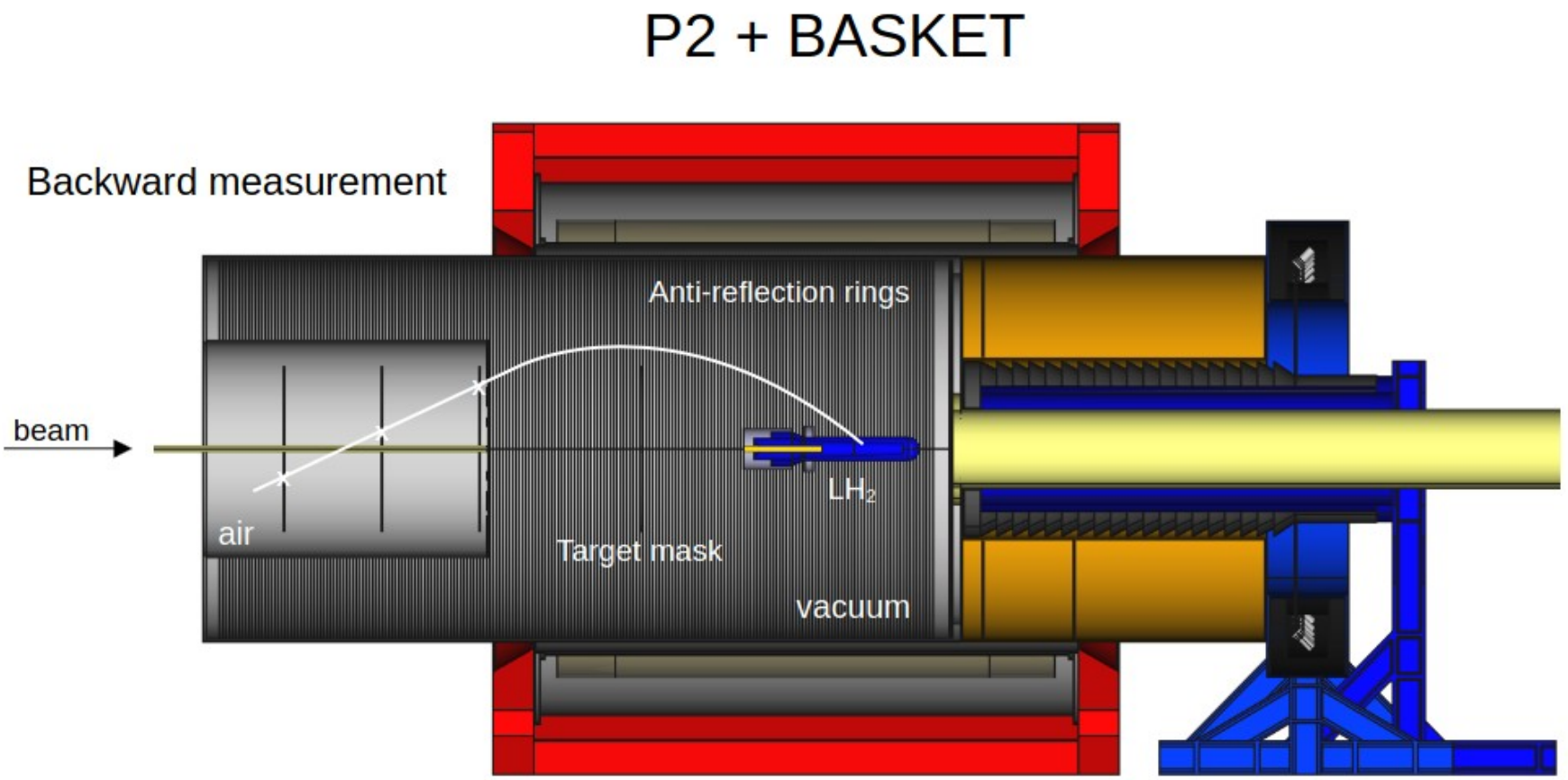
Simulation aspects and next steps

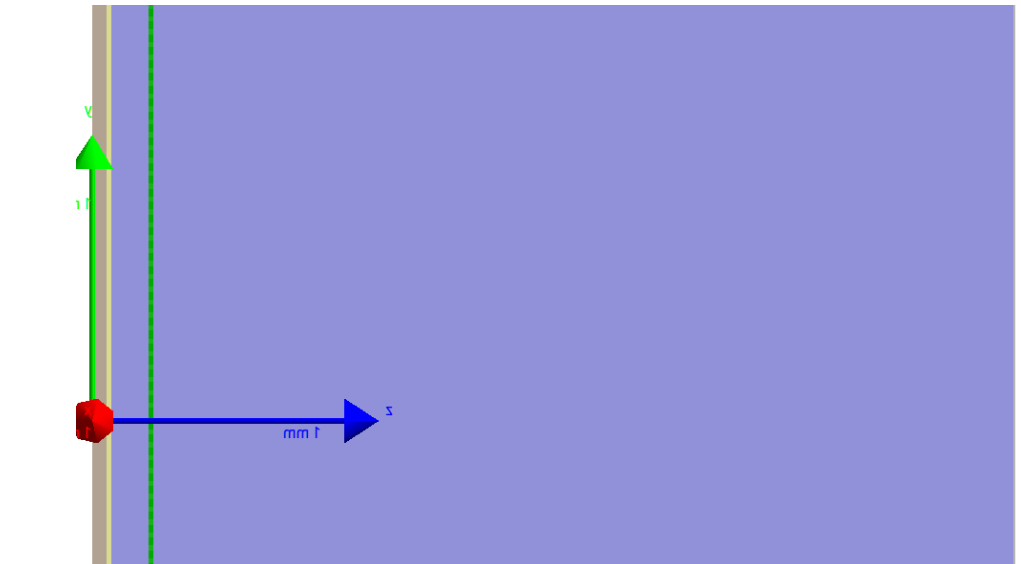


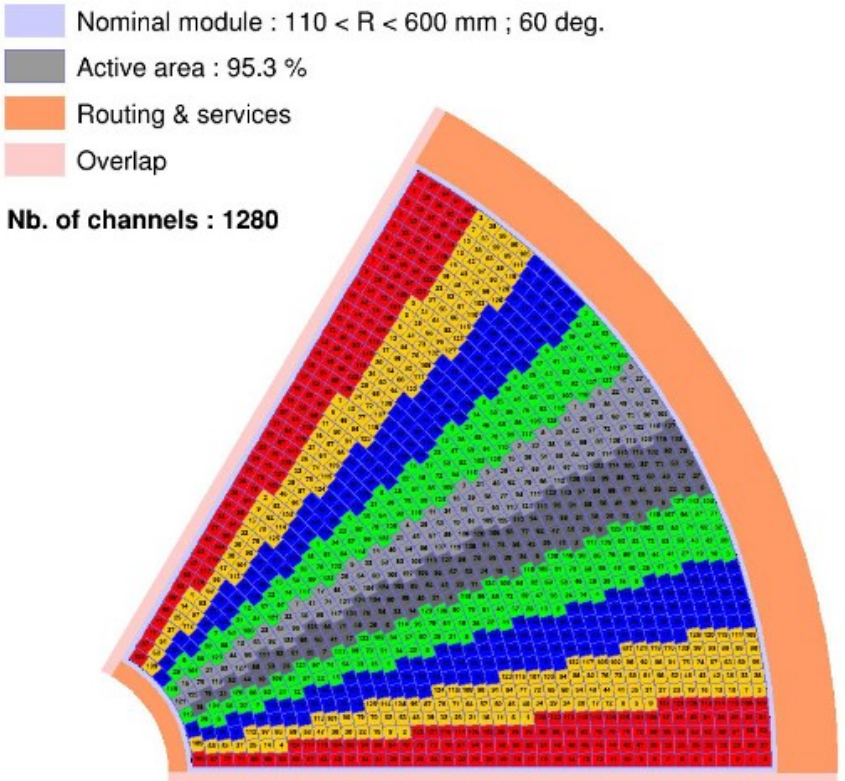
Simulation aspects and next steps

- Detector
- X-ray radiation background
- Online analysis
- Mechanics
- Backward detector paper

