

Fun4All Calorimeter Plots – Energy recalibration

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Details:

- Particle: e-, pi-
- Statistics: 100000 (0-30 GeV) + 50000 (0-10 GeV)
- geta range: -4 to 4
- Cuts employed:
 - **Tower energy cut: 100 MeV**
 - Detector-wise geta cuts
 - Circular cuts on dphi and dtheta: for manual clustering
- Photon digitization: turned off
- **Sampling fractions updated for all calorimeters**

Electron

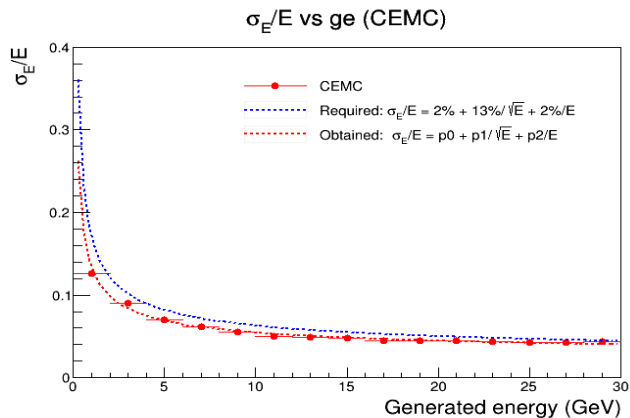
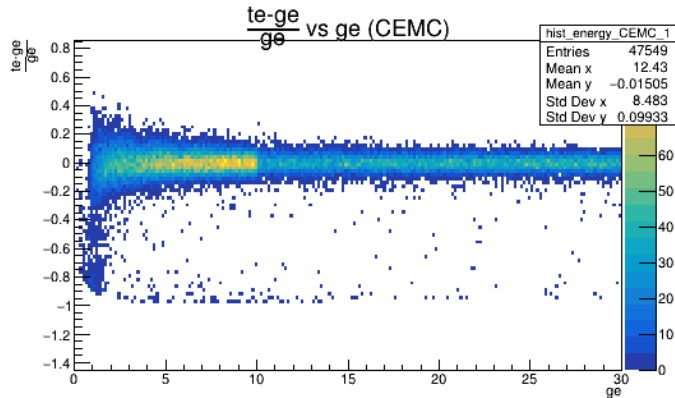
(CEMC, FEMC, EEMC)

Calibration procedure:

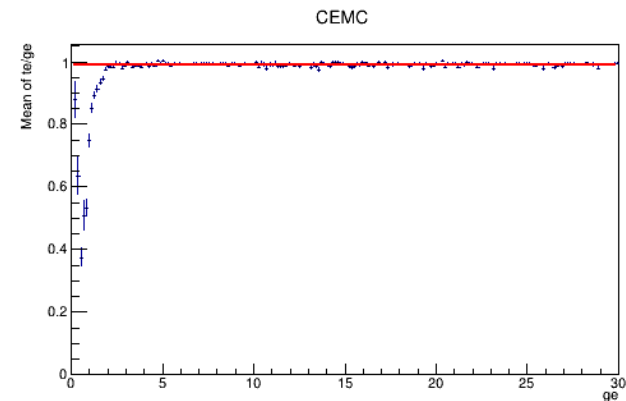
1. Obtain Tprofile plots for the calorimeters' t_e/g_e vs g_e plots.
2. Get a good fit function for that calorimeter.
3. Use this fit function to recalibrate the tower energy of the respective calorimeter (t_e /calibration factor).

Before recalibration: CEMC

$\eta = -1.5$ to 1.2



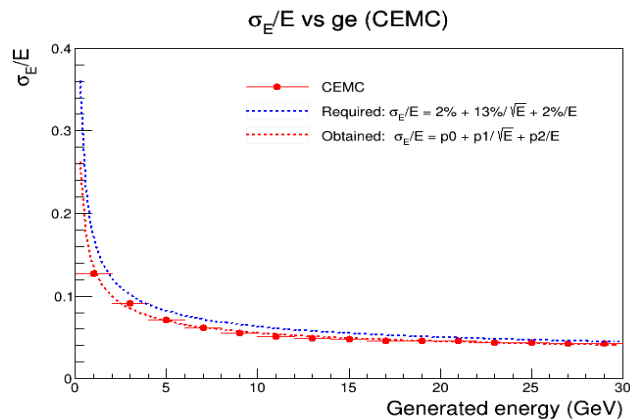
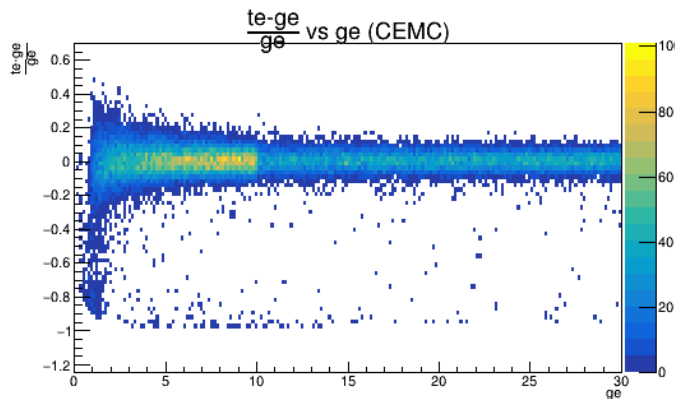
P0=0.0205302; p1=0.10534; p2=0.02



(pol0 fit)

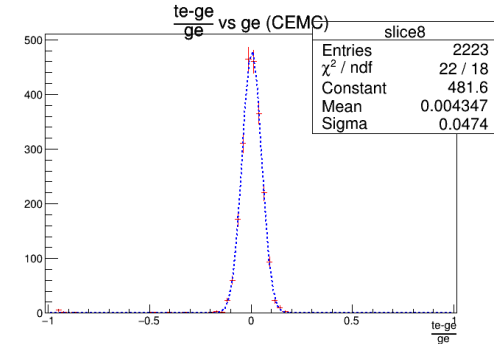
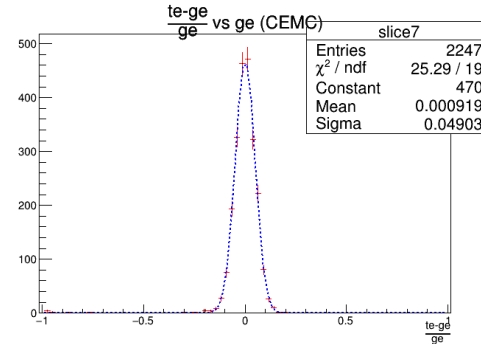
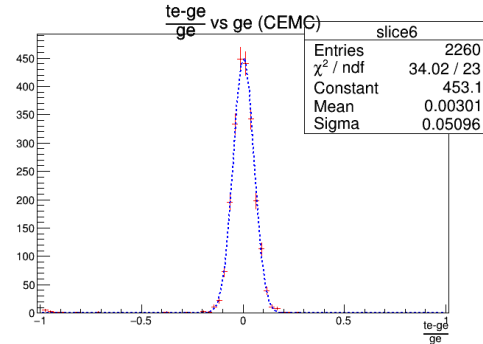
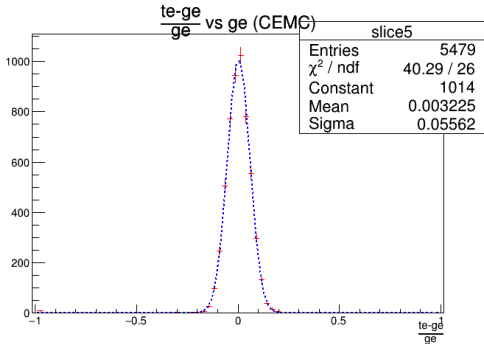
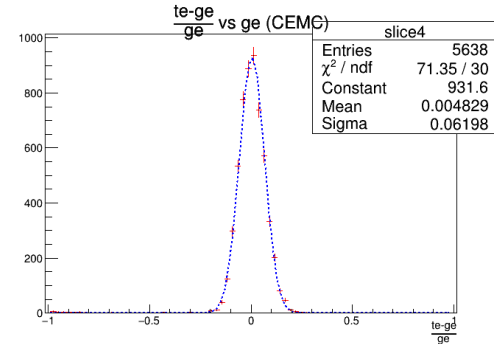
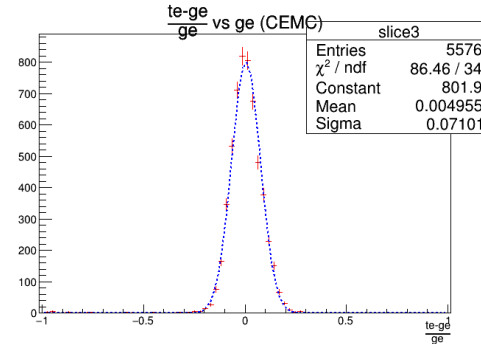
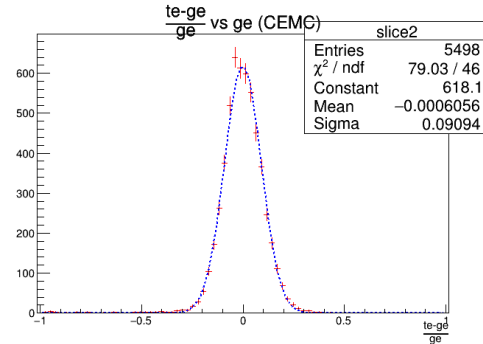
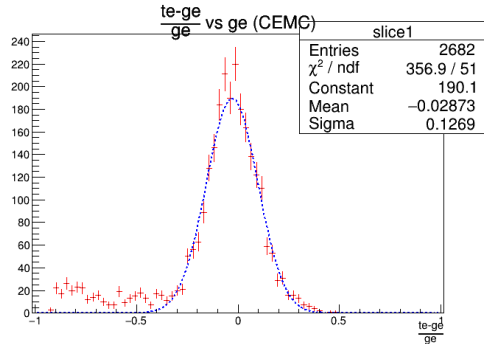
p0 = 0.991468

