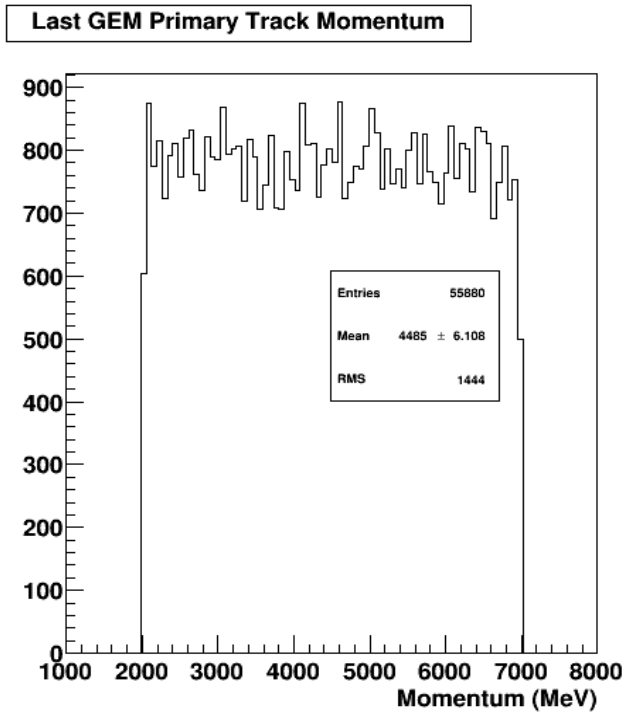
ECAL Update 5

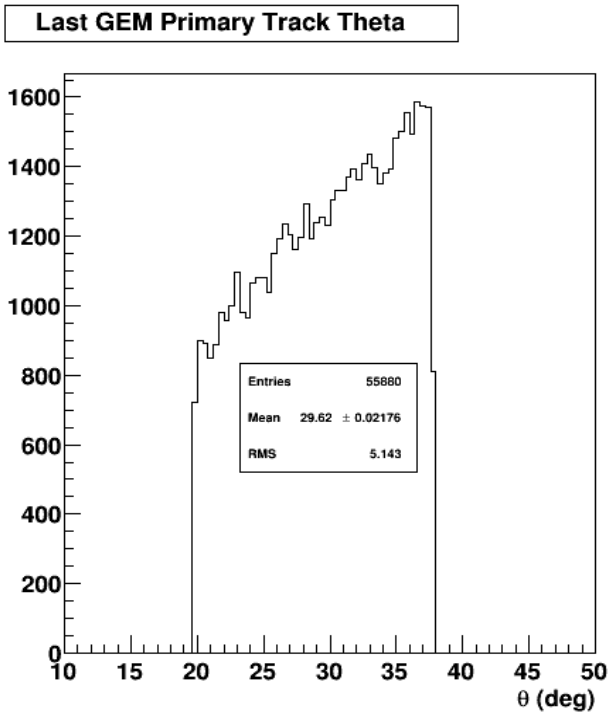
Energy Resolution Simulation

- Input flat distribution : electrons
- No radiative effects in the target
- Setup only include ECAL and sensitive detector replacing last GEM in vacuum medium.
- Use ecal cluster energy and input momentum to get energy resolution for shower only and pre-shower + shower combination