Detector simulation

P2Sim / Malte

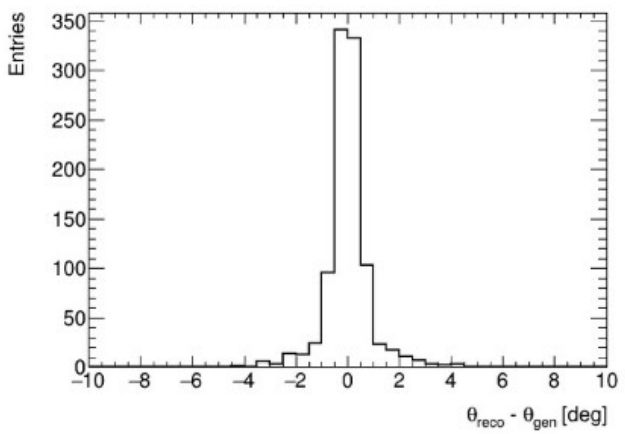


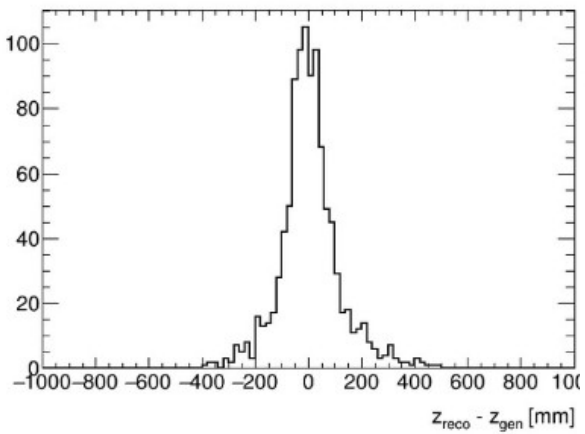


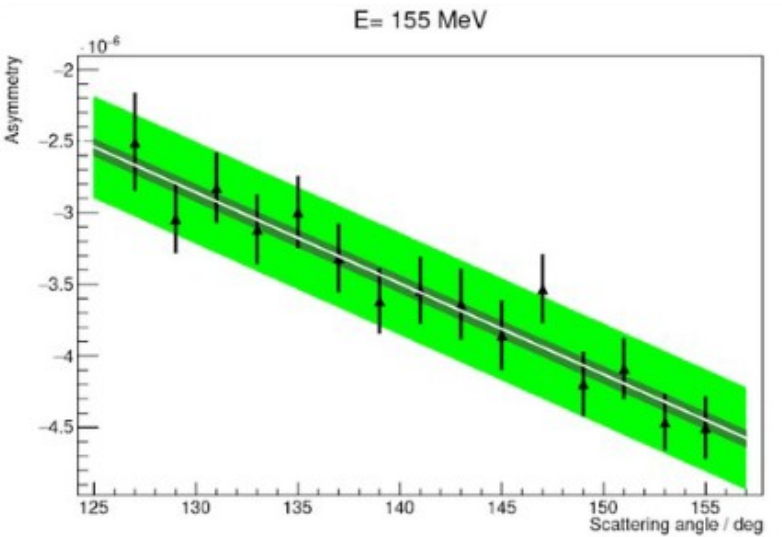
Position discretization + module, plane ID

Detector simulation

- Basic performance updated with current simulation
- Physics measurement procedure to be repeated / consolidated

