

Fun4All Calorimeter Plots – Pion Energy Recalibration & Resolution

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Details:

- Particle: pi-
- Statistics: 100000 (0-30 GeV) + 50000 (0-10 GeV)
- geta range: -4 to 4
- gphi range: $-\pi$ to π
- Cuts employed:
 - Detector-wise geta cuts
 - CEMC, HCALIN, HCALOUT: $\eta = -1.1$ to 1.1
 - FEMC, FHCAL: $\eta = 1.3$ to 3.3
 - Circular cuts on dphi and dtheta: for manual clustering
 - **Energy cut on towers:**
 - **Aggregated tower energy cut: 100 MeV**
- Photon digitization: turned off
- All sampling fractions updated

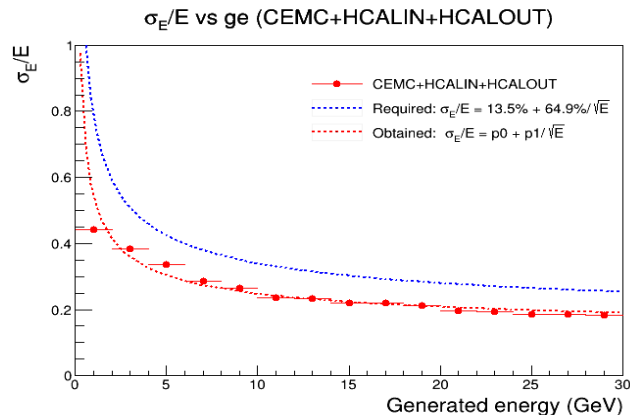
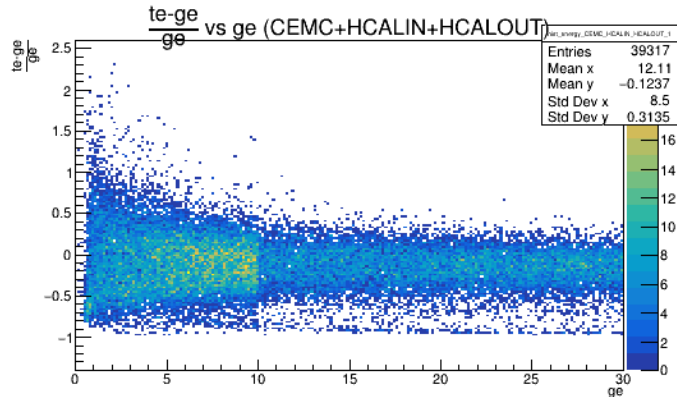
Method of calibration:

- For the aggregated tower energies, we use the normalized fit function: fit function / mean
 - $\rightarrow ce(\text{calibrated energy}) = te / (f(ge) + 1) * (M(te/ge))$
- Then fit function obtained from summed energies' $(te-ge)/ge$ vs ge plot is used to calibrate the final tower energy
 - Final $ce = ce / (\text{final fit} + 1)$