Recalibration using pol0 fit:

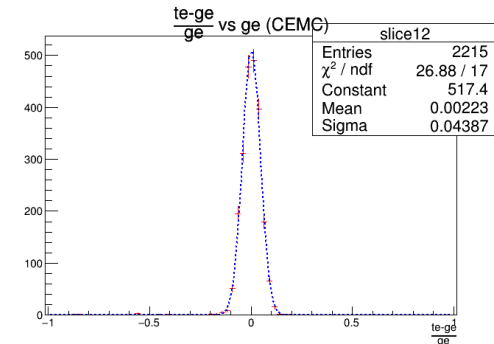
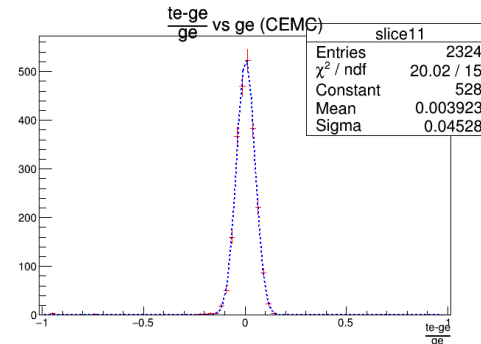
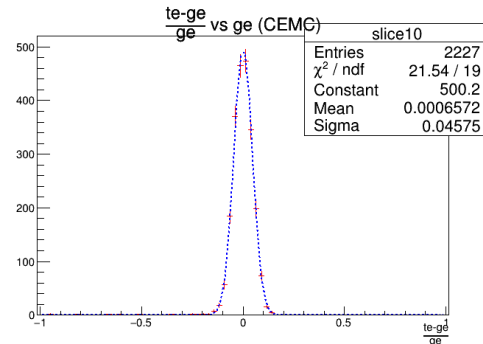
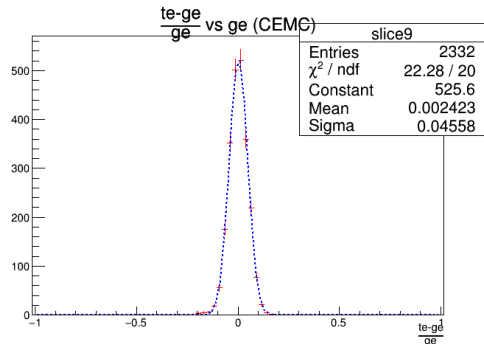


P0=0.0205302; p1=0.10534; p2=0.02

CEMC Gaussian fits (after calibration):

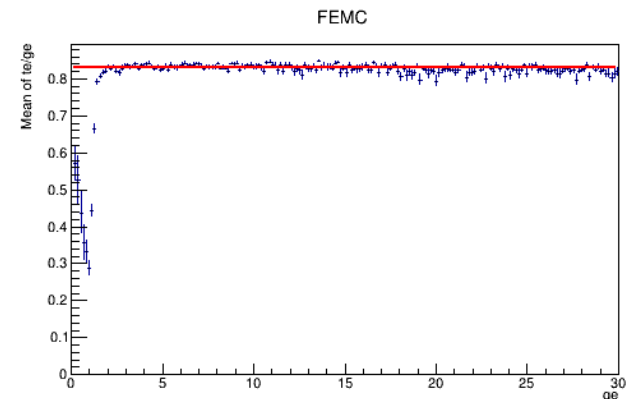
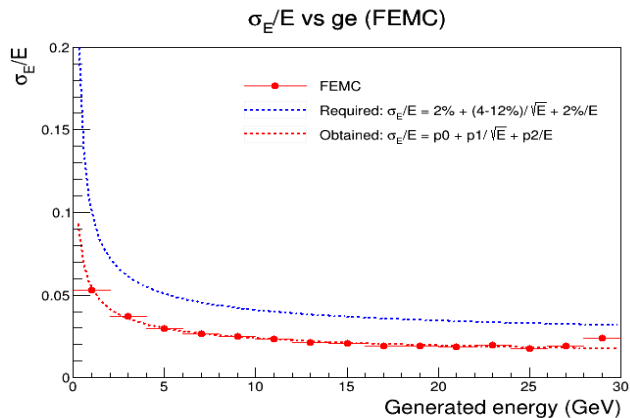
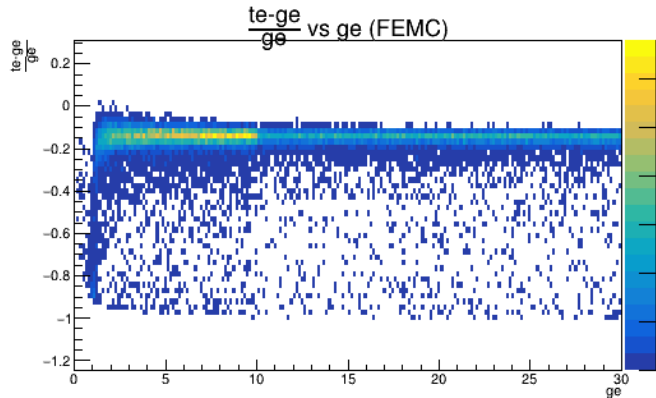


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Before recalibration: FEMC

$\eta = 1.3$ to 3.3

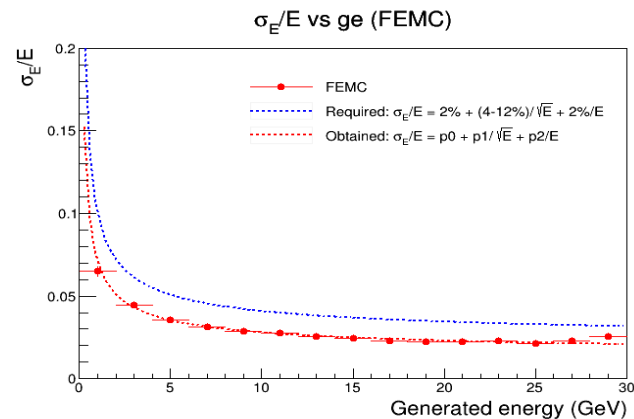
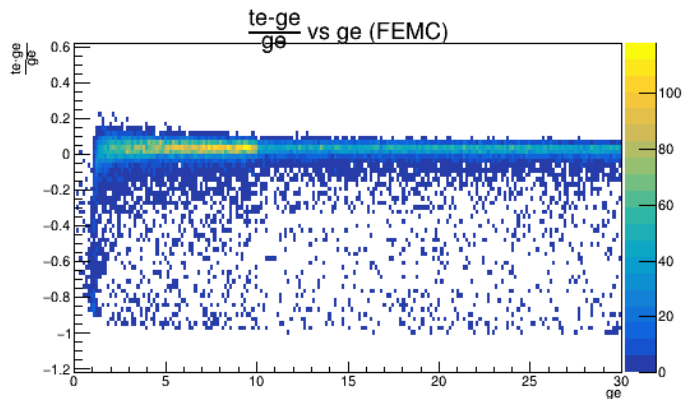


