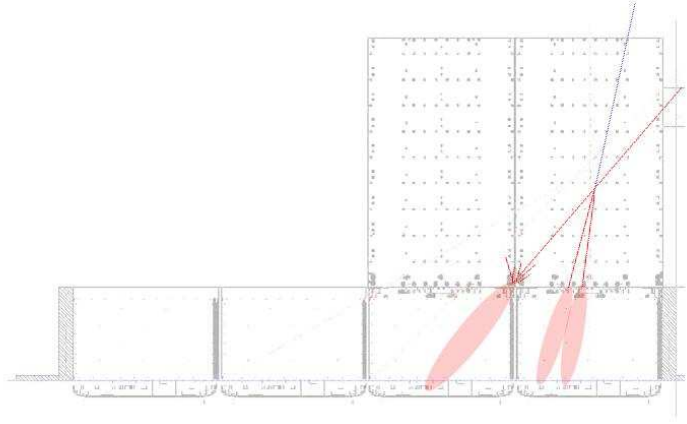
GLAST CERN 2006 Beamtest

GEANT4 Standalone EM showers



Johan Bregeon (INFN-Pisa)

Beamtest Analysis - April 11^{th}, 2007

Simulation Improvements

- Beam Spot
  - angle, divergence
- Cuts
  - default cuts and MSC Step Limit
- EM Physics
  - standard, G4standard , G4standard_fast, G4standard_exp, Livermore, Penelope

simulation parameters

Physics			Geometry		Beam			Particle	
EM Physics	**cuts**	**mscStepLimit**	**CAL Shape**	**TKR Shape**	**Width**	**Angle**	**Divergence**	**Type**	**Energy**
standard	1mm	10mm	40 Layers	HoneyComb	Small 3mm	0°	0mrad	e^-	10GeV
G4standard	10μm	1mm	30 Cylinders	Homogeneous	Big 3cm	0.5°	5mrad	proton	50GeV
G4standard_fast	1μm	10μm		Equ. Al block					100GeV
G4standard_exp									
Livermore									
Penelope									

- Quite a big phase space to cover...
- I do not know much about different EM physics lists and mscStepLimit...

