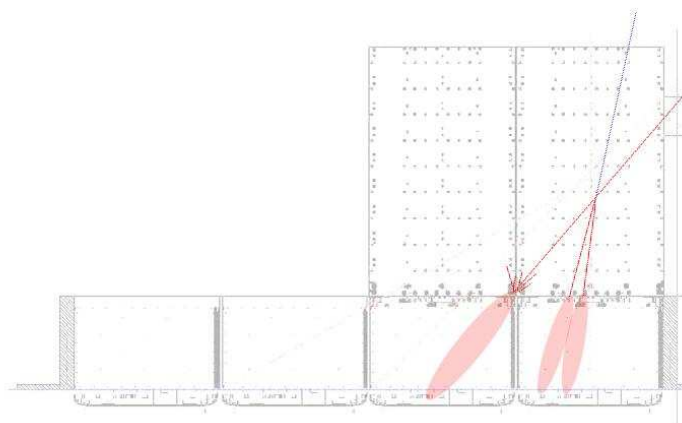# GLAST CERN 2006 Beamtest

CUTower
Collimator simulation

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Beamtest Analysis - November 28th, 2007

Collimators

- Original idea by G.Barbiellini... a year ago !

  - Collimators are part of the beam line

  - Part of the beam might interact with the collimator and electrons would end up in the CU having seen extra material

  - Different part of the beam could see different amount of material

- Simulation with the CUTower standalone GEANT code

  - Consider only the Calorimeter (no tracker)

  - Add a *collimator* in front of the calorimeter

  - Confront with a simulation with an homogeneous piece of material of equivalent radiation length
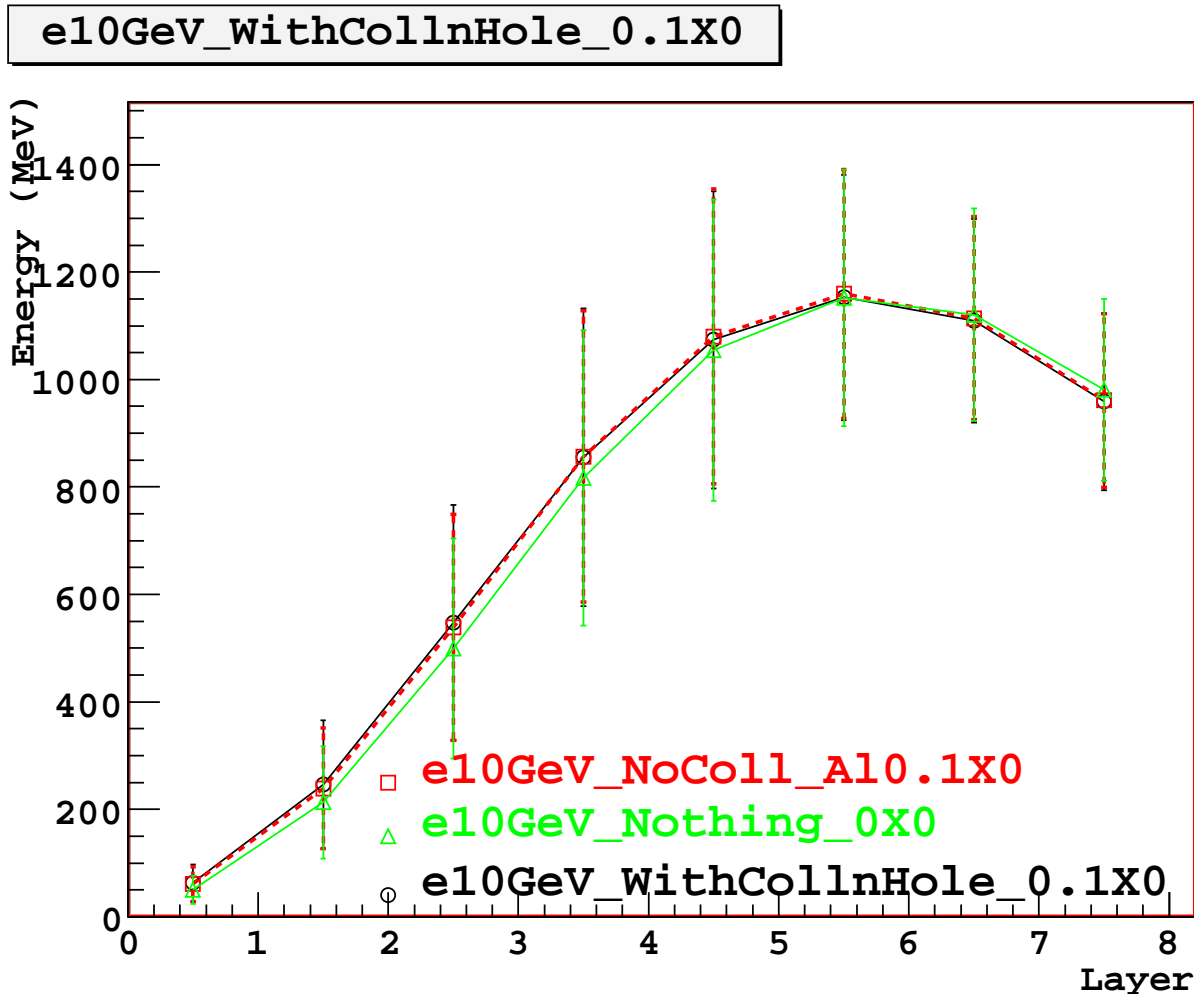
  - Study the longitudinal shower profile

Simulated collimator geometry

- Trying something simple enough with Al material.