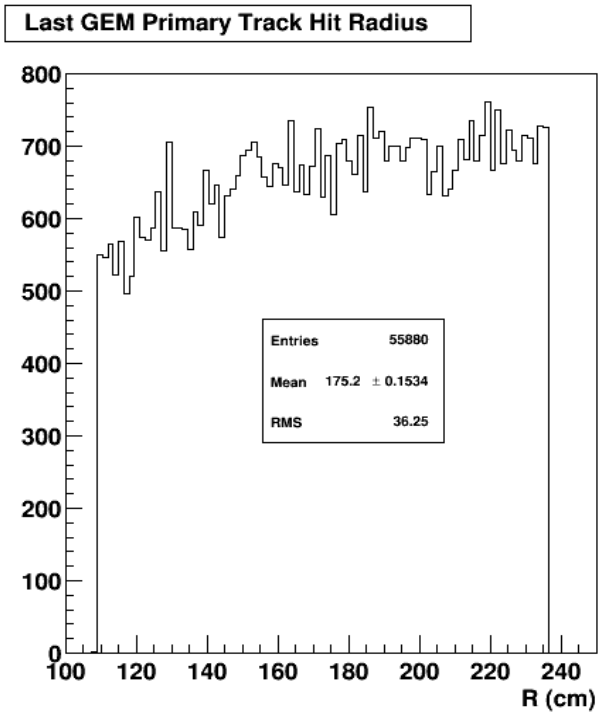
Input Flat Distribution Before



Input Momentum

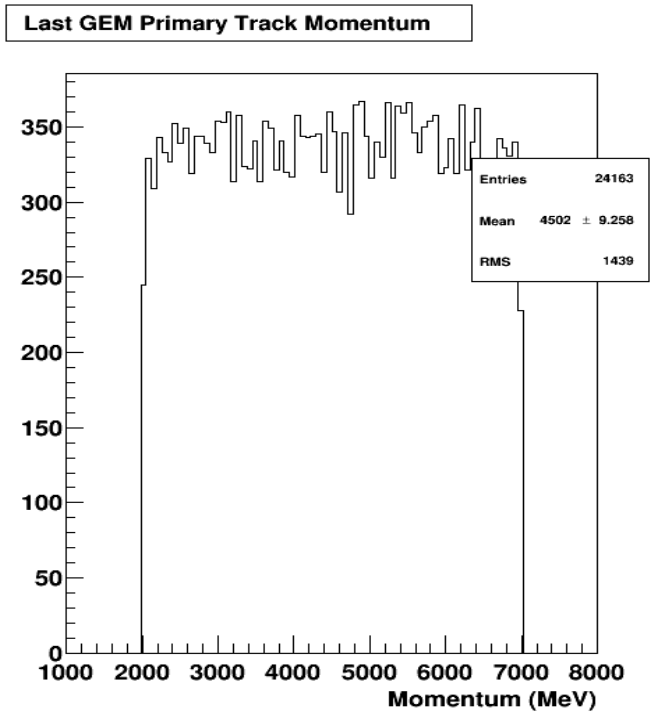


Input Angle

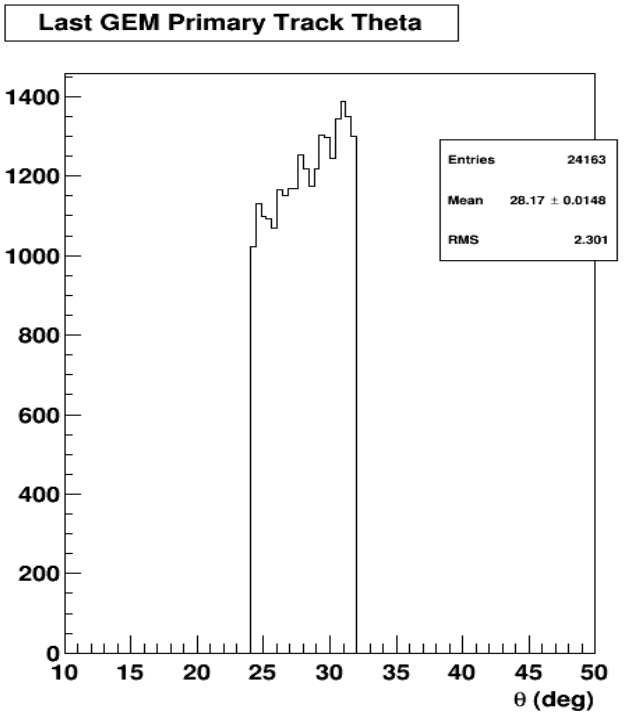


Input Radius

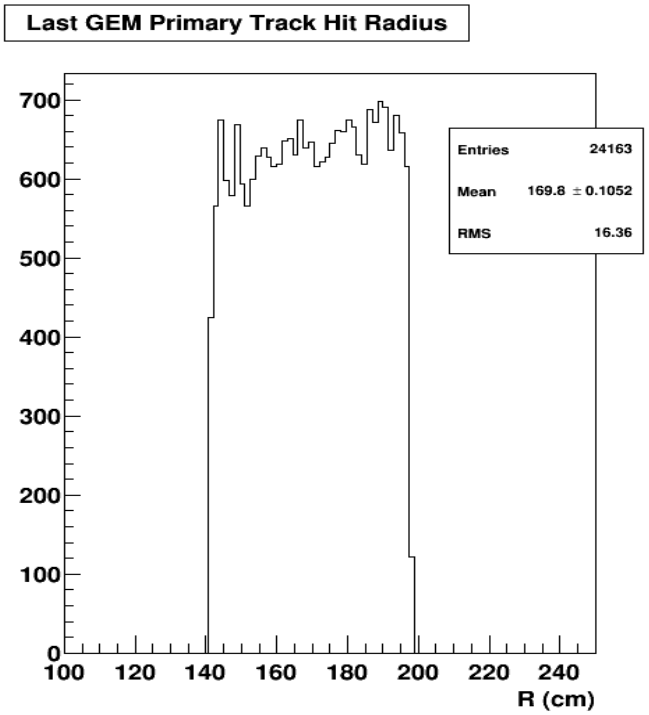
Input Flat Distribution Now



Input Momentum

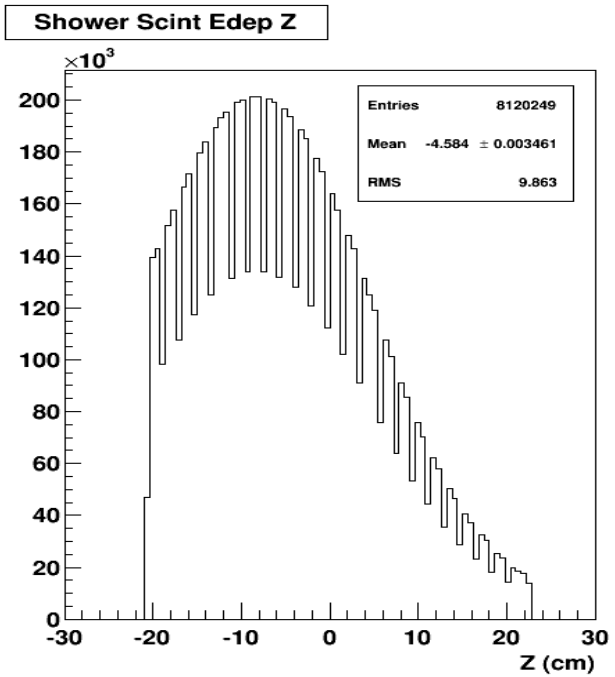


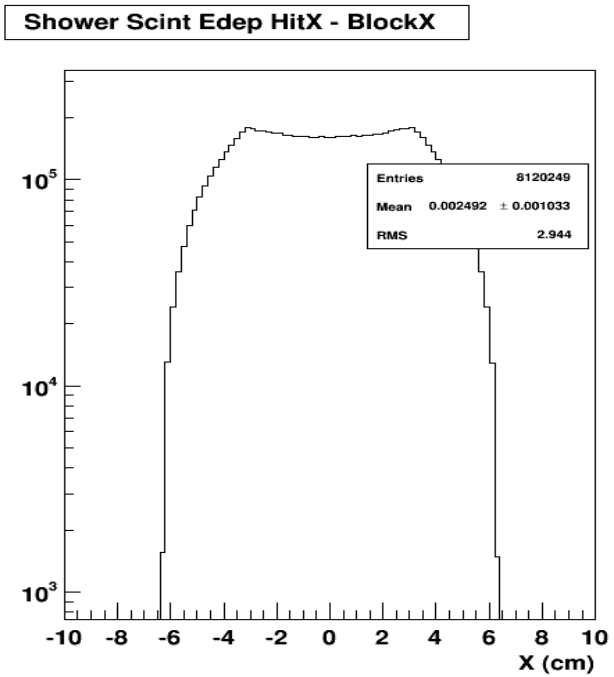