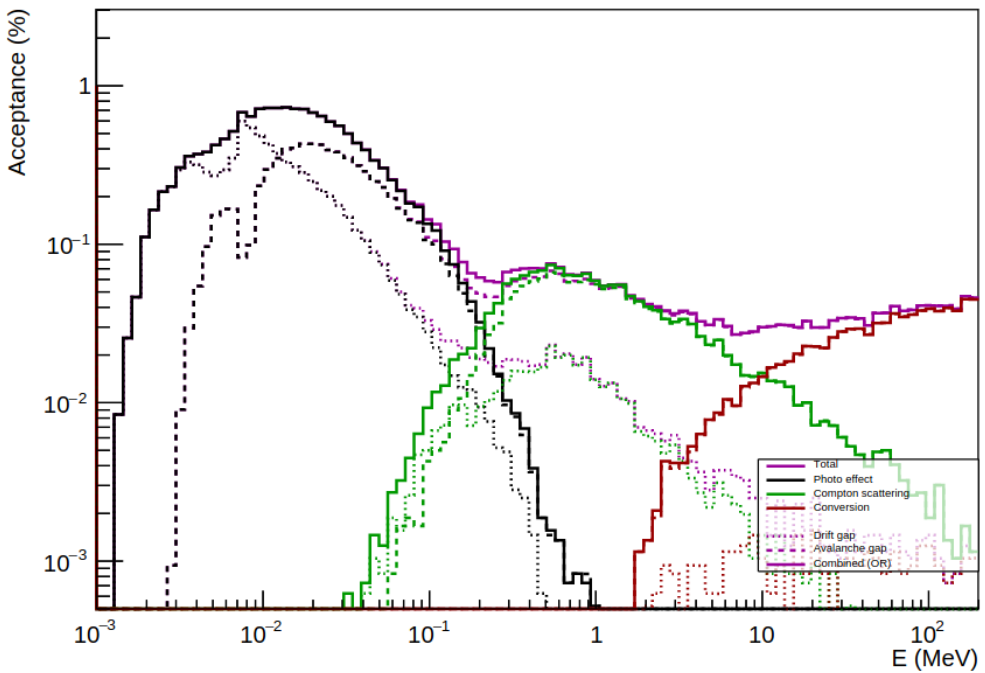


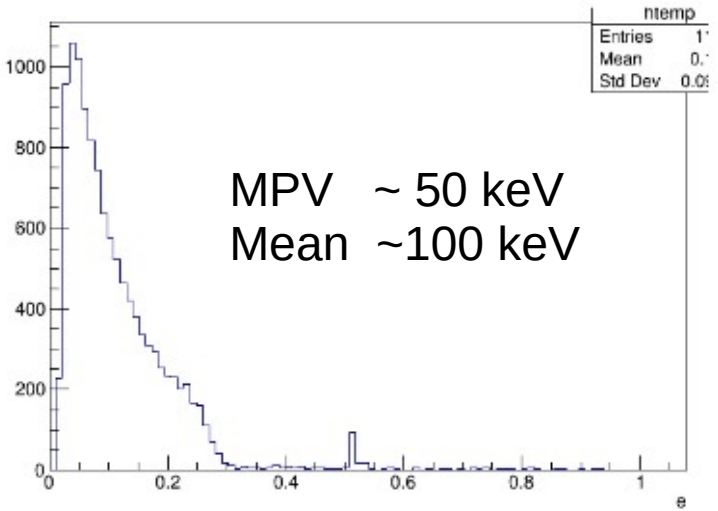




X-ray background

- Two factors : incident flux; detector response
- Detector reponse :





