

Fun4All Calorimeter Plots

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Details:

- Details for calorimeters:

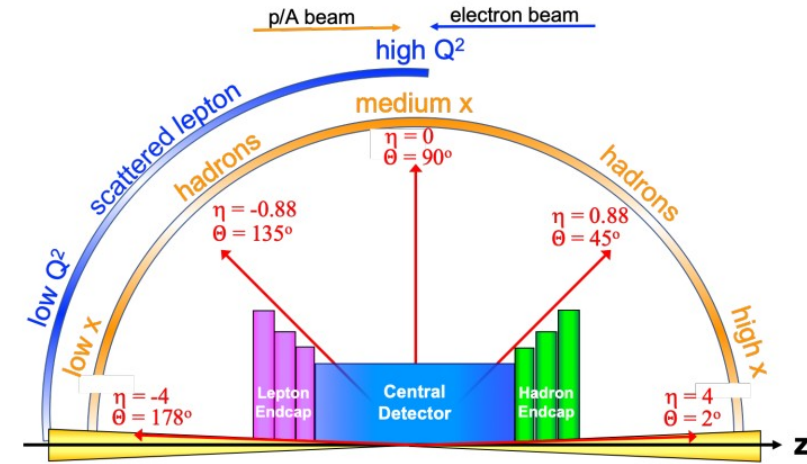
- EMCal: Material: Lead tungstate (PWO) crystals for $\eta < -2$; For the other areas several options exist (Scintillating glass, Lead glass, etc.) depending on the geometrical constraints.
- Hcal: Material: [Steel absorber (inner hcal) , Aluminium absorber (outer hcal)] + plastic scintillators

- Details for the slides:

- Particles: e-, pi-, K-
- Generated momentum (gp) range: 0-30GeV/c
- Generated pseudorapidity (geta) range: -4 to 4
- Generated phi (gphi) range: -pi to pi
- Reconstructed energy cut on cluster energy (ce) and tower energy (te): 200 MeV

- **Generated pseudorapidity (geta) cuts:**

- CEMC: -1.5 to 1.2
- EEMC: -3.5 to -1.7
- FEMC: 1.3 to 3.3
- FHCAL: 1.2 to 3.5
- HCALIN: -1.1 to 1.1
- HCALOUT: -1.1 to 1.1



A schematic showing how hadrons and the scattered lepton for different x - Q^2 are distributed over the detector rapidity coverage. Reference: EIC Yellow Report

(Reference: Electron-Ion Collider Detector Requirements and R&D Handbook Version 1.1)

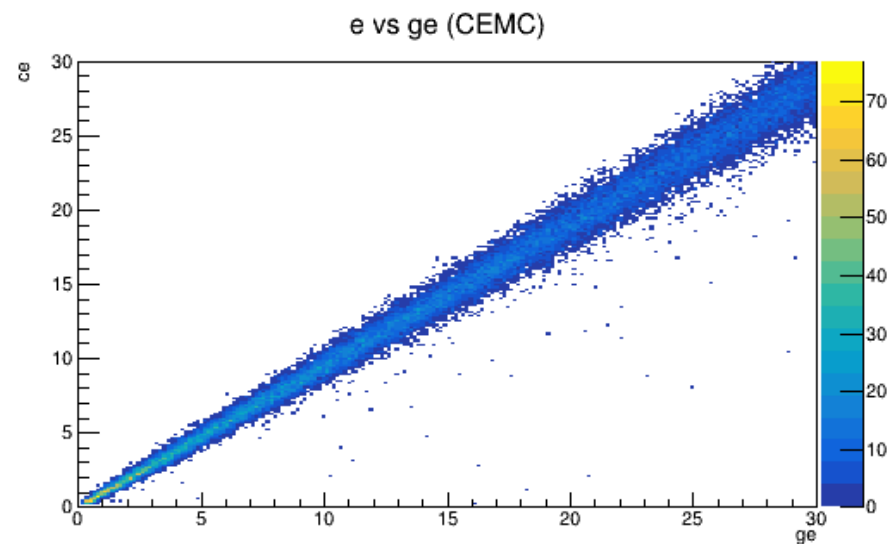
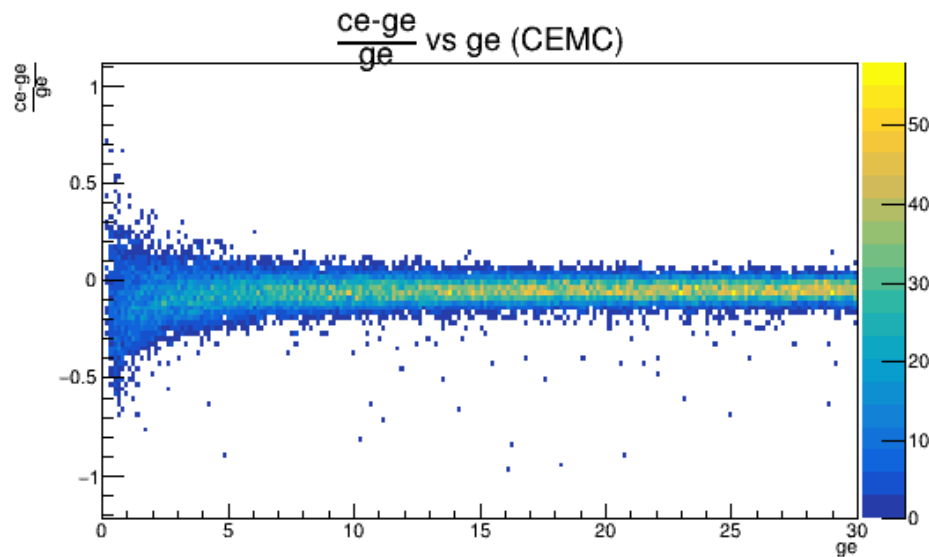
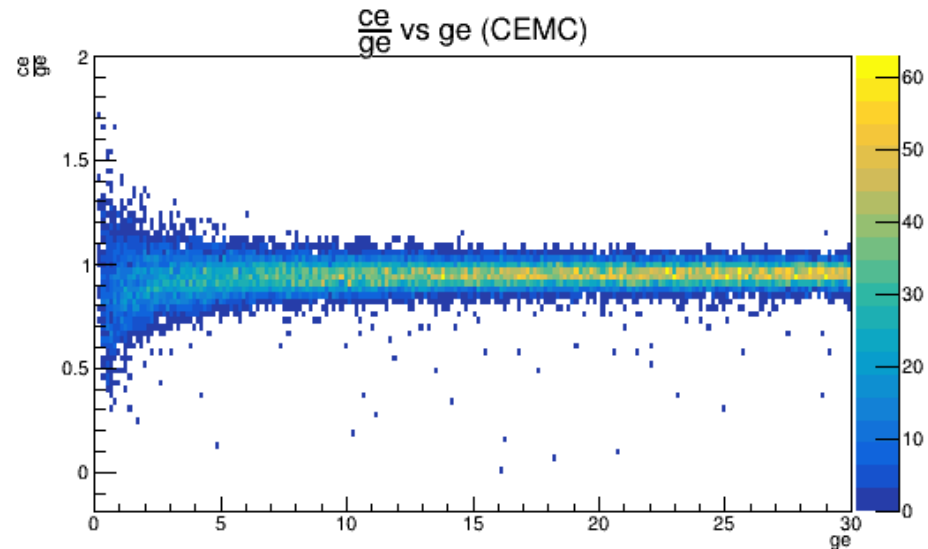
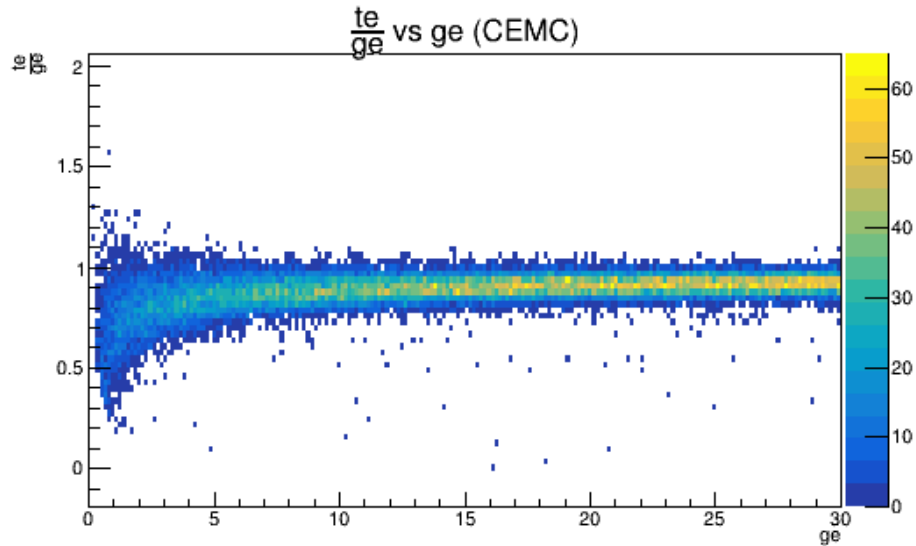
Electron

te : tower energy

ce: cluster energy

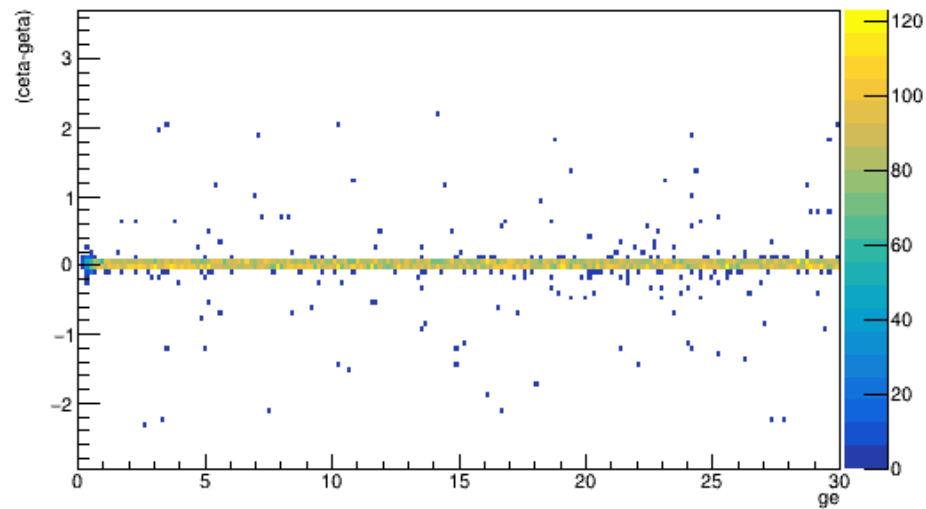
ge: generated energy

CEMC: η : -1.5 to 1.2

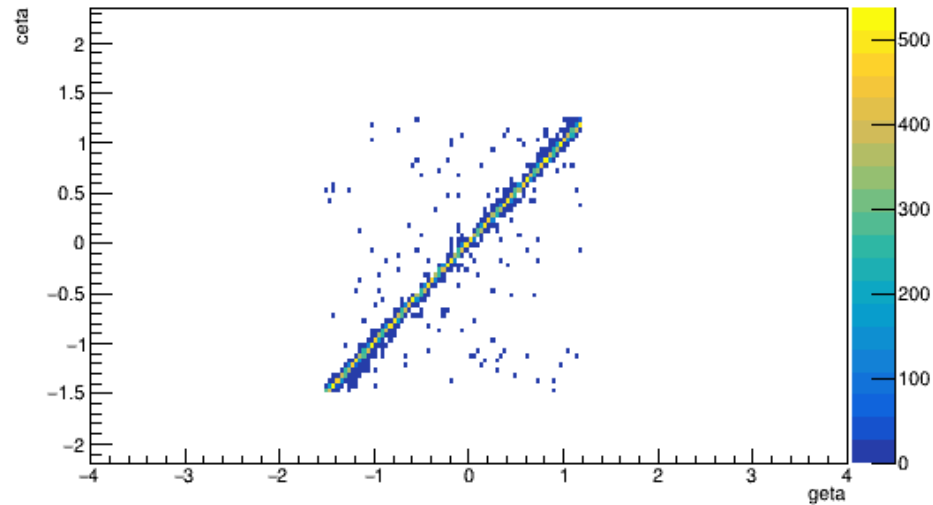


CEMC: η : -1.5 to 1.2

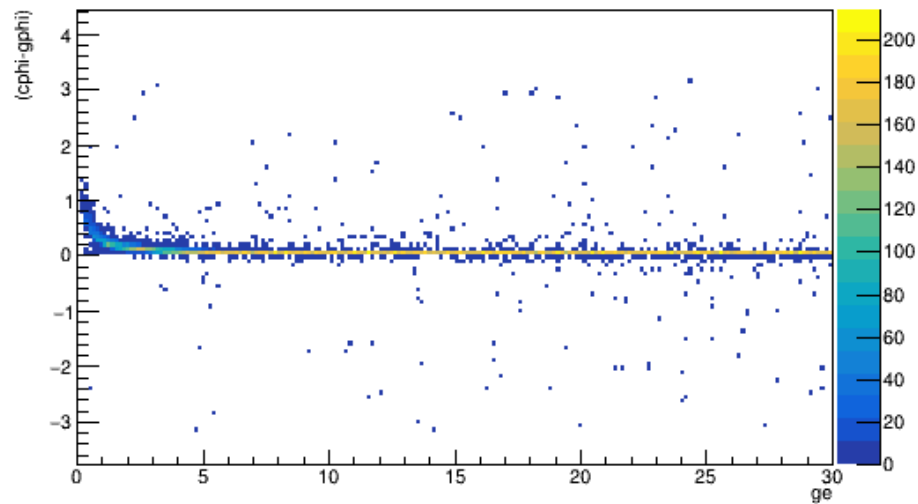
$\Delta \eta$ vs $g\eta$ (CEMC)



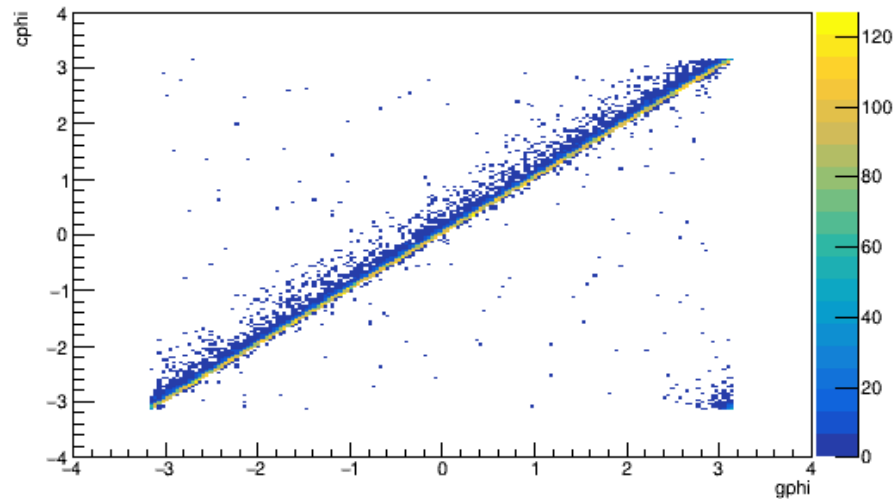
η vs $g\eta$ (CEMC)



$\Delta \phi$ vs $g\phi$ (CEMC)

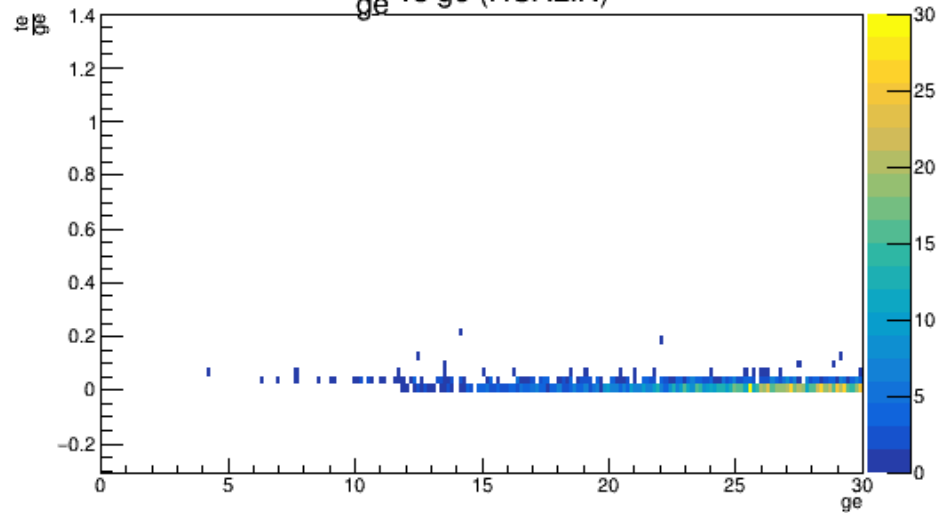


ϕ vs $g\phi$ (CEMC)

