Fun4All Calorimeter Plots: Implementation of MIP energy cut on pion plots

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Contents:

- Implementation of theta-dependent energy cut on:
  - Monoenergetic pions: energy deposition plots
  - 0-30 GeV pions: energy resolution plots

Specifications:

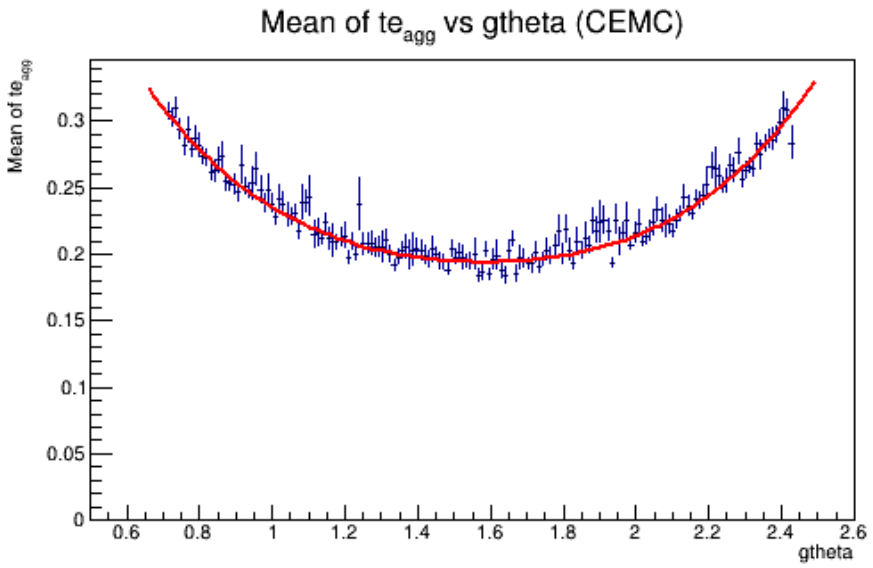
SIMULATION & ANALYSIS DETAILS FOR MUON:

- Particles: mu-
- Given energy (ge): 4 GeV
- Events: 46900 (mu-) (By IITI)
- **NEW** pseudorapidity cuts on calorimeters:
  - EEMC: η = -3.4 to -1.77
  - CEMC, HCALIN, HCALOUT: η = -0.98 to 0.99
  - FEMC, FHCAL: η = 1.32 to 3.14
- A theta dependent energy cut obtained from energy deposition plots of electromagnetic calorimeters

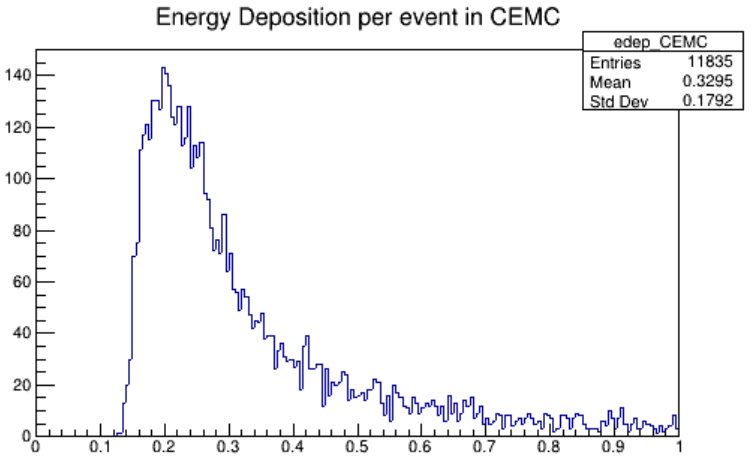
SIMULATION & ANALYSIS DETAILS FOR PION:

- Particles: pi-
- 1. Events: 42300 (By IITI)
- 2. Events: 100000 (0-30 GeV), 50000(0-10GeV)
- **NEW** pseudorapidity cuts on calorimeters:
  - EEMC: η = -3.4 to -1.77
  - CEMC, HCALIN, HCALOUT: η = -0.98 to 0.99
  - FEMC, FHCAL: η = 1.32 to 3.14
- The theta dependent energy obtained from muons implemented on the emcals and energy resolution compared with previous results.