Barrel region:
CEMC+HCALIN+HCALOUT

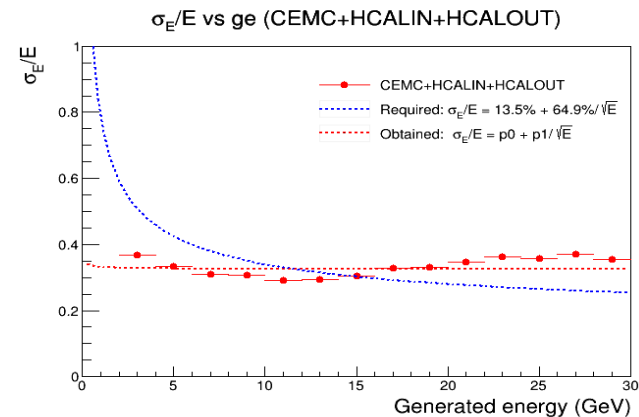
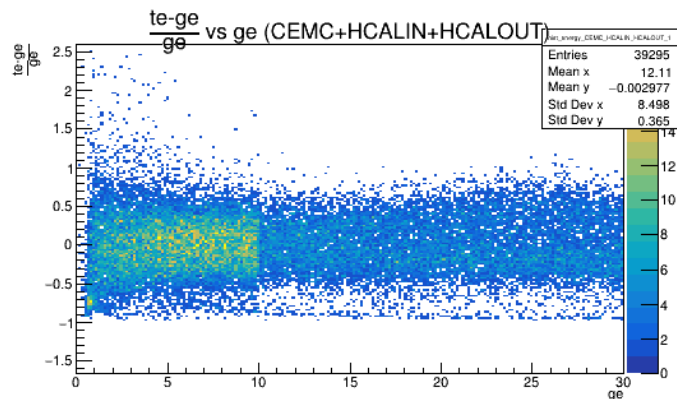
Before recalibration: CEMC+HCALIN+HCALOUT