Input Angle

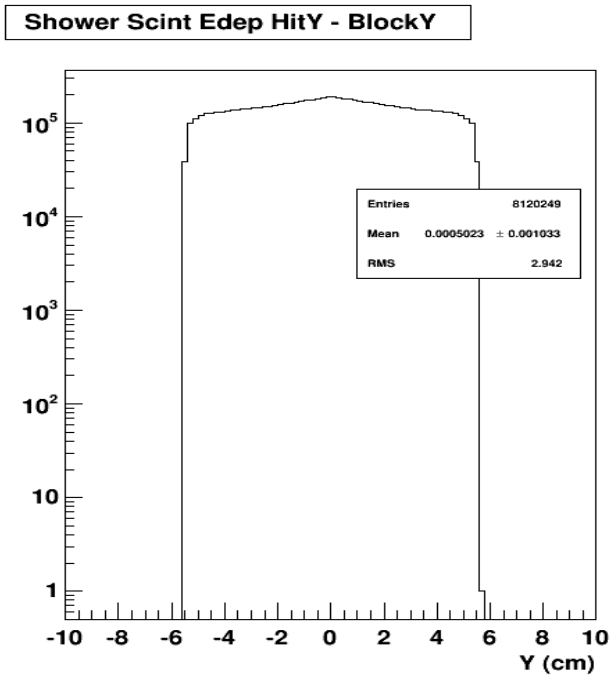


Input Radius

Energy Deposit Distribution on ECAL : Now

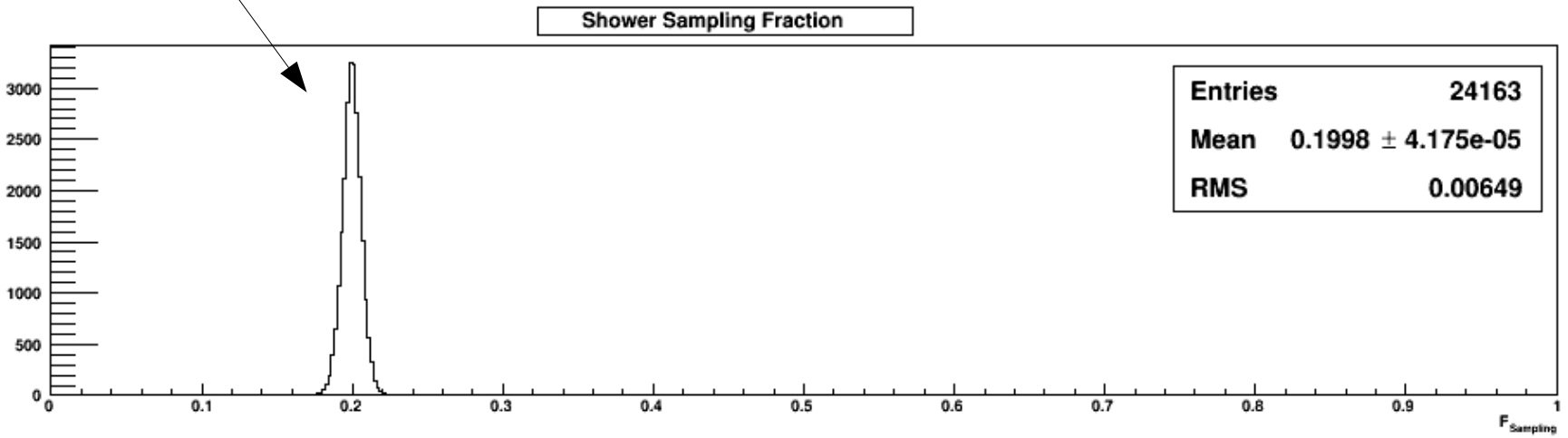


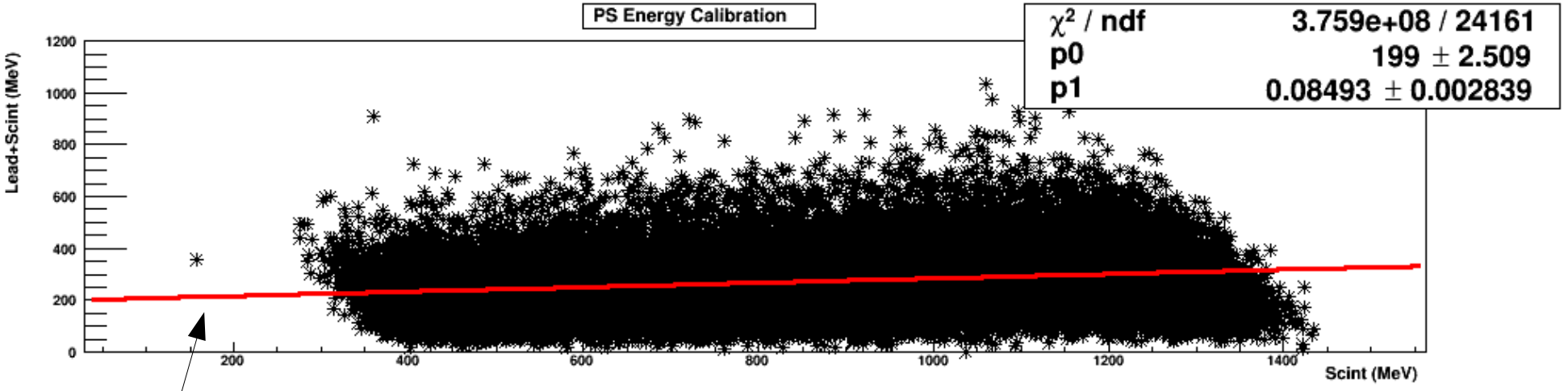




ECAL Energy Calibration

Sampling_Fraction = sh_edep_scint/(sh_edep_scint+sh_edep_lead)





Pre-Shower Lead+Scint edep vs. Scint edep