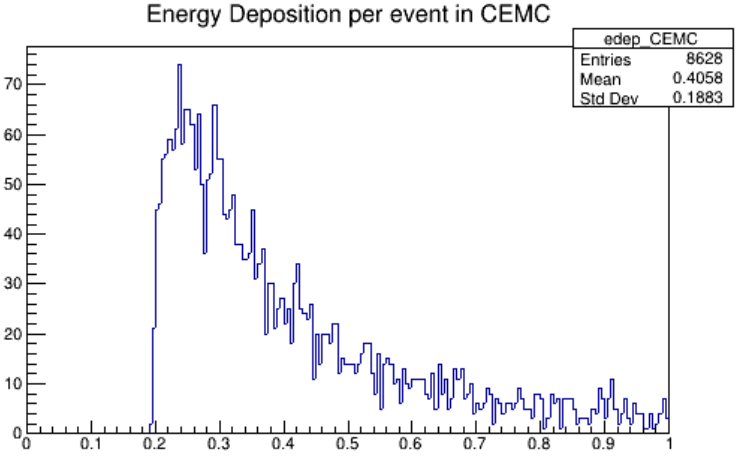
CEMC:



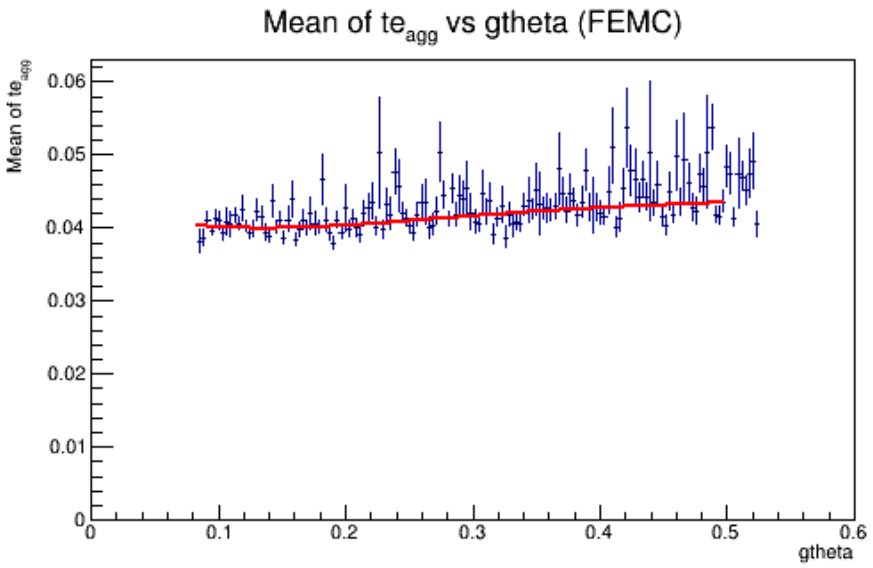
Without theta dependent cut:
(η = -1.1 to 1.1)



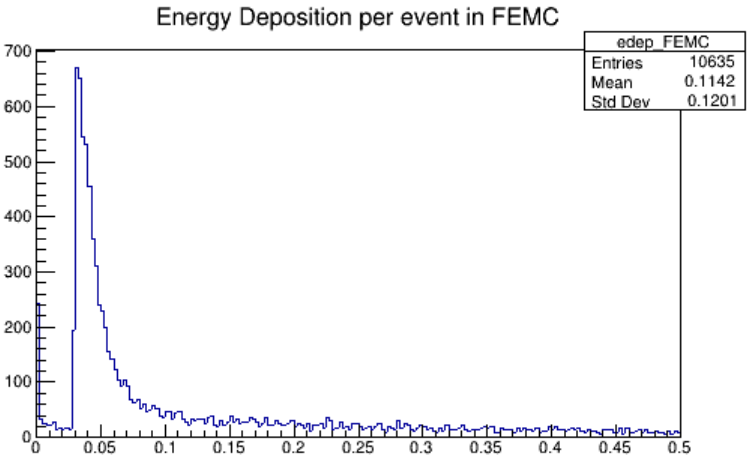
With theta dependent cut:
(η = -0.98 to 0.99)



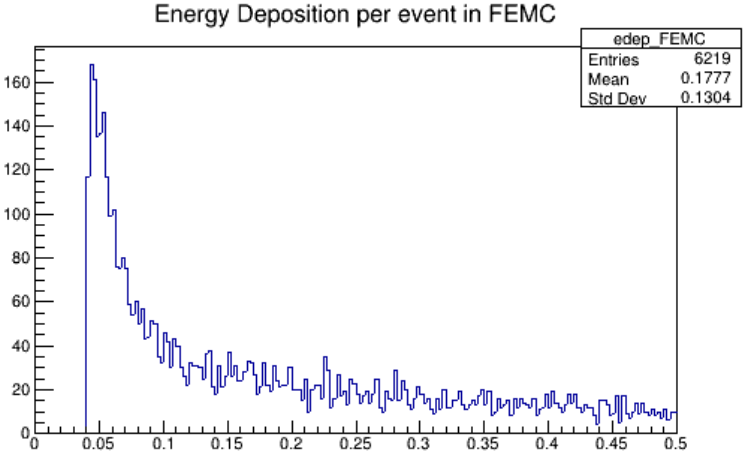
FEMC:



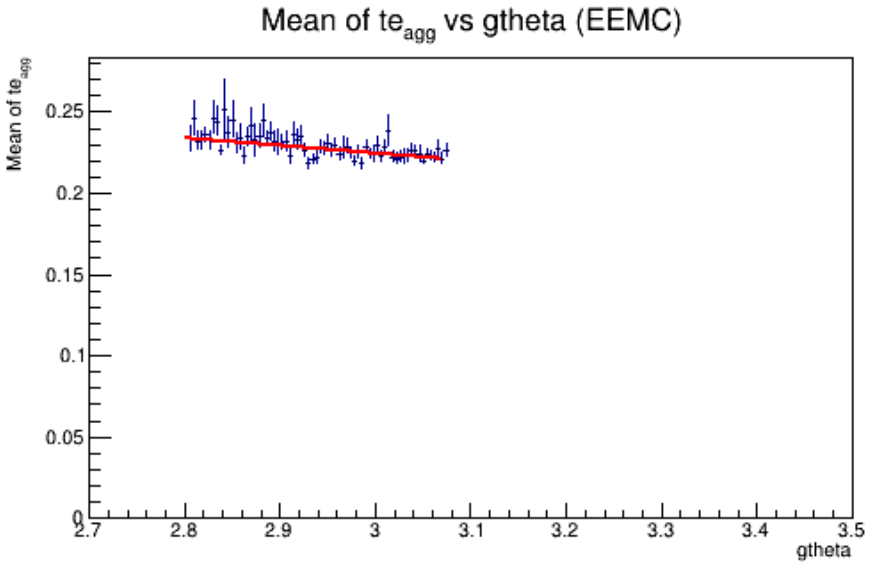
Without theta dependent cut:
(η = 1.3 to 3.3)



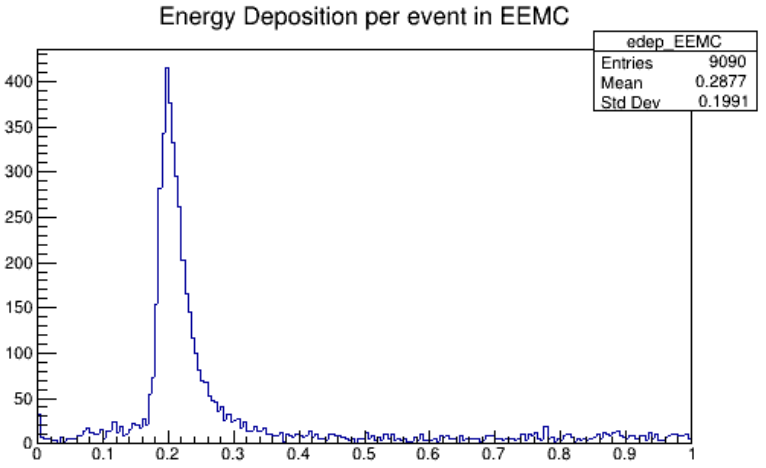
With theta dependent cut:
(η = 1.32 to 3.14)



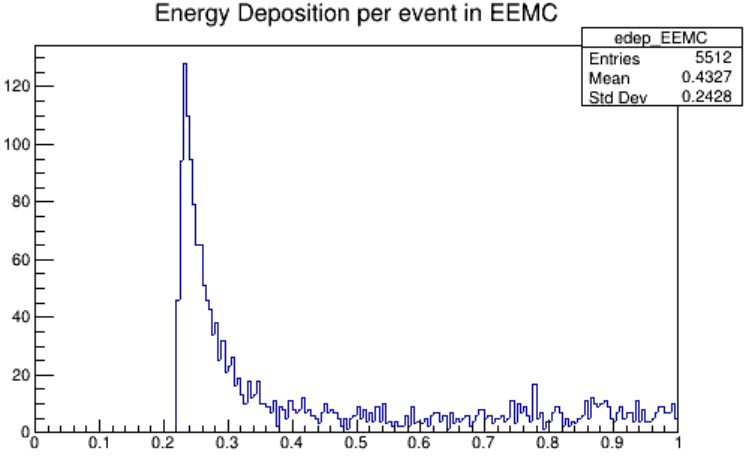
EEMC:



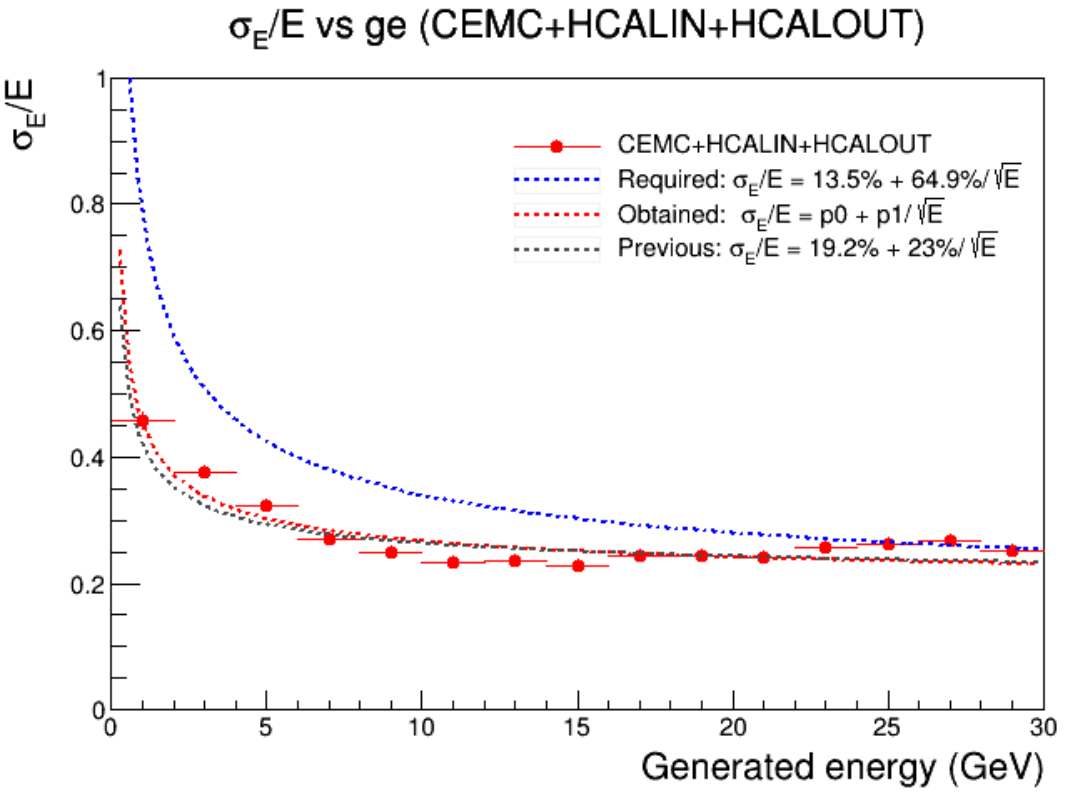
Without theta dependent cut:
(η = -3.5 to -1.7)



With theta dependent cut:
(η = -3.4 to -1.77)



Theta dependent energy cut implemented on pion: Barrel Resolution (CEMC+HCALIN+HCALOUT)



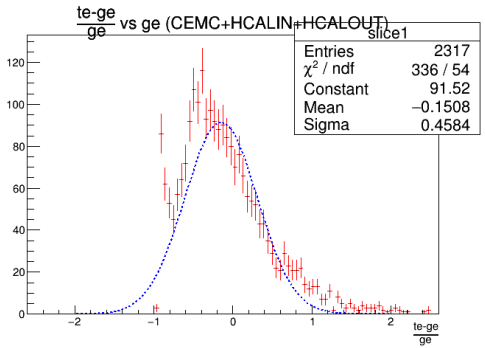
$\sigma_E/E = 18.1\% + 27.3\%/\sqrt{E}$

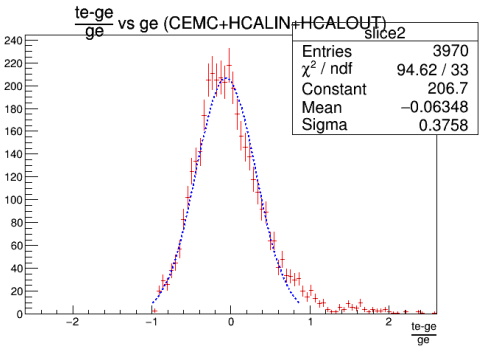
Previous case:
Individual tower energy cut on CEMC: 200 MeV (To remove the calibration problem faced in higher energies)
+
Agg tower energy cut on CEMC: 0 (to remove zeroes)

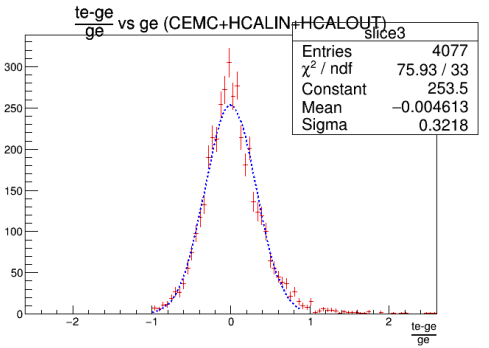
Latest result:
Individual tower energy cut on CEMC: 200 MeV
+
Agg tower energy cut on CEMC: Theta dependent energy cut obtained from muon energy parameterization