$\eta = -1.1$ to 1.1



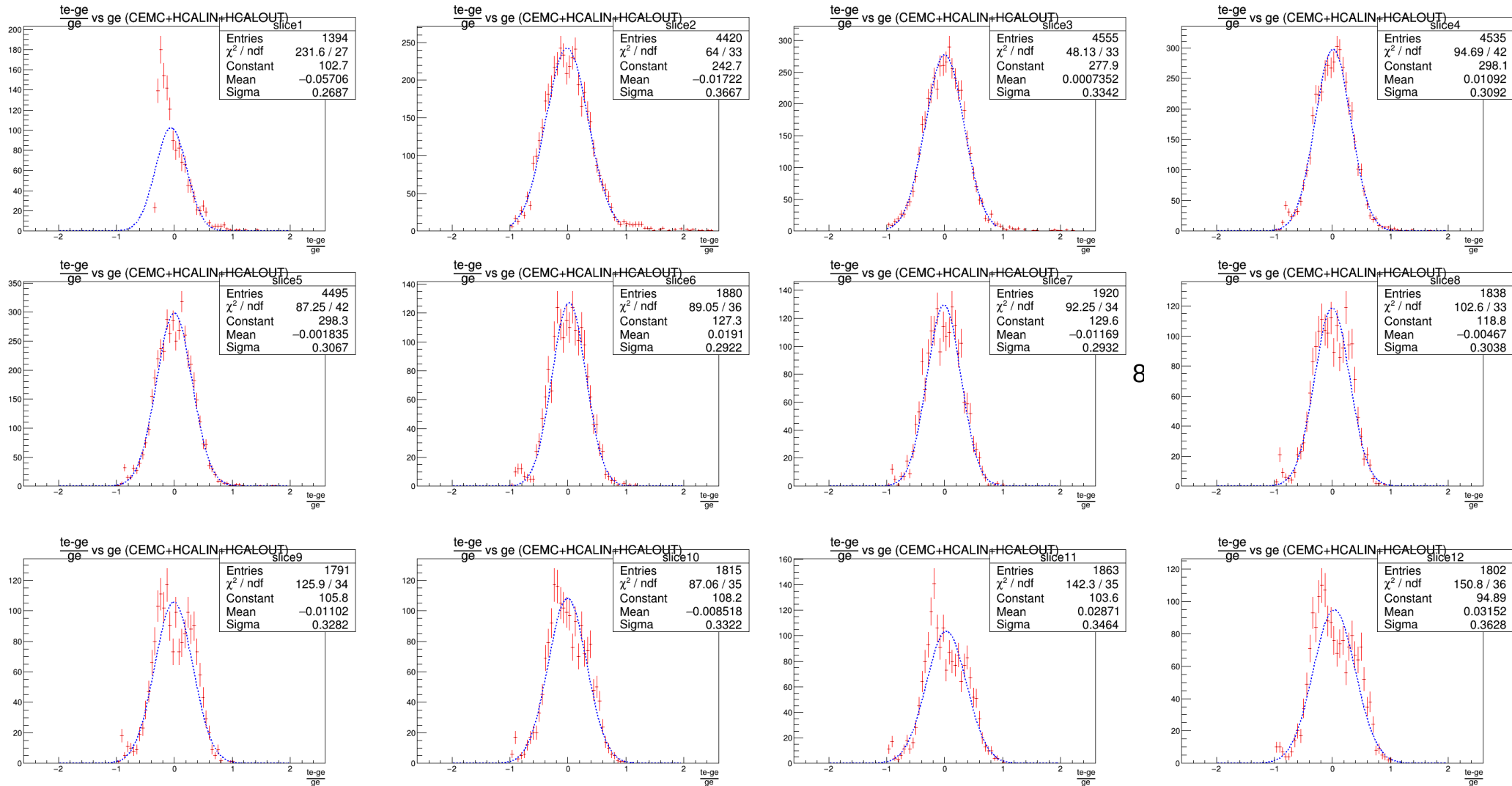
$p_0=0.11155$;
 $p_1=0.431151$

After Calibration:

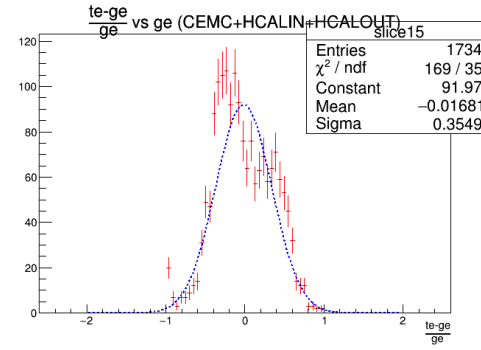
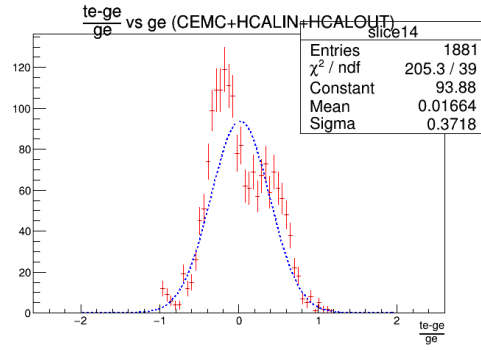