$p_0=0.00850391$; $p_1=0.049664$; $p_2=-0.00370873$

(pol0 fit)

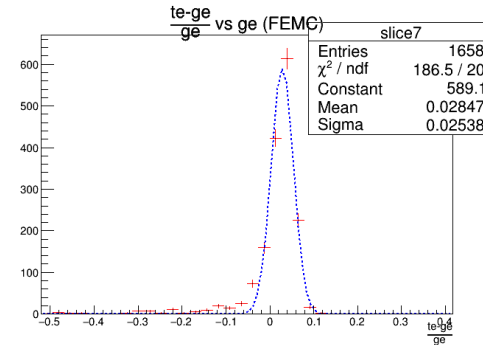
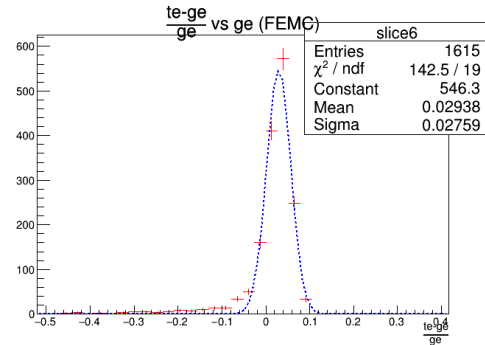
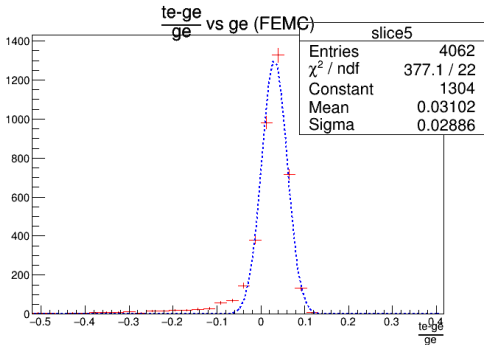
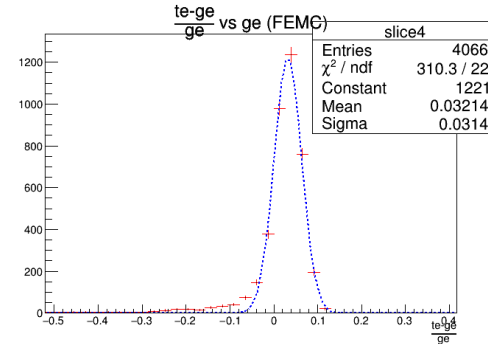
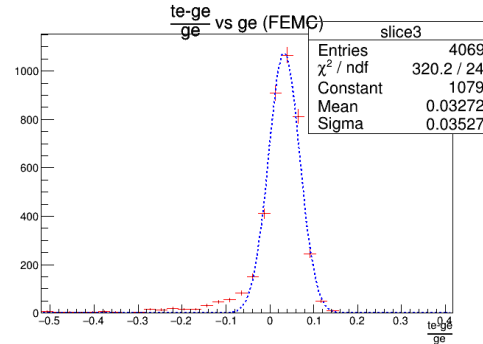
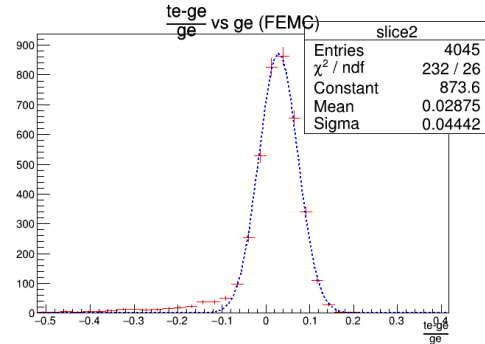
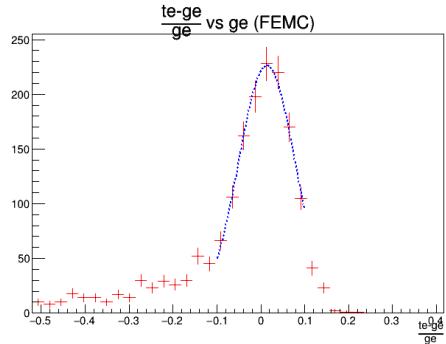
$p_0 = 0.830733$

Recalibration using pol0 fit:

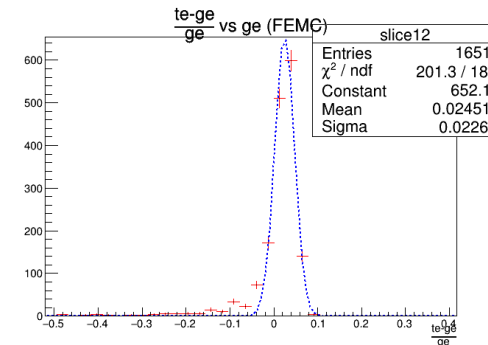
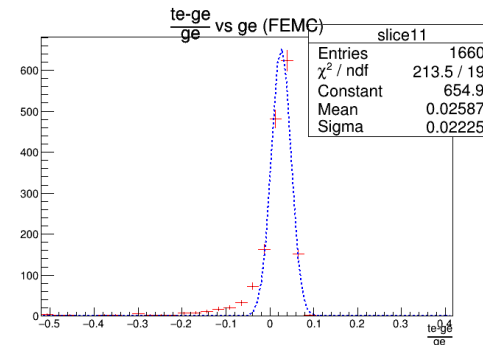
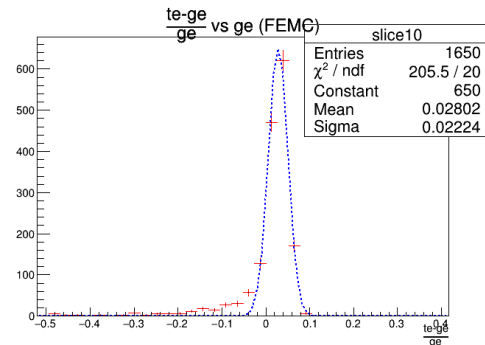
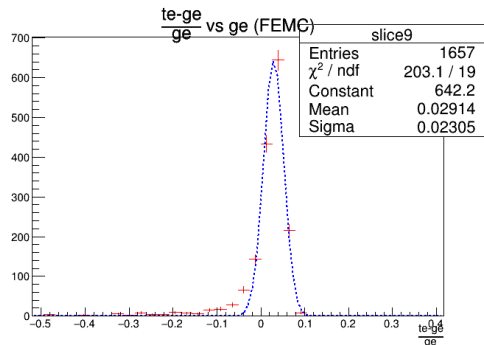
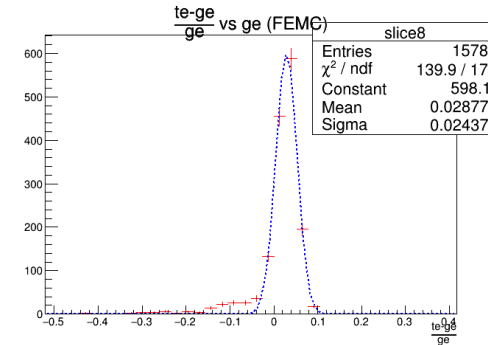


$p_0=0.0115892$; $p_1=0.0484642$; $p_2=0.0108484$

FEMC Gaussian fits (after calibration):