- 1st cube is void, just a hole, 0. X0 seen : $a = 2.8mm$ (surface=1/3 beam)

- 2nd cube is 0.1 X0 of Al : $b = 4.1mm$(surface=1/3 beam)

- 2rd cube is 0.2 X0 of Al : $c = 5.0mm$(surface=1/3 beam)

- Beam is e^- 10GeV in uniform square patch with $c = 5.0mm$

```
0.2X0 (Al)
  0.1X0 (Al)

    0.X0
    (hole)
```

← Beam Width →

0.1X0 equivalent collimator
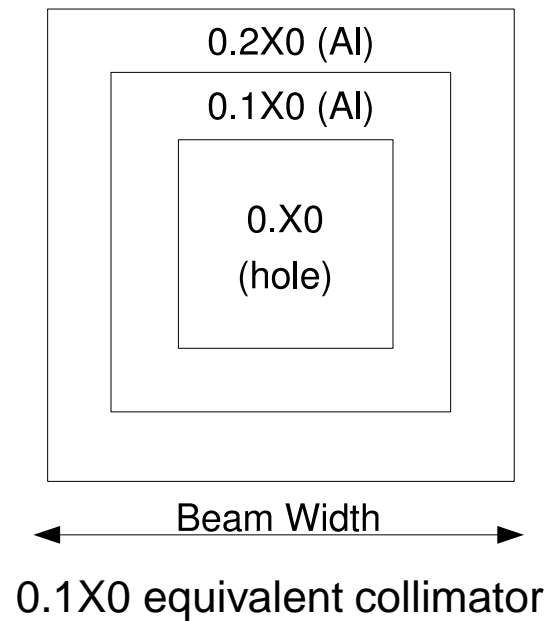
0.1X0 collimator

● Very slight discrepancy between the red-dashed and plain-black curve

→ *collimators* seems equivalent to an homogeneous pice of Al

e10GeV_WithCollnHole_0.1X0

□ e10GeV_NoColl_Al0.1X0
△ e10GeV_Nothing_0X0
○ e10GeV_WithCollnHole_0.1X0

1.4X0 collimator

- Looking for non linear behaviour in the shower shape due to the fact that different part of the beam see different part of material

- The phenomenon probably occures to particles going through the tracker...

- Trying a Thick collimator : 1.2X0 - 1.4X0 - 1.6X0

→ Only small effects seen given the *collimator* thickness
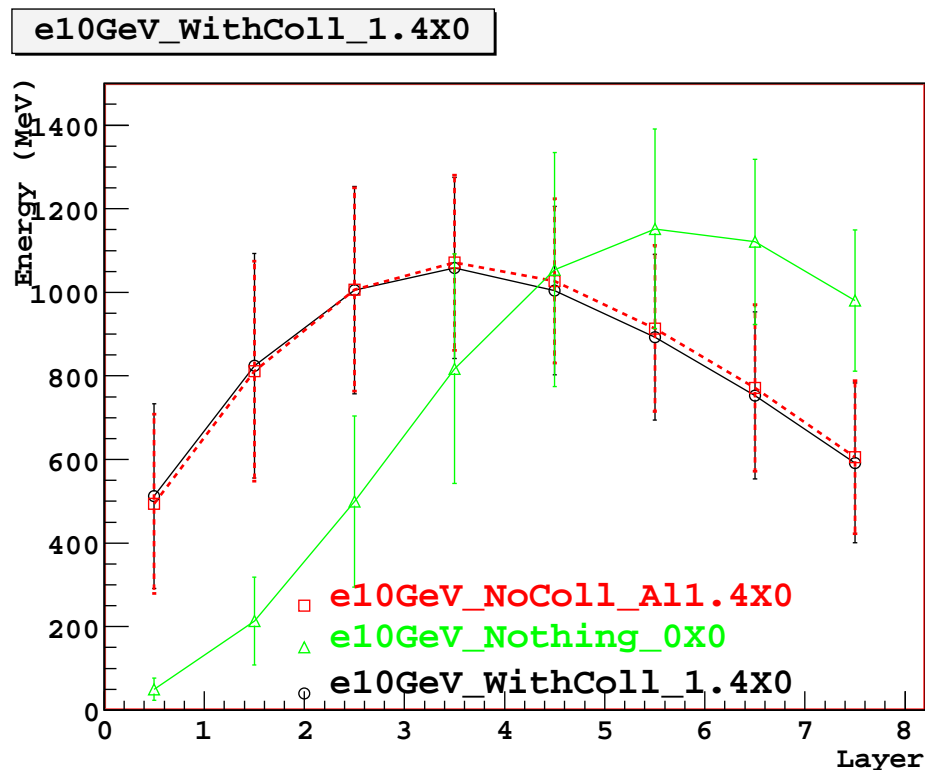
Conclusion

- We have used a simple geometry to simulate the Interaction of the beam with collimators

- Collimators are a potential reasonable way to explain why we miss some material on the beam line

- Very slight differences are observed on the shower profile when comparing a collimator like or an homogeneous piece of material.

- Collimator geometry shall be implemented, at least as an option in the `beamtest06` package.