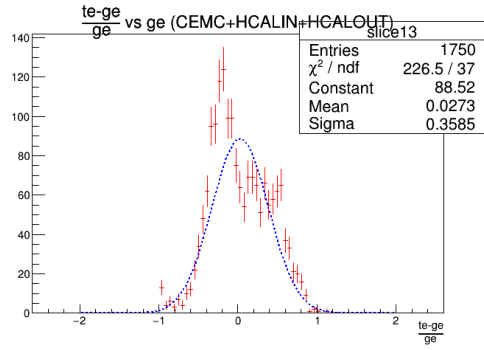


$p_0=0.32253$;
 $p_1=0.00979982$

CEMC+HCALIN+HCALOUT Gaussian fits (after calibration):

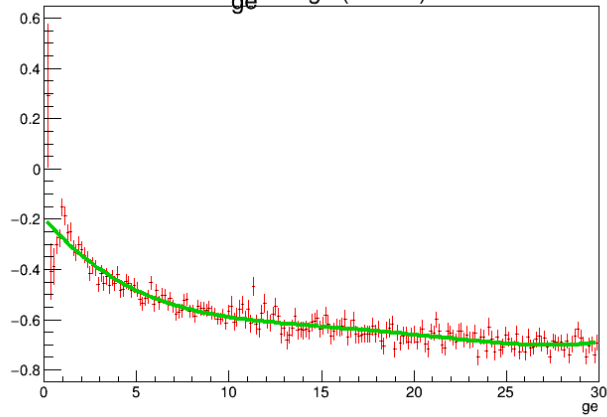


CEMC+HCALIN+HCALOUT gaussian fits (after calibration):