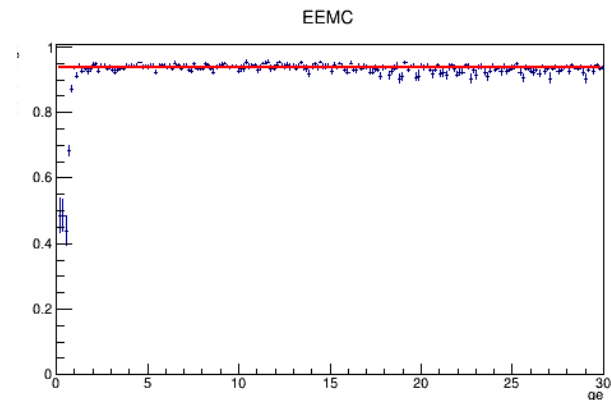
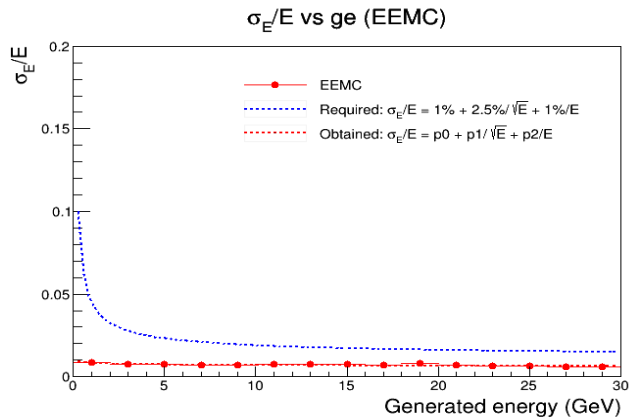
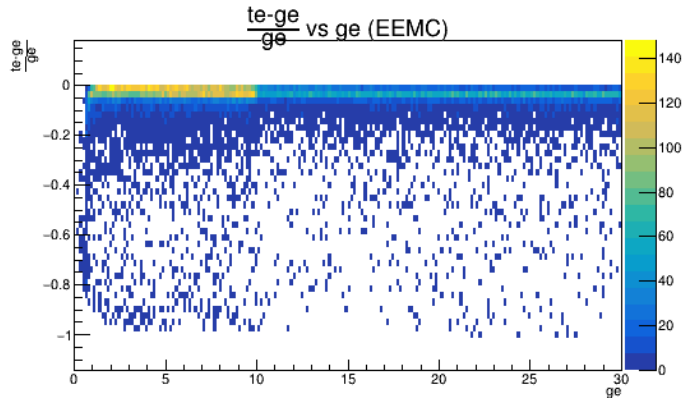


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Before recalibration: EEMC

$\eta = -3.5$ to -1.7

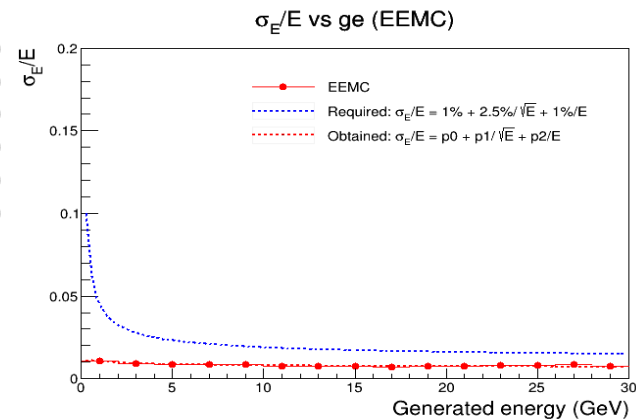
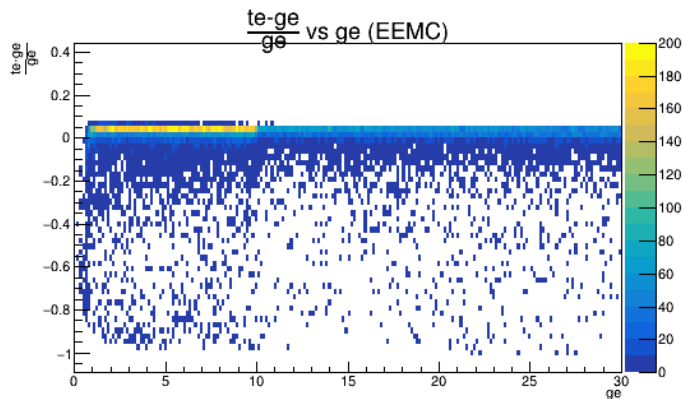


$p_0=0.00586027$; $p_1=0.00355051$; $p_2=-0.000994373$

(pol0 fit)

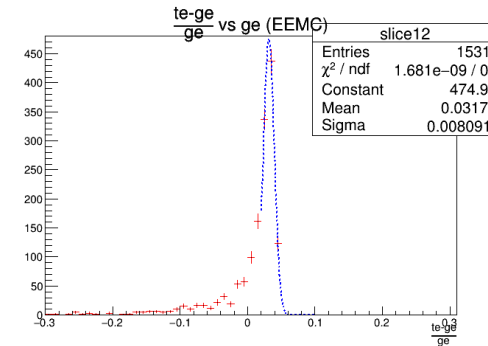
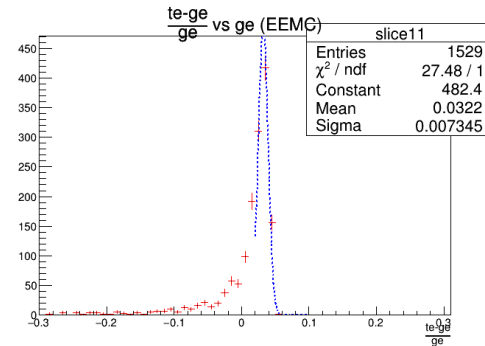
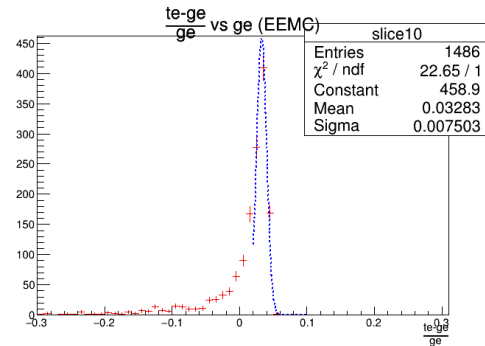
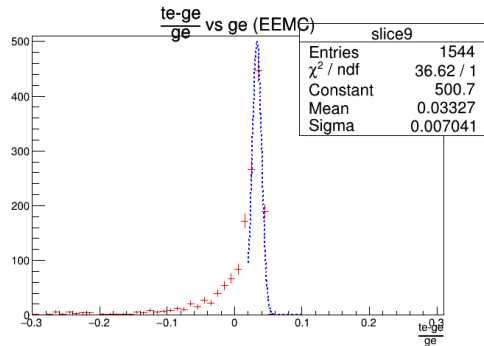
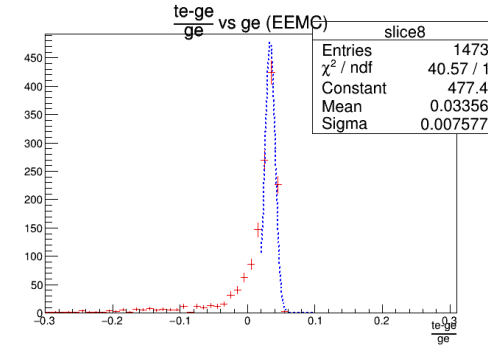
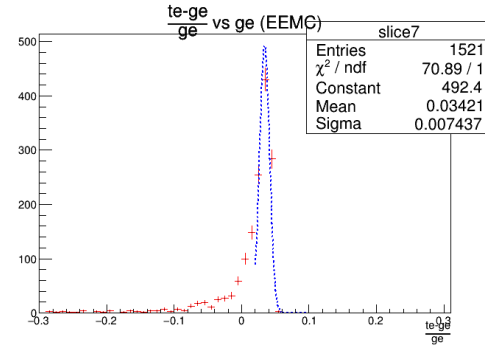
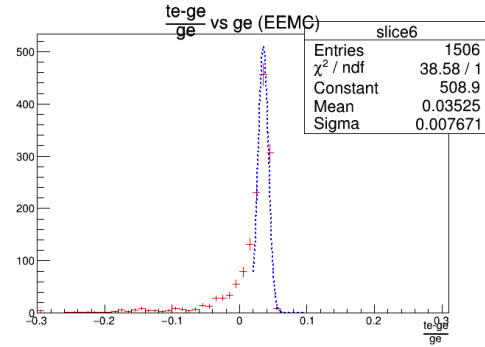
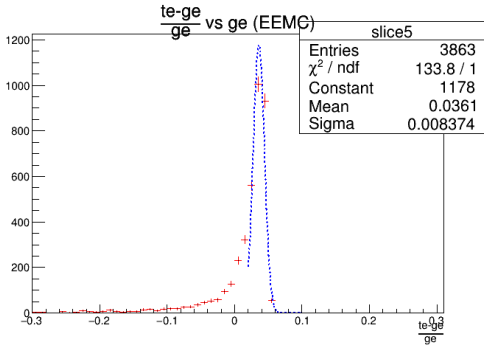
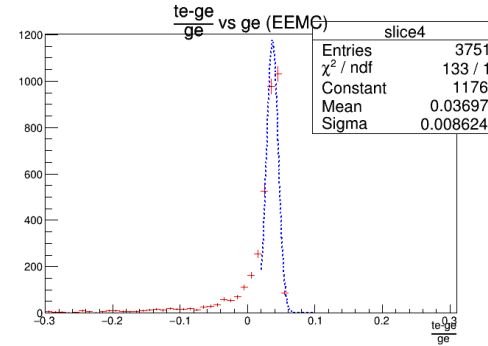
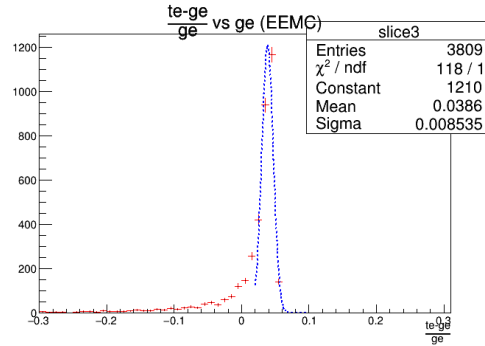
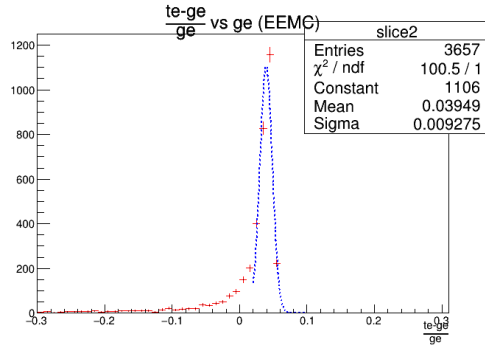
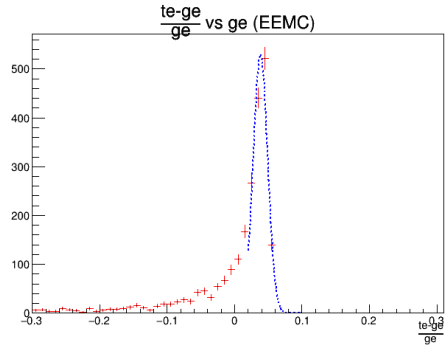
$p_0 = 0.939041$