~0.1% photon interaction probability in the relevant range

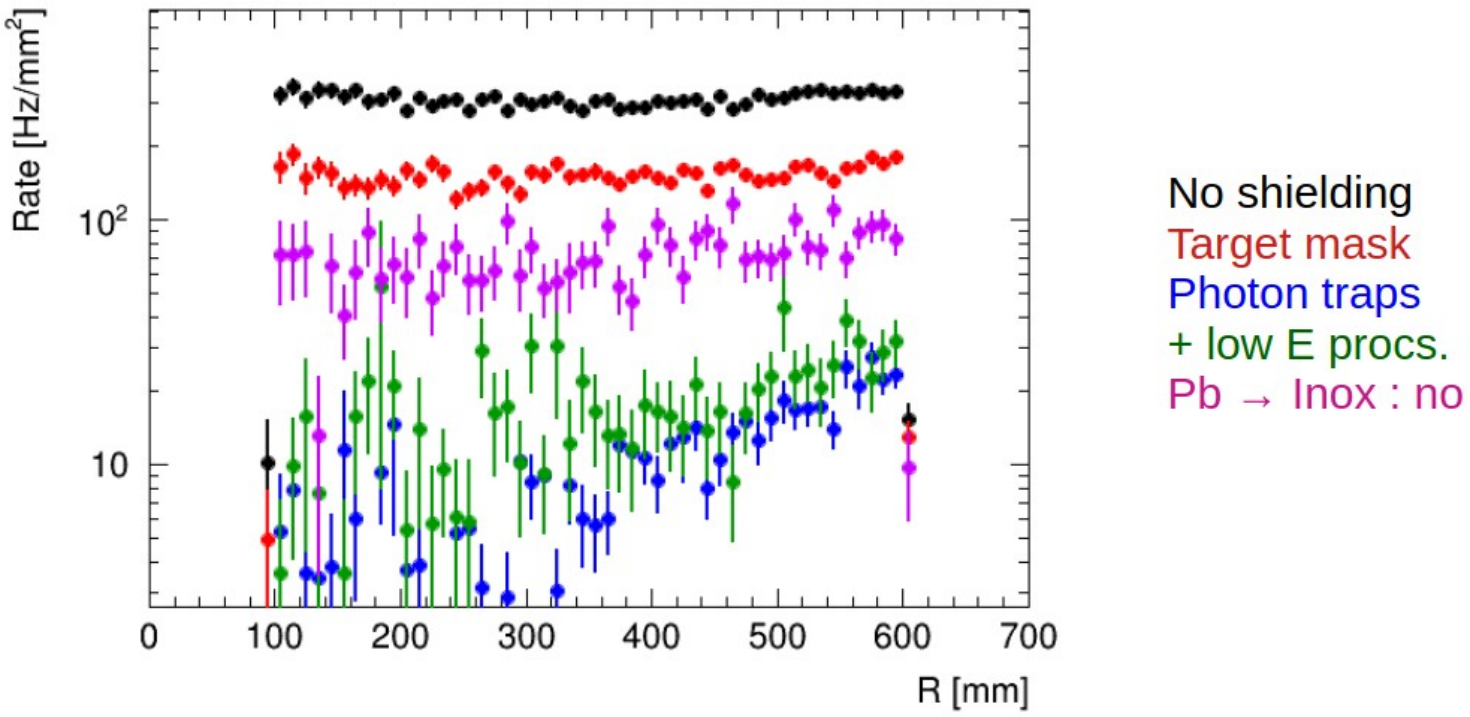
Validation with sources ongoing

- Fe55 : 6 keV, found ~0.8%
- Cobalt, Americium… to cover 50-100 keV range
- consider using light sources (SOLEIL)

Gregoire

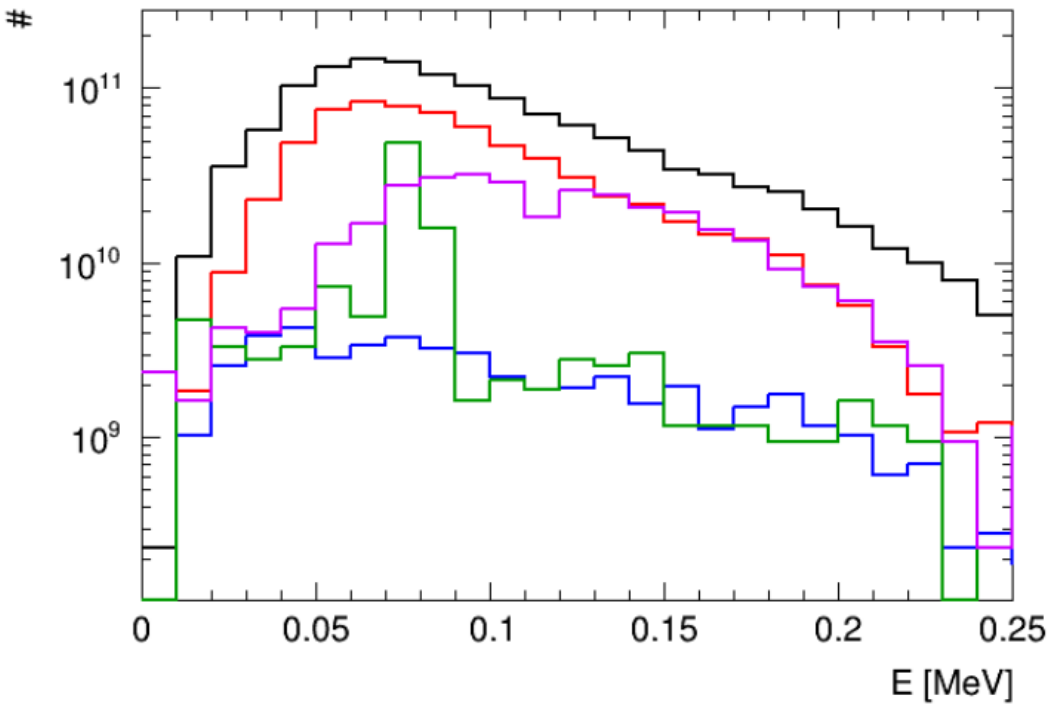
X-ray background

- Two factors : incident flux; detector response
- Incident flux : initially ~1000x times larger than signal; aim to reduce by ~50



X-ray background

- Two factors : incident flux; detector response
- Incident flux : initially ~1000x times larger than signal; aim to reduce by ~50