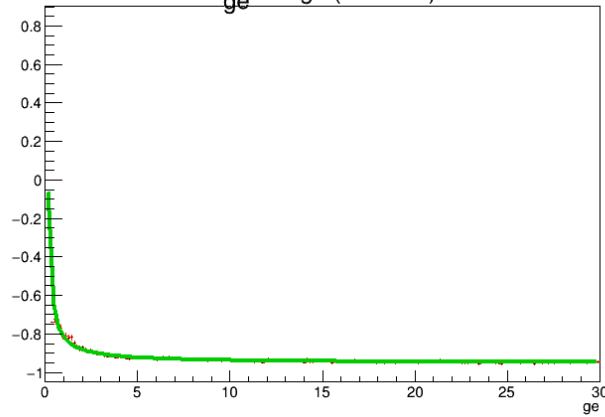


Steps involved in calibration:

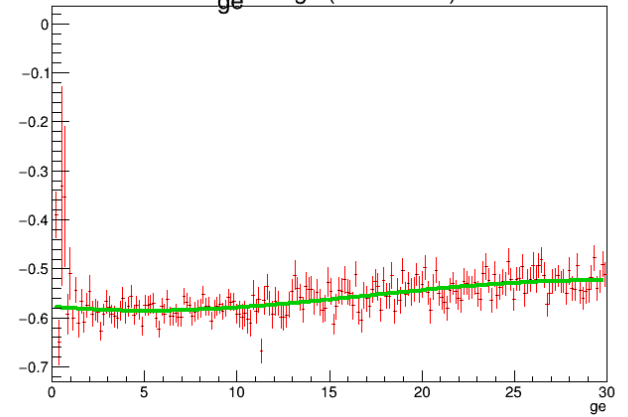
$\frac{te-ge}{ge}$ vs ge (CEMC)



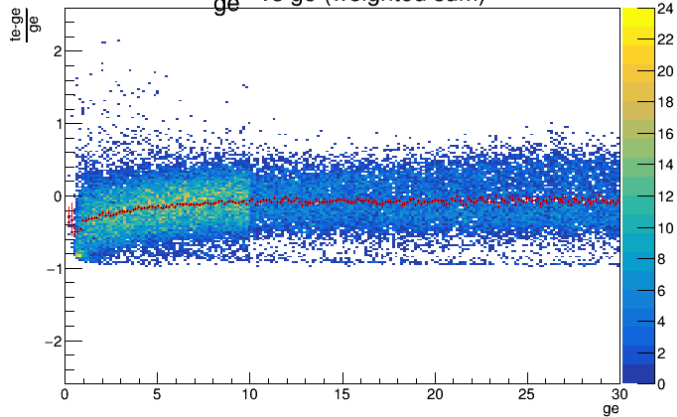
$\frac{te-ge}{ge}$ vs ge (HCALIN)



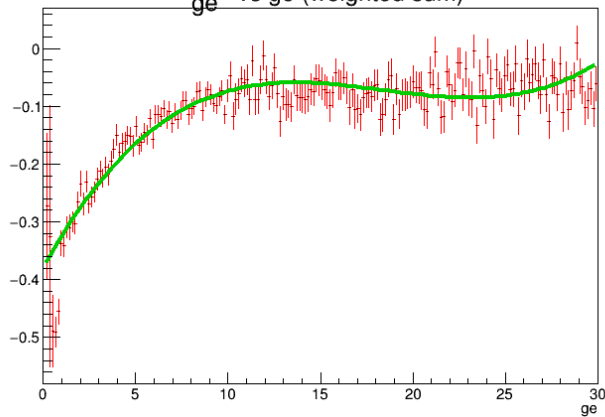
$\frac{te-ge}{ge}$ vs ge (HCALOUT)



