

Fun4All Calorimeter Plots: Pion: New Calibration for Barrel Calorimeters

Simran
Lokesh Kumar
Panjab University, Chandigarh, INDIA

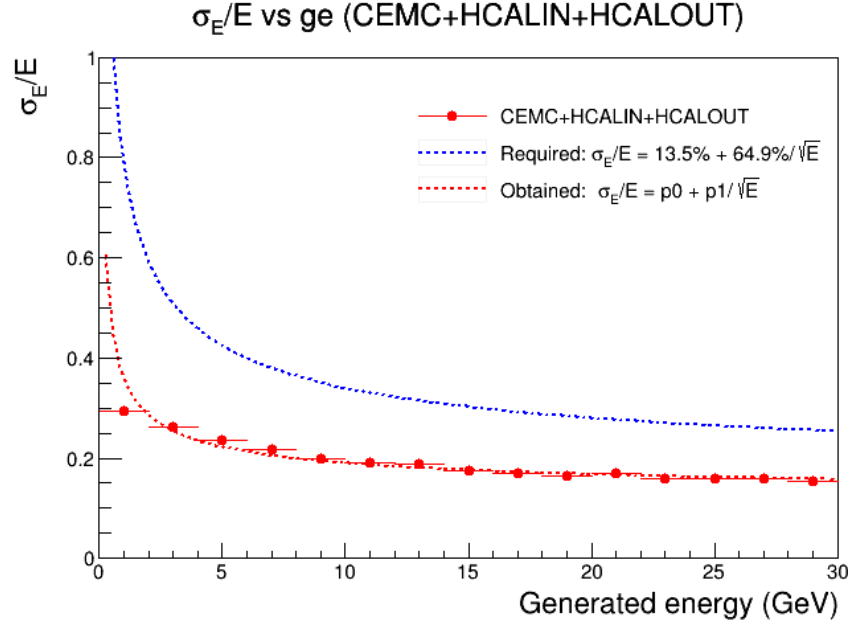
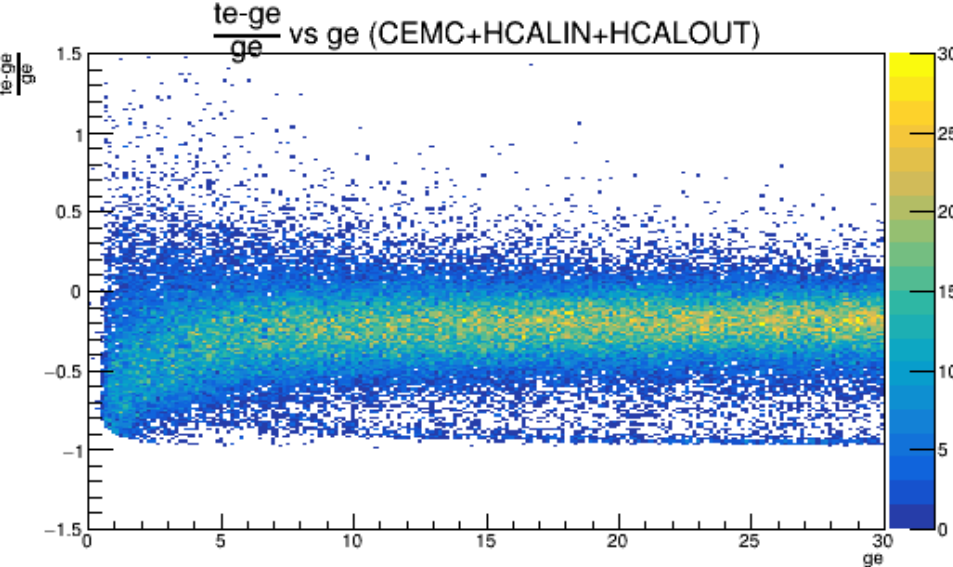
Fun4All QA Biweekly Meeting
April 29, 2022

Specifications:

SIMULATION & ANALYSIS DETAILS:

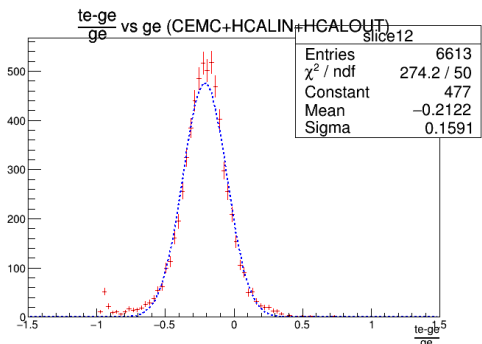
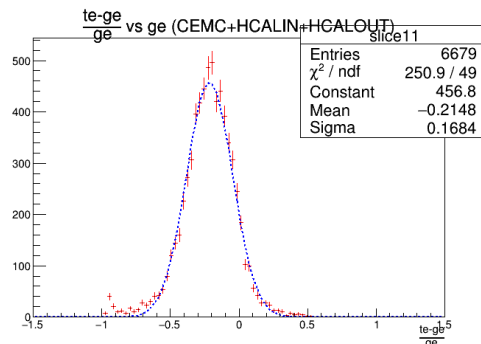
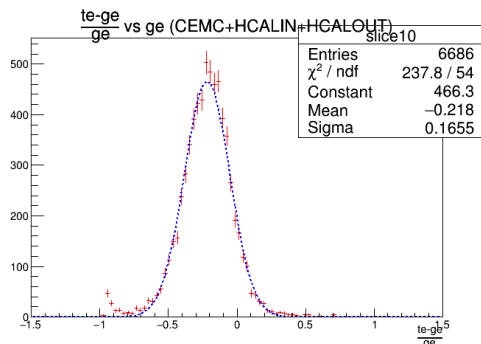
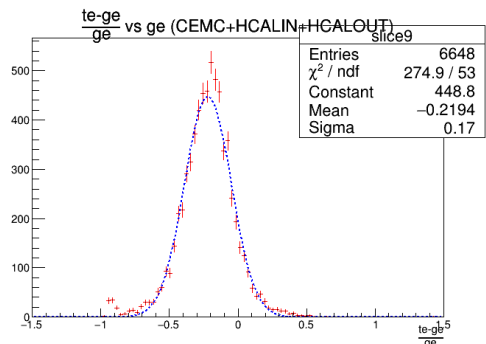
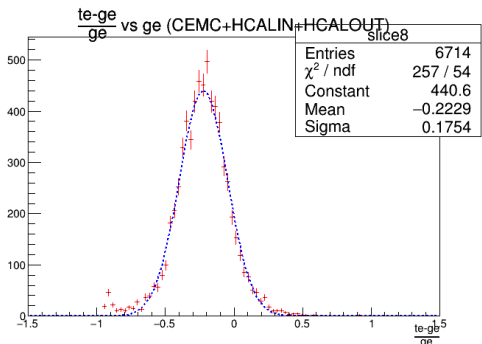
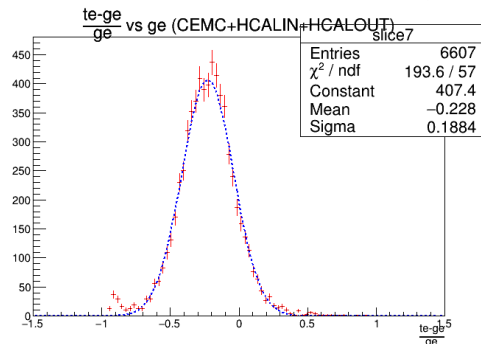
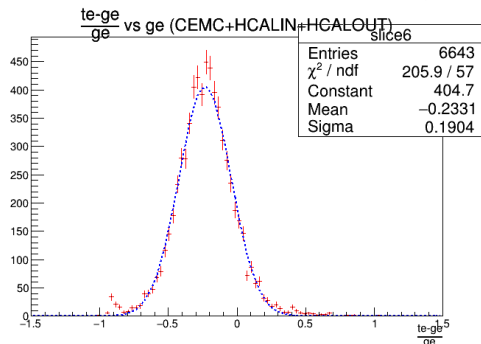
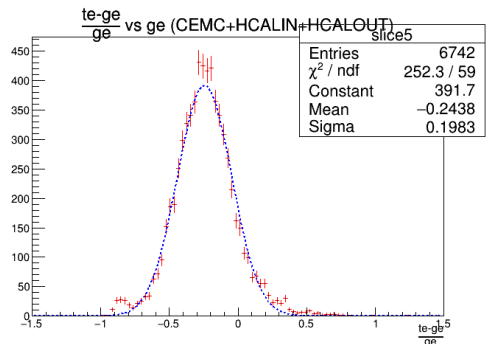
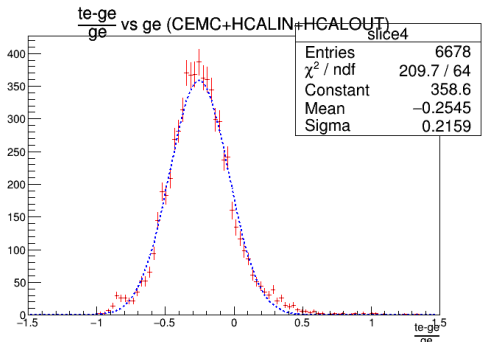
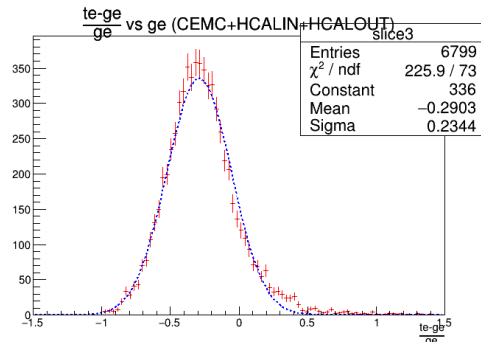
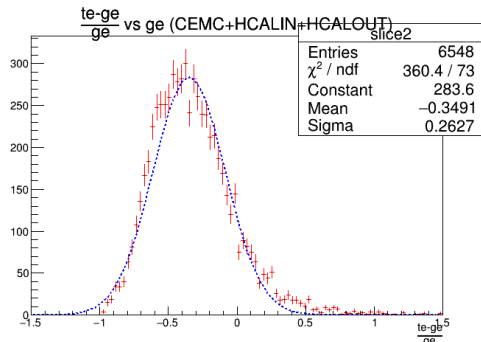
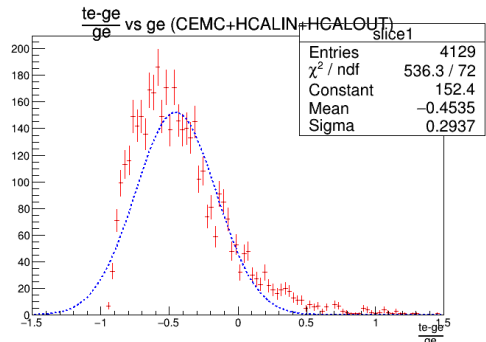
- Particles: pi-
- Events: 100000 (0-30 GeV)
- **Various Cuts used:**
 - Pseudorapidity cuts on each calorimeter:
 - Pion:
 - Barrel Region: $\eta = -0.98$ to 0.99
 - Clustering cut based on theta and phi values
 - Theta-dependent energy cut on individual tower energies
 - 100MeV cut on aggregated tower energies (CEMC+HCALIN+HCALOUT) for each event
- **2 CALIBRATION METHODS COMPARED!**