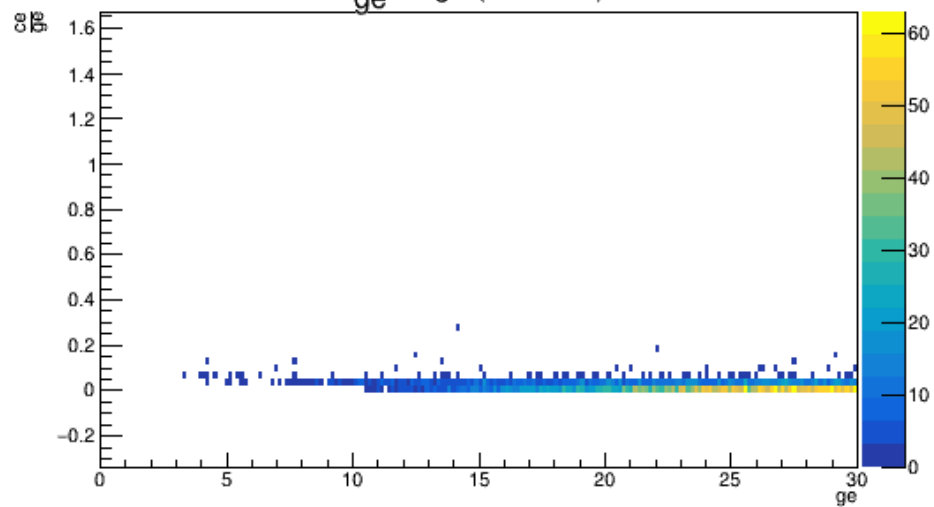


HCALIN: η : -1.1 to 1.1

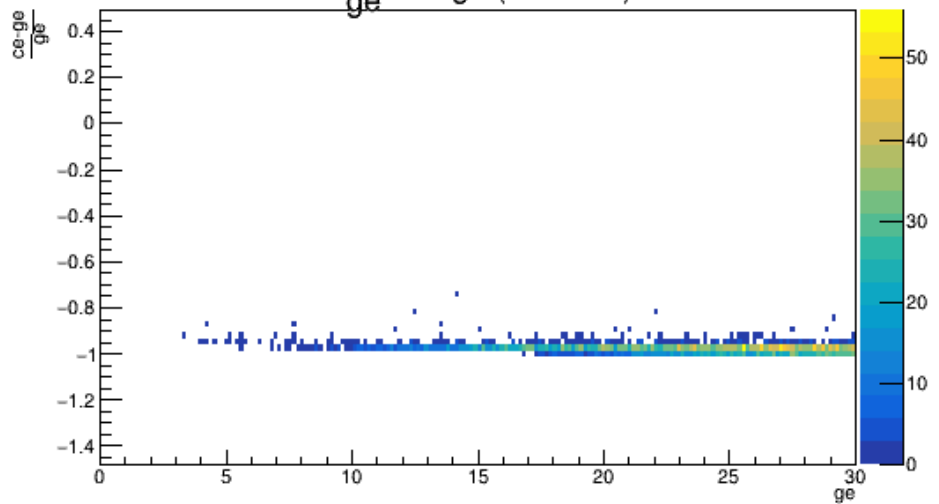
$\frac{t_e}{g_e}$ vs g_e (HCALIN)



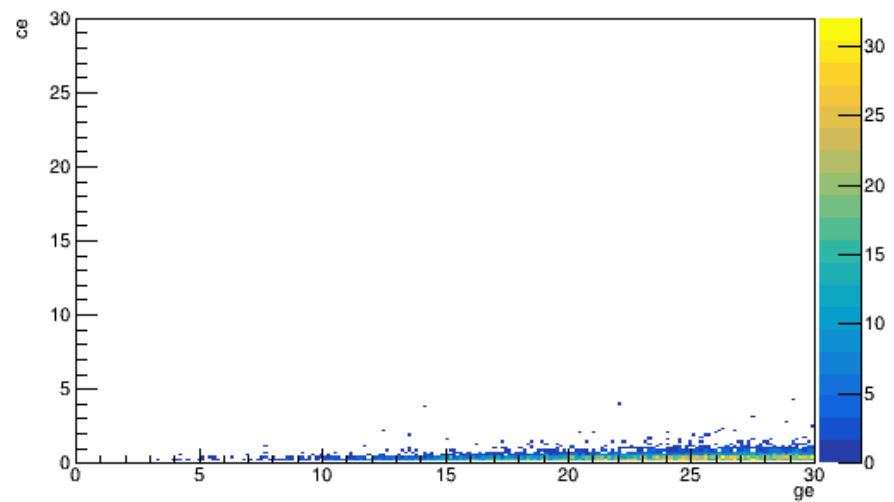
$\frac{c_e}{g_e}$ vs g_e (HCALIN)



$\frac{c_e - g_e}{g_e}$ vs g_e (HCALIN)

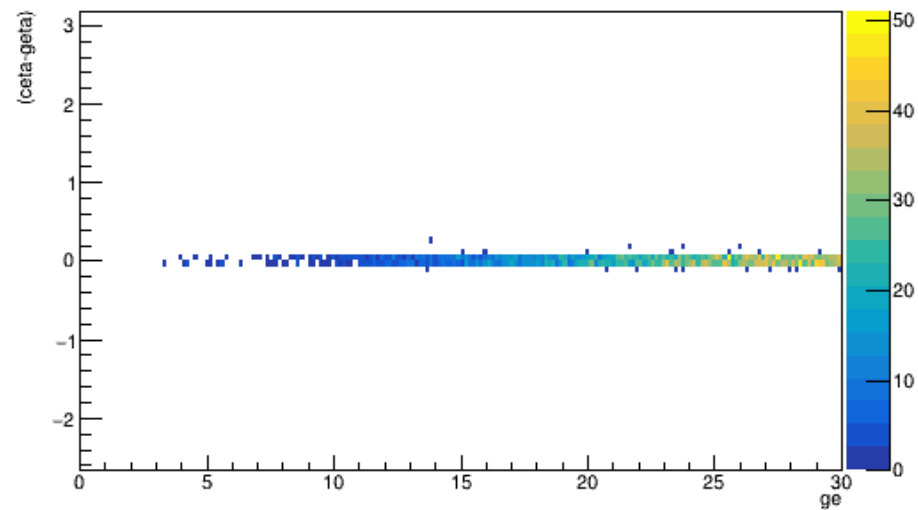


e vs g_e (HCALIN)

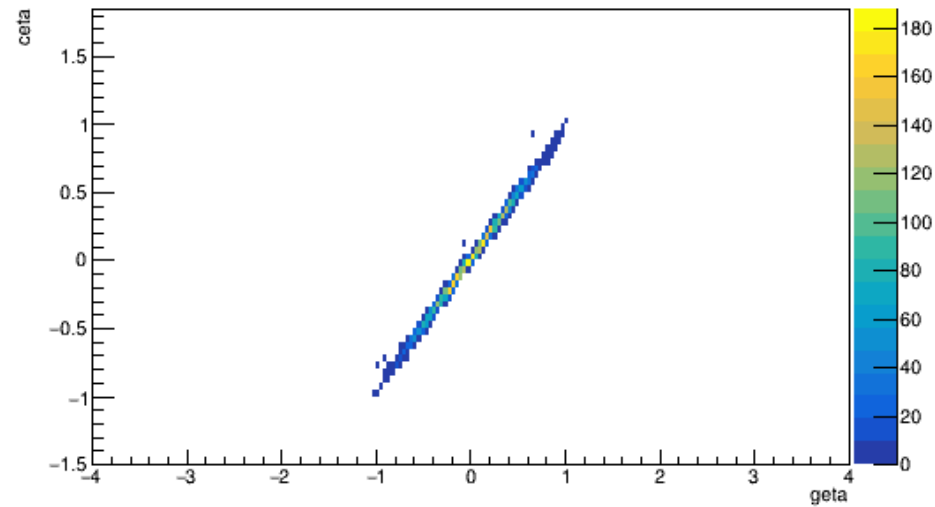


HCALIN: η : -1.1 to 1.1

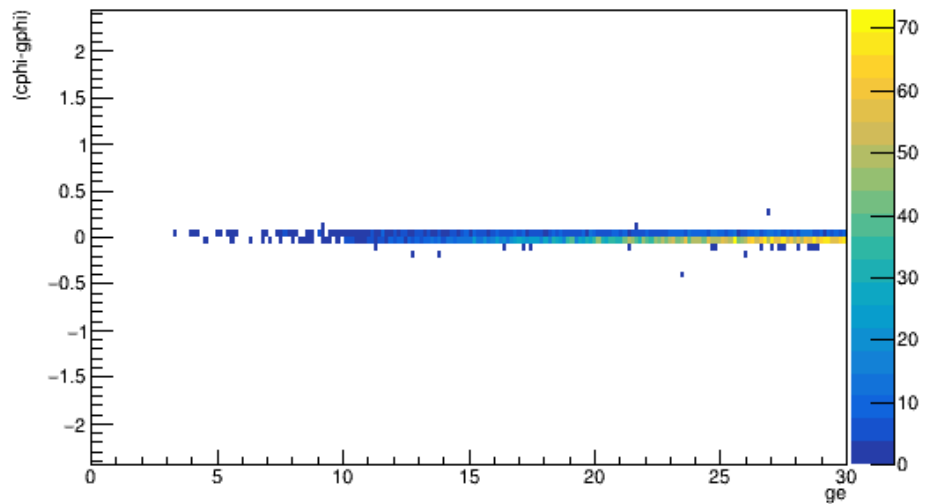
$\Delta \eta$ vs $g\eta$ (HCALIN)



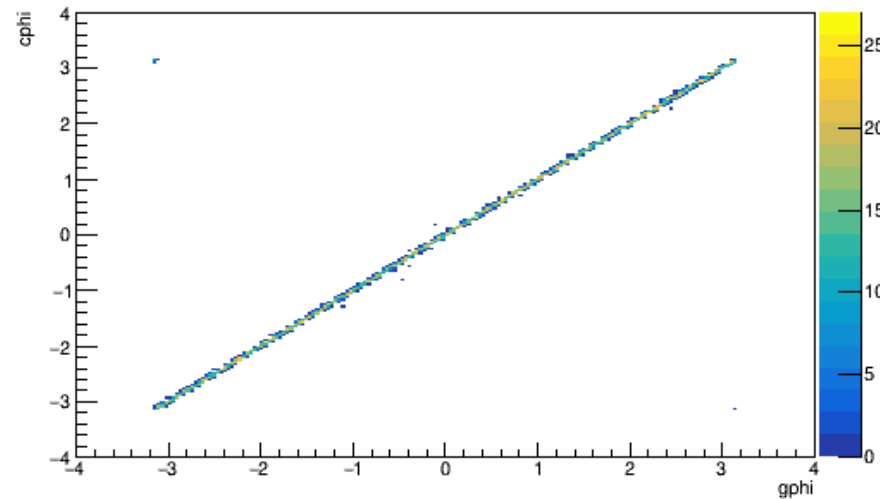
η vs $g\eta$ (HCALIN)



$\Delta \phi$ vs $g\eta$ (HCALIN)

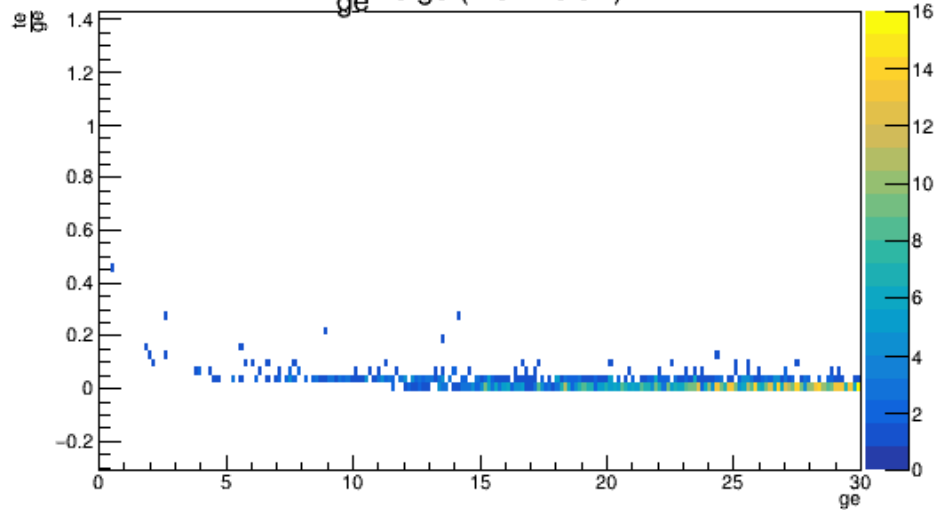


ϕ vs $g\phi$ (HCALIN)

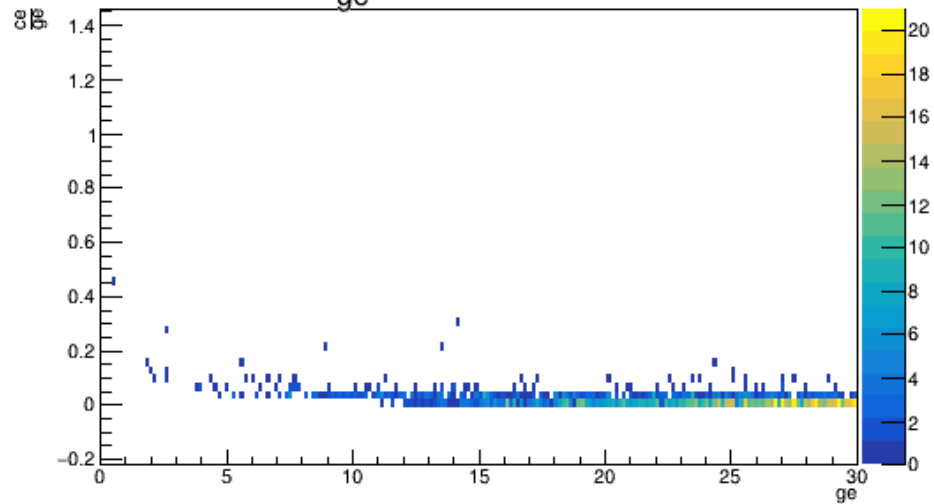


HCALOUT: η : -1.1 to 1.1

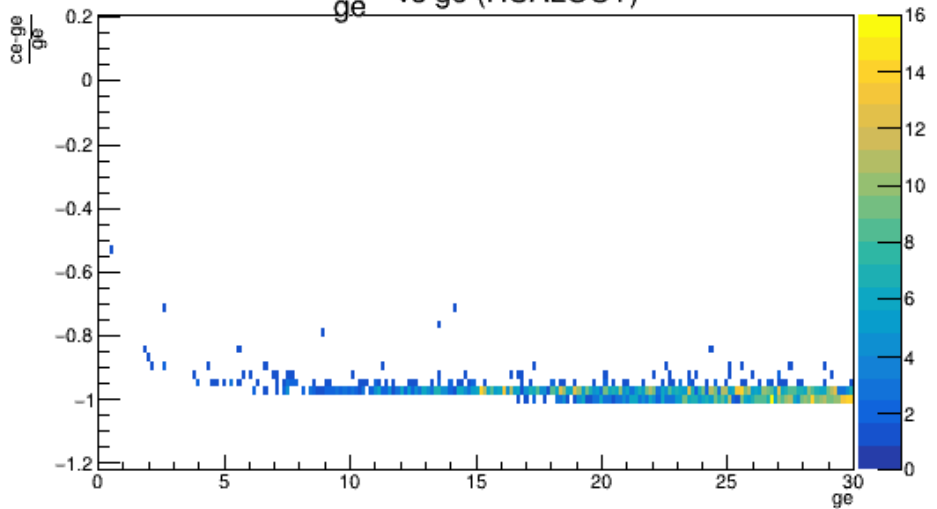
$\frac{te}{ge}$ vs ge (HCALOUT)



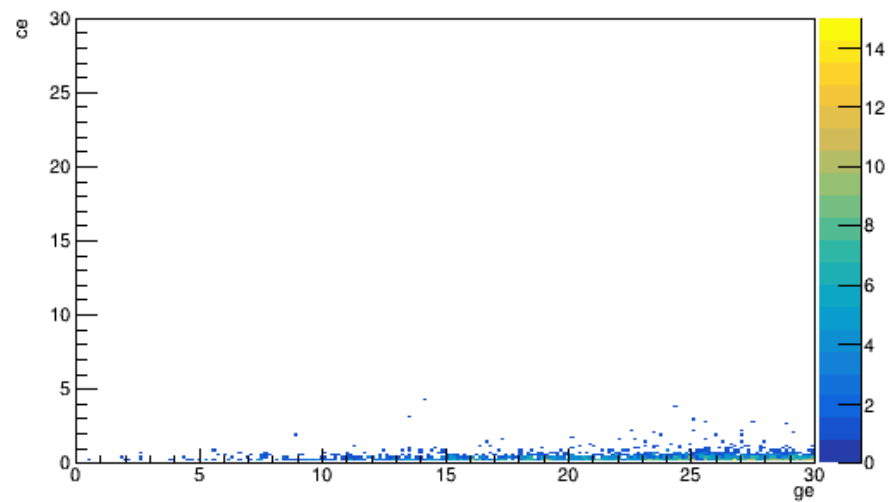
$\frac{ce}{ge}$ vs ge (HCALOUT)



