Status report

Geant4 simulation segmented calorimeter

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# Geant4 simulation segmented calorimeter

- Starting point: Anastasia's simulation code (2014)
 What's already in:
  - Single block of scintillator
  - PMT with photocathode
  - Production of photons (+Birk's law)
- What's been added (yet):
  - Segmentation of scint in beam direction with parameters:
    - Number of slices
    - Wrapping material thickness (per slice)
  - Output of deposited energy per scintillator slice
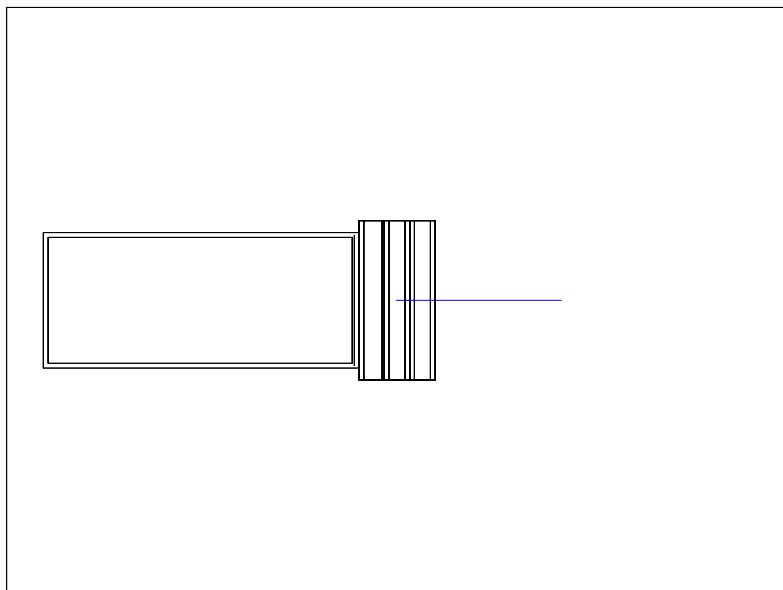
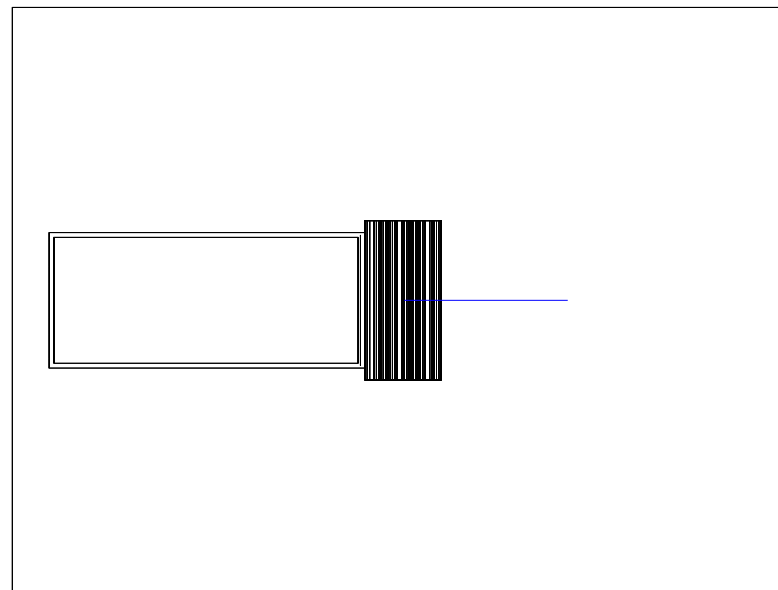Calorimeter thickness = 60mm, E_proton = 60MeV