Barrel Region: UNCALIBRATED

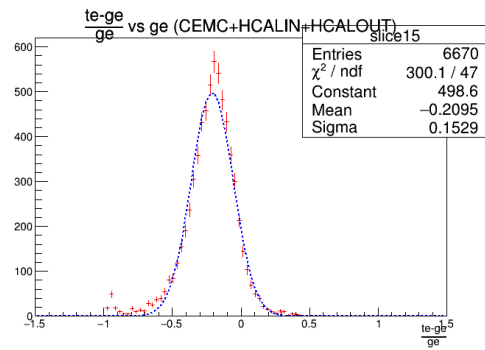
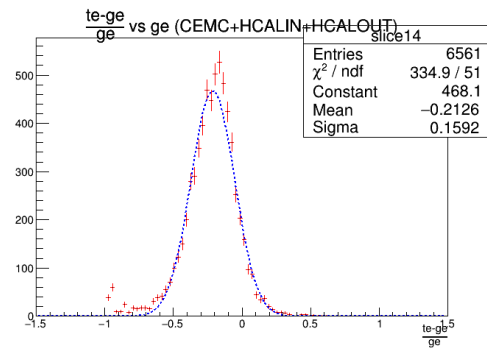
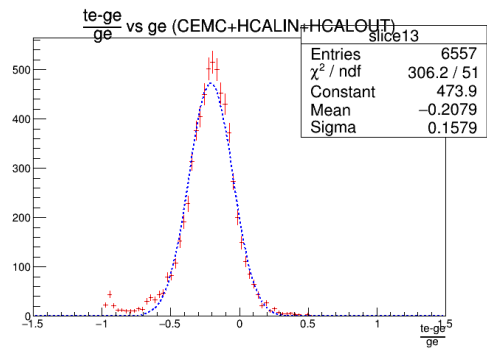


$$\sigma_E/E = 11.2612\% + 24.6419\%/\sqrt{E}$$

CEMC+HCALIN+HCALOUT: Gaussian fits

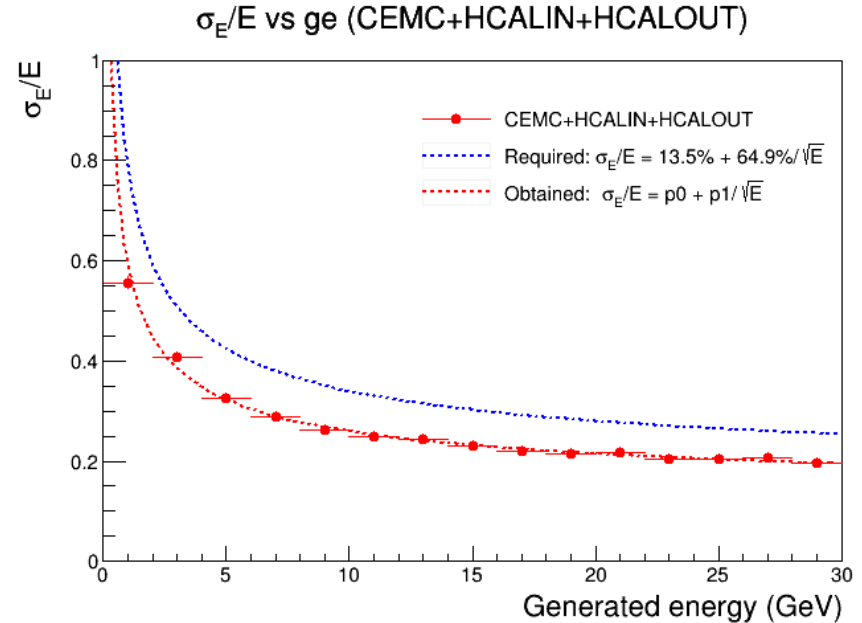
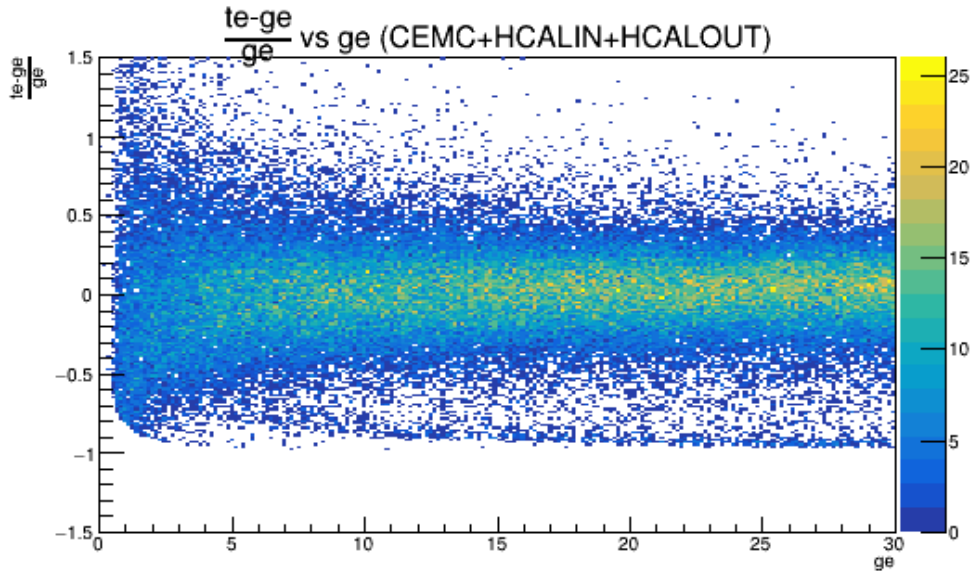