ECAL Energy Calibration

Calibrated Energy on Shower = sh_edep_scint * sampling_fraction

Calibrated Energy on PreShower =

ps_edep_scint + ps_edep_lead

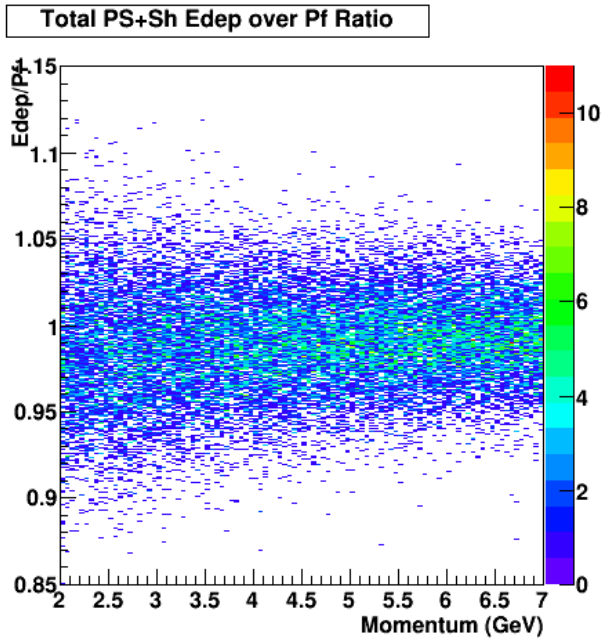
Calibrated Total Energy =

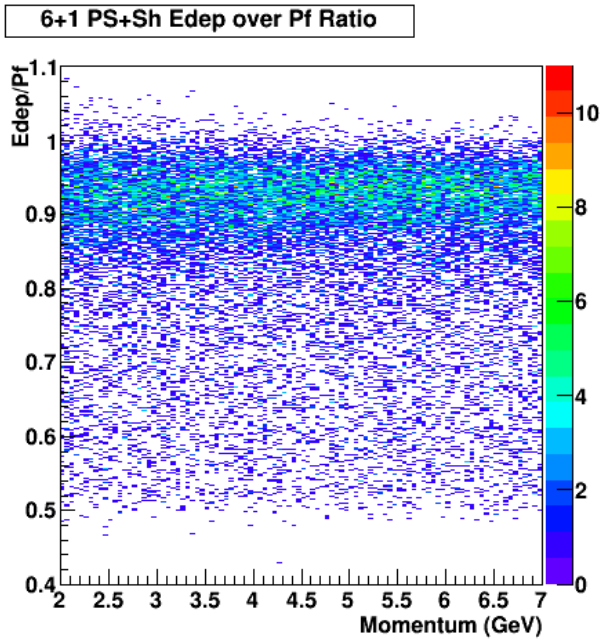
Calibrated Energy on Shower + Calibrated Energy on PreShower

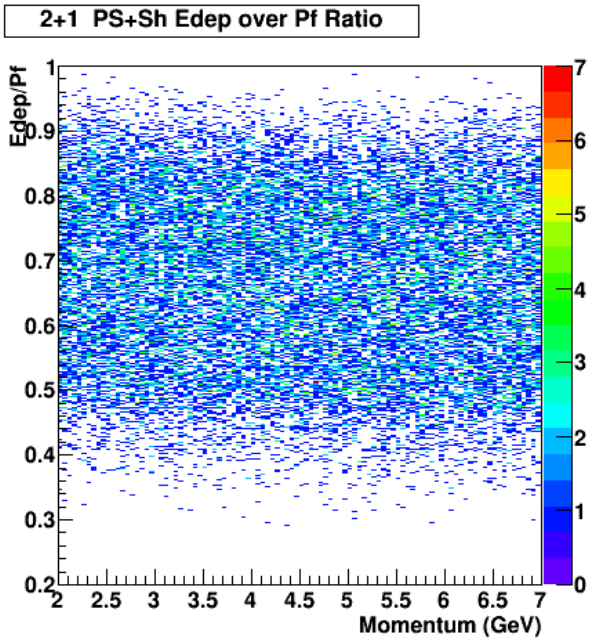
Note :