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

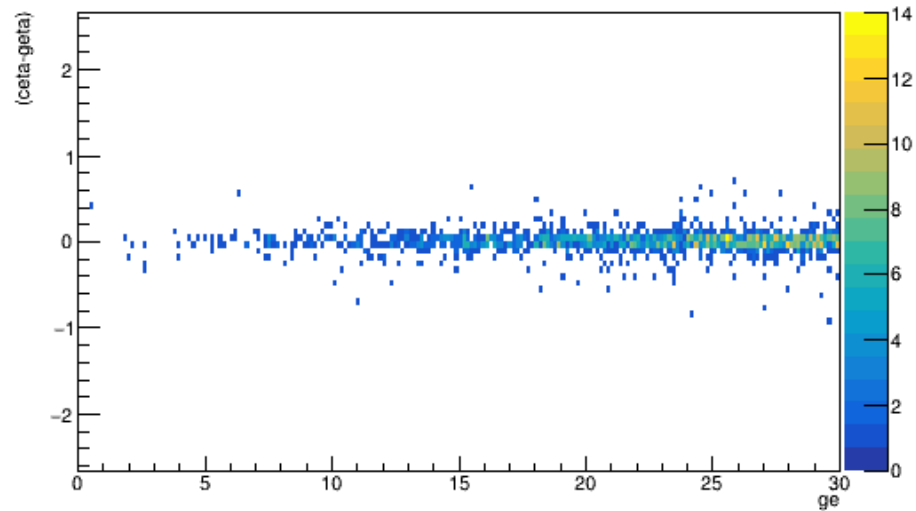


e vs ge (HCALOUT)

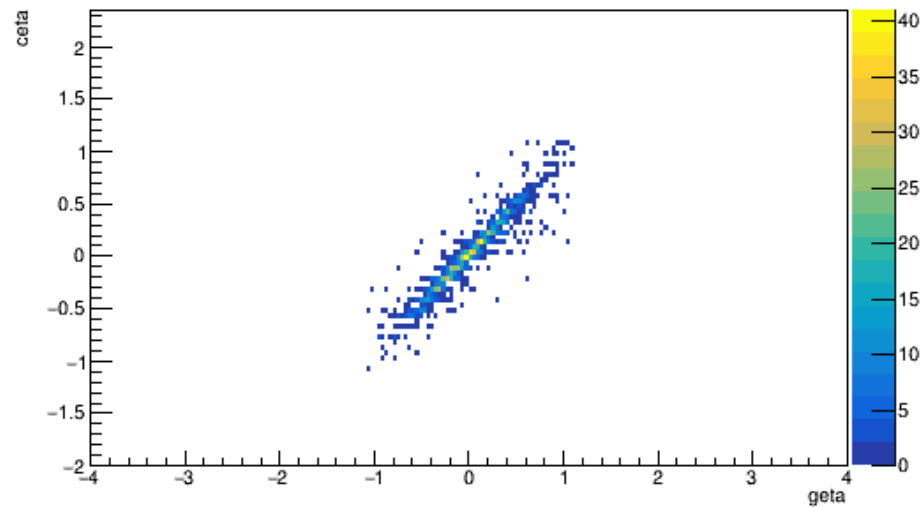


HCALOUT: η : -1.1 to 1.1

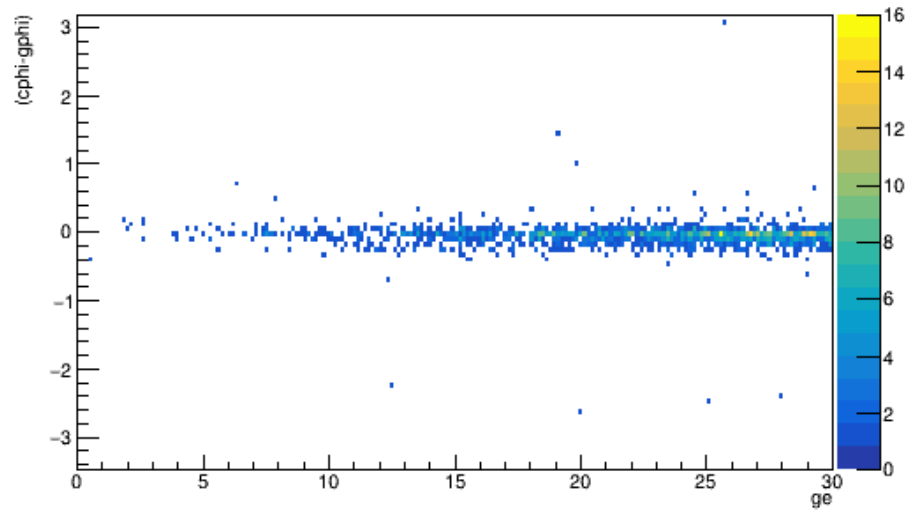
$\Delta \eta$ vs g_e (HCALOUT)



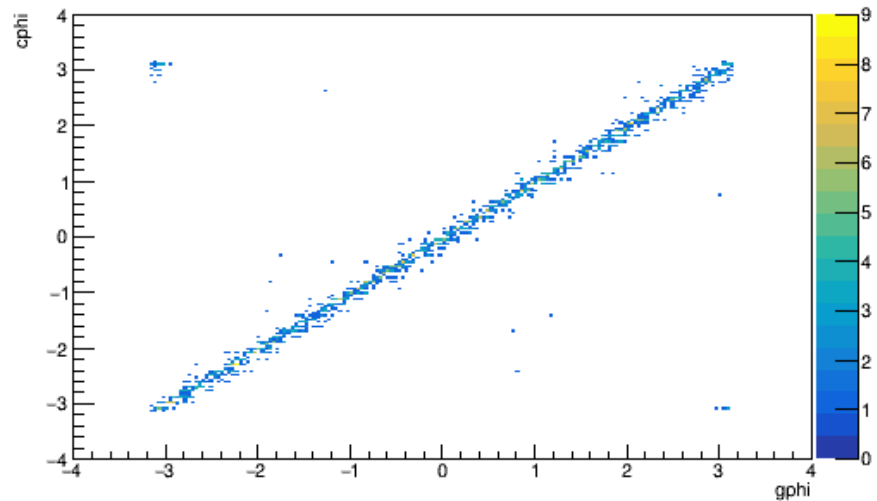
η vs g_{η} (HCALOUT)



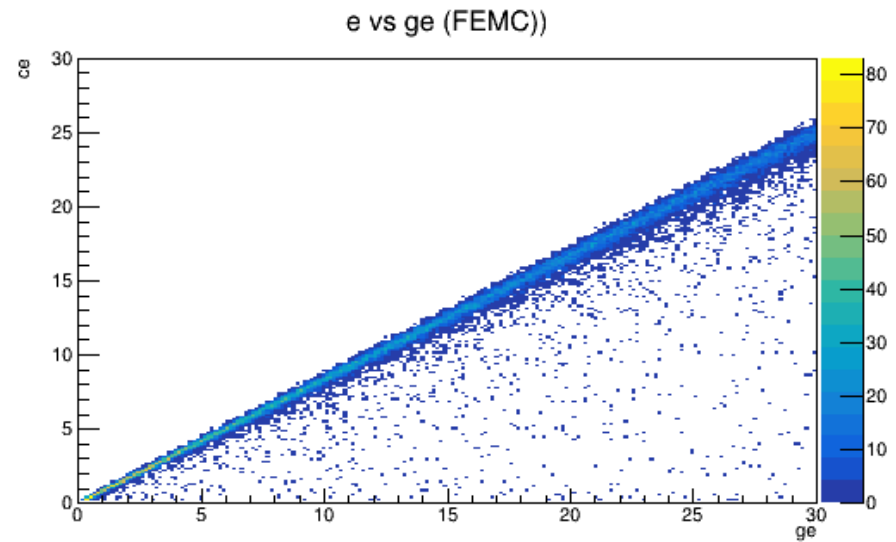
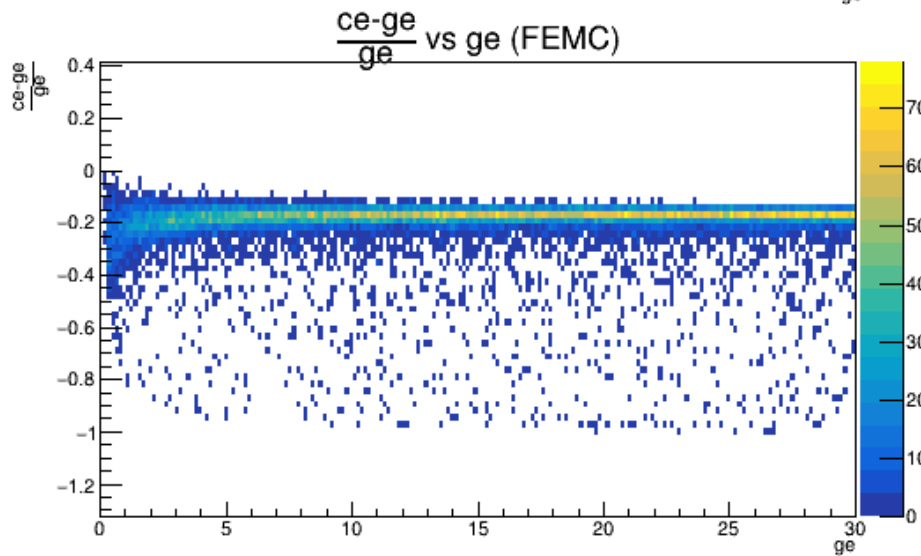
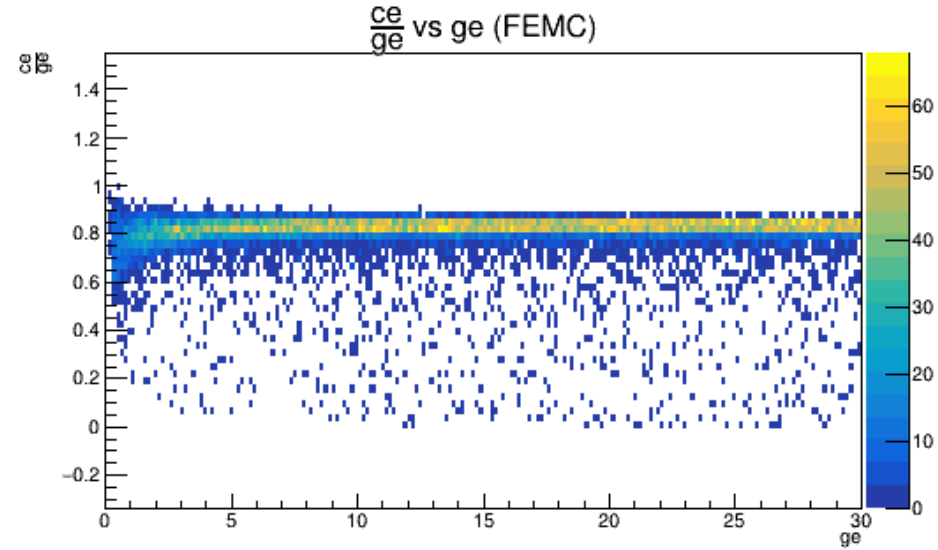
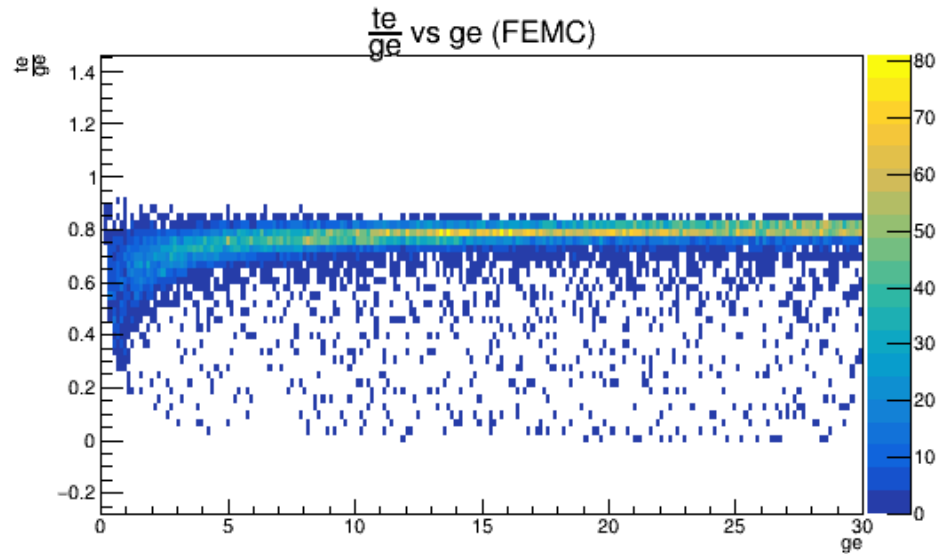
$\Delta \phi$ vs g_e (HCALOUT)



ϕ vs g_{ϕ} (HCALOUT)

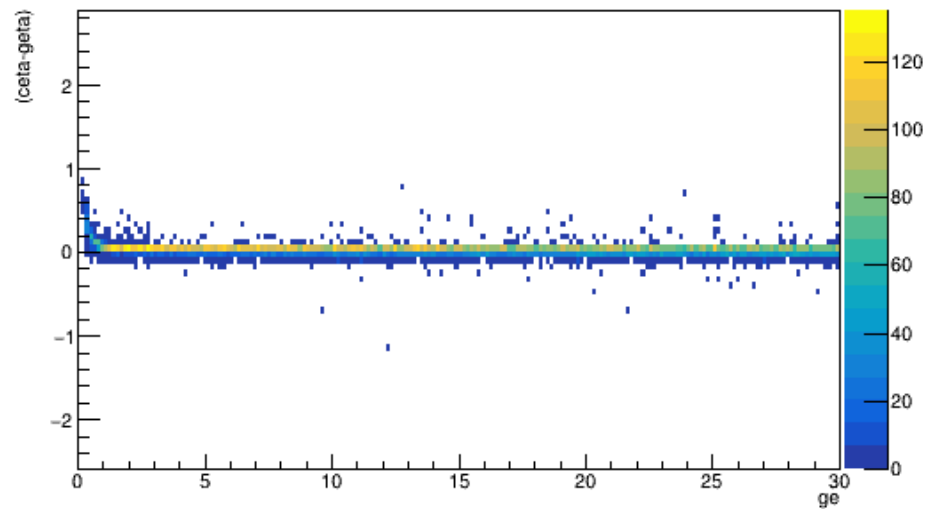


FEMC: η : 1.3 to 3.3

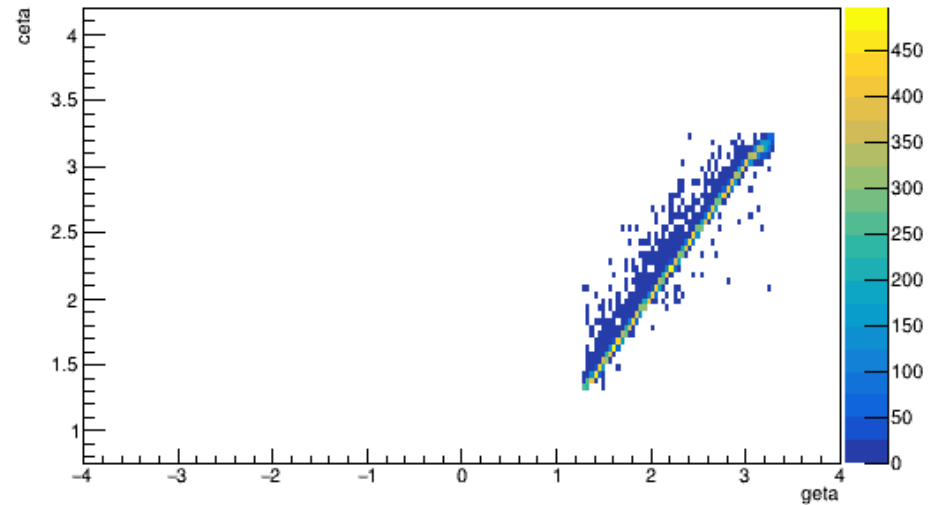


FEMC: η : 1.3 to 3.3

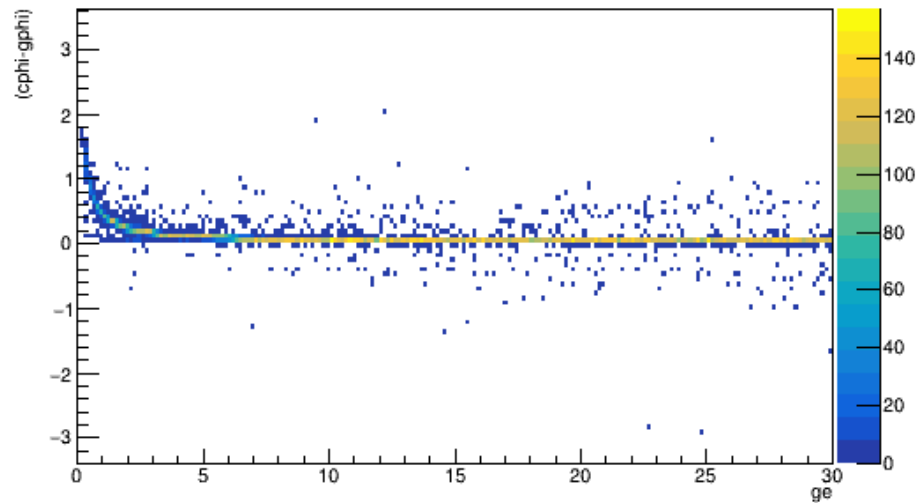
$\Delta \eta$ vs g_e (FEMC)