CEMC+HCALIN+HCALOUT: gaussian fits



Barrel Region: CALIBRATION METHOD 1

- aggregated (CEMC+HCALIN+HCALOUT) energies calibrated using fit function obtained from Tprofile fit of $t_e(\text{CEMC+HCALIN+HCALOUT})/g_e$

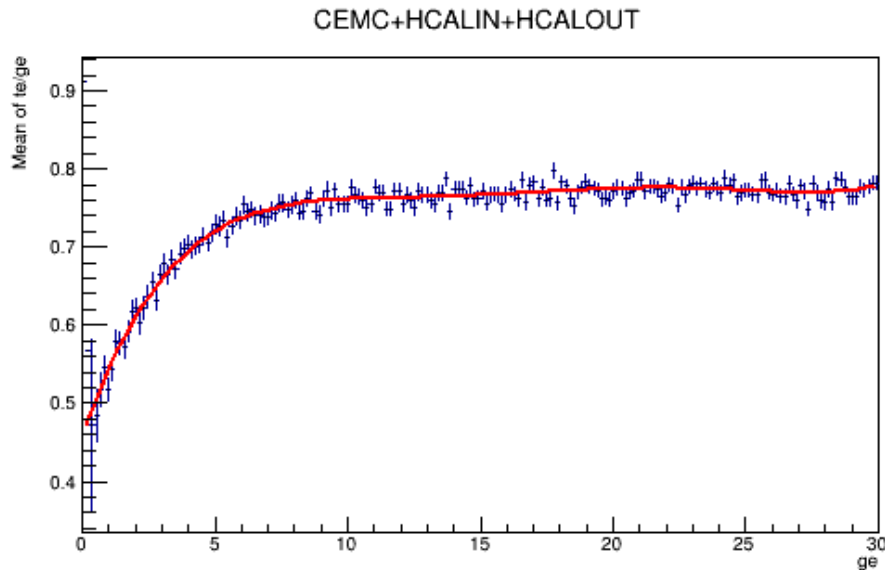


$$\sigma_E/E = 10.6297\% + 48.5058\%/\sqrt{E}$$

Barrel Region: CALIBRATION METHOD 1

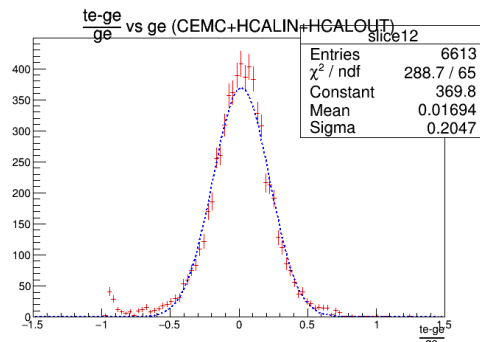
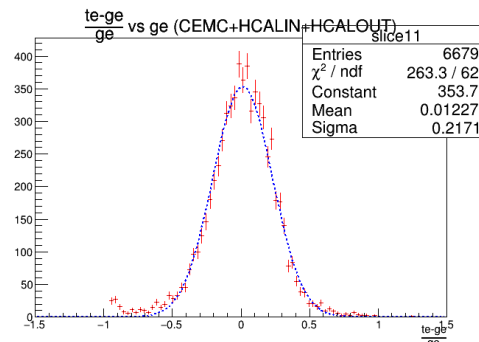
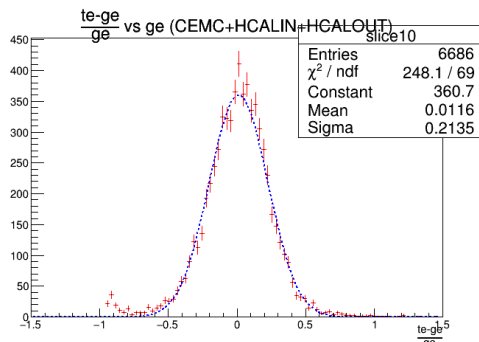