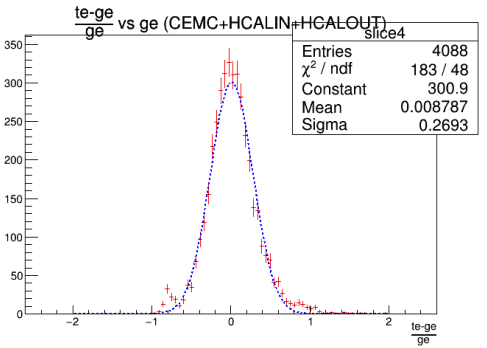
(100MeV agg te cuts on other calorimeters)(unchanged)

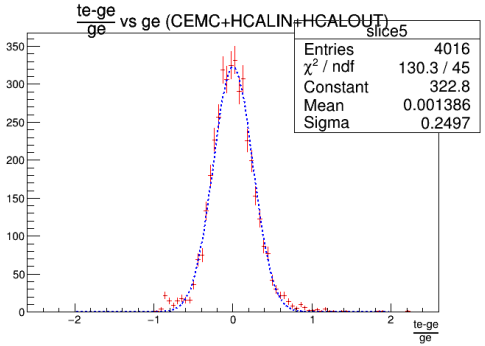
CEMC+HCALIN+HCALOUT: Gaussian fits

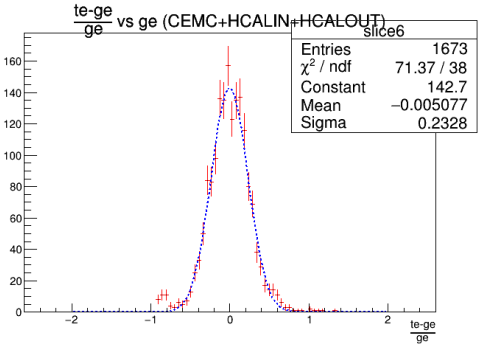


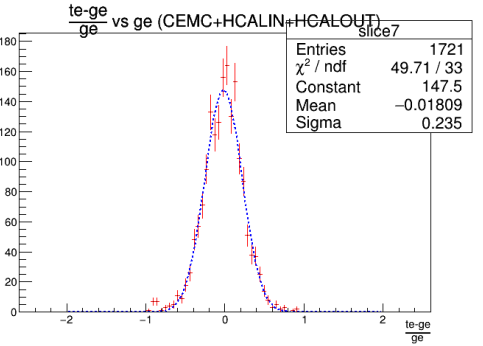


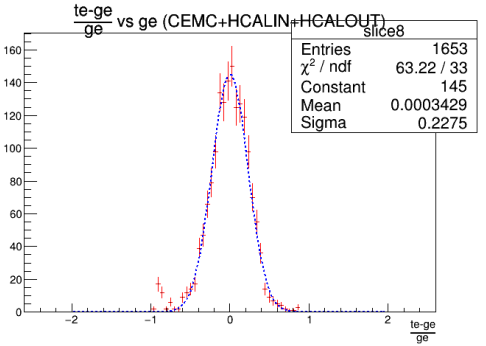


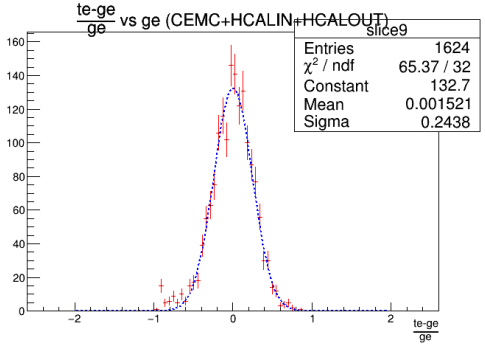


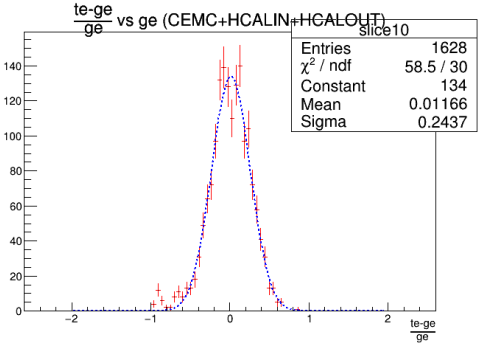