some tests

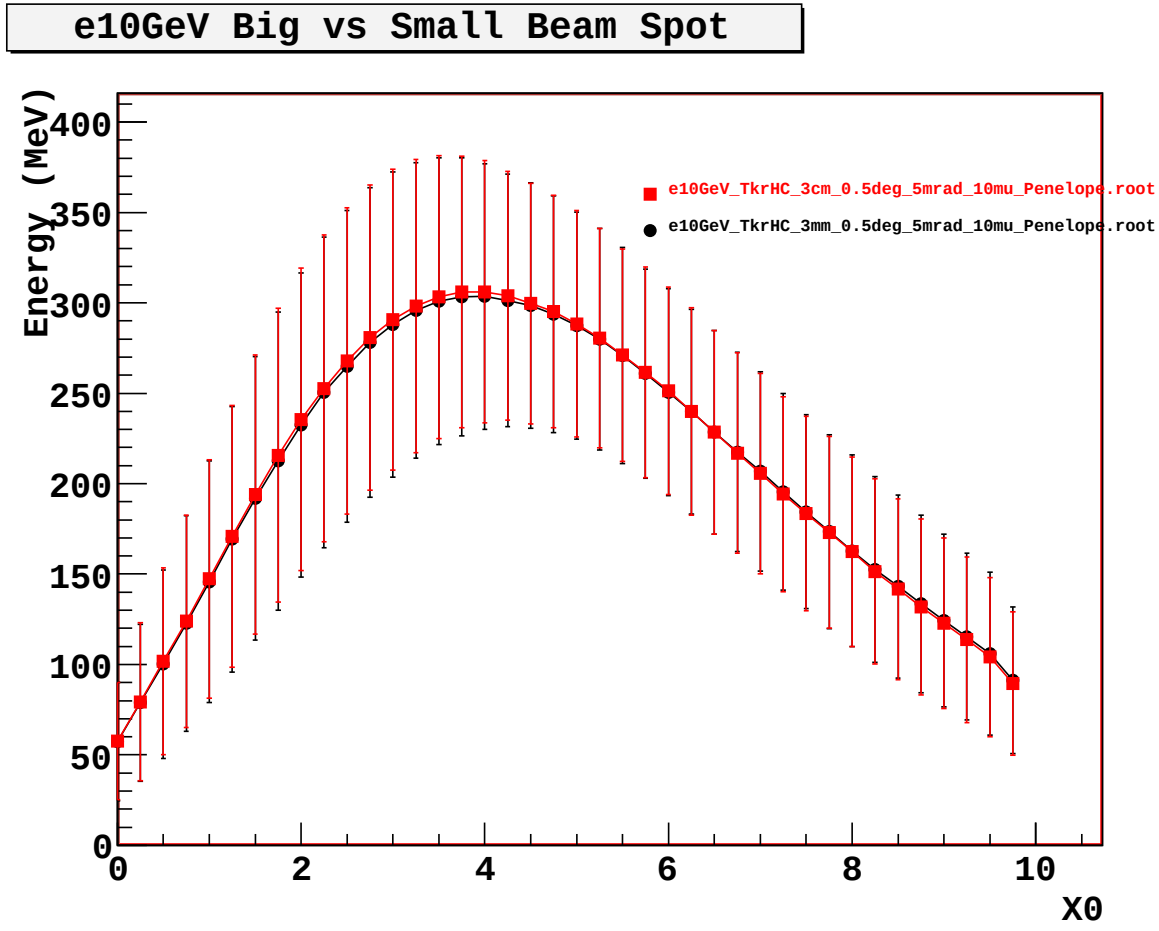
default parameters

- 10GeV electrons
- Angle = 0.5°
- Divergence = 5mrad

Tests

- Beam Spot: Big and Small with HoneyComb Tracker
- Tracker: realistic and homogeneous honeycomb
- Standard and Penelope EM physics
- G4Standard and Penelope EM physics