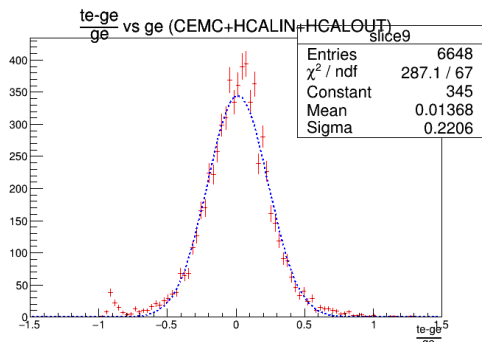
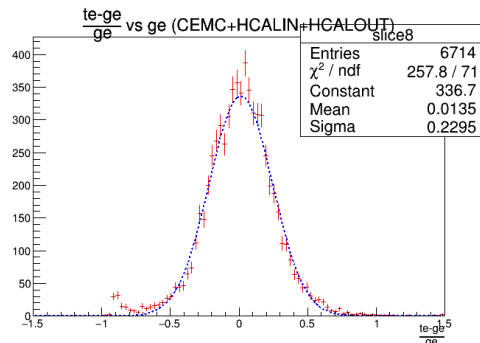
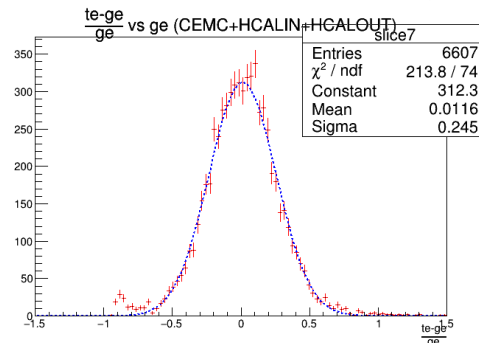
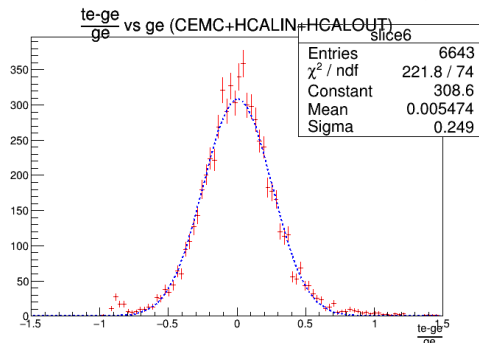
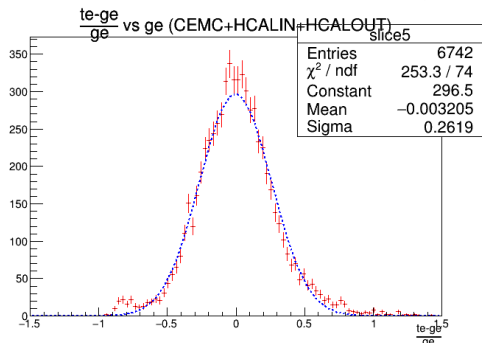
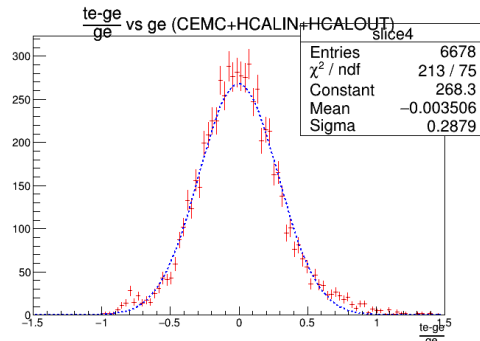
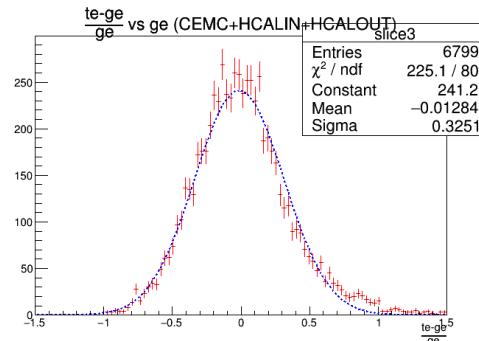
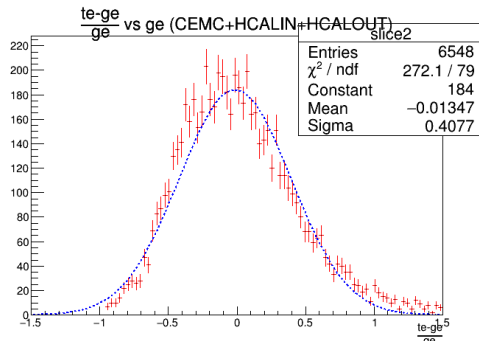
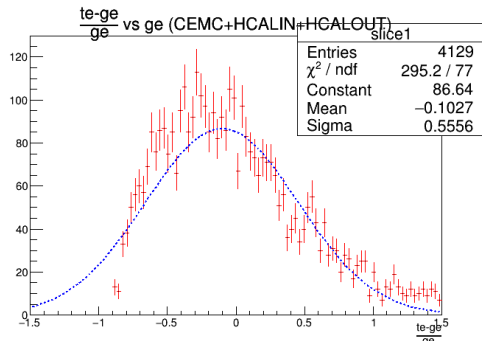
- aggregated (CEMC+HCALIN+HCALOUT) energies calibrated using fit function obtained from Tprofile fit of $te(CEMC+HCALIN+HCALOUT)/ge$