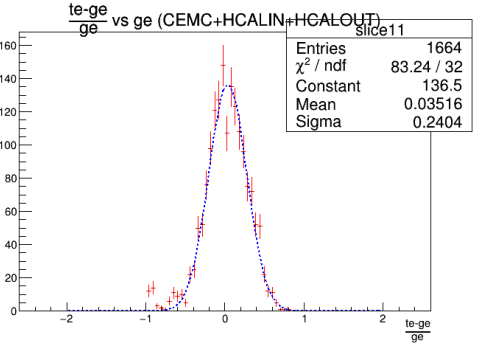


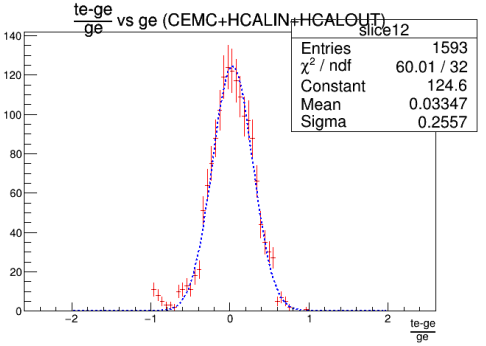




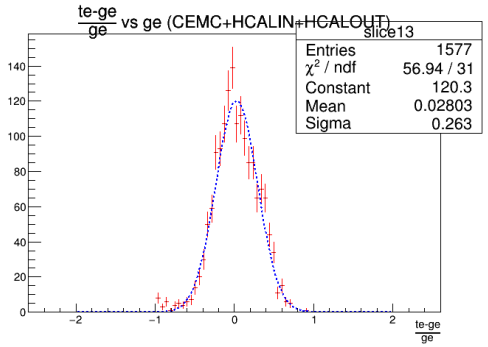


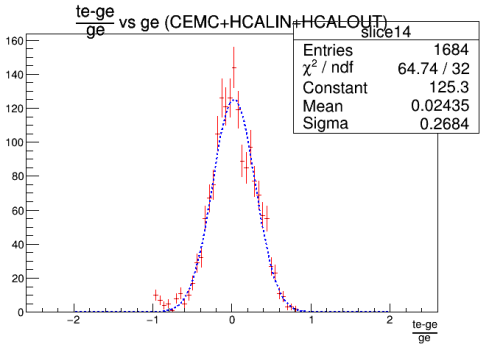


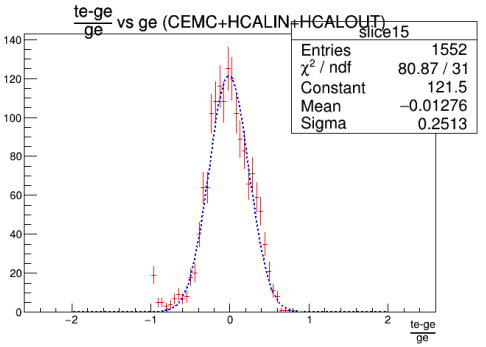




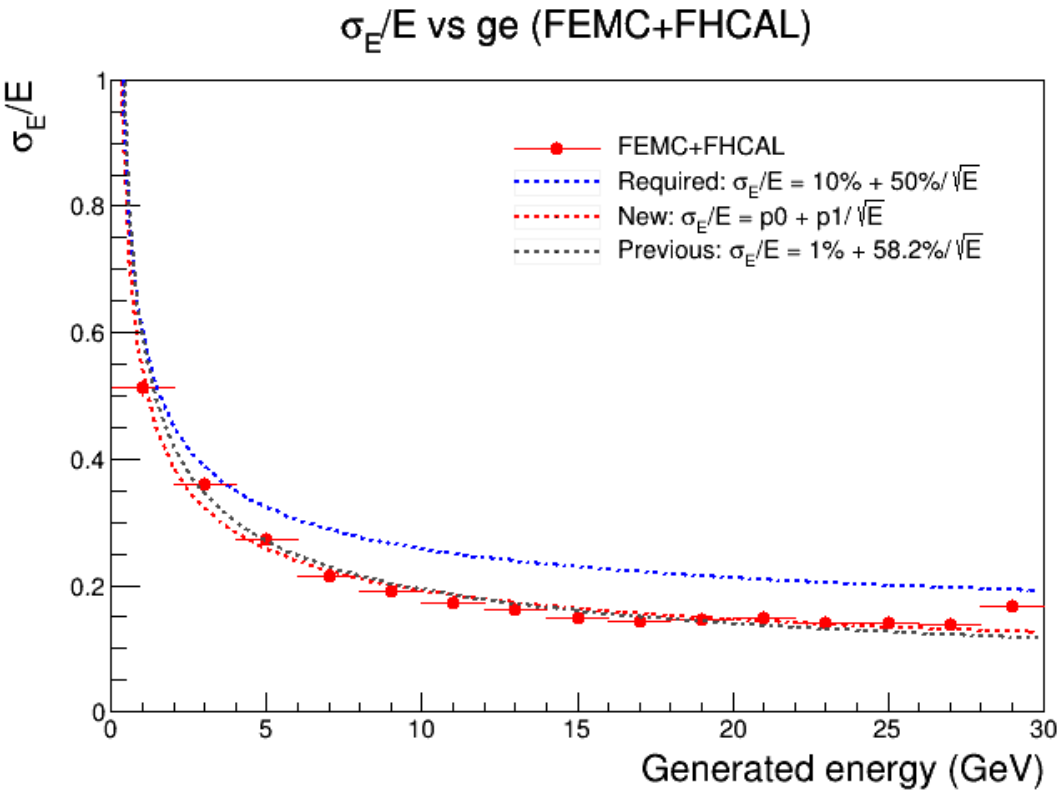
CEMC+HCALIN+HCALOUT: gaussian fits







Theta dependent energy cut implemented on pion: Forward Resolution (FEMC+FHCAL)