- sampling_fraction obtained from previous plot
- Energy deposit on lead in shower and pre-shower are recorded in the simulation
  - The fit shown in previous plot was not used

edep over P_f Ratio in Shower

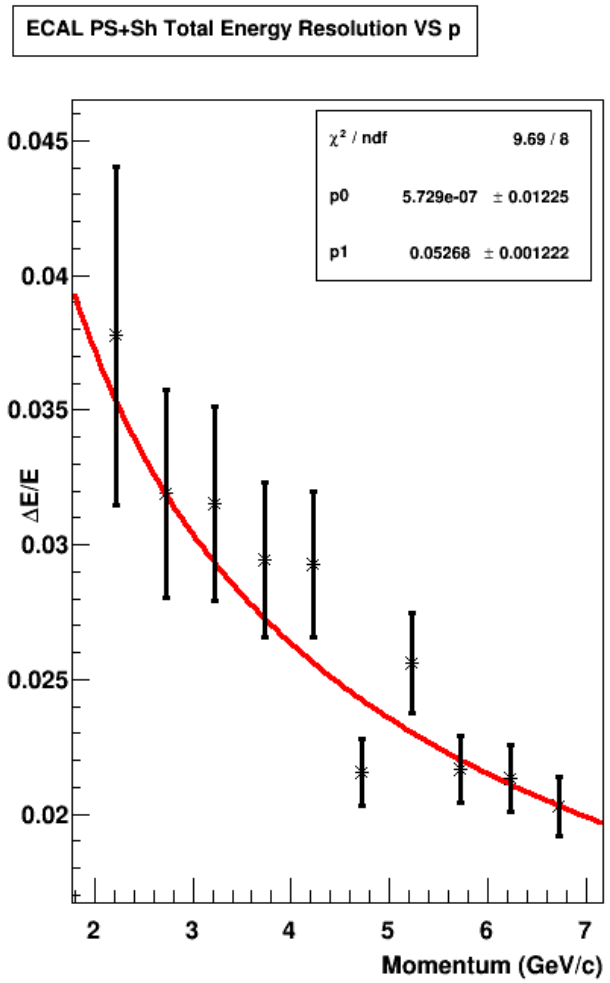


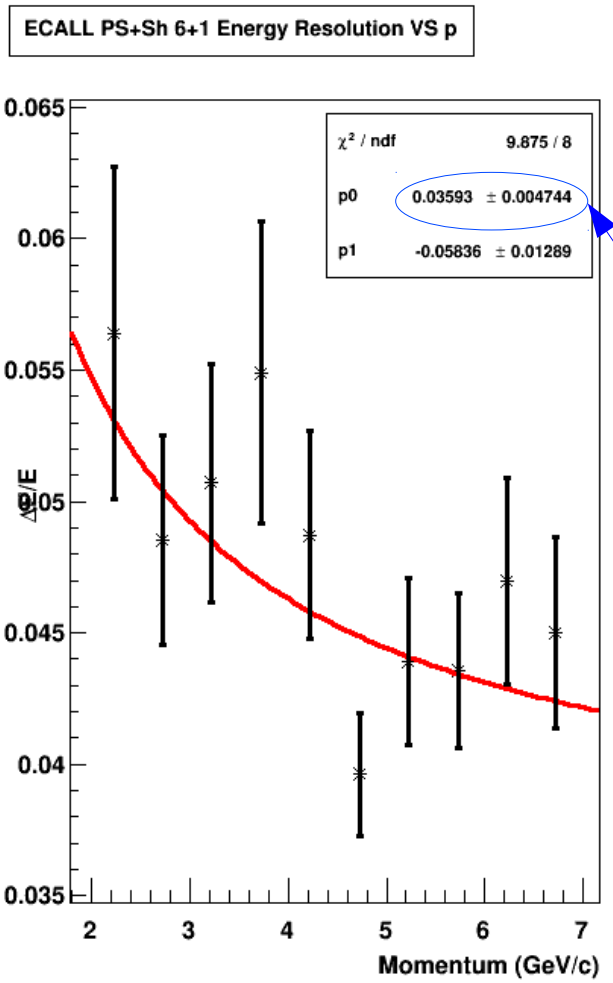




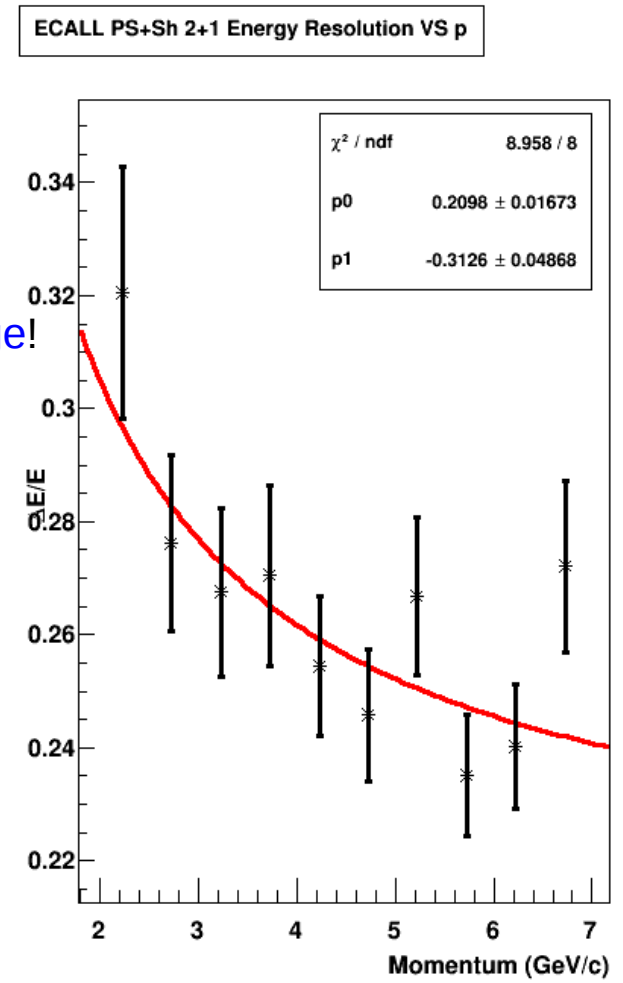
Pre-Shower lead and scintillator included in the simulation

Intrinsic ECAL Energy Resolution





Large!



Based on calibrated energy deposit in the ECAL

Shower Energy Resolution

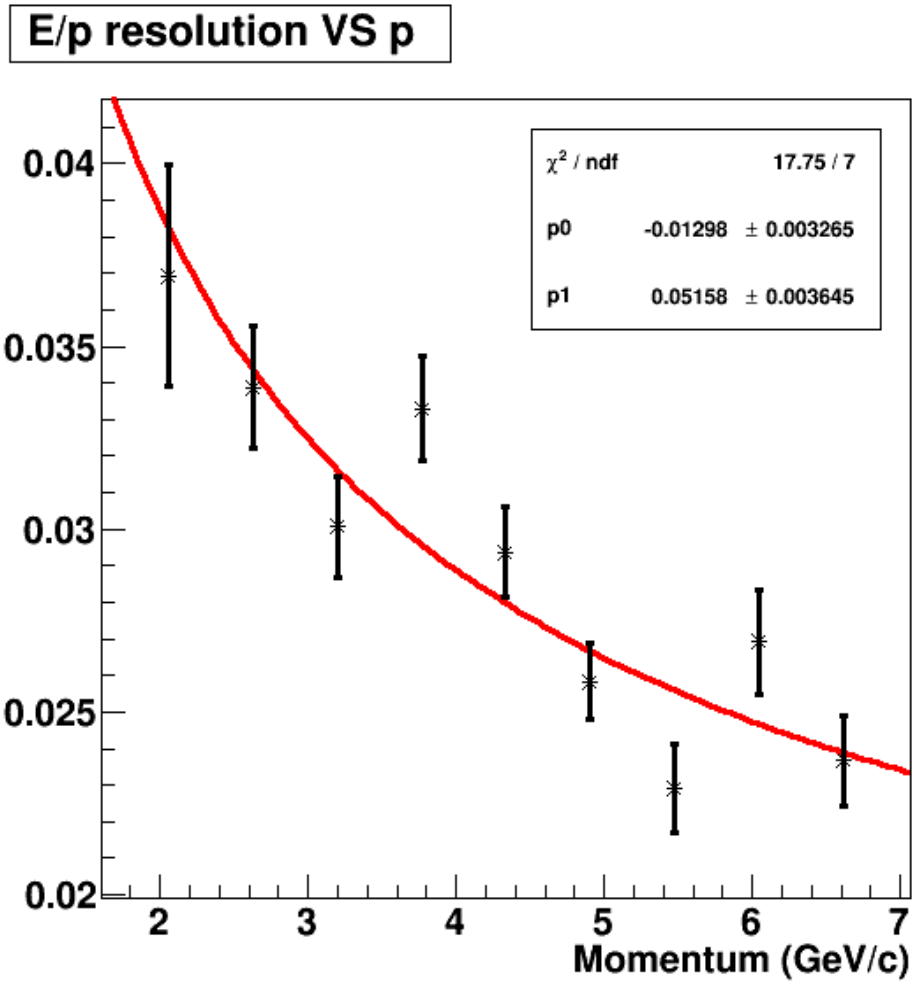
From Total Energy on ECAL		
Pf (GeV)	Res (%)	Error (%)
2.23	0.038	0.006
2.73	0.032	0.004
3.23	0.032	0.004
3.73	0.029	0.003
4.23	0.029	0.003
4.73	0.022	0.001
5.23	0.026	0.002
5.73	0.022	0.001
6.23	0.021	0.001
6.73	0.020	0.001

From 6+1 Clusters		
Pf (GeV)	Res (%)	Error (%)
2.23	0.056	0.006
2.73	0.049	0.004
3.23	0.051	0.005
3.73	0.055	0.006
4.23	0.049	0.004
4.73	0.040	0.002
5.23	0.044	0.003
5.73	0.044	0.003
6.23	0.047	0.004
6.73	0.045	0.004

Note :
The main difference between total energy based energy resolution and 6+1 cluster based energy resolution is the constant term is larger when 6+1 clusters are considered.