- $te(\text{calibrated}) = te(\text{raw})/T\text{profile fit function}$

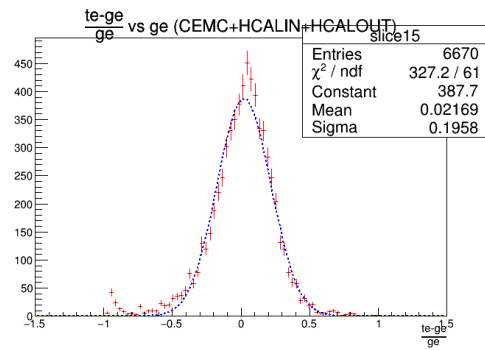
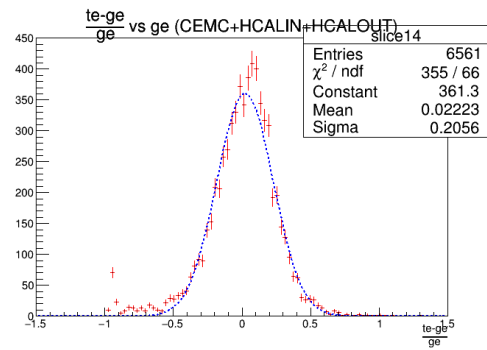
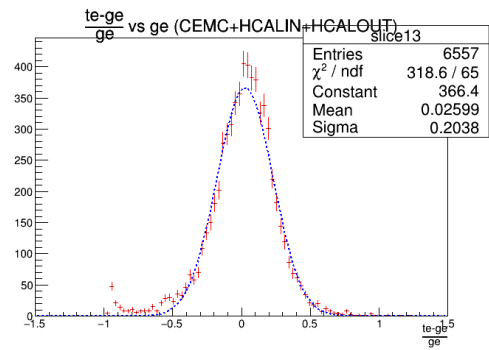


Tprofile fit function utilized for calibration: pol5

CEMC+HCALIN+HCALOUT: Gaussian fits

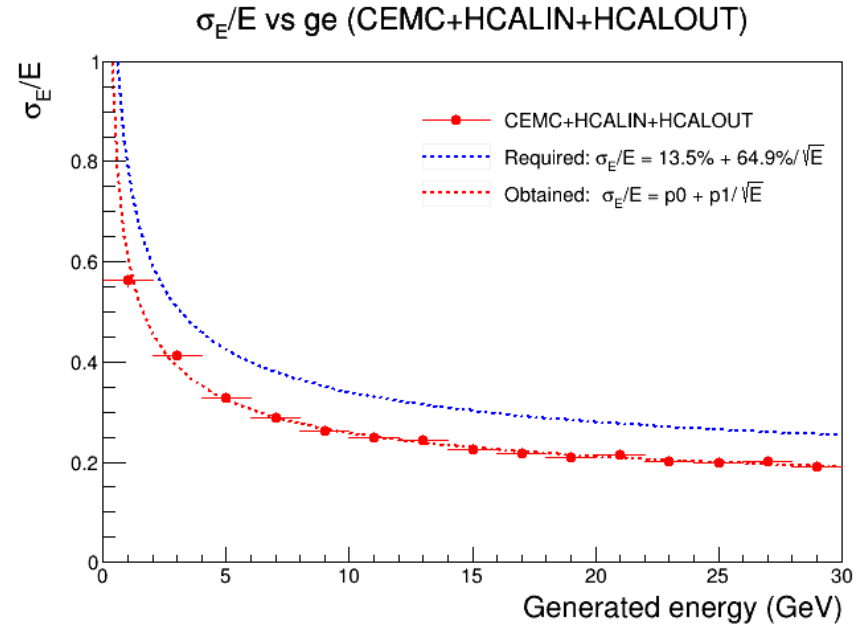
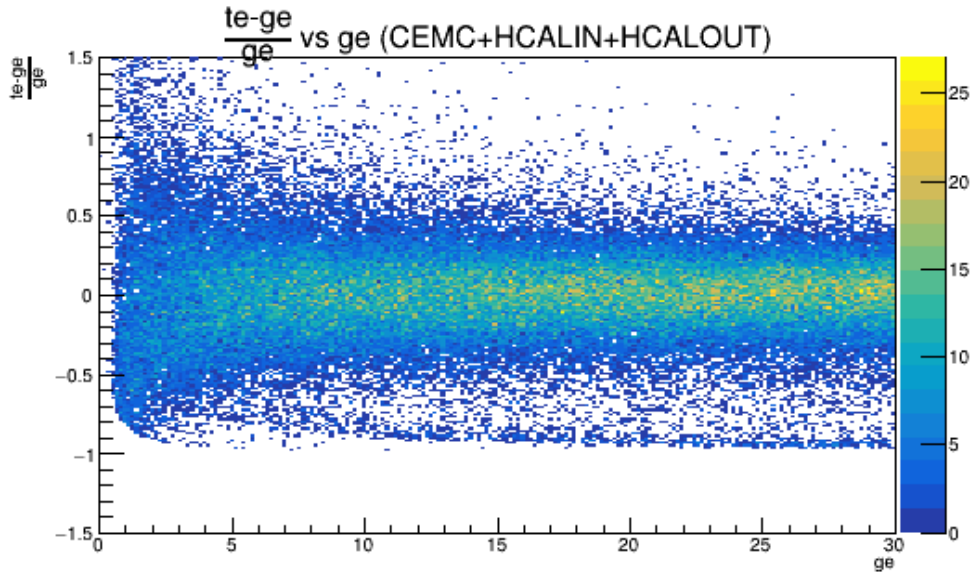


CEMC+HCALIN+HCALOUT: gaussian fits



Barrel Region: CALIBRATION METHOD 2

- aggregated (CEMC+HCALIN+HCALOUT) energies calibrated using fit function obtained from **means from raw Gaussian fits** of $(te(CEMC+HCALIN+HCALOUT)-ge)/ge$