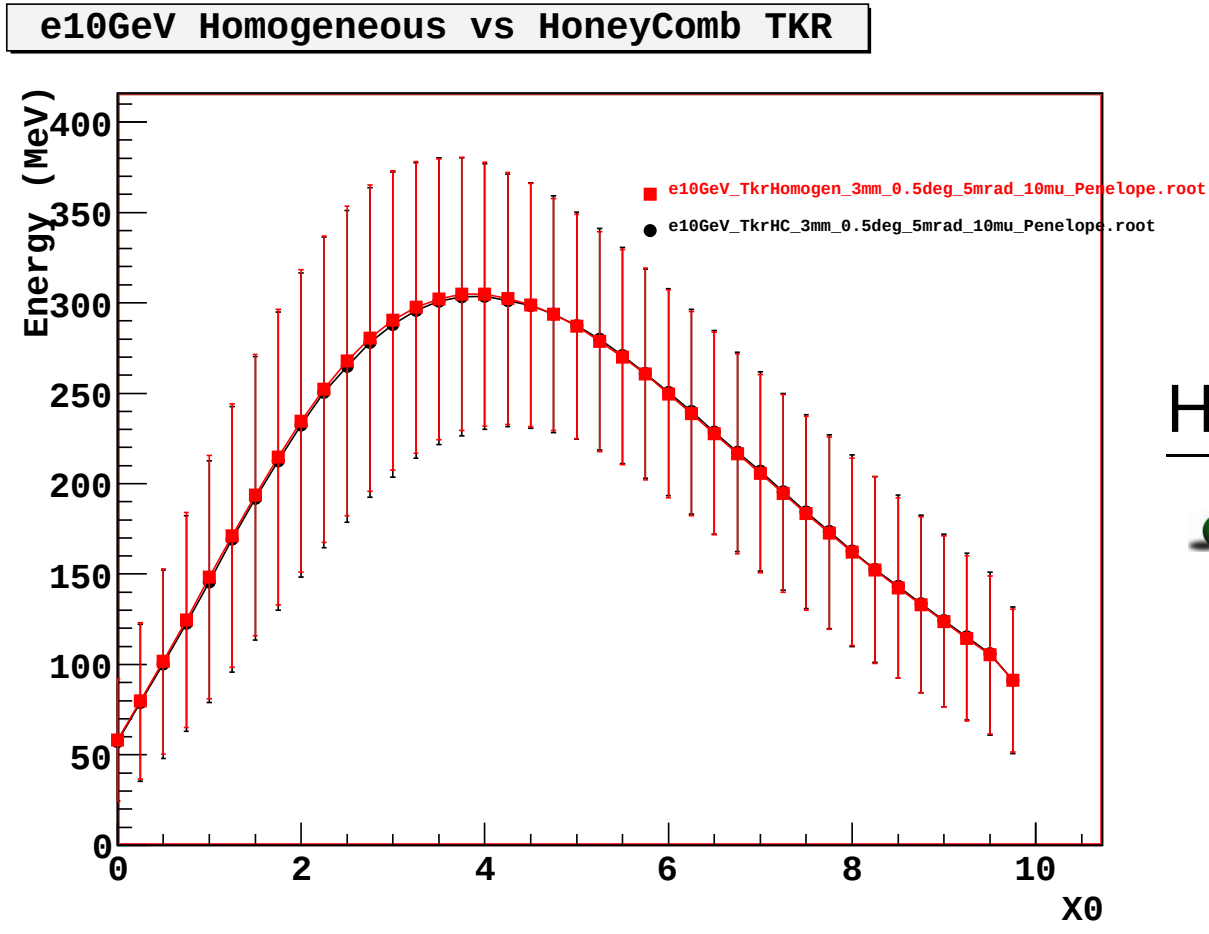
Big vs Small Beam Spot



Beam Spot

- Slight difference in the shape near the maximum

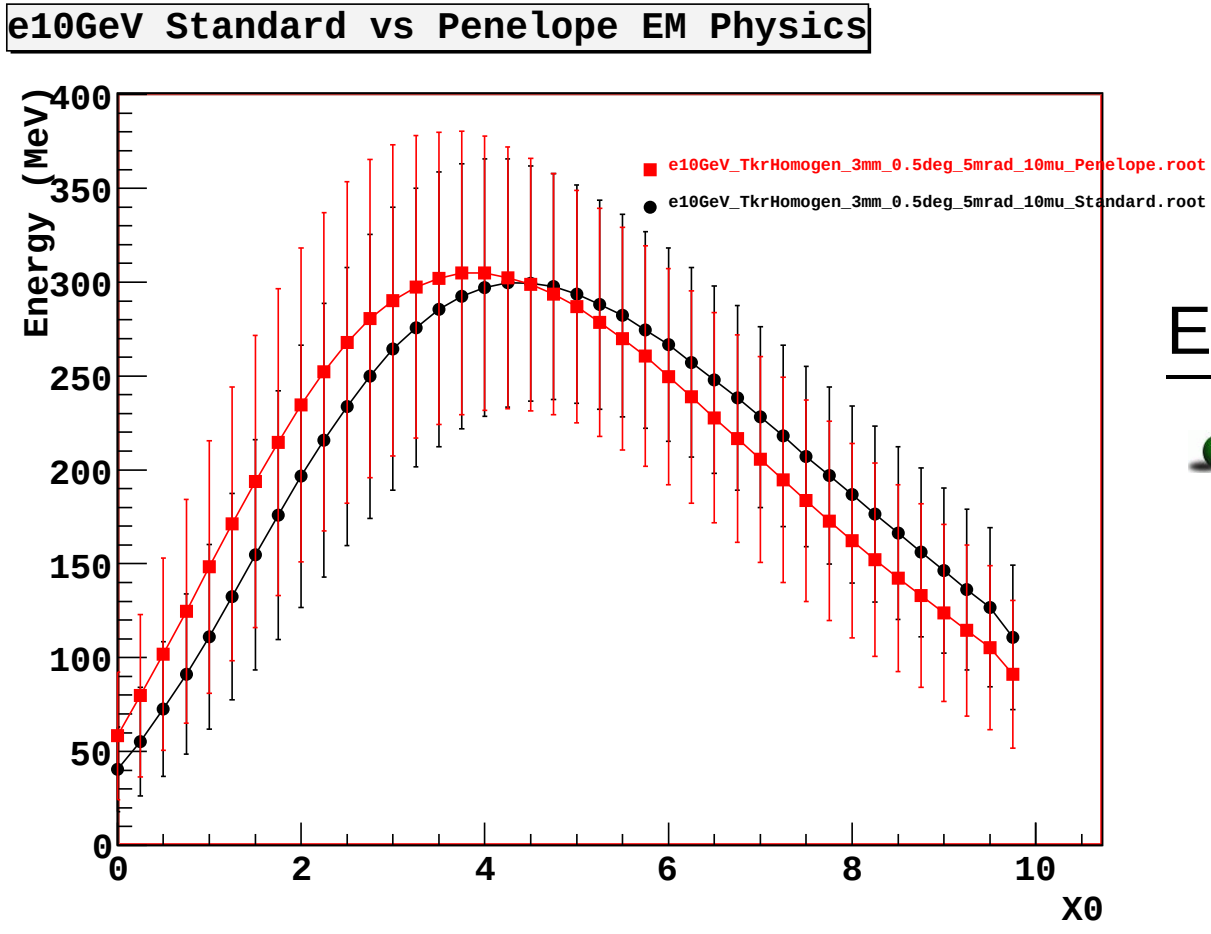