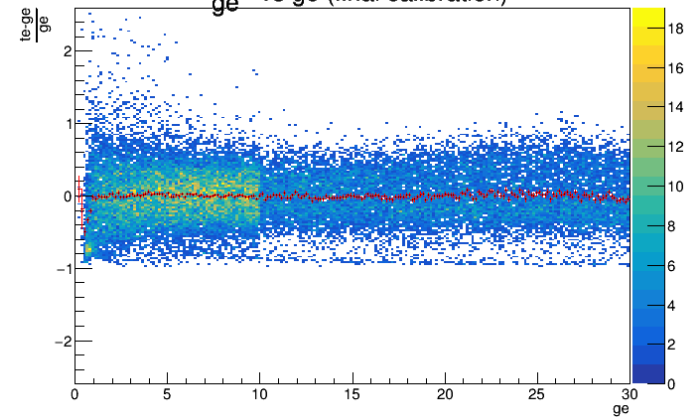
$\frac{te-ge}{ge}$ vs ge (weighted sum)



$\frac{te-ge}{ge}$ vs ge (weighted sum)



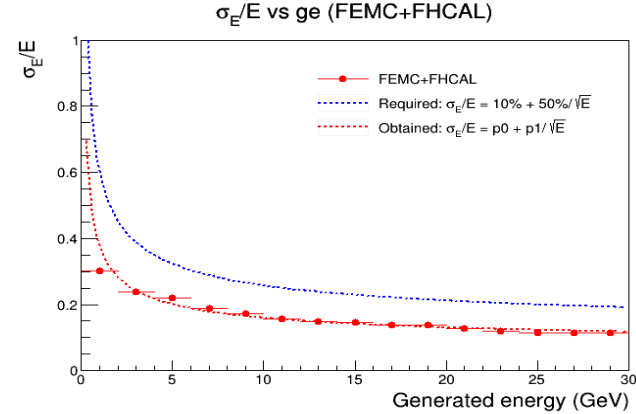
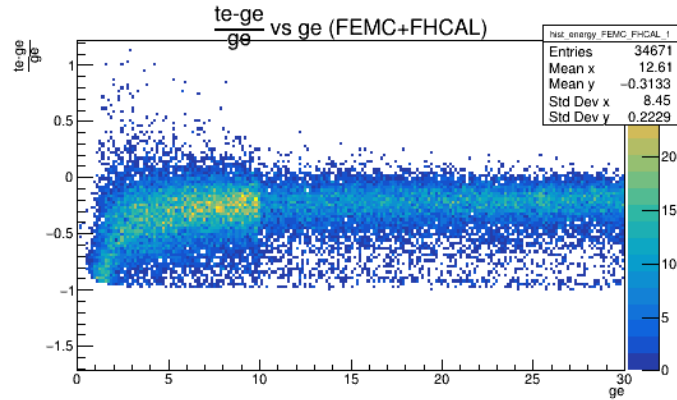
$\frac{te-ge}{ge}$ vs ge (final calibration)



**Forward region:
FEMC+FHCA**

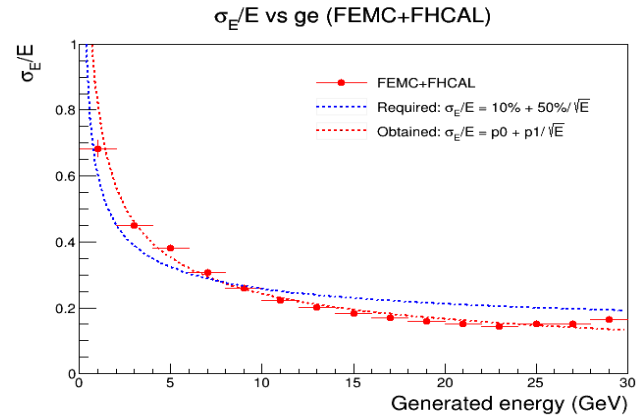
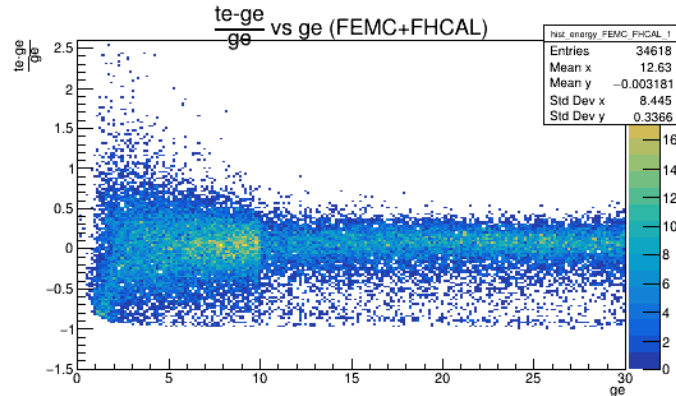
Before recalibration: FEMC+FHCAL