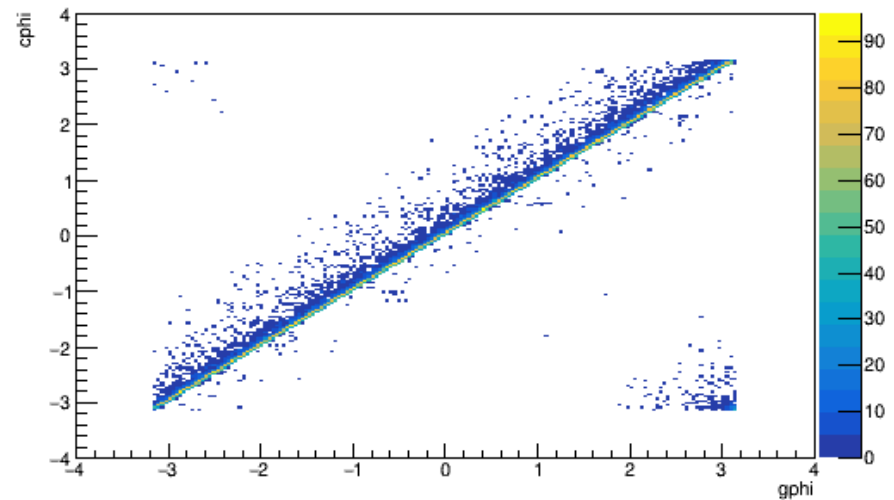
η vs $g\eta$ (FEMC)



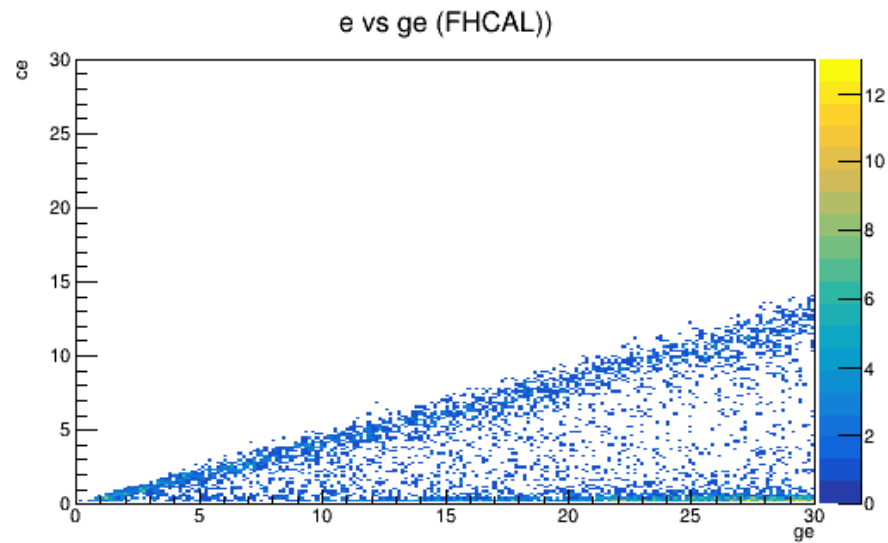
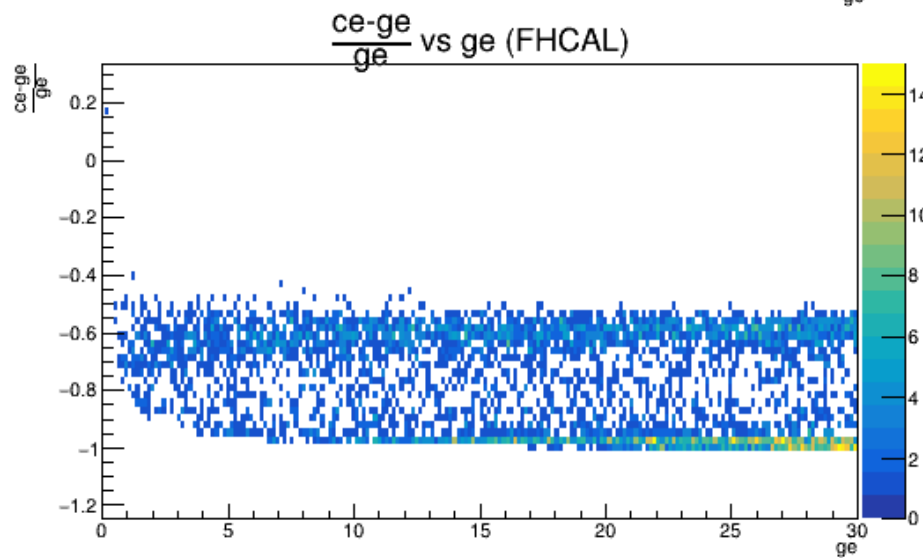
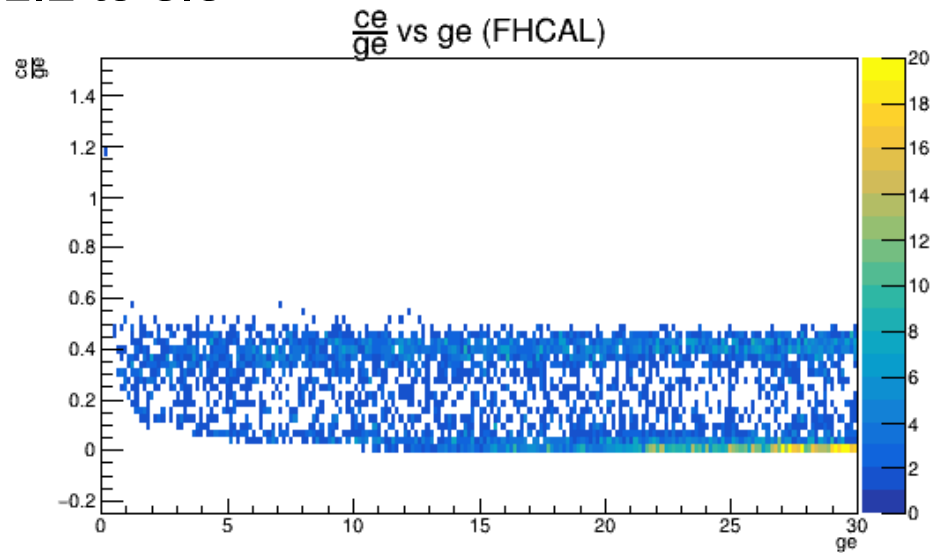
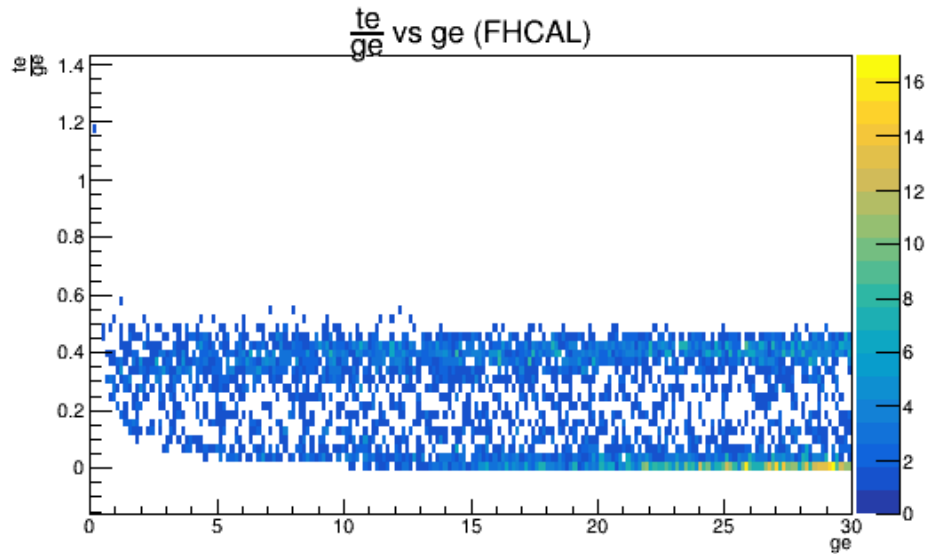
$\Delta \phi$ vs g_e (FEMC)



ϕ vs $g\phi$ (FEMC)

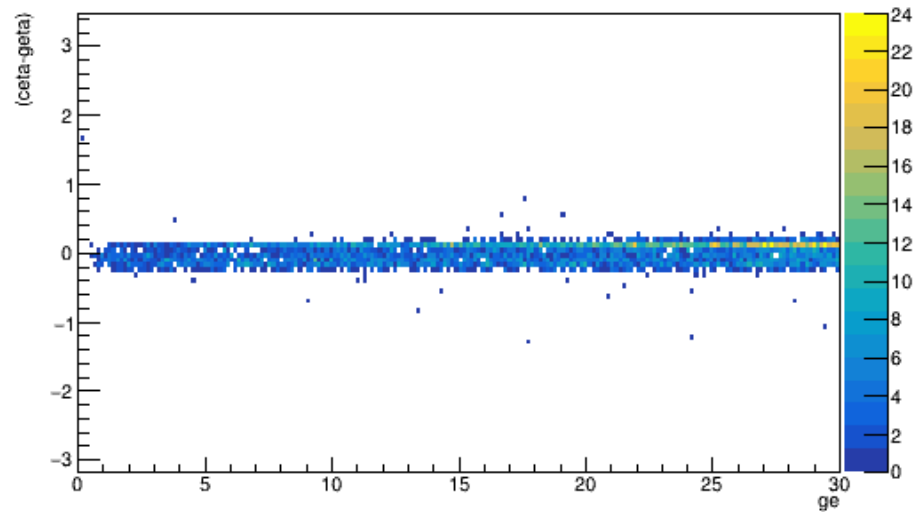


FHCAL: η : 1.2 to 3.5

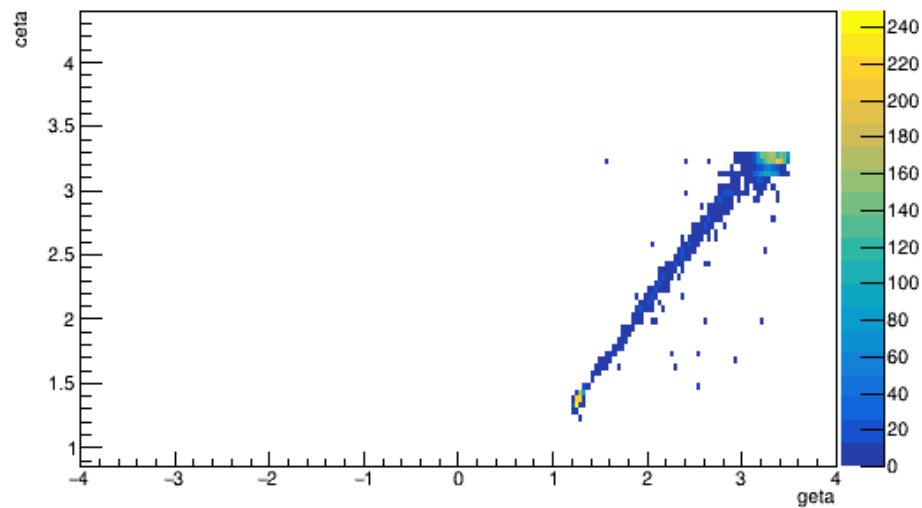


FHCAL: η : 1.2 to 3.5

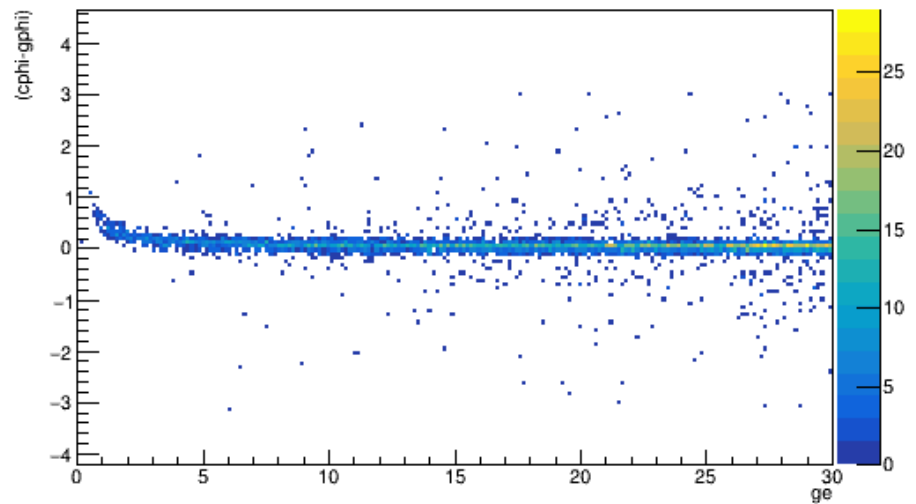
$\Delta \eta$ vs g_e (FHCAL)



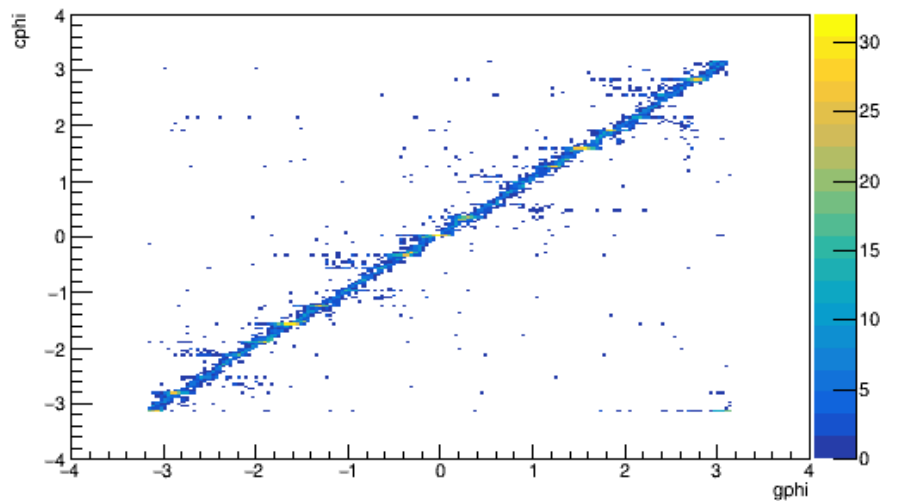
η vs g_e (FHCAL)