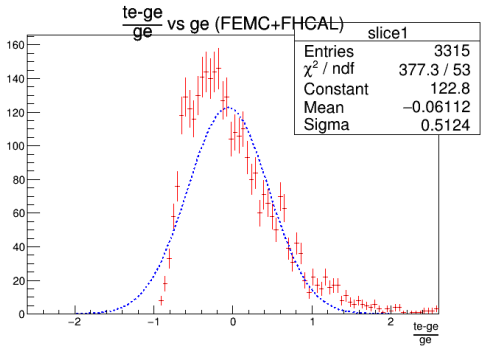
$\sigma_E/E = 3.4\% + 50\%/\sqrt{E}$

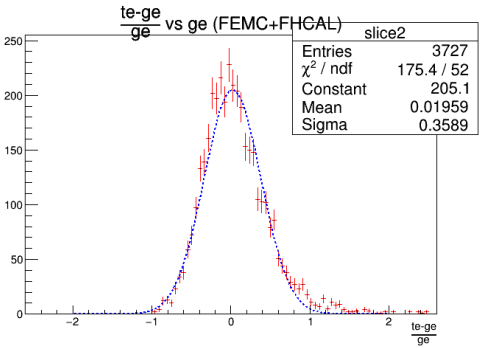
Previous case:
Individual tower energy cut on FEMC: No cut
(This cut only worsens the resolution)
+
Agg tower energy cut on FEMC: 200 MeV

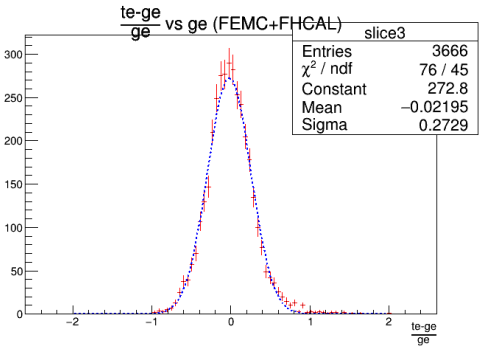
Latest result:
Agg tower energy cut on FEMC: Theta dependent energy cut obtained from muon energy parameterization

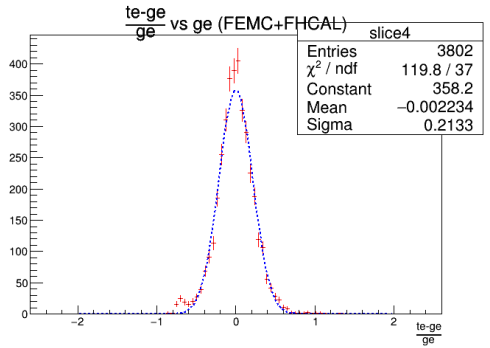
(100MeV agg te cuts on other calorimeter)(unchanged)