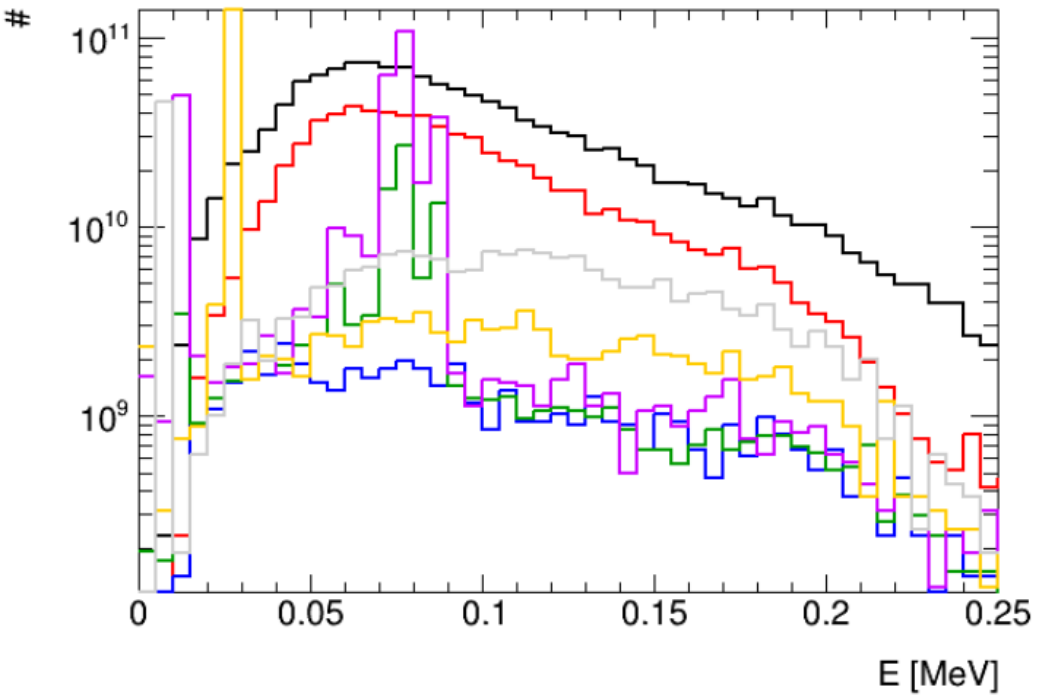


No shielding
Target mask
Photon traps
+ low E procs.
Pb → Inox : no

Low E :
- new ~80 keV resonance (lead fluo.)
- rest unchanged

X-ray background

- Two factors : incident flux; detector response
- Incident flux : initially ~1000x times larger than signal; aim to reduce by ~50



Z-graded shielding :

No shielding
Target mask

Old :

Pb, traps
+ low E procs.

New :