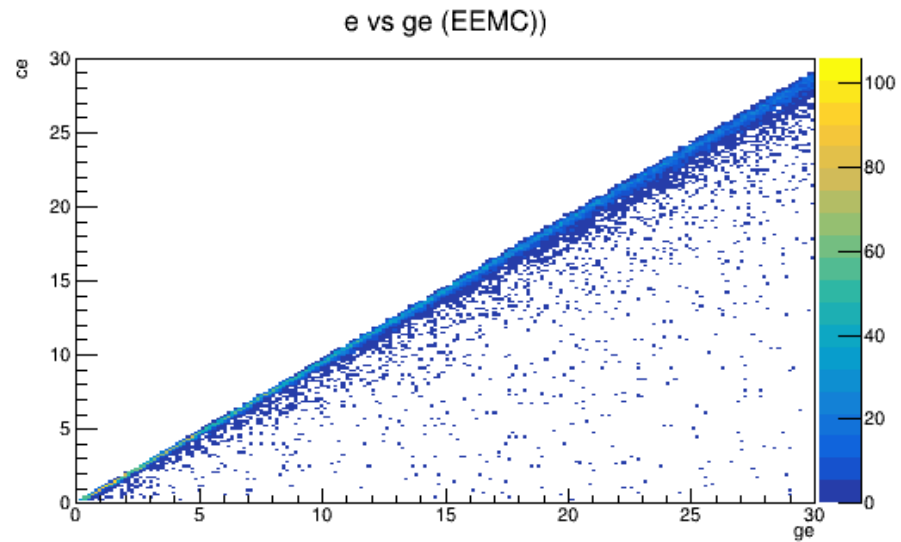
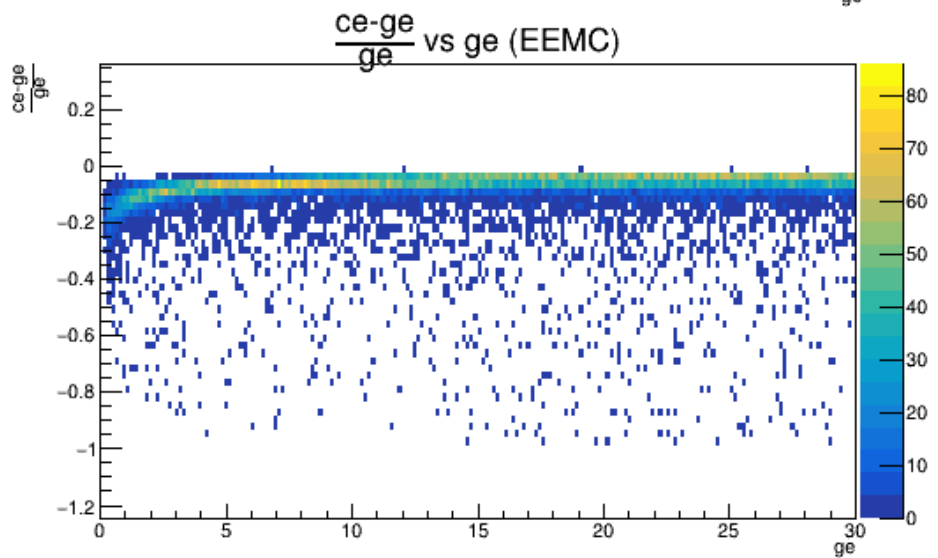
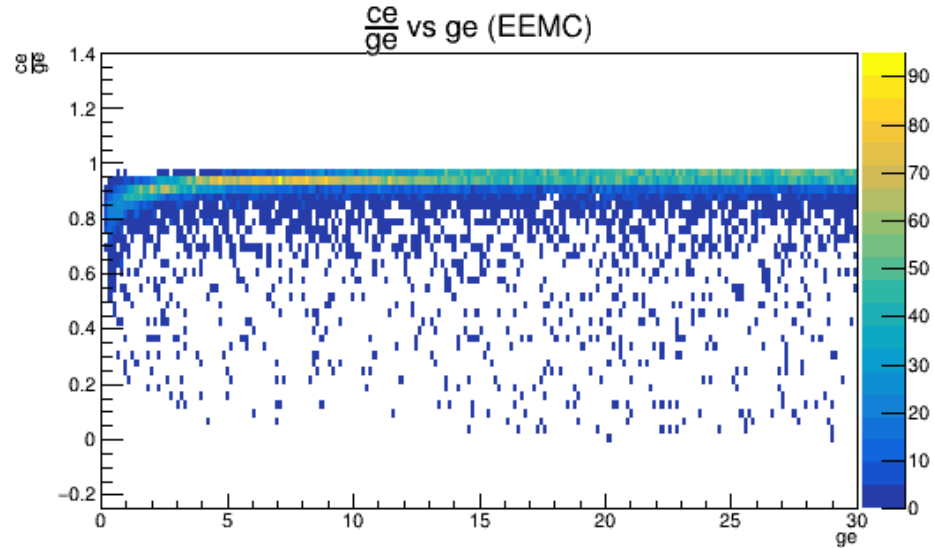
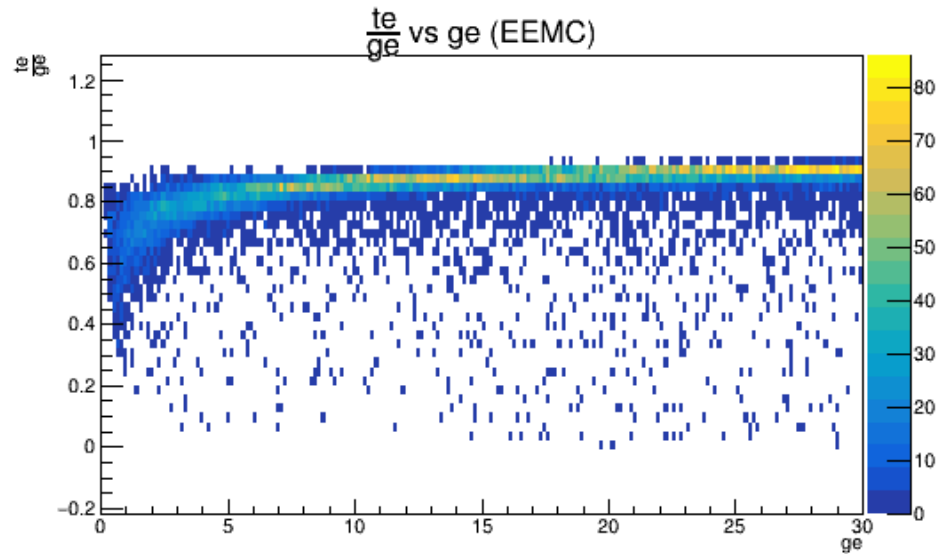
$\Delta \phi$ vs g_e (FHCAL)



ϕ vs g_ϕ (FHCAL)

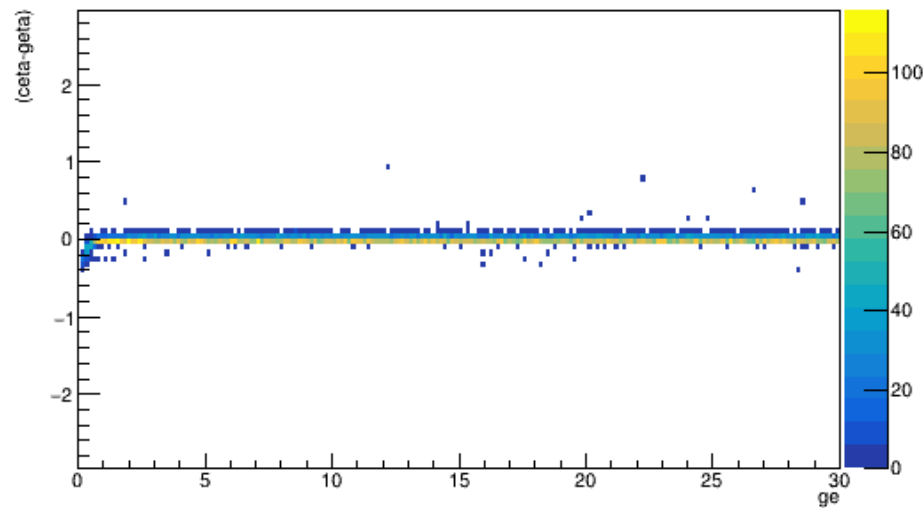


EEMC: η : -3.5 to -1.7

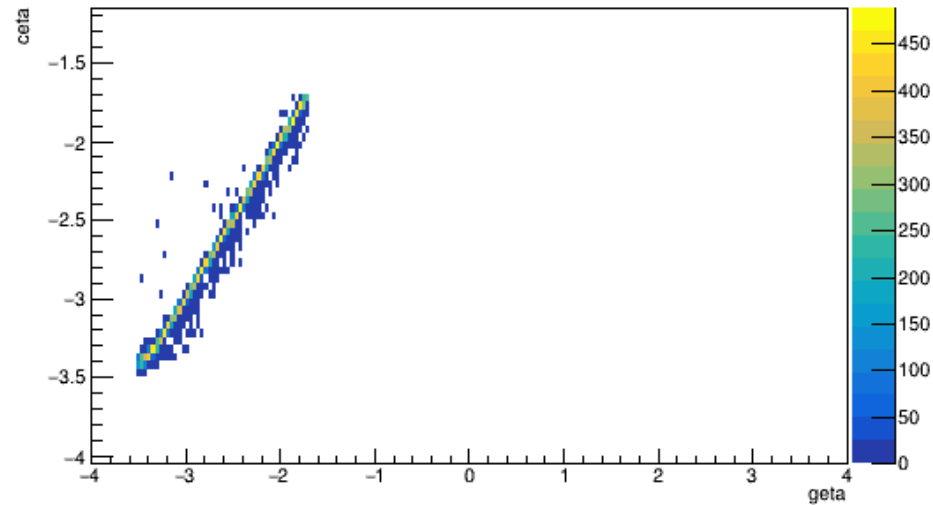


EEMC: η : -3.5 to -1.7

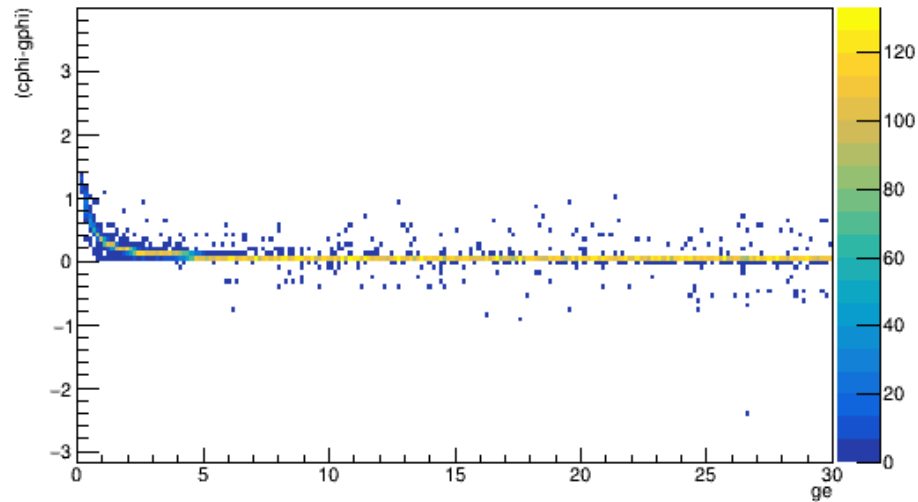
$\Delta \eta$ vs $g\eta$ (EEMC)



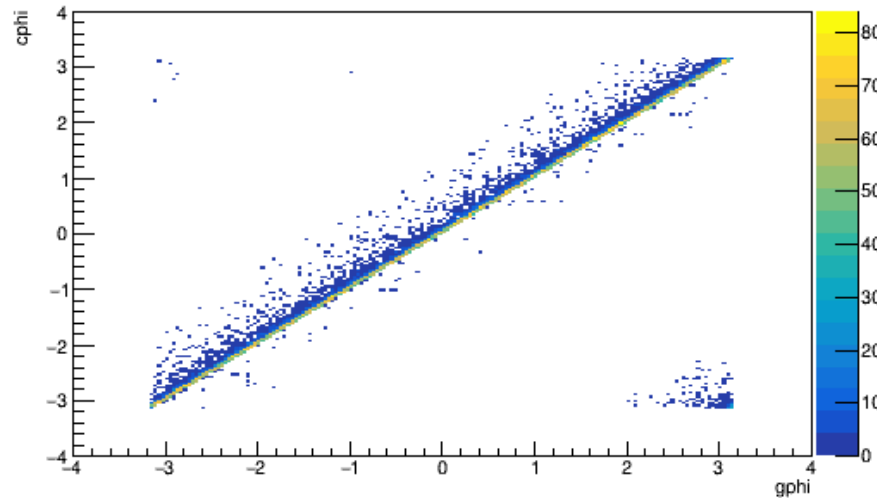
η vs $g\eta$ (EEMC)



$\Delta \phi$ vs $g\eta$ (EEMC)



ϕ vs $g\phi$ (EEMC)



Added energies

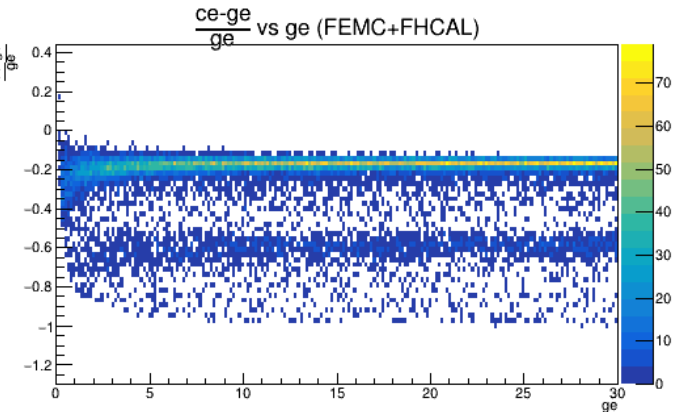
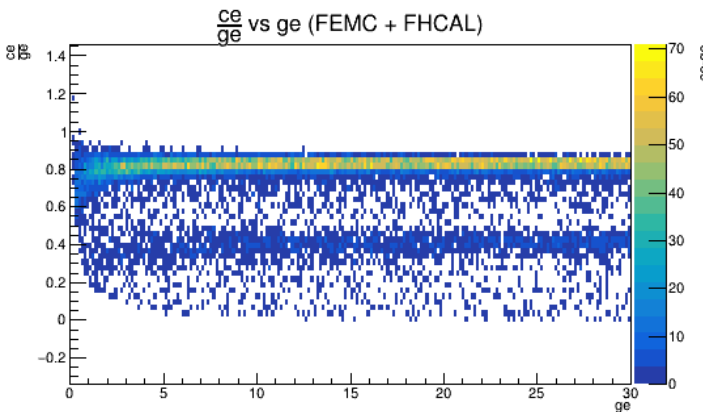
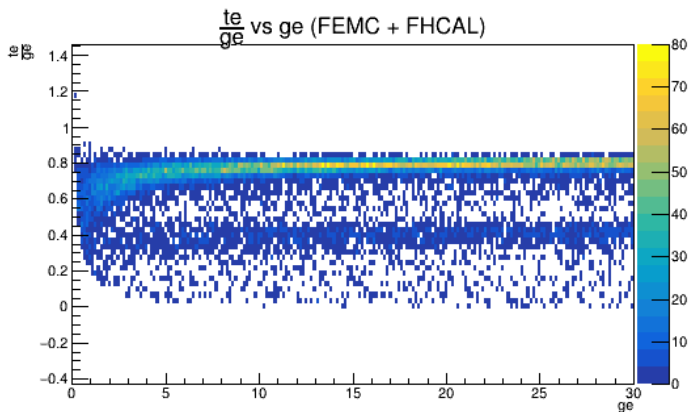
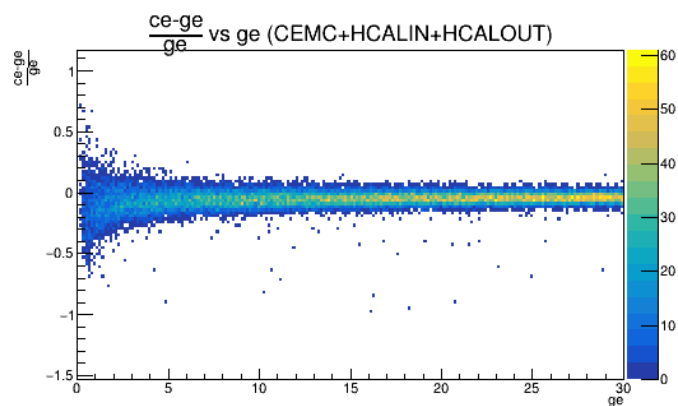
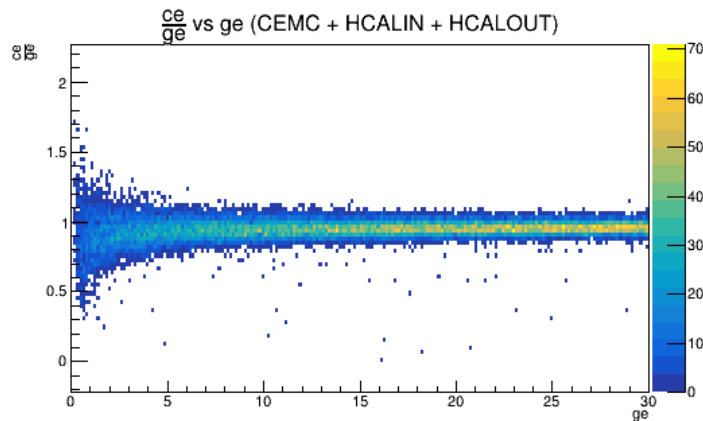
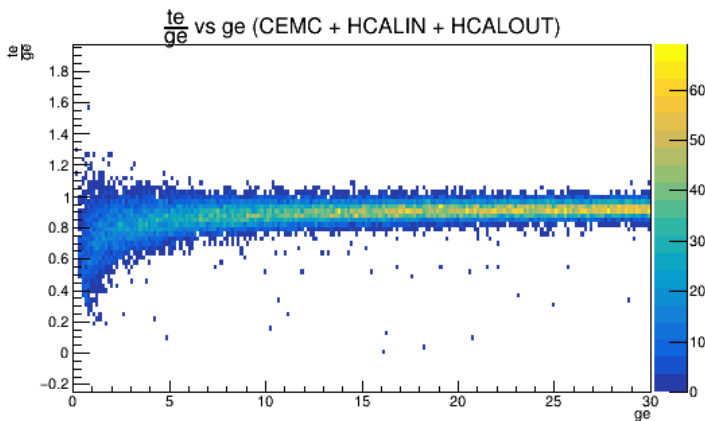
CEMC: η : -1.5 to 1.2