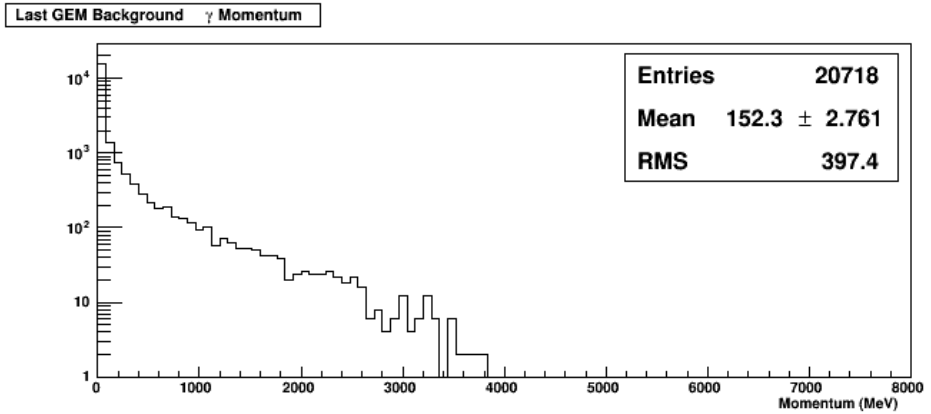
Jin's Energy Resolution (with No Phot. Elec.)

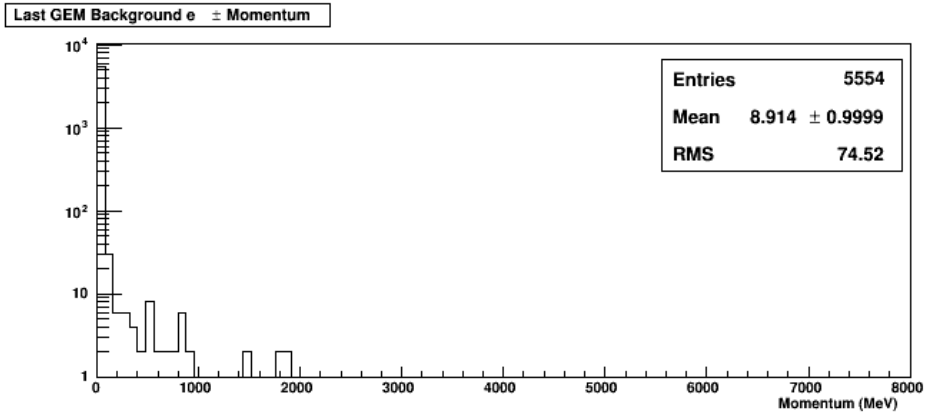
- Jin's estimation was based on ecal (ps+sh) calibrated energy deposition
  - No Photon fluctuations included