$\eta = 1.3$ to 3.3



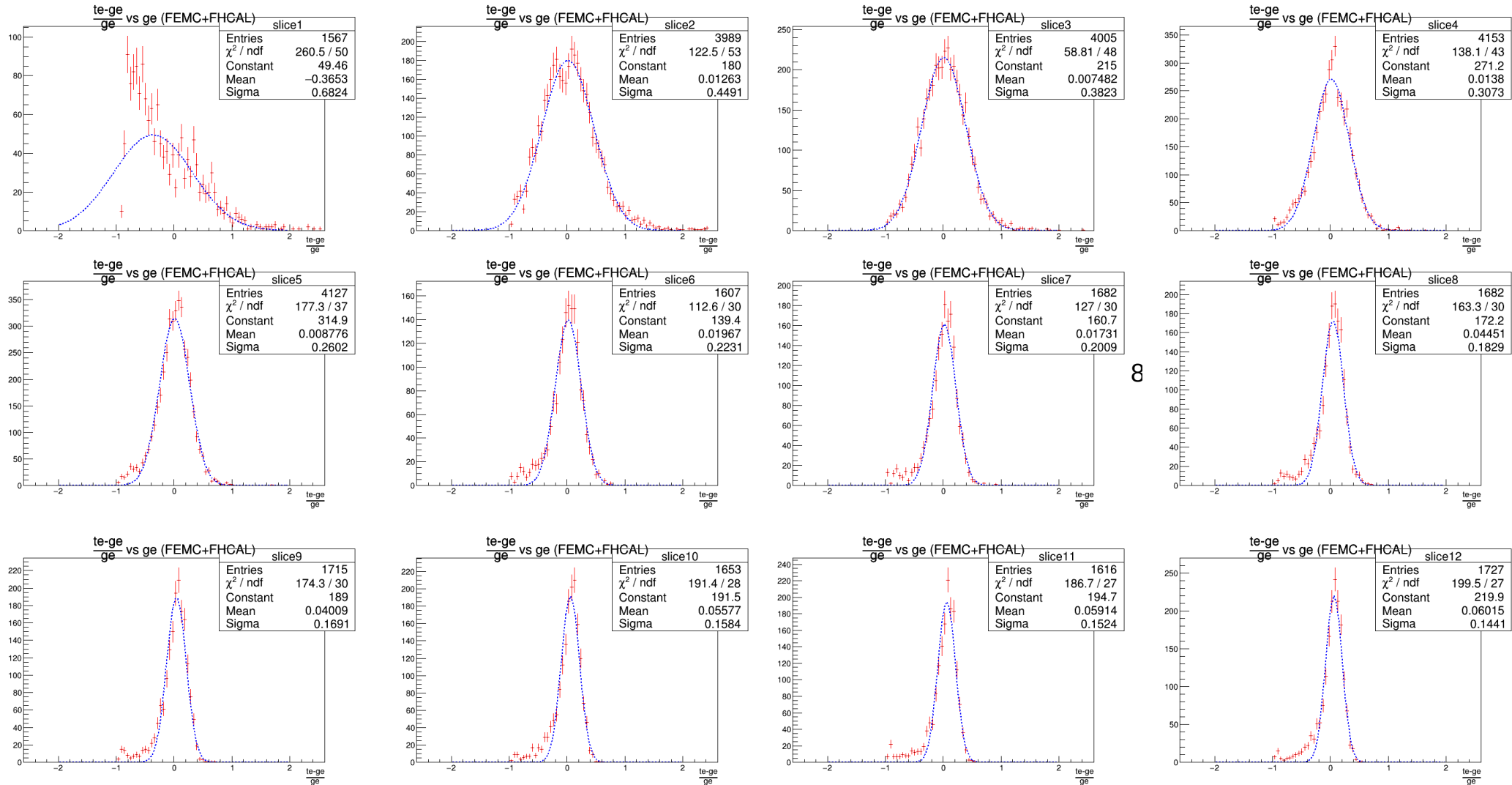
$p_0=0.0598577$;
 $p_1=0.316926$

After calibration:

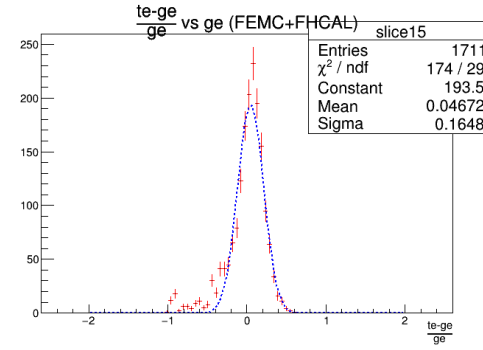
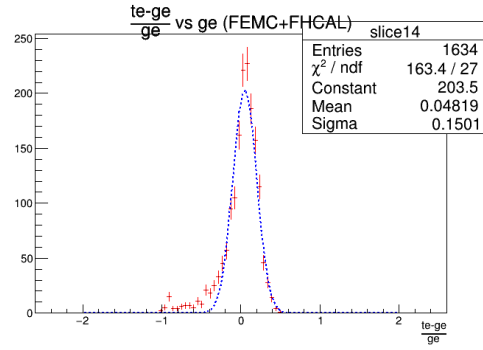
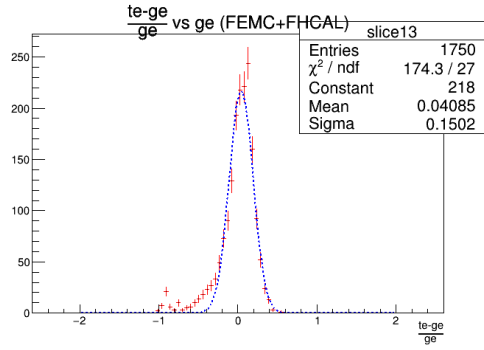