HCALIN: η : -1.1 to 1.1

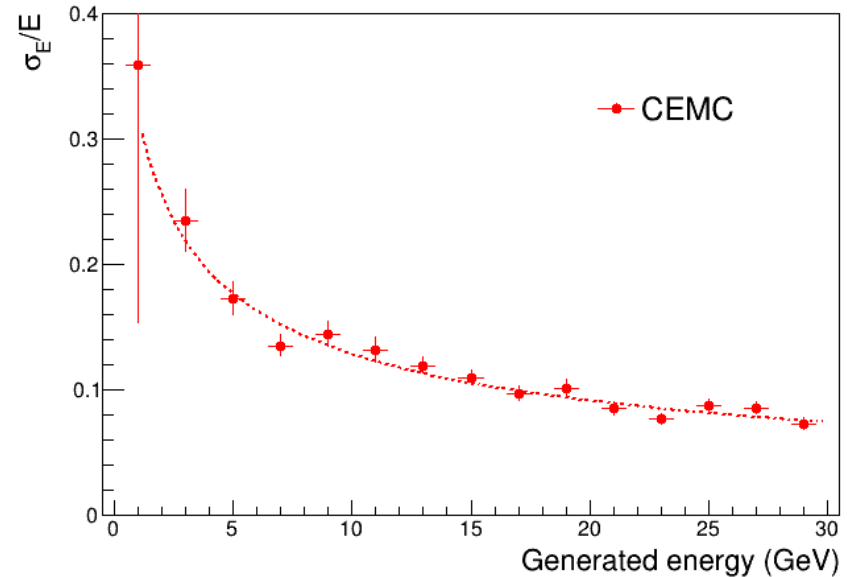
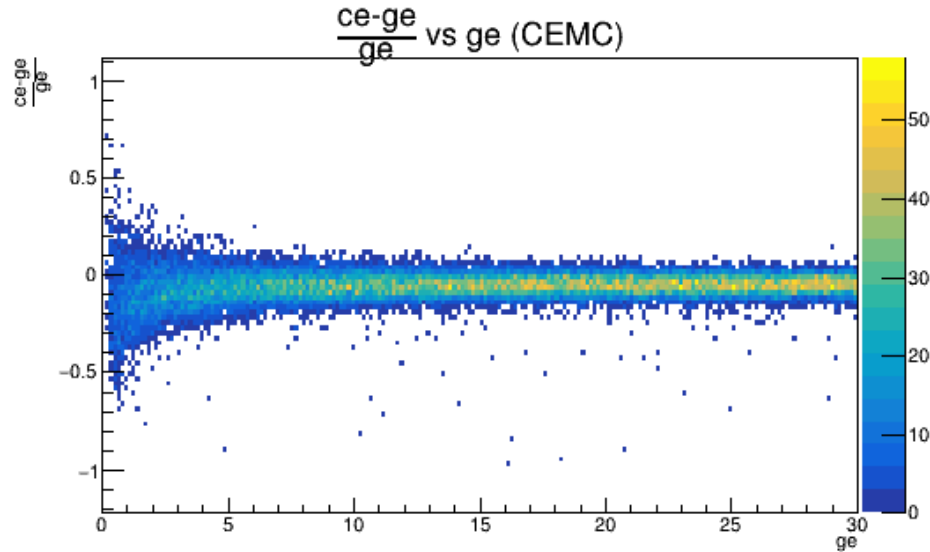
HCALOUT: η : -1.1 to 1.1

FEMC: η : 1.3 to 3.3

FHCAL: η : 1.2 to 3.5



Electron – Energy resolution (CEMC)



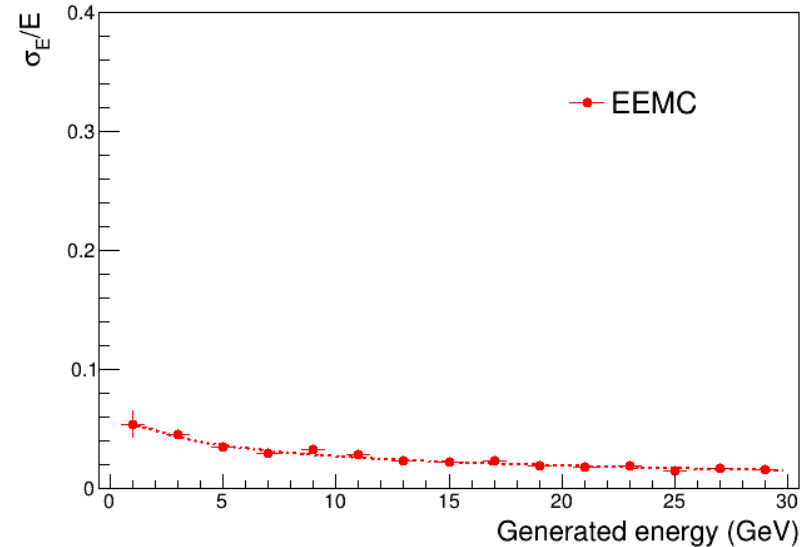
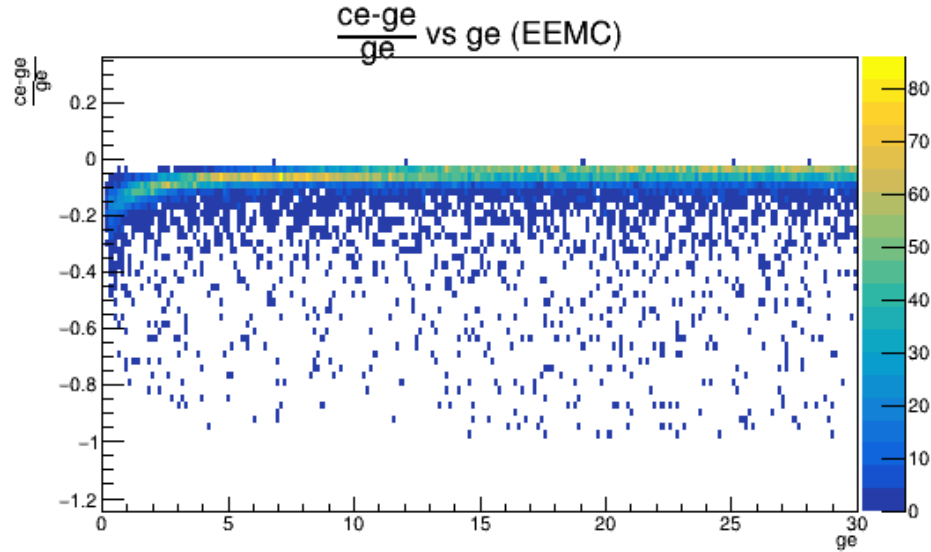
$$y=[0] + [1] / \sqrt{x} + [2] / x$$

[0]: -0.0100199 (1%)

[1]: 0.490374 (49%)

[2]: -0.164575 (16.4%)

Electron – Energy resolution (EEMC)



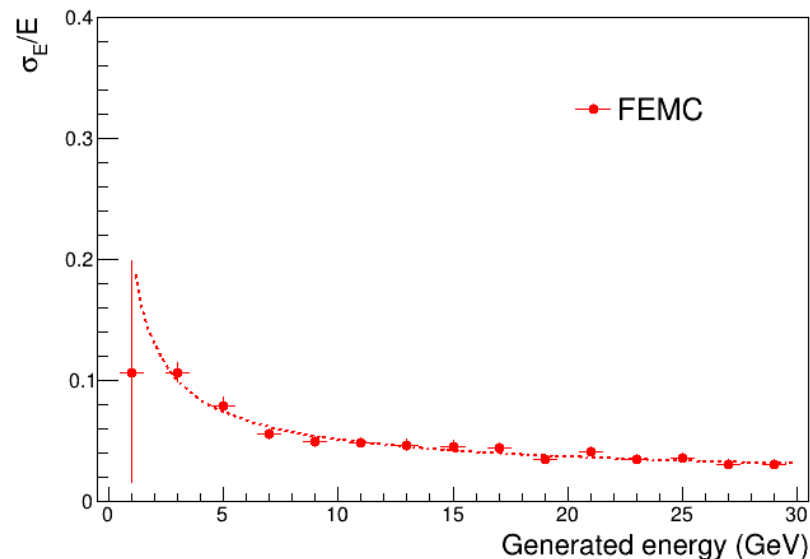
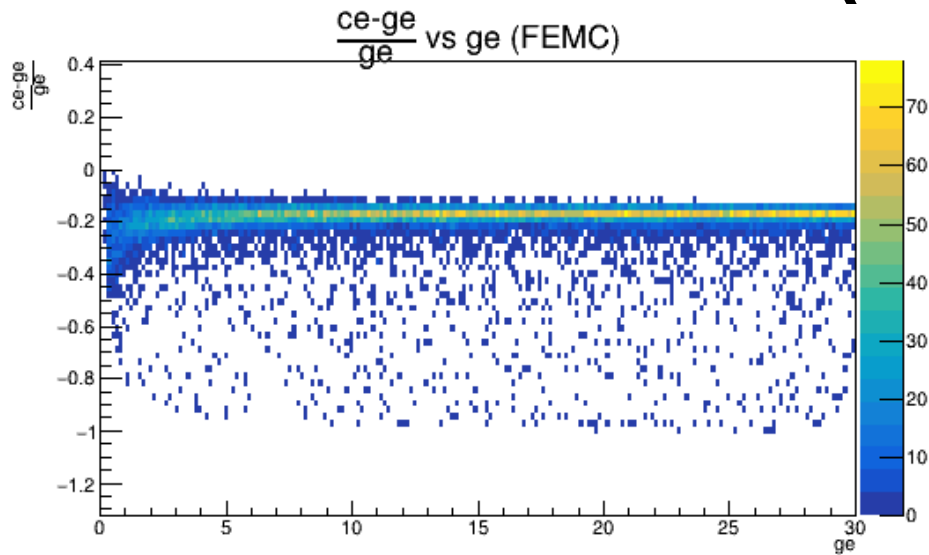
$$y=[0] + [1] / \text{sqrt}(x) + [2] / x$$

[0]: -0.00456897(0.4%)

[1]: 0.118390 (11.8%)

[2]: -0.0608926 (6%)

Electron – Energy resolution (FEMC)



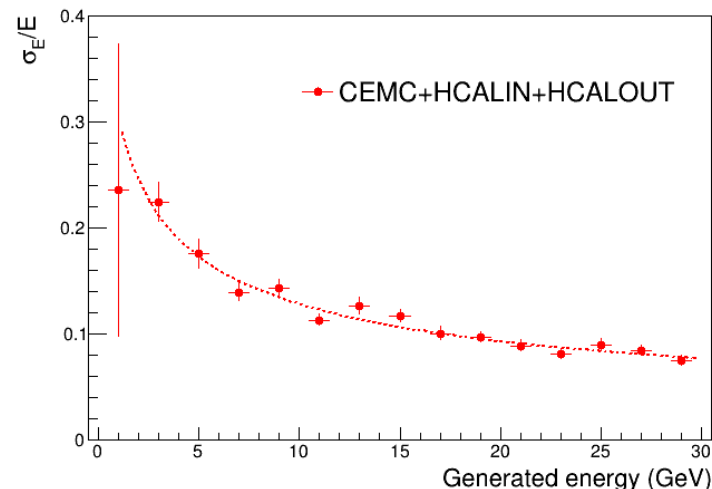
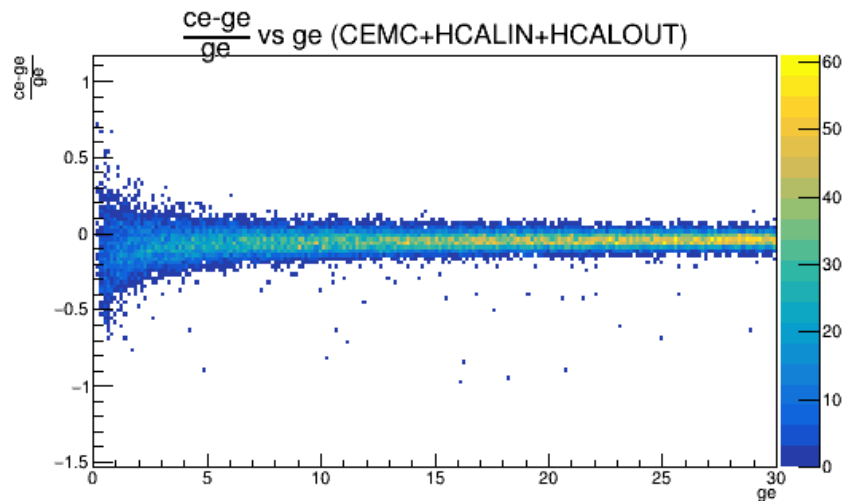
$$y=[0] + [1] / \text{sqrt}(x) + [2] / x$$

[0]: 0.00901082(0.9%)

[1]: 0.103755 (10.3%)

[2]: 0.092878 (9%)

Electron – Energy resolution (CEMC+HCALIN+HCALOUT)



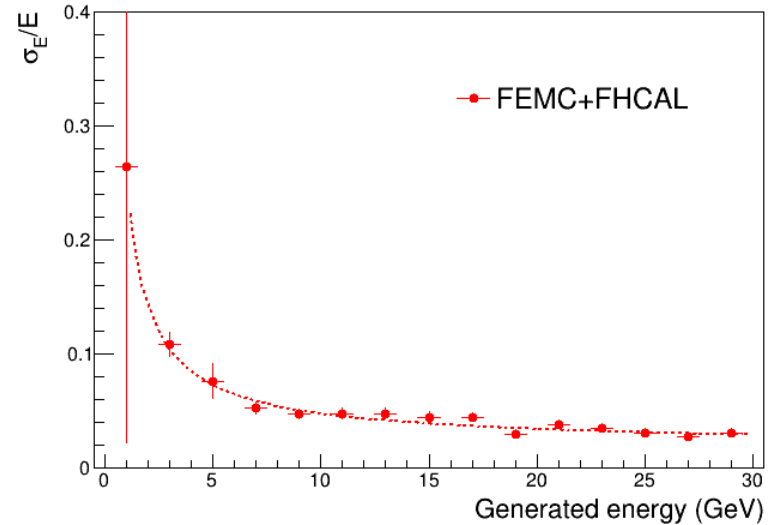
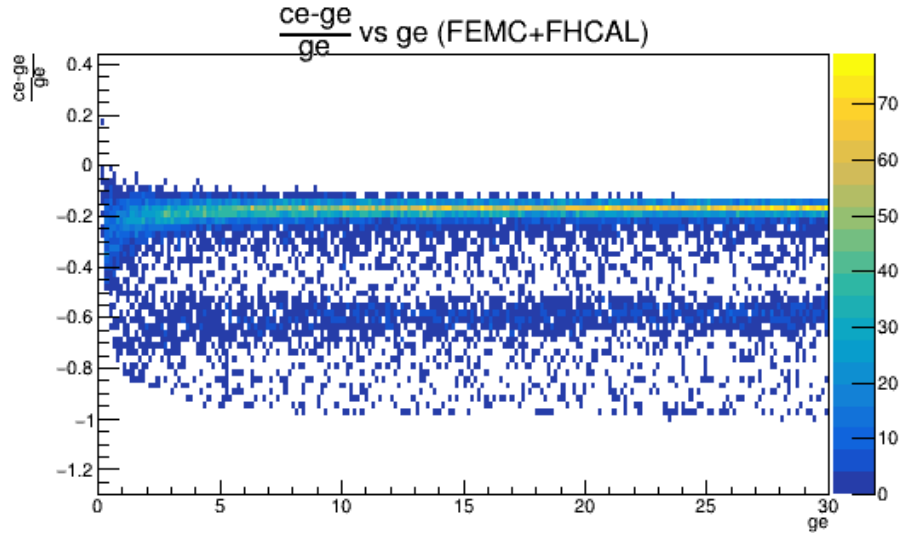
$$y = [0] + [1] / \sqrt{x} + [2] / x$$

[0]: -0.00276476(0.2%)

[1]: 0.464782 (46%)

[2]: -0.161309 (16%)

Electron – Energy resolution (FEMC+FHCAL)