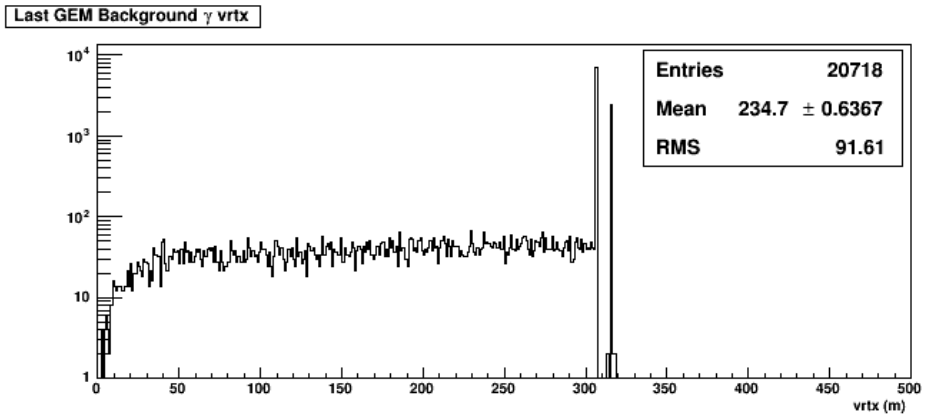


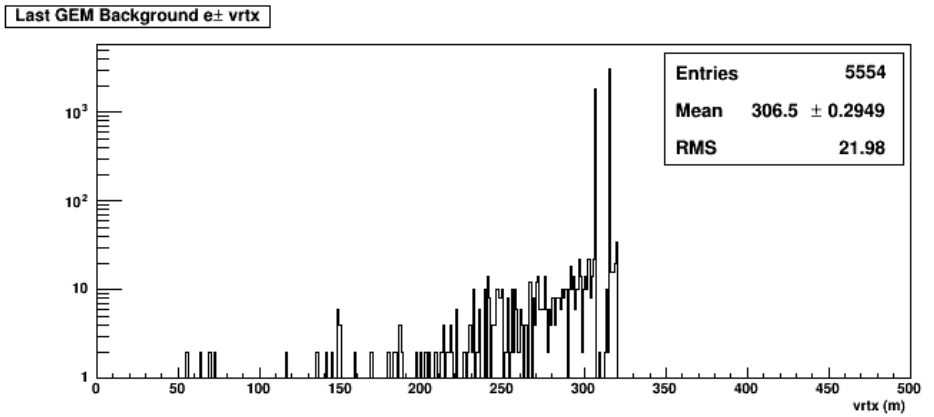
Supplementary Slides

Background due to Radiative Effects



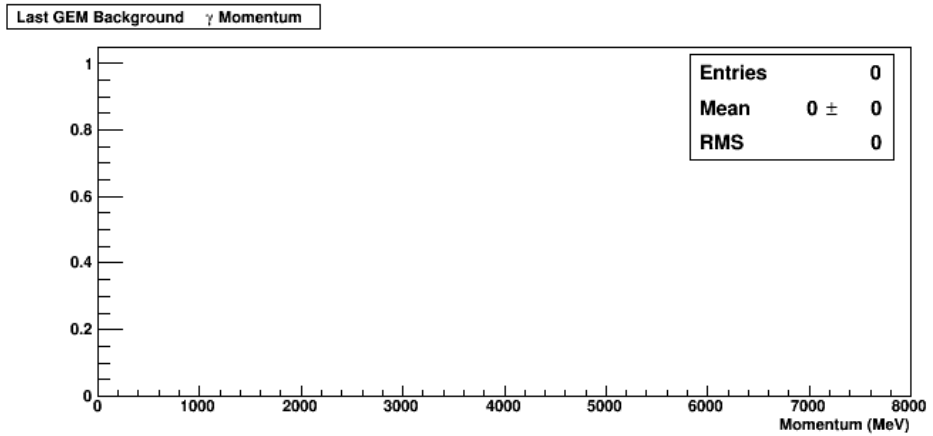


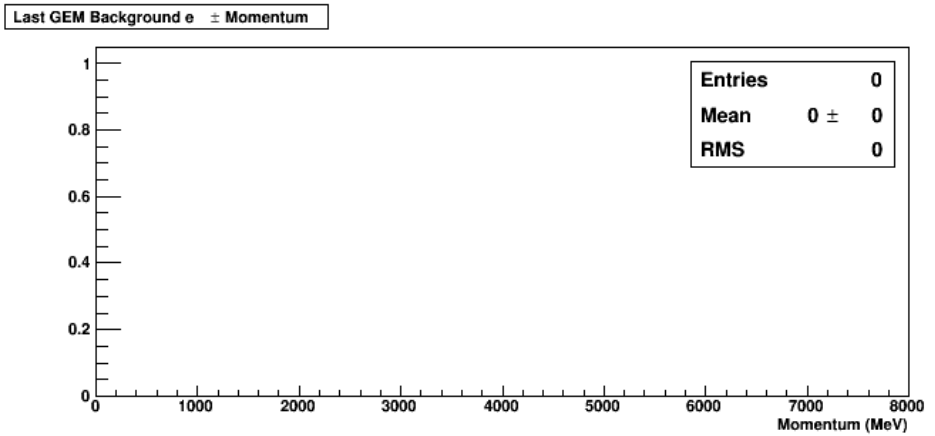


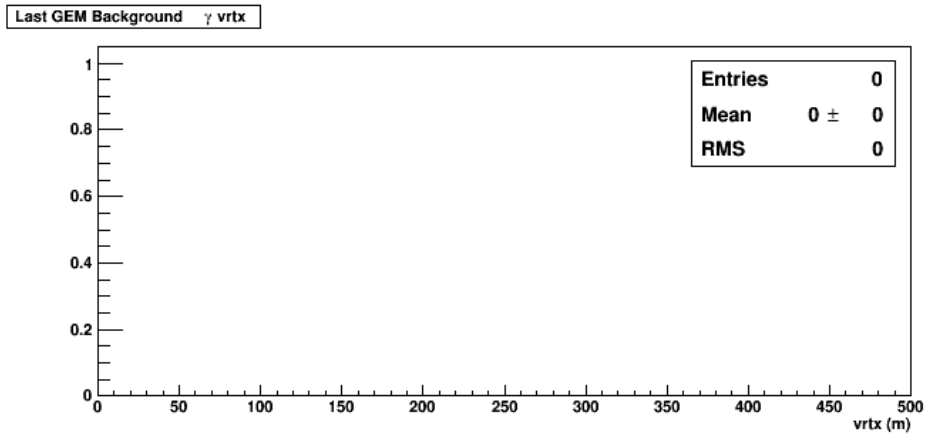


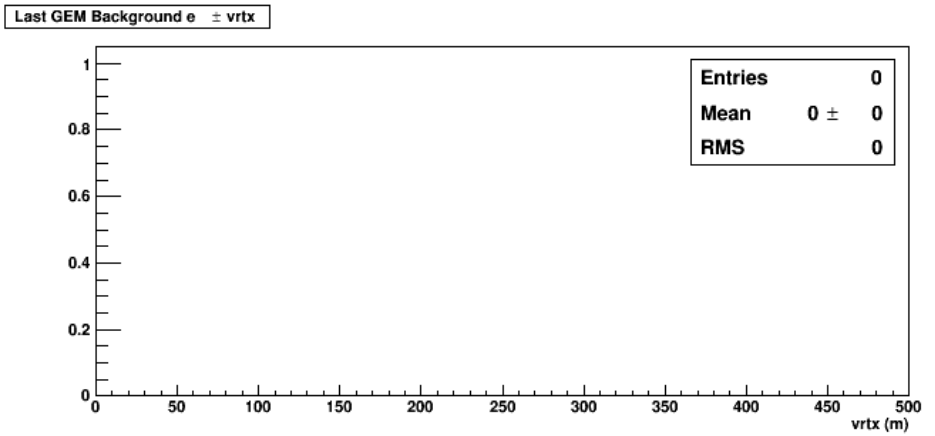
Simulation included empty target geometry, last 2 GEMs, and ECAL in air medium

Background due to Radiative Effects









Simulation only include ECAL and sensitive detector replacing last GEM in vacuum medium

Energy Deposit Distribution on ECAL : Before