Homogeneous vs HoneyComb TKR



HoneyComb

- no differences

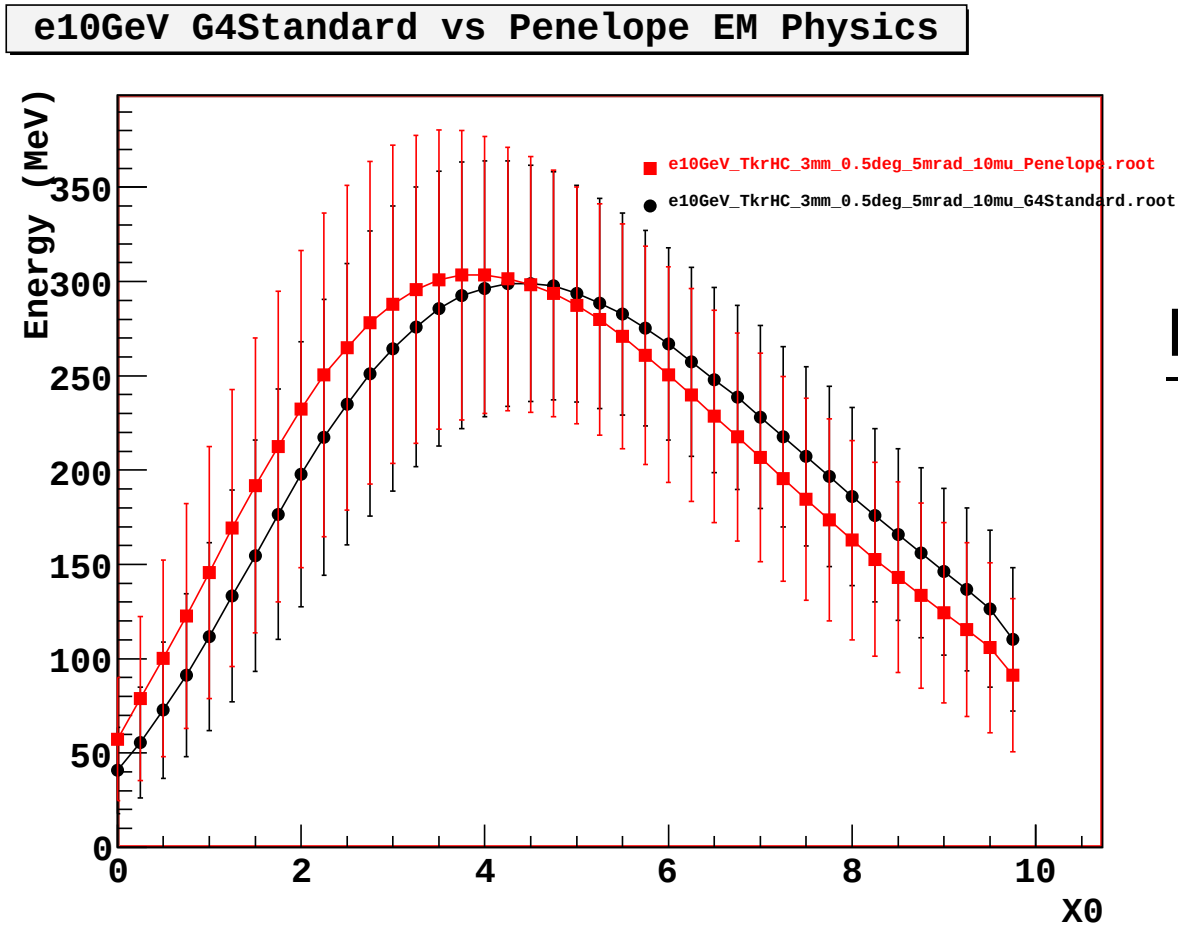
Standard vs Penelope EM Physics



EM Physics

- Penelope EM shower starts earlier !