$p_0=-0.0206291$;
 $p_1=0.834022$

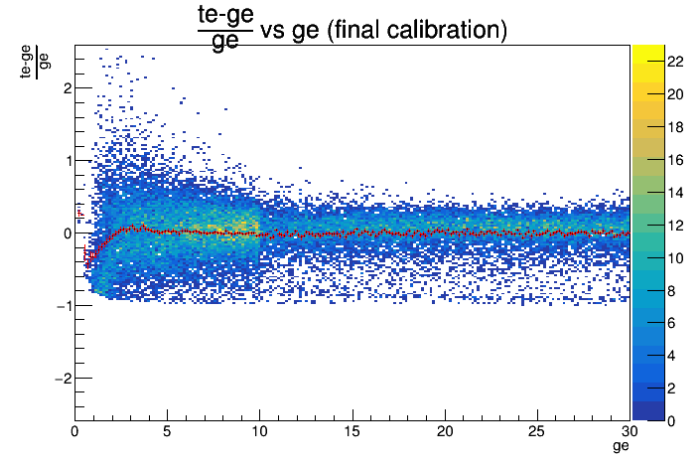
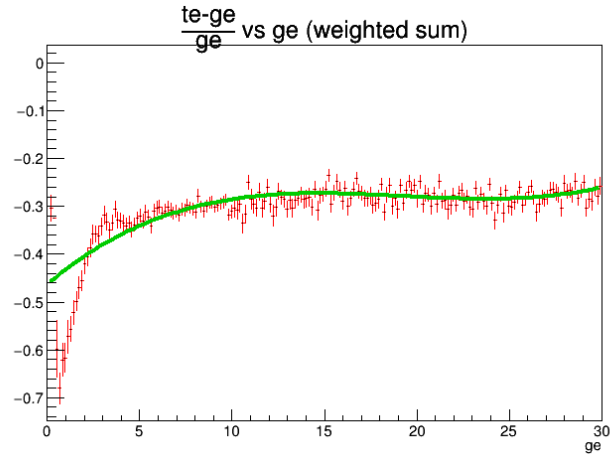
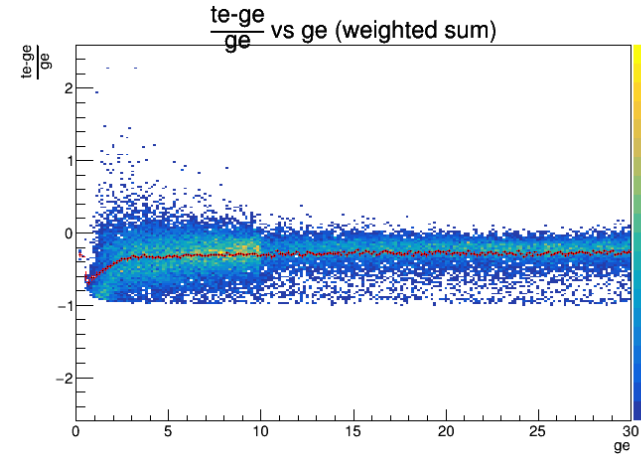
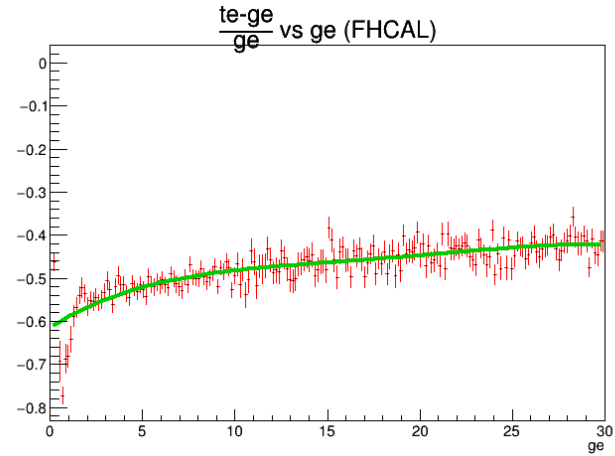
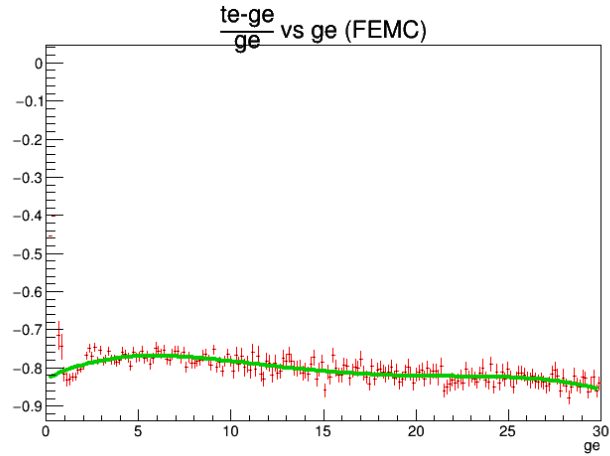
FEMC+FHGAL Gaussian fits (after calibration):



FEMC+FHCAL: gaussian fits (after calibration):



Steps involved in calibration:



THE END