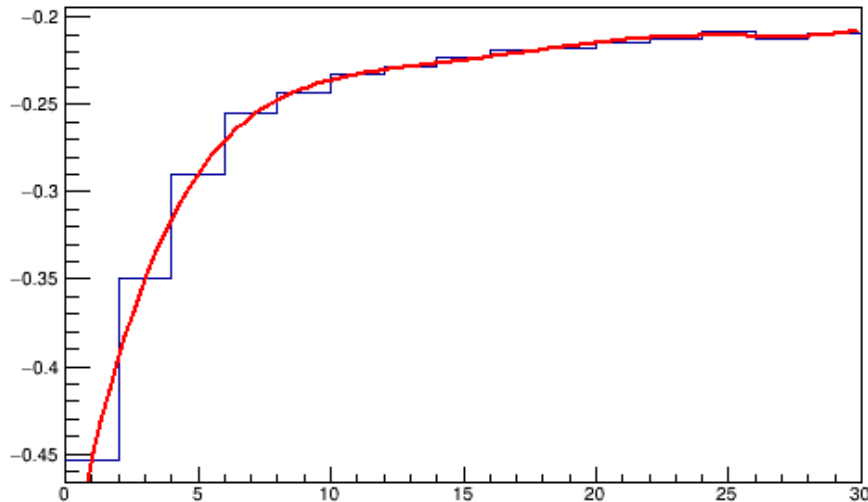


$$\sigma_E/E = 9.73678\% + 50.9849\%/\sqrt{E}$$

Barrel Region: CALIBRATION METHOD 2

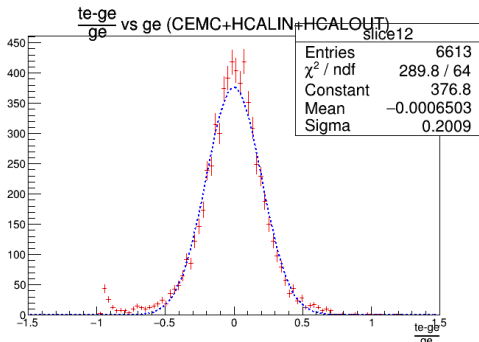
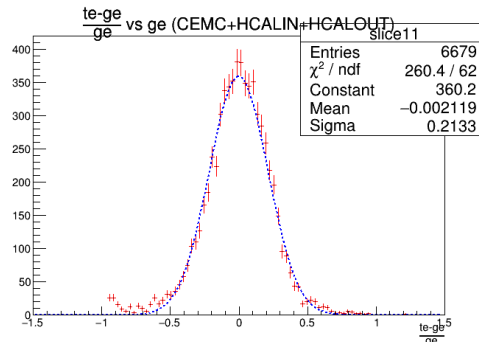
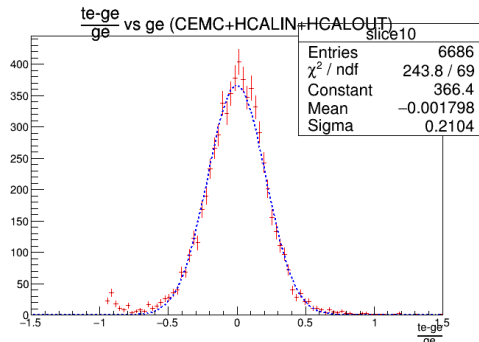
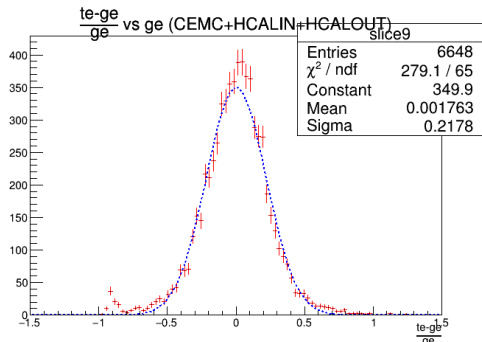
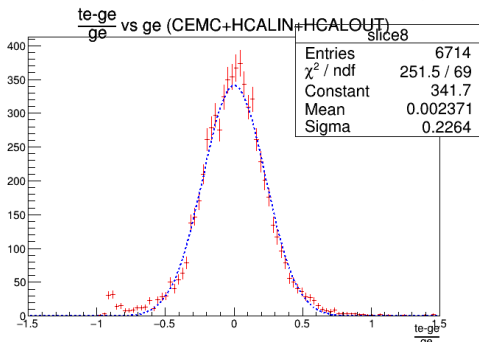
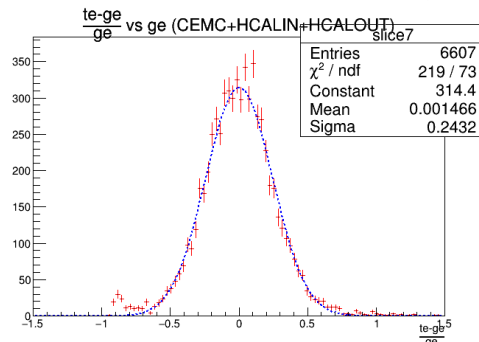
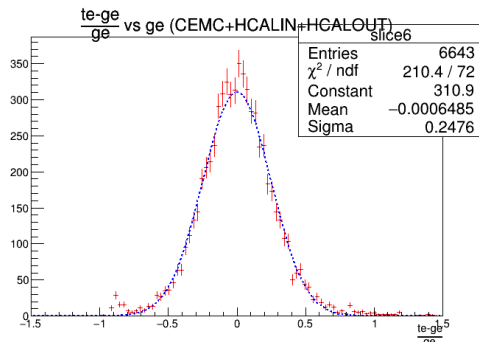
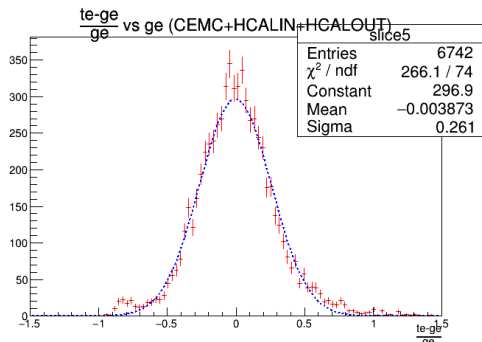
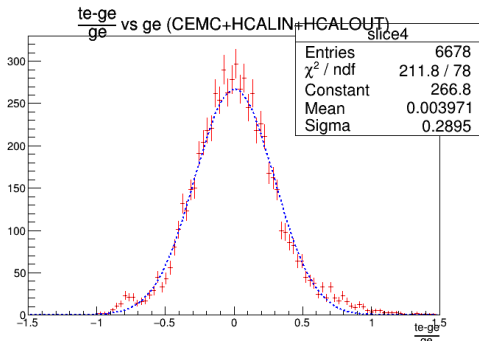
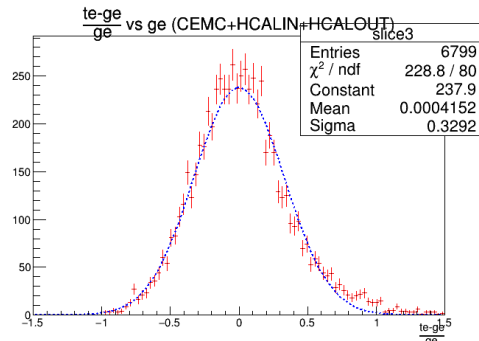
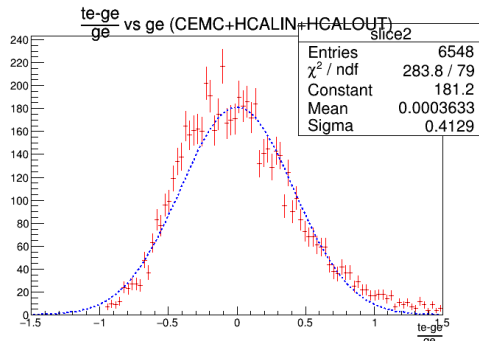
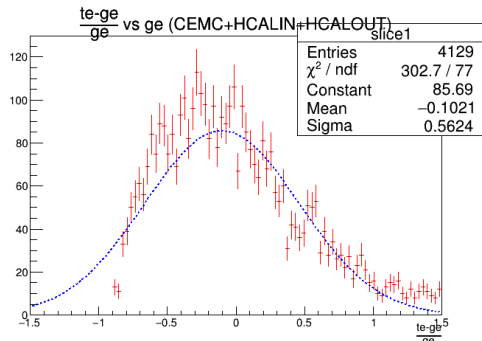
- aggregated (CEMC+HCALIN+HCALOUT) energies calibrated using fit function obtained from fit of means of gaussian fits of $(te(CEMC+HCALIN+HCALOUT)-ge)/ge$