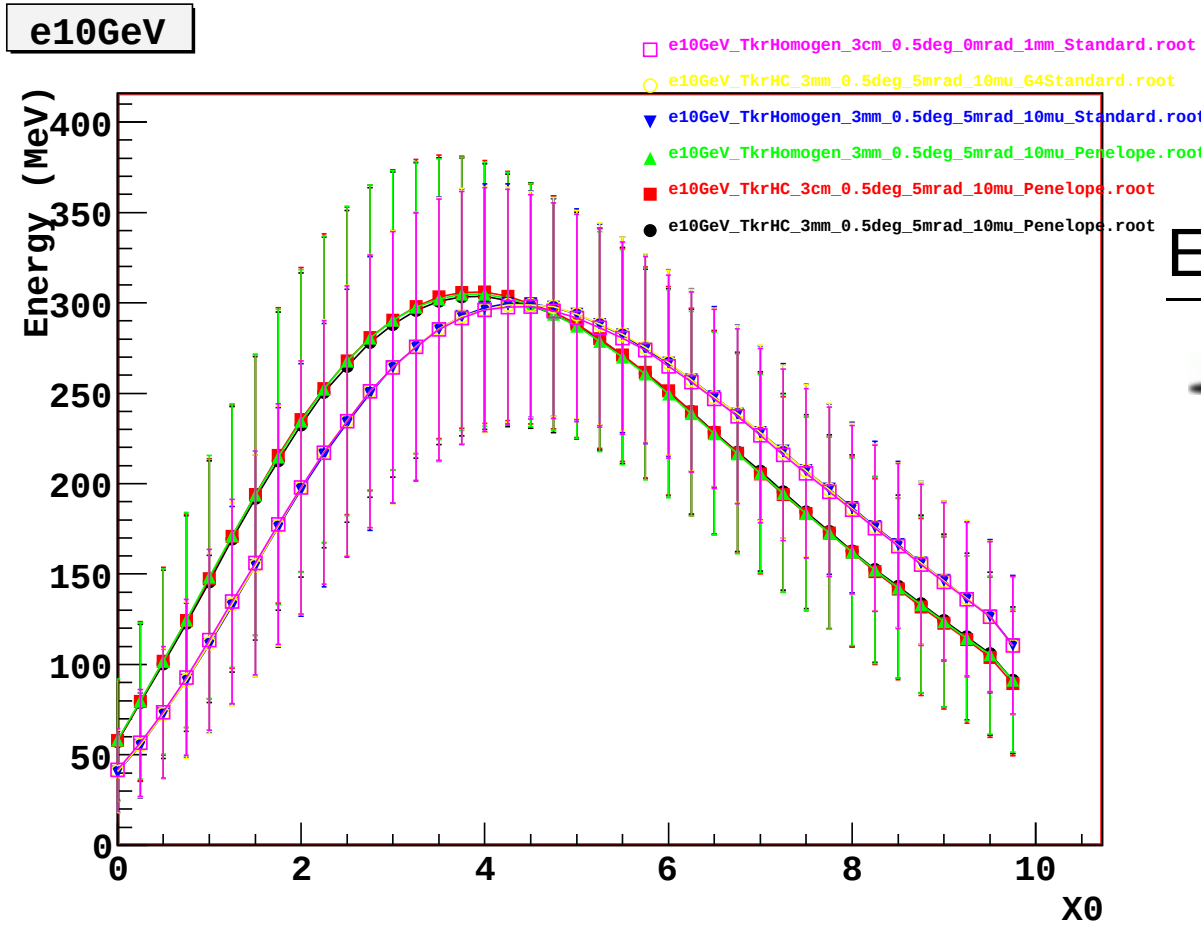
G4Standard vs Penelope EM Physics



EM Physics

- Penelope EM shower starts earlier !

All Penelope vs All Standard



EM Physics

- All my Penelope simulations show an EM shower that starts earlier !

Is that real ?

- The shift in the EM shower when turning on Penelope EM physics is big :$\sim 0.2X0$

$\Rightarrow$ too big, I am still not convinced that I do not have a bug somewhere.

- need to cross check:
  - is the same effect observed with looser cuts ?
  - is the same effect observed with no tracker ?
  - can we turn on Penelope physics in Beamtest Release ?
- need to look at hits in the Si planes: earlier shower shall mean more hits.