Recalibration using pol0 fit:



$p_0=0.00589056$; $p_1=0.00737884$; $p_2=-0.00254919$

EEMC Gaussian fits (after calibration):



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Pion

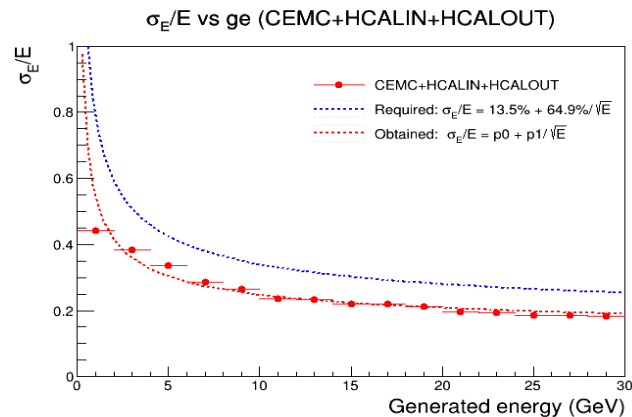
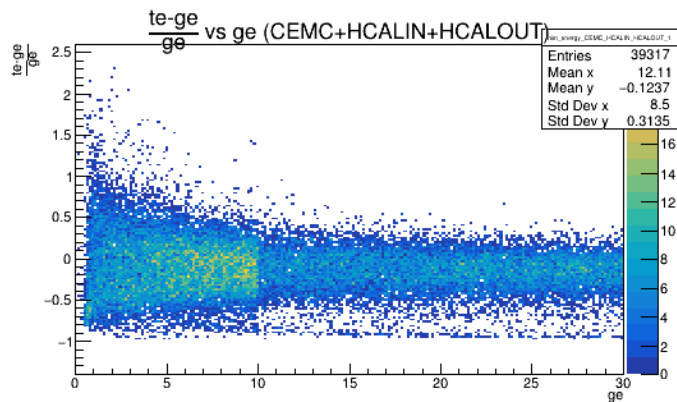
**CEMC+HCALIN+HCALOUT
FEMC+FHCAL**

Normalization procedure:

1. Make Tprofile plots for the individual calorimeter's t_e/g_e vs g_e plot.
2. Fit it with a function and normalize this function.
3. Multiply this normalized function with the tower energy of the respective calorimeter.
4. Look at the summed tower energy $(t_e-g_e)/g_e$ plot (i.e. CEMC+HCALIN+HCALOUT & FEMC+FHCAL) and fit it with a function.
5. Use this function to recalibrate $t_e(\text{CEMC+HCAL})$ and $t_e(\text{FEMC+FHCAL})$.

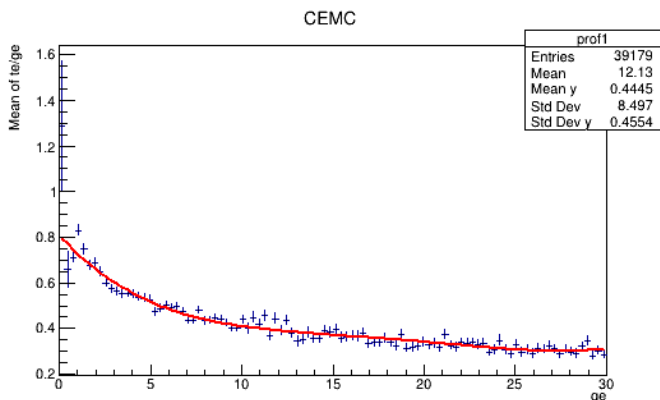
Before recalibration: CEMC+HCALIN+HCALOUT

$\eta = -1.1$ to 1.1

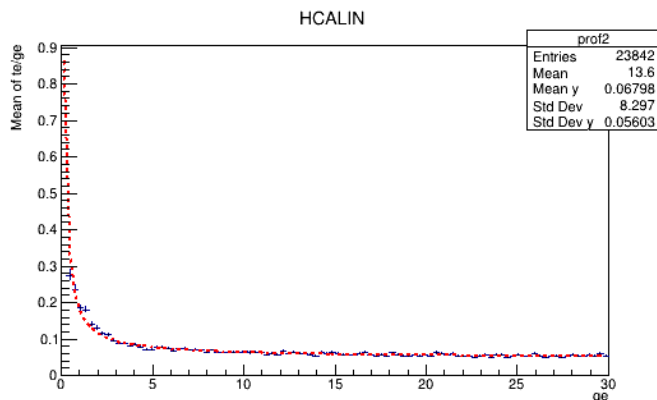


$p0=0.11155$;
 $p1=0.431151$

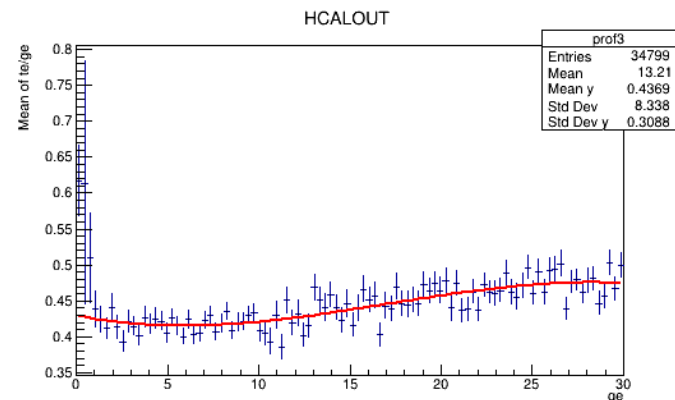
Tprofile plots:



(pol4 fit)