Pb, flat layer 2mm
+ Sn layer 2mm
+ Cu layer, 2mm

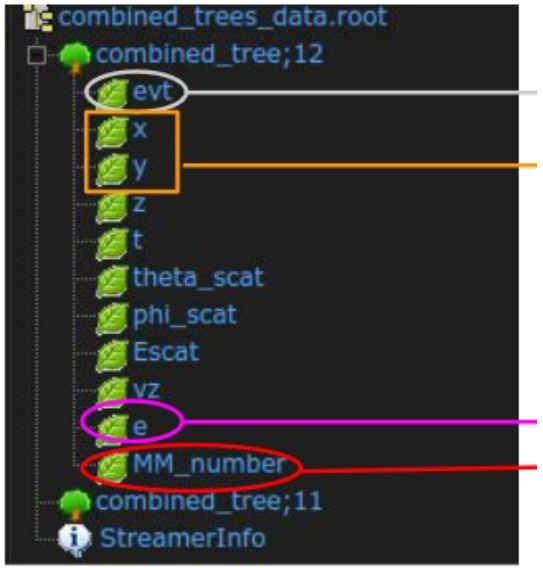
Matthieu

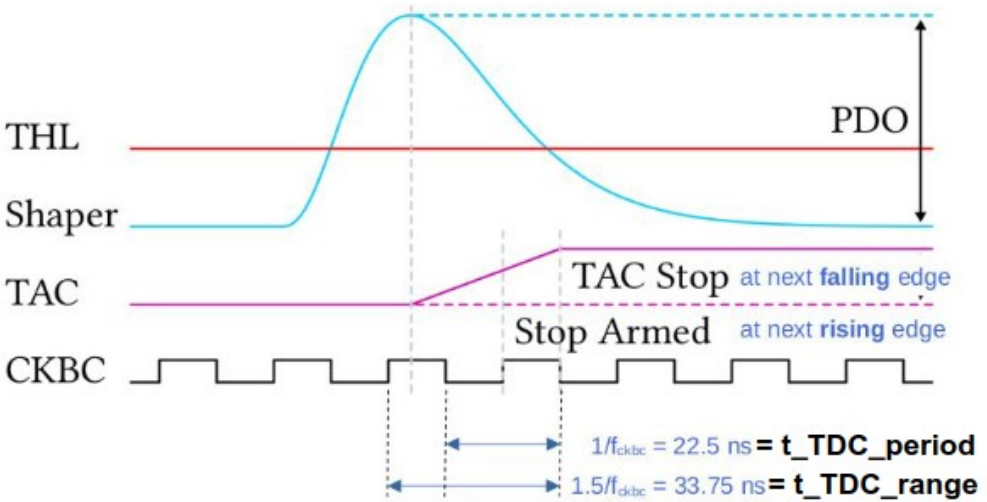
Online analysis

- Question : computing and storage needs for backward detector?
- Raw data volume : ~10 Pb / 1000 hours. Aim to reduce by ~10^2
- Strategy :
  - Simulate signal + backound hits (→ P2Sim)
  - Convert root ouputs into VMM data format (Matthieu)
  - Send this through ethernet to the backend, as for normal data
  - Design/optimize online algorithms (histogramming, parallel raw data stream, etc)