- $te(calibrated) = te(raw)/mean \text{ fit function}$

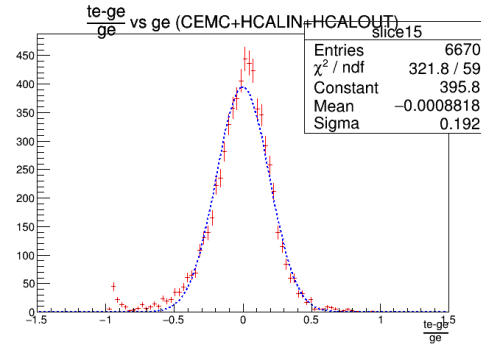
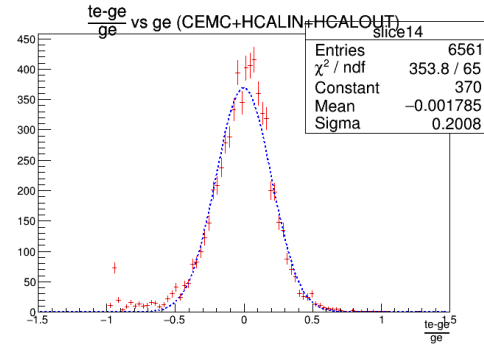
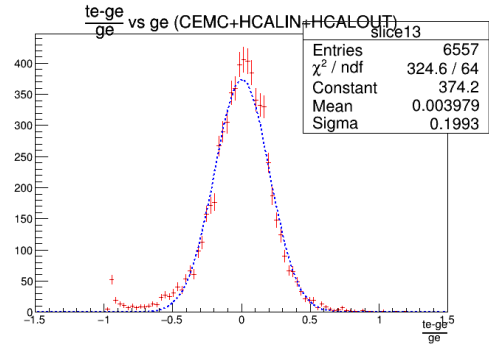


Fit function of means of gaussians utilized for calibration: pol5

CEMC+HCALIN+HCALOUT: Gaussian fits



CEMC+HCALIN+HCALOUT: gaussian fits



THANKS!