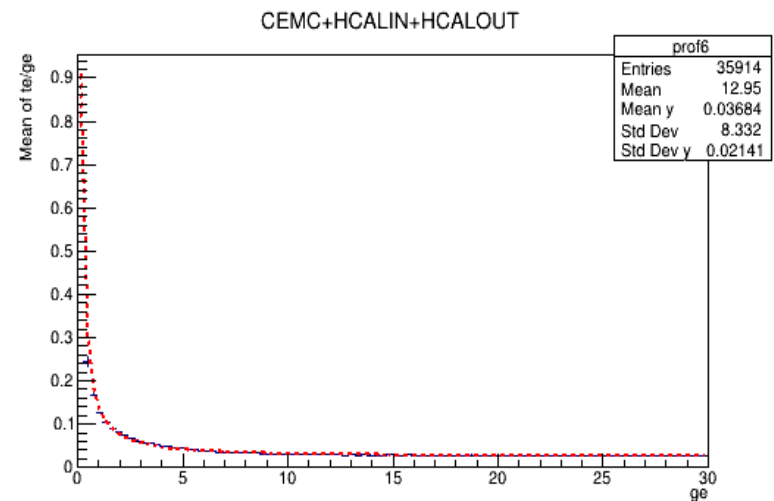
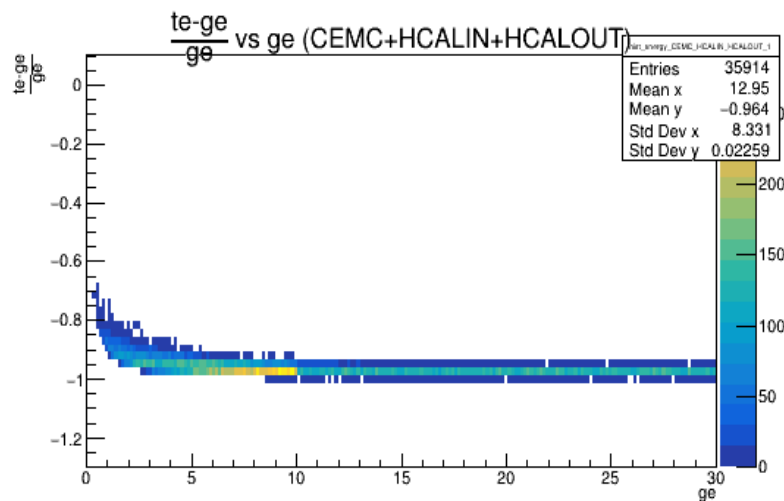
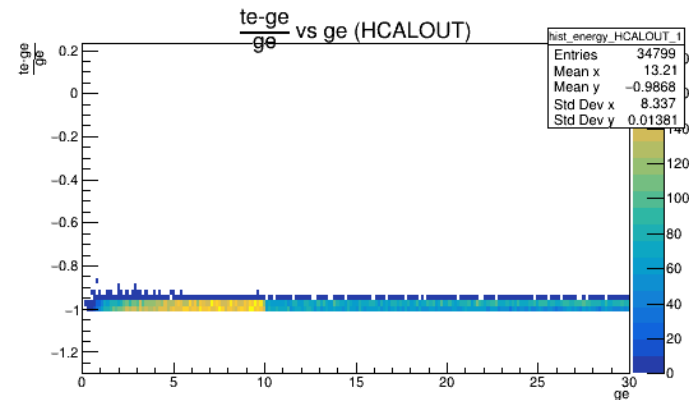
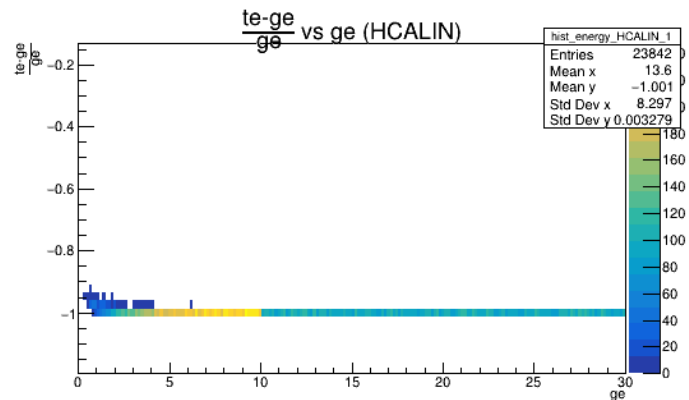
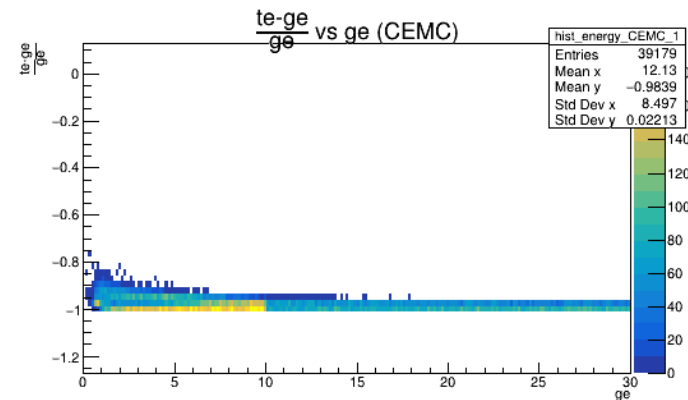
$([0] + [1]/\sqrt{x}) + [2]/x$



(pol3 fit)

Shape correction with normalized fit functions: CEMC+HCALIN+HCALOUT

$\eta = -1.1$ to 1.1

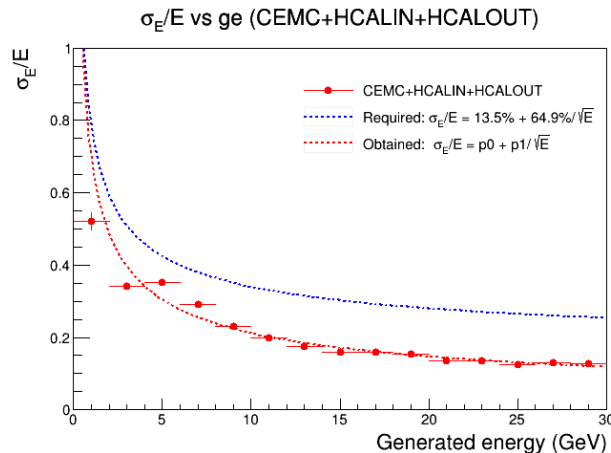
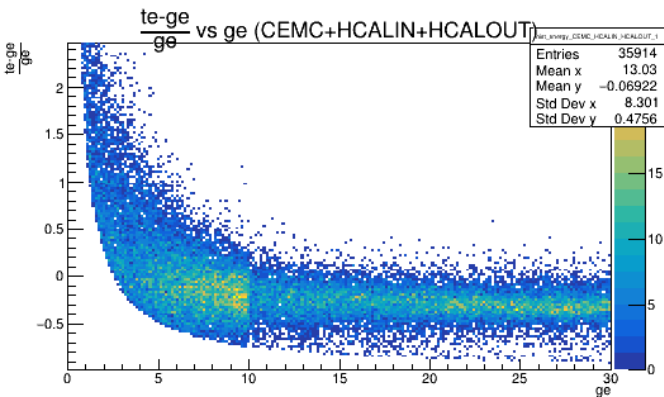