Online analysis

Matthieu





Hit = 1 Channel TDC Offset VMM ID ADC BCID

1 00100110101001100000 0011110111100 1000000000000

Neighbour Hit toujours a 0

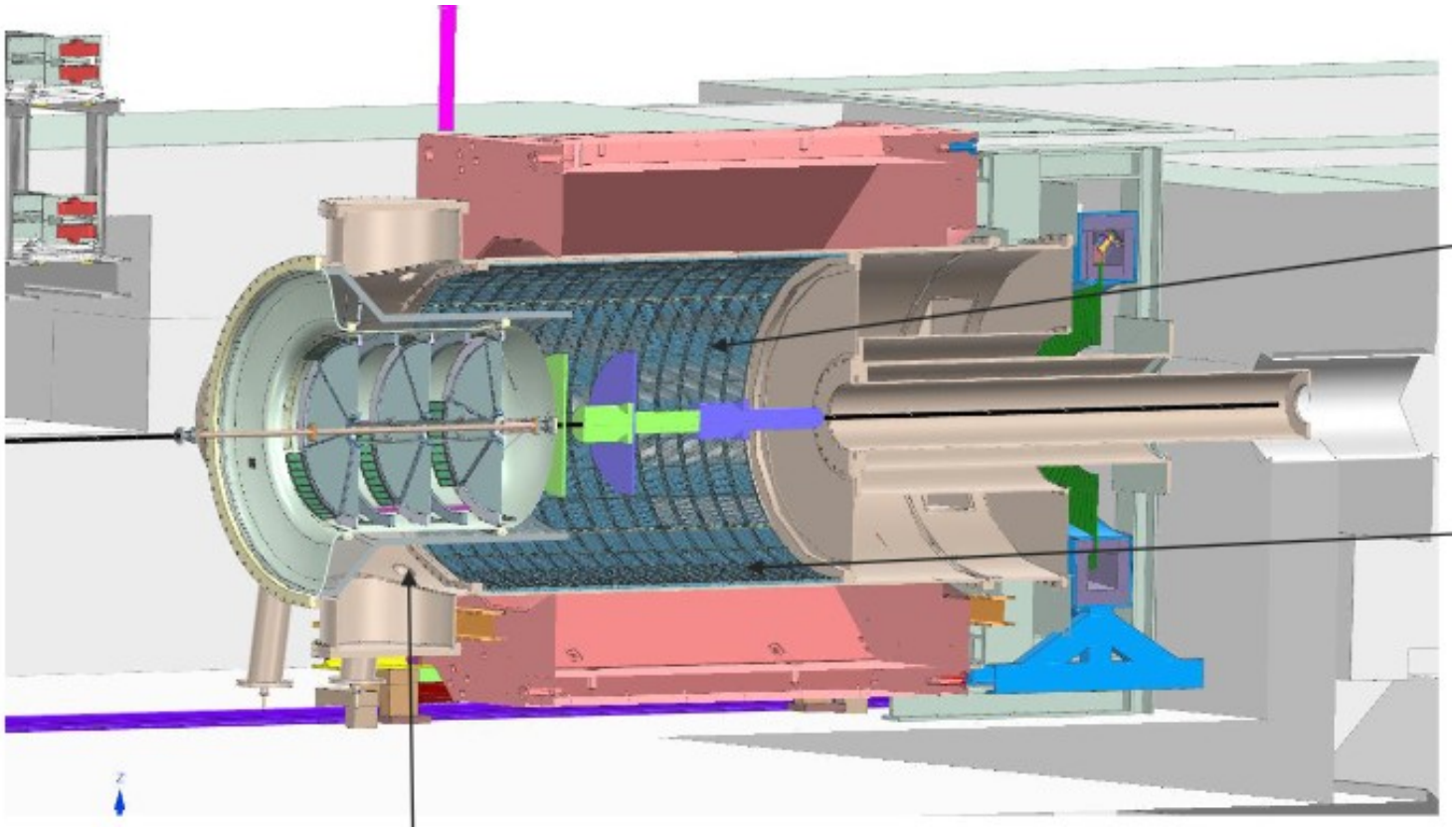
Hit = 0 VMM ID Timestamp

0 0011 00000000000000000000000000000000000000000

Lorsque le temps dépasse ~ 1.6 ms

Mechanics

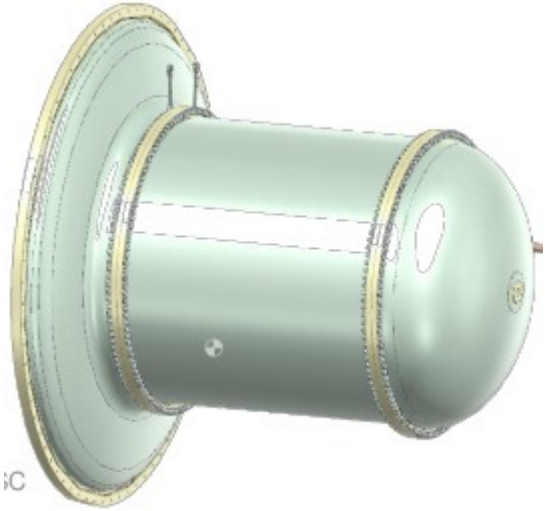
- Items
  - Chapeau
  - X-ray traps
  - Target mask
  - Back-end and LV



Sandrine, Boris

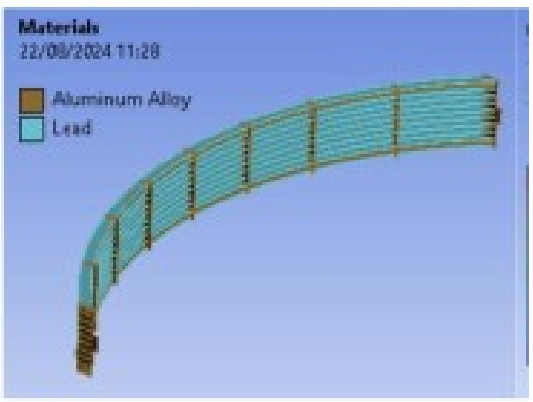
Mechanics

- Chapeau
  - Proposed design close to final; 2D drawings, tendering, construction will take time
  - Aim to complete 2D drawings + tendering by the end of the year
  - To be confirmed (→ Mainz)
    - Installation scenario
    - Exclusion zones



Mechanics

- X-ray traps :
  - Mechanical structure and interface with vacuum chamber OK for sides and top
  - sandwich material being optimized
- Target mask
  - Simple object per se; support/movement?
- Interfaces
  - Both items can be completed once target support is defined
  - Mask movement : same system as target?



Mechanics

- Back-end end LV
  - Options to be decided : near or distant
  - To be confirmed:
    - Shortest distance from detector to bunker? (max allowed : 20m)
    - Radiation levels : 1-MeV neutron equivalents, and protons >20 MeV

- Sharing of design files
  - Procedure agreed upon this morning… emails coming

Backward detector Paper

- Scope similar to P2 paper
  - Science potential
  - Detector and readout design
  - Status of prototypes and detector/readout tests
- Still several issues to sort out. Plan for 2025?