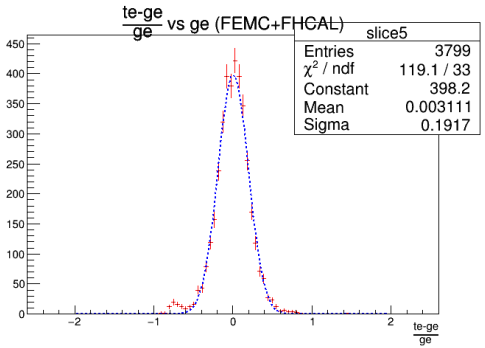
FEMC+FHCAL: Gaussian fits

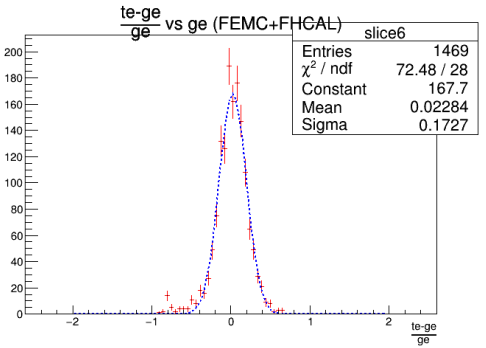


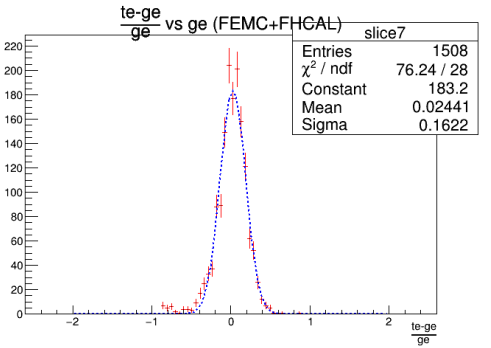


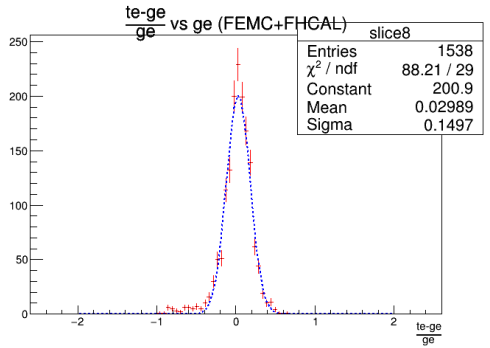


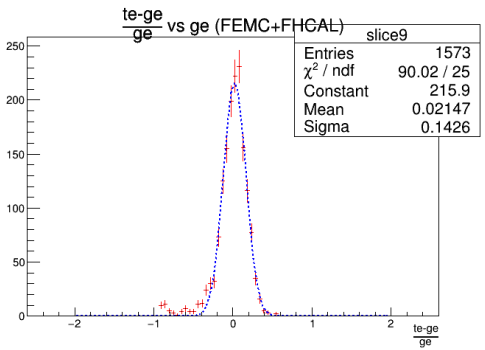


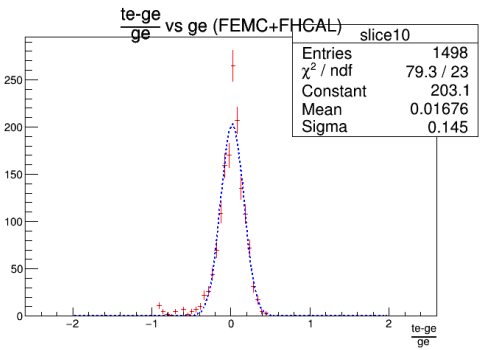


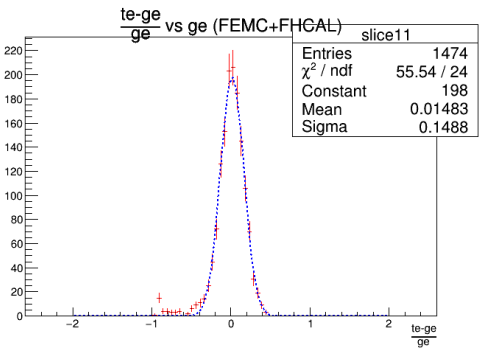


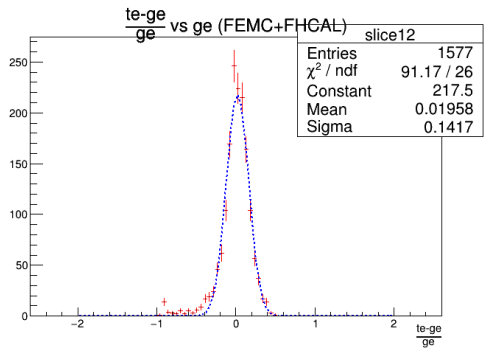




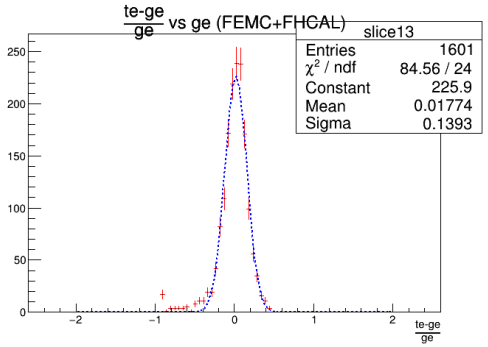


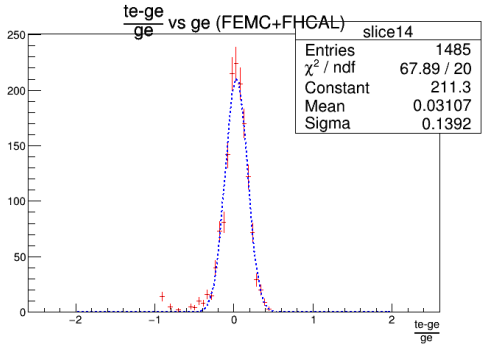


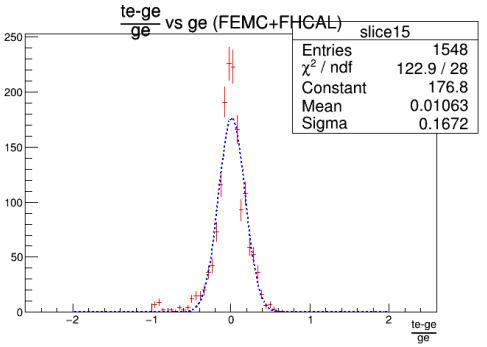




FEMC+FHCAL: gaussian fits







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