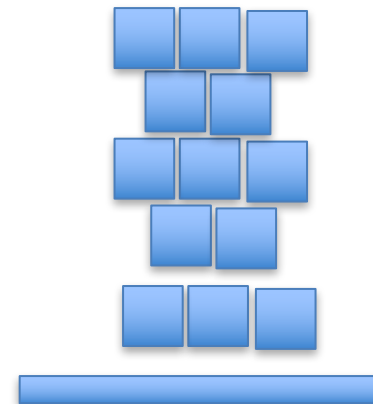
Test on 16 channel (just 3 with double SiPMs readout)

- New digitizer
- Noise study
- Equalization

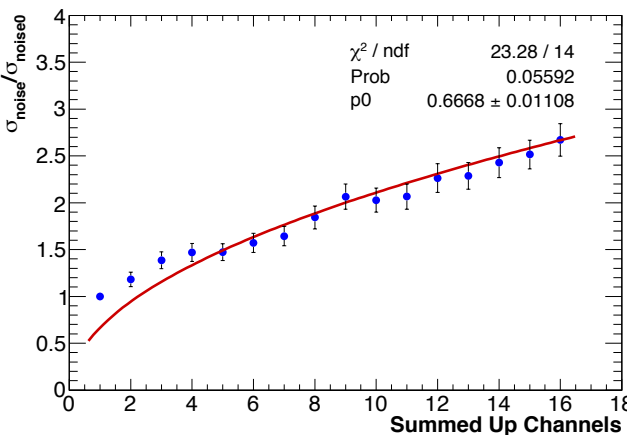
Time resolution evaluation same as the TB

- Single crystal
- Neighboring crystal

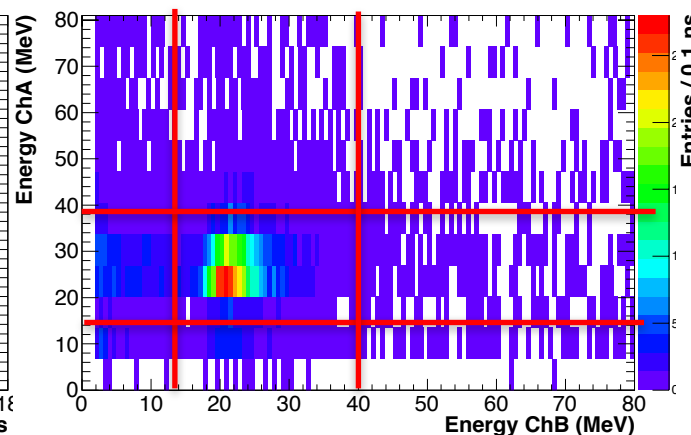
Plastic scintillator



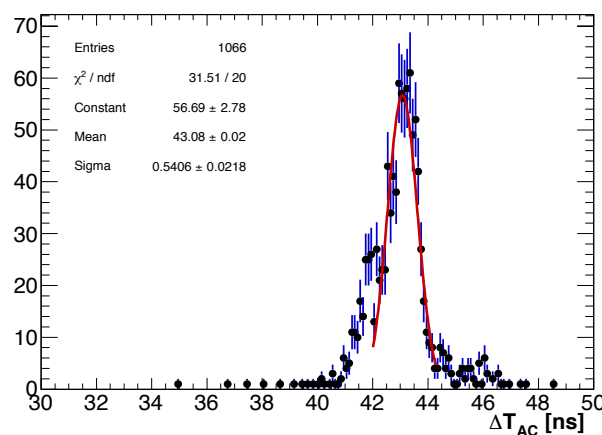
Check the trace selection, used for the calorimeter calibration in situ

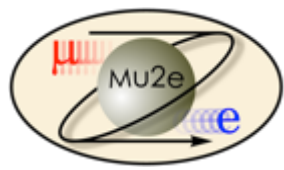


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Future project

Short list of next projects:

- Finalize geometry once missing components are available
- Improve light propagation description in crystal
- Improve timing resolution description
- Improve hit extraction procedure (single and multiple peaks)
- Improve MC matching
- Improve clustering code (algorithmic changes)
- More generally, review the full calorimeter code and try to make it more efficient/cleaner.

Good progress have made on the simulation, and most of the infrastructure is in place. Future work should be mostly about improving the realism of the simulation, though we already have a fairly good MC (once the timing resolution will be improved).