N_slices = 1, wrapping = 10mm

Wrapping

PMT

Incoming
proton

Scintillator slice
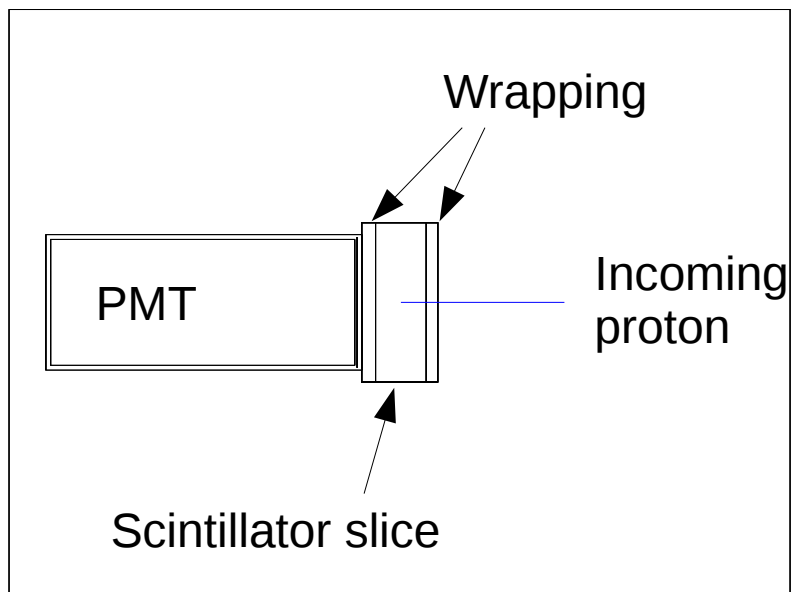
N_slices = 2, wrapping = 5mm
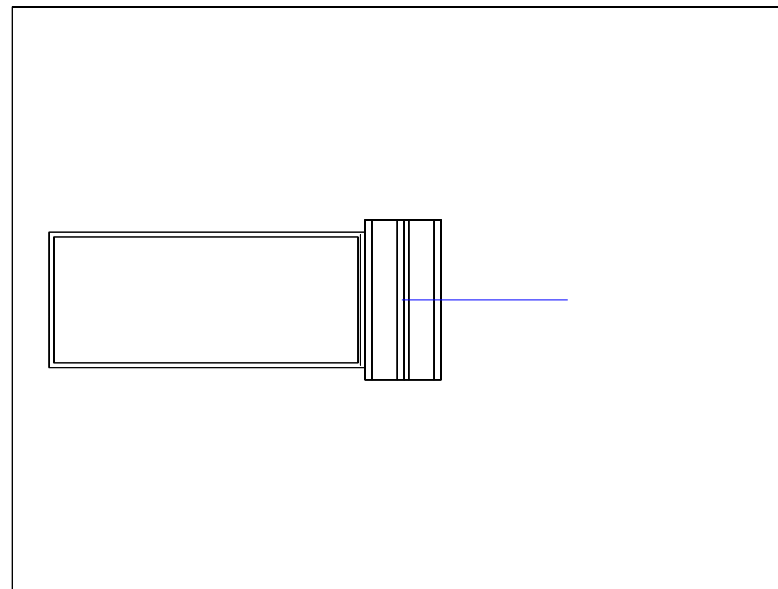
N_slices = 3, wrapping = 3mm
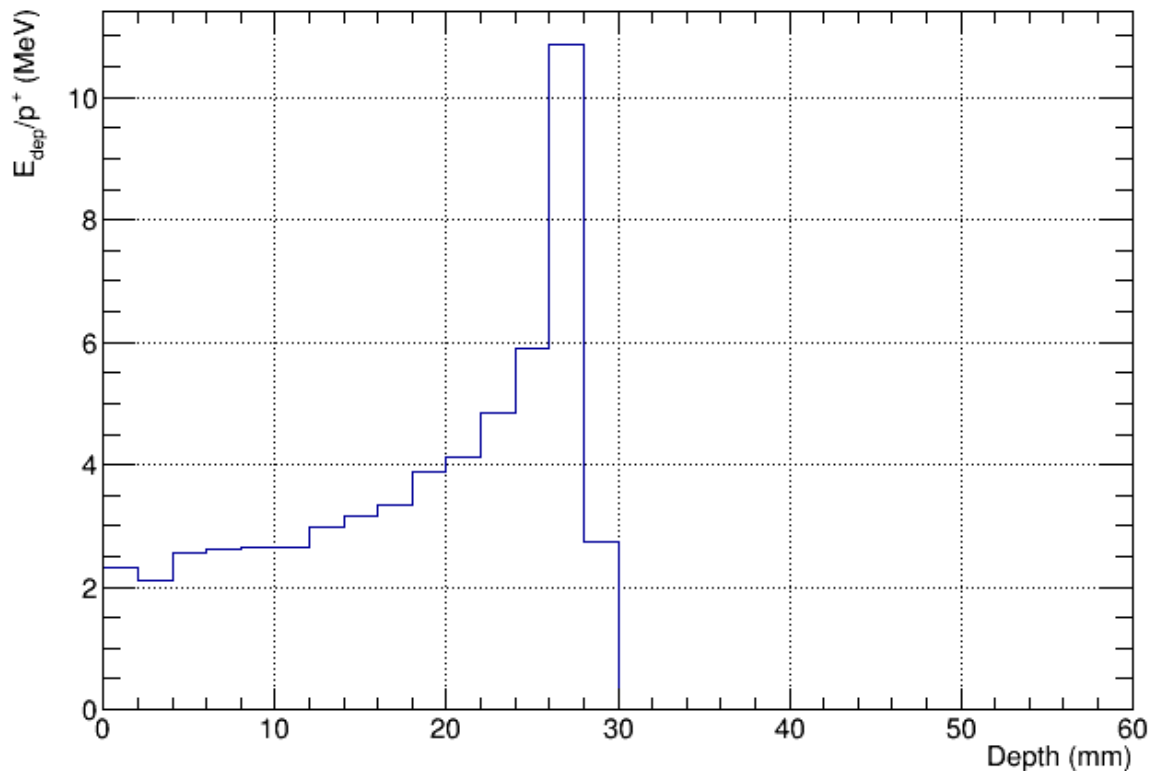
N_slices = 30, wrapping = 0.01mm

Control plot: Energy deposition in scintillator

- E_proton = 60 MeV
- Calorimeter thickness = 60 mm
- N_slices = 30
- Wrapping thickness = 10 mu
- => scintillator slice thickness = ~2 mm

Bug: E_dep_scint = 59.0314 MeV
    E_dep_wrap =   1.1525 MeV   → sum unequal 60.000 MeV
→ Double counting of E_dep for steps which start in one volume (scint or wrap) and end in other?

To do

- Fix E_dep bug

- Remove PMT (design photodiode instead)

- Study photon production

- Runtime for 1 proton: about 30 seconds (30 scint slices) → Optimize?

- Current simulation on SL5, Geant4.10.0 → Upgrade to SL6, Geant4.10.2