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

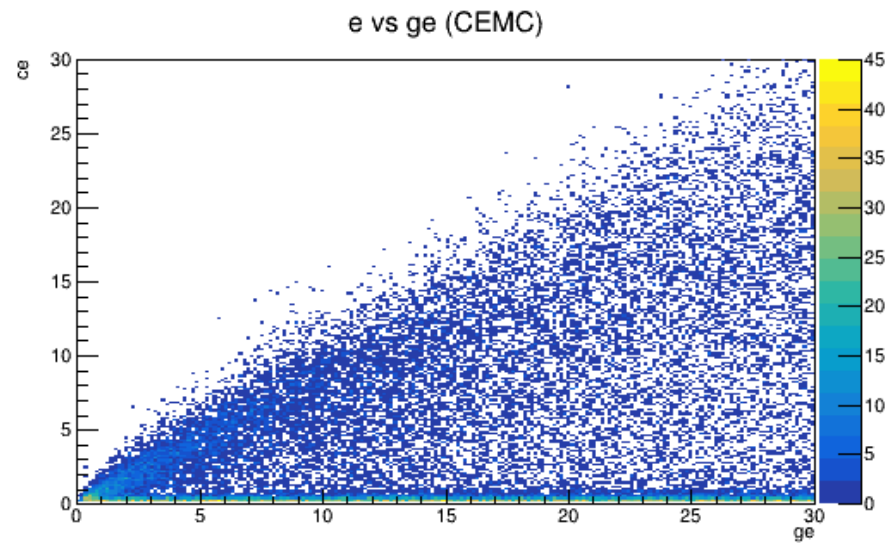
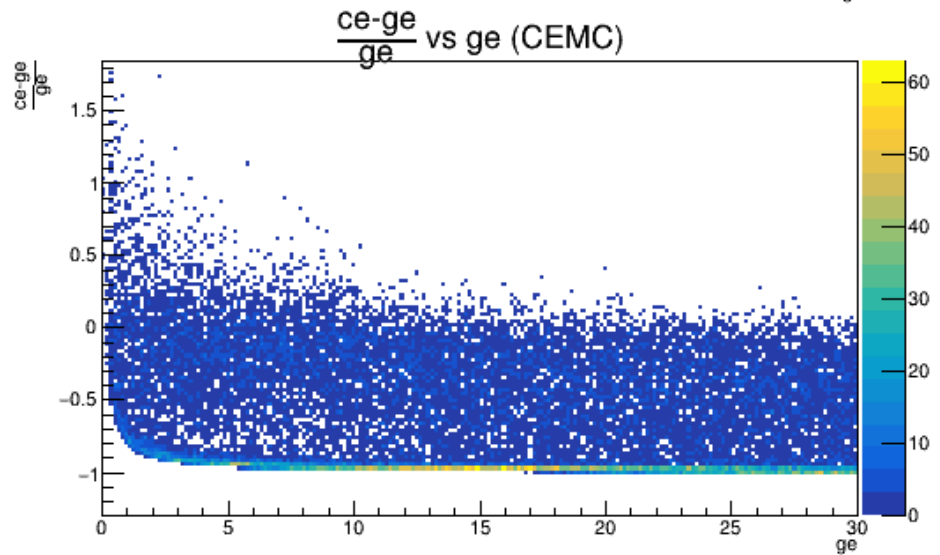
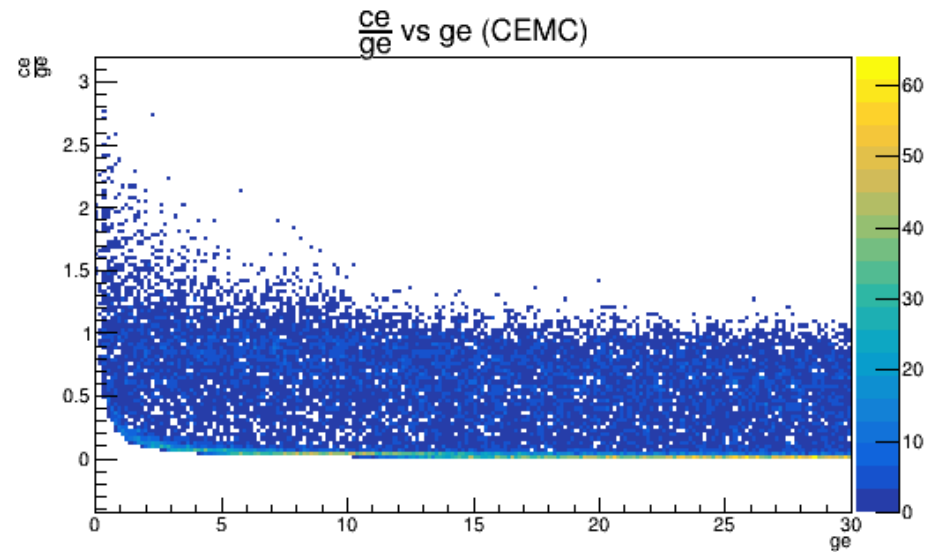
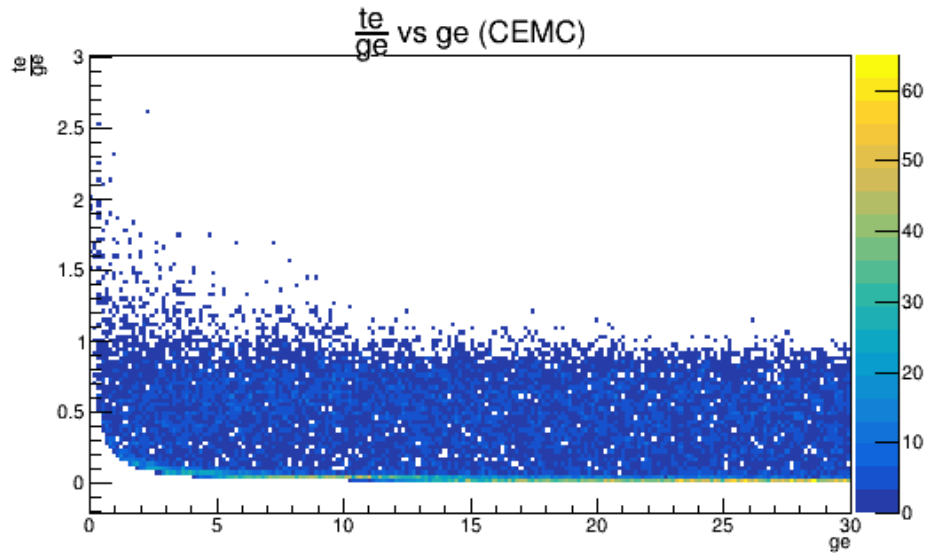
[0]: 0.0140835(1.4%)

[1]: 0.471767 (47%)

[2]: 0.188482 (19%)

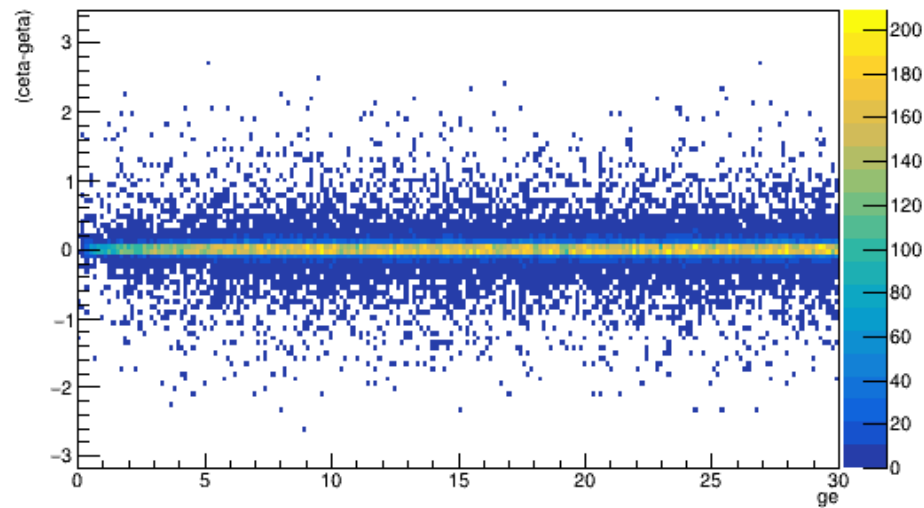
Pion

CEMC: η : -1.5 to 1.2

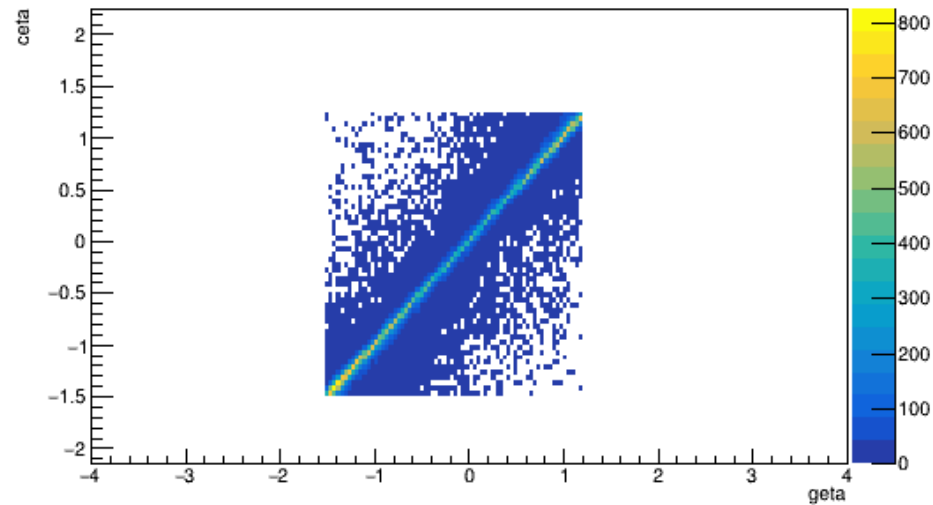


CEMC: η : -1.5 to 1.2

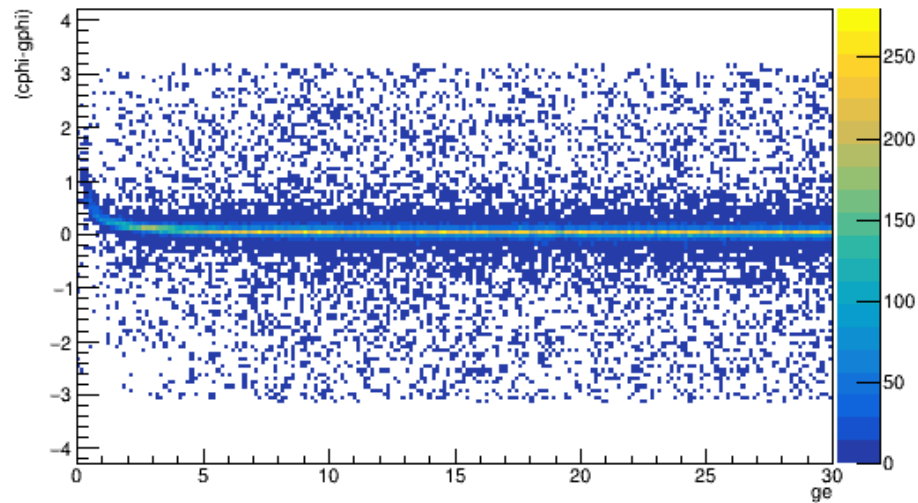
$\Delta \eta$ vs $g\eta$ (CEMC)



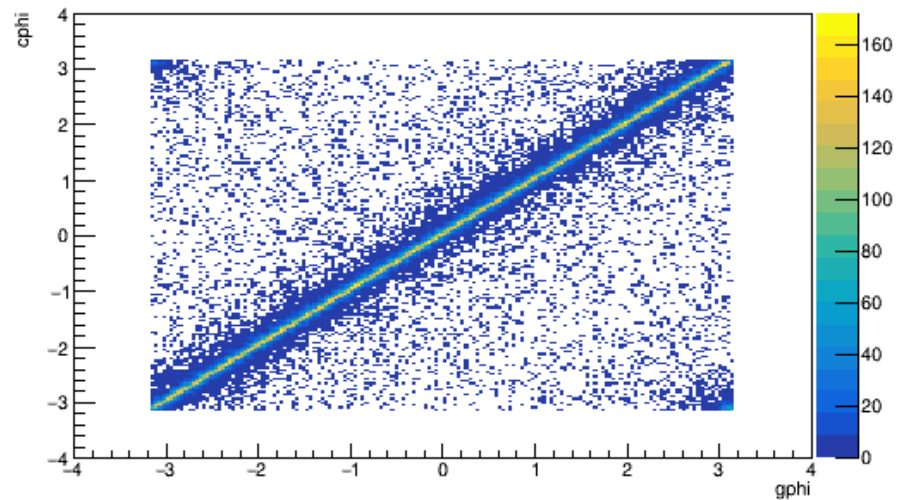
η vs $g\eta$ (CEMC)



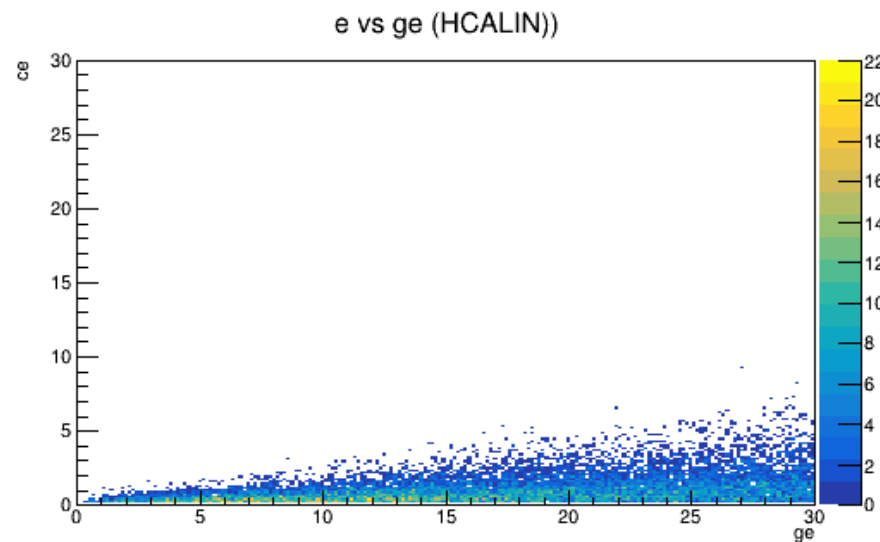
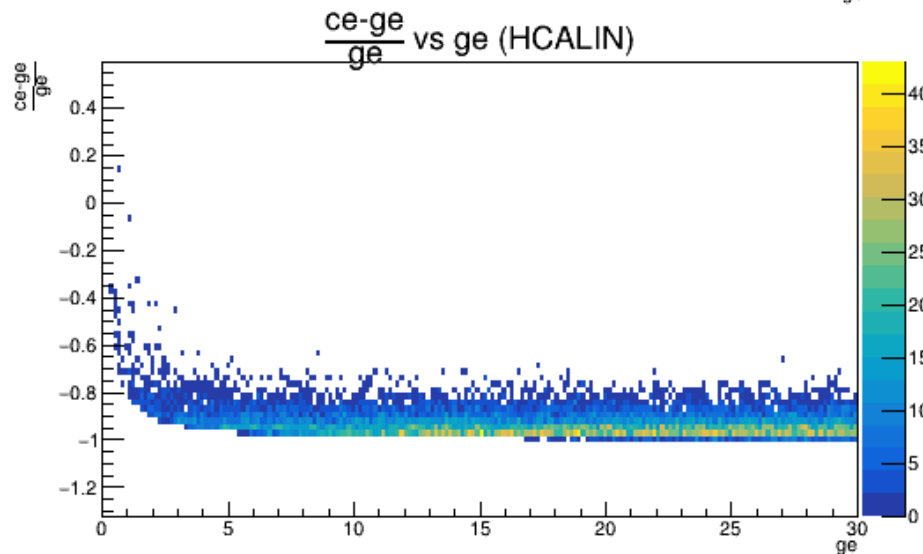
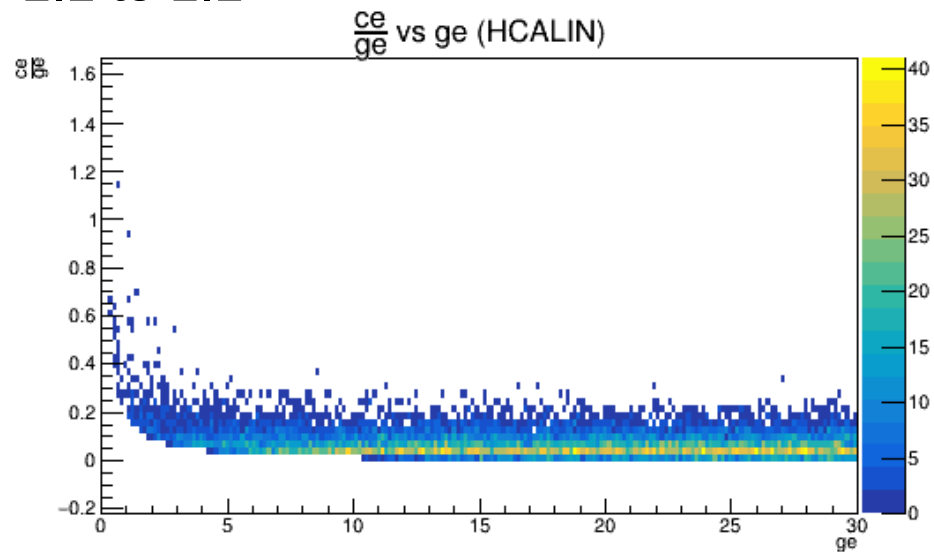
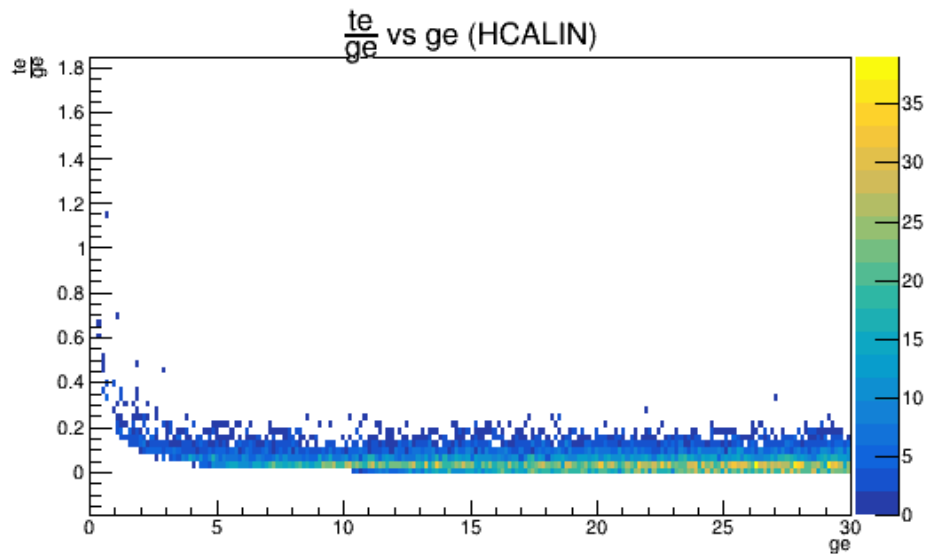
$\Delta \phi$ vs $g\eta$ (CEMC)