$([0] + [1]/\sqrt{x} + [2]/x)$

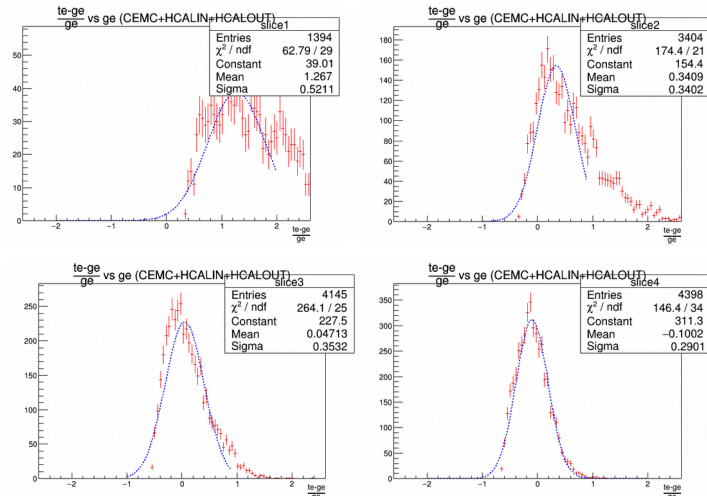
Recalibration: CEMC+HCALIN+HCALOUT

$\eta = -1.1$ to 1.1

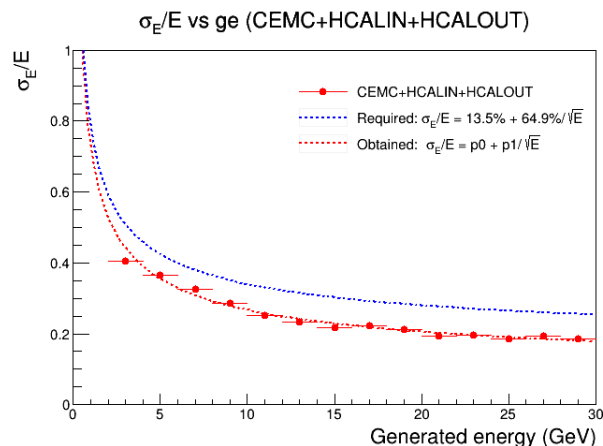
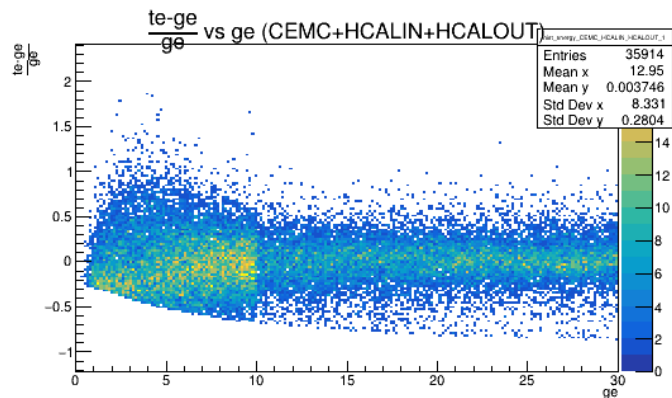
Recalibration:- with y-mean



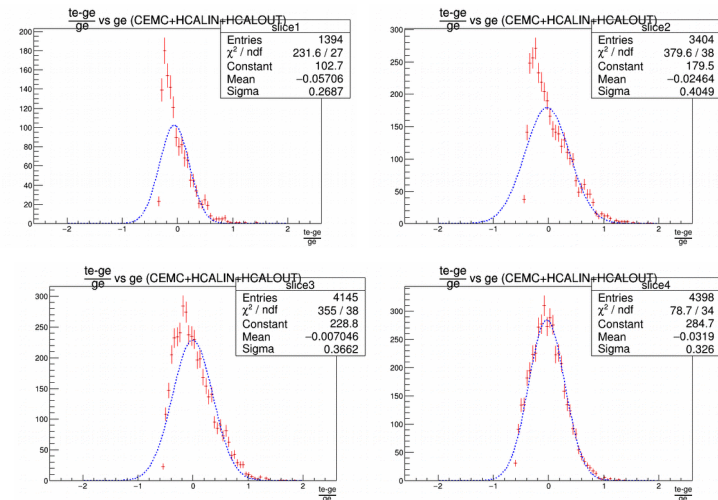
$p_0 = -0.0108495$; $p_1 = 0.706109$



Recalibration:- with fit function

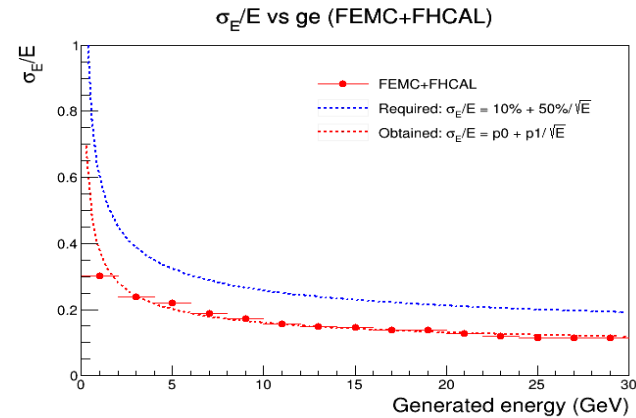
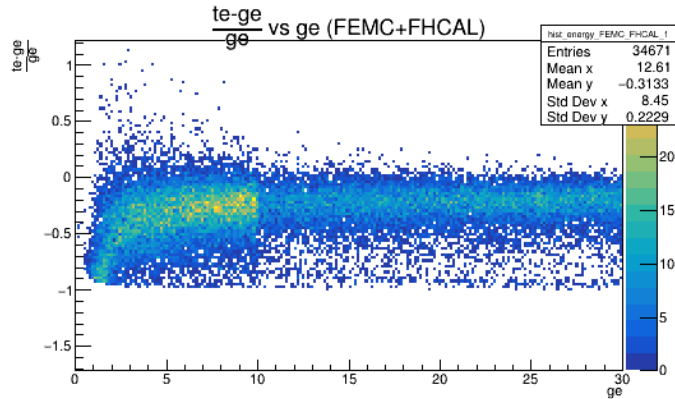


$p_0 = 0.0558756$; $p_1 = 0.669669$



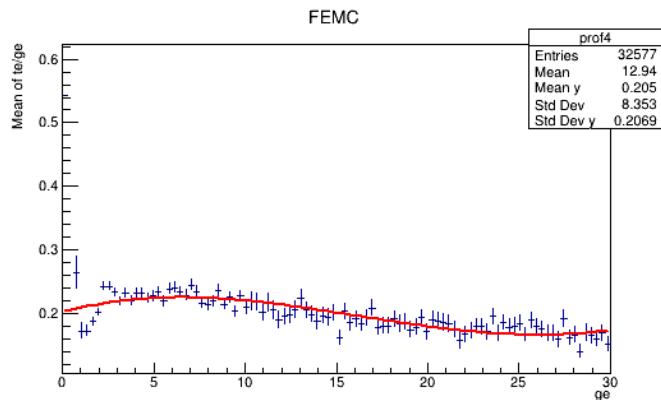
Before recalibration: FEMC+FHICAL

$\eta = 1.3$ to 3.3

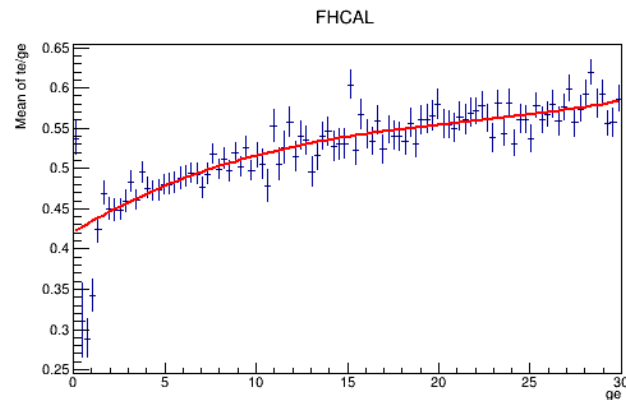


$p0=0.0598577$;
 $p1=0.316926$

Tprofile plots:



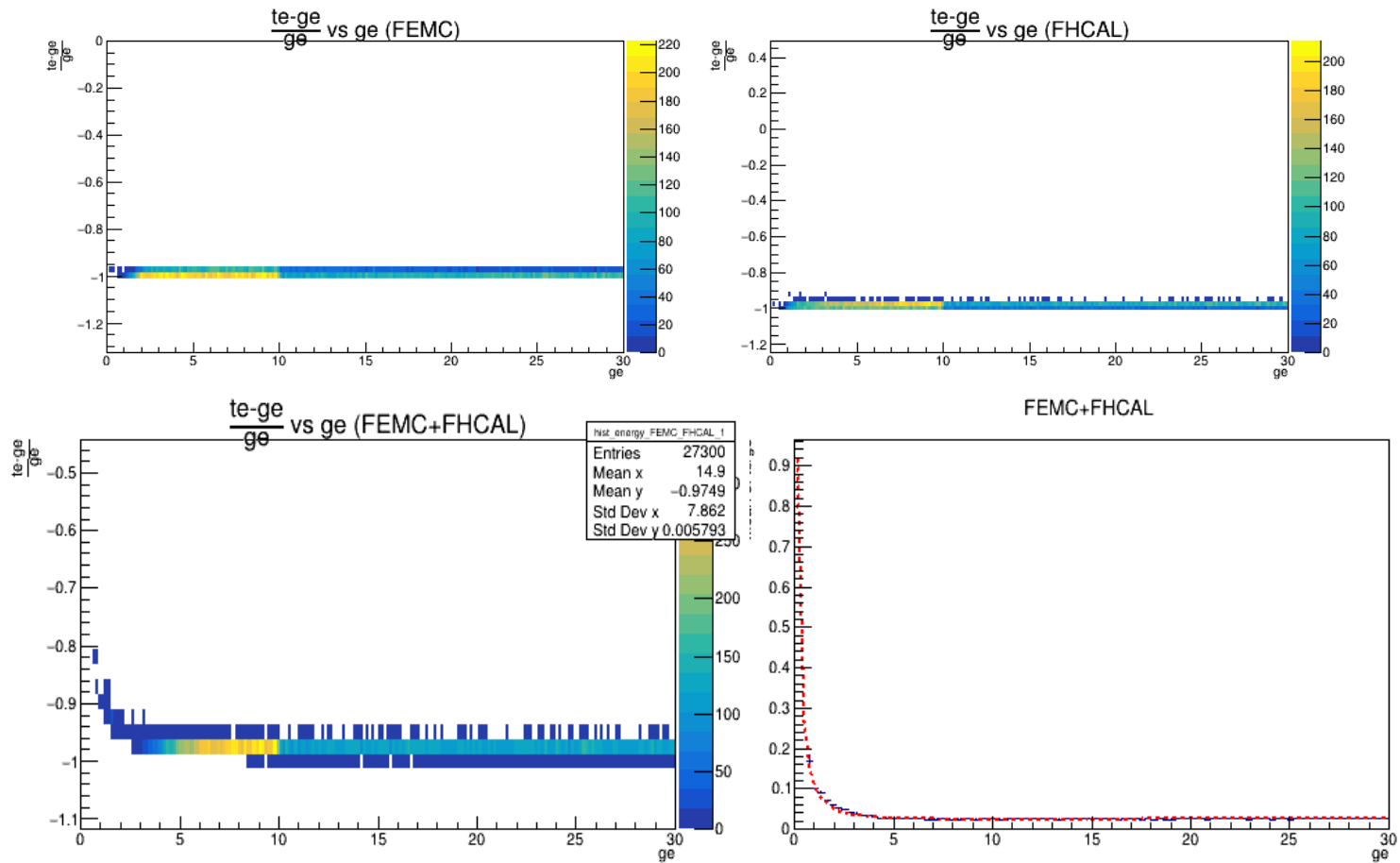
(pol3 fit)



(pol3 fit)

Shape correction with normalized functions: FEMC+FHCAL

$\eta = 1.3$ to 3.3

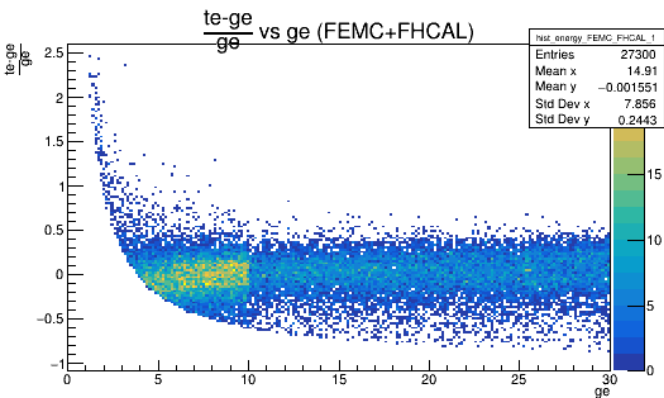


$([0] + [1]/\sqrt{x}) + [2]/x$

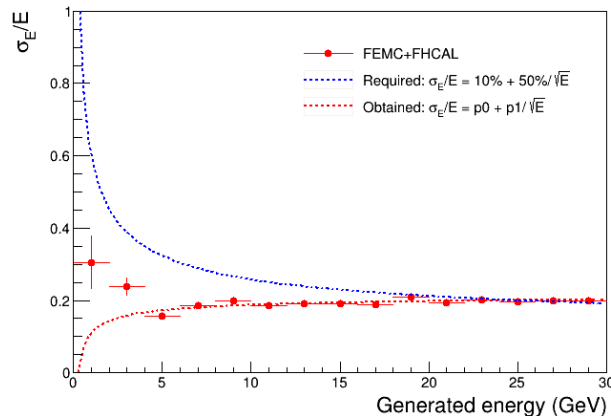
Recalibration: FEMC+FHCAI

$\eta = 1.3$ to 3.3

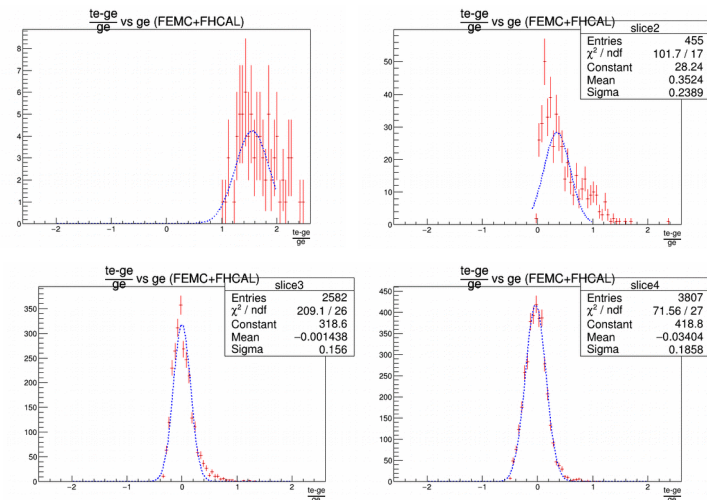
Recalibration:- with y-mean



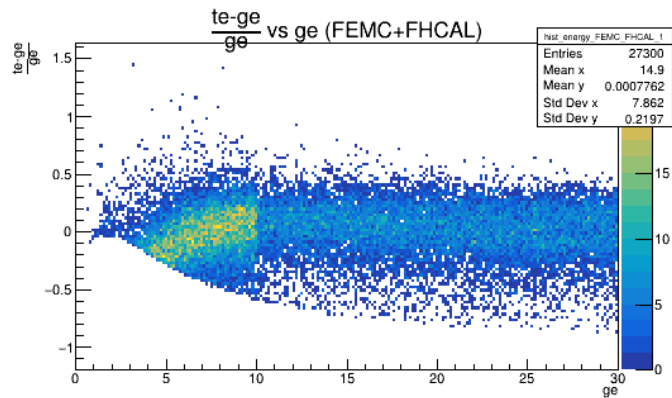
σ_E/E vs ge (FEMC+FHCAI)



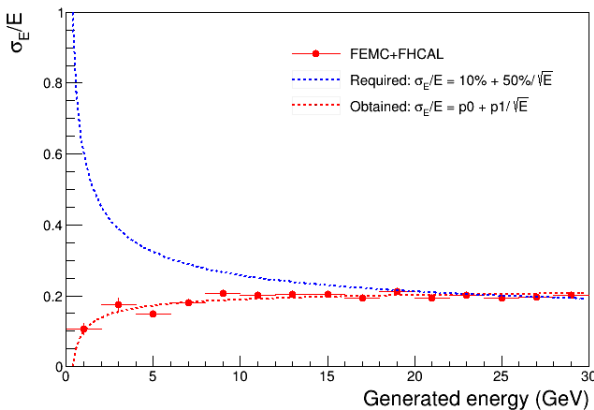
$p_0=0.222486$; $p_1=-0.111601$



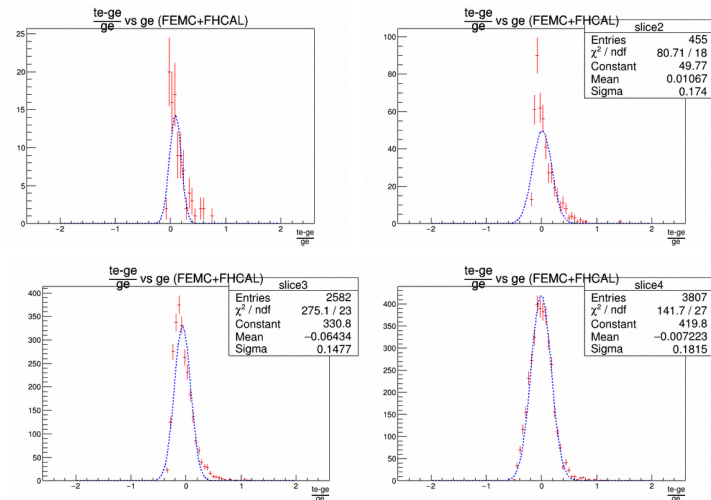
Recalibration:- with fit function



σ_E/E vs ge (FEMC+FHCAI)



$p_0=0.230483$; $p_1=-0.130824$



THE END