ϕ vs $g\phi$ (CEMC)

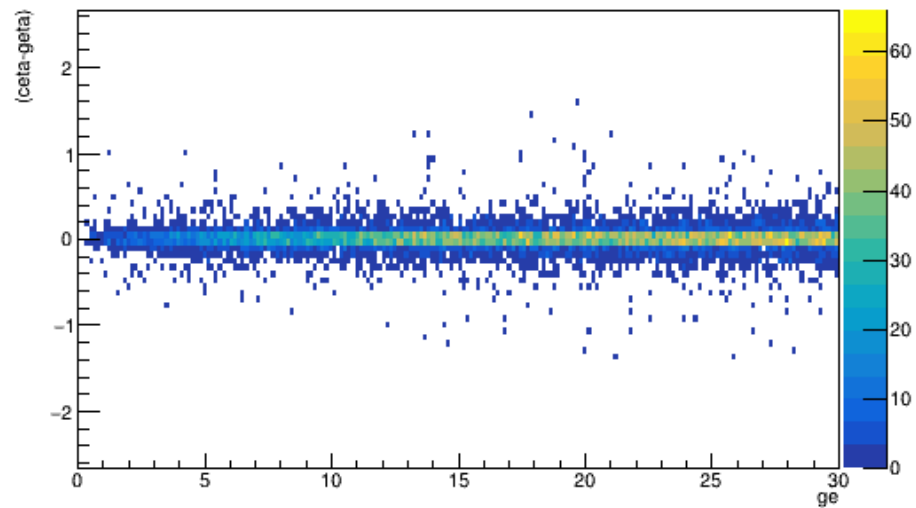


HCALIN: η : -1.1 to 1.1

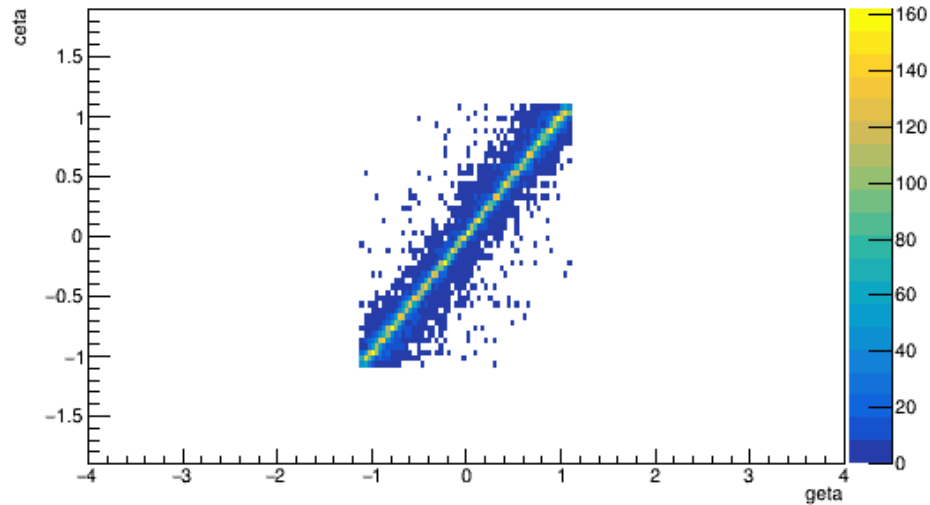


HCALIN: η : -1.1 to 1.1

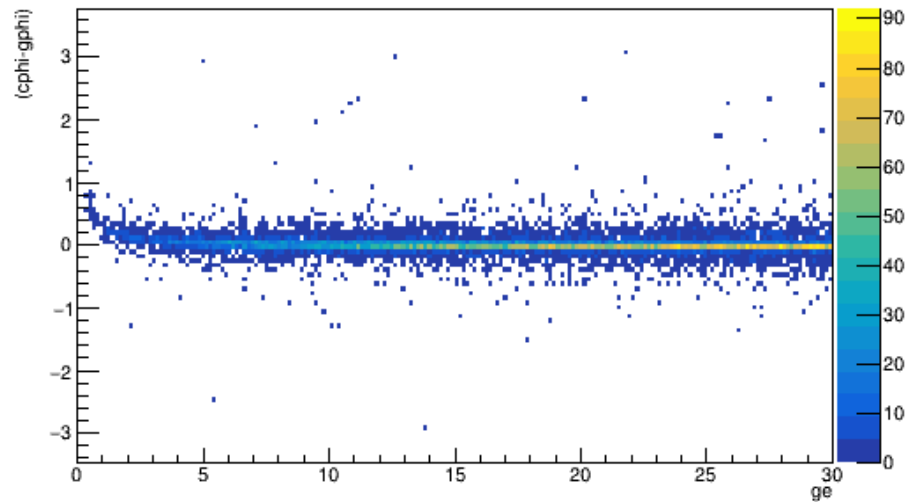
$\Delta \eta$ vs $g\eta$ (HCALIN)



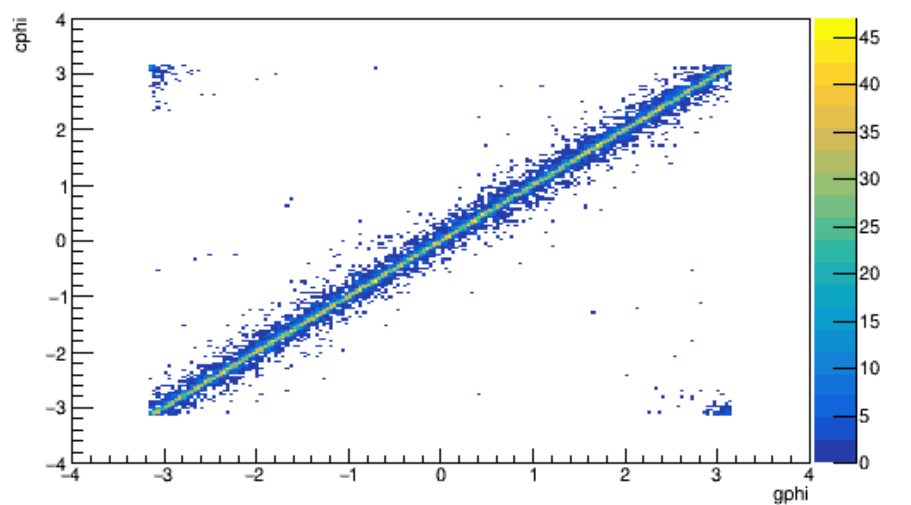
η vs $g\eta$ (HCALIN)



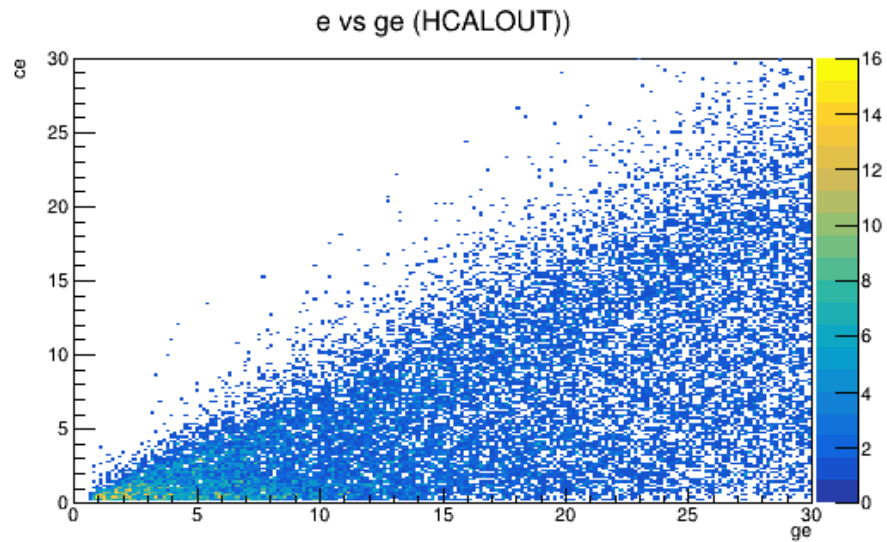
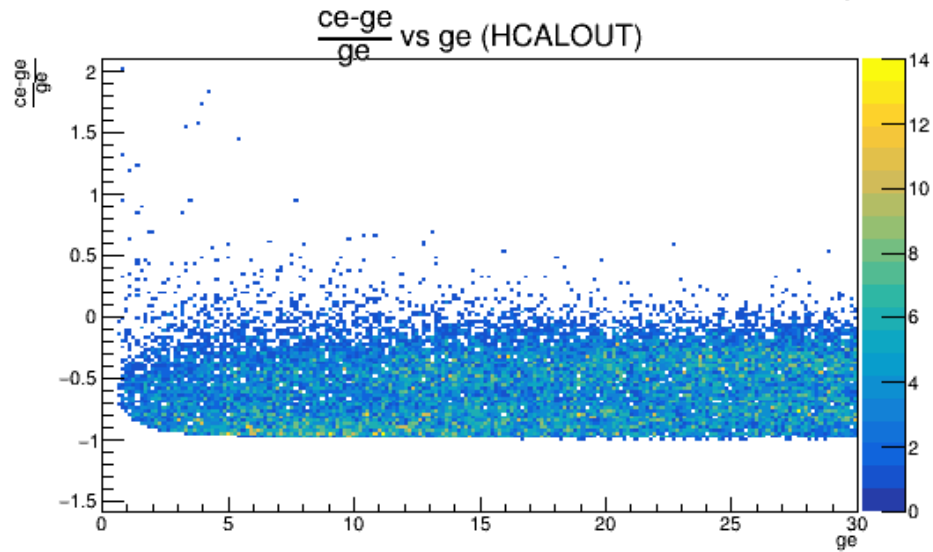
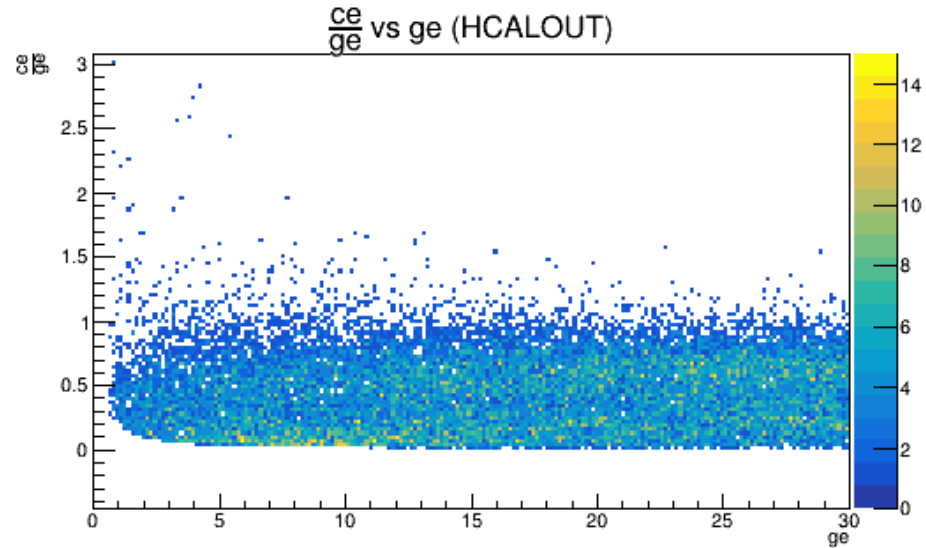
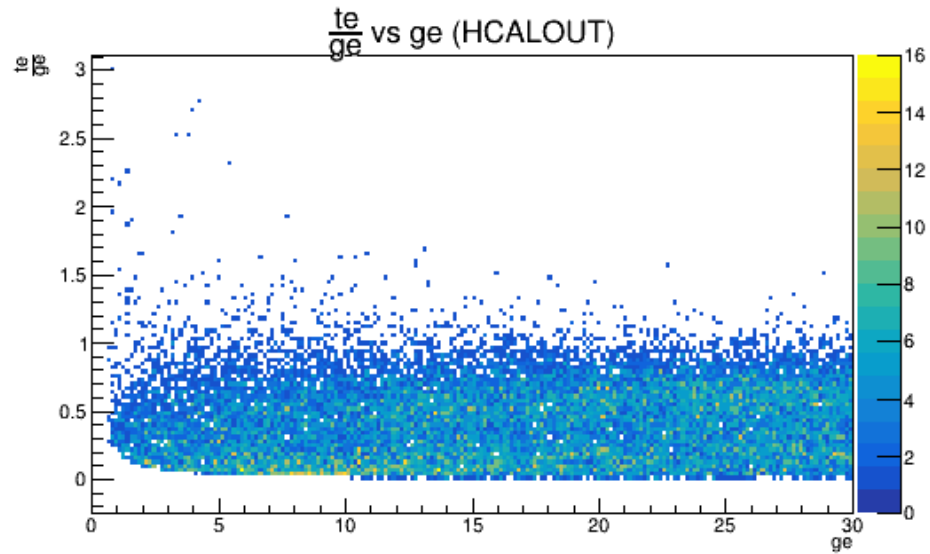
$\Delta \phi$ vs $g\eta$ (HCALIN)



ϕ vs $g\phi$ (HCALIN)

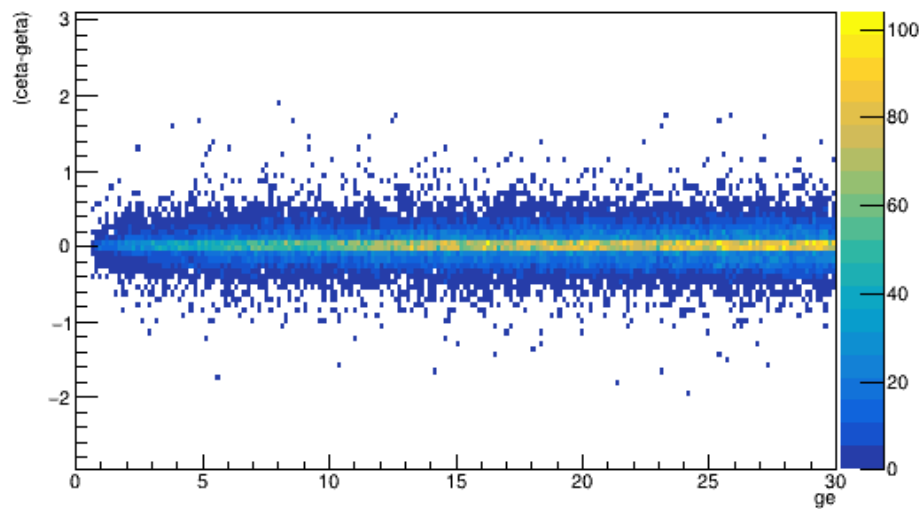


HCALOUT: η : -1.1 to 1.1

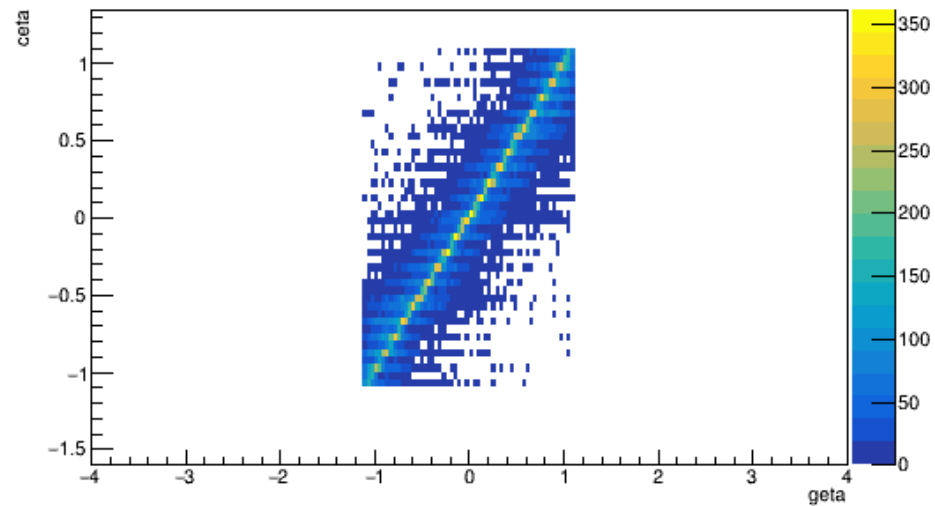


HCALOUT: η : -1.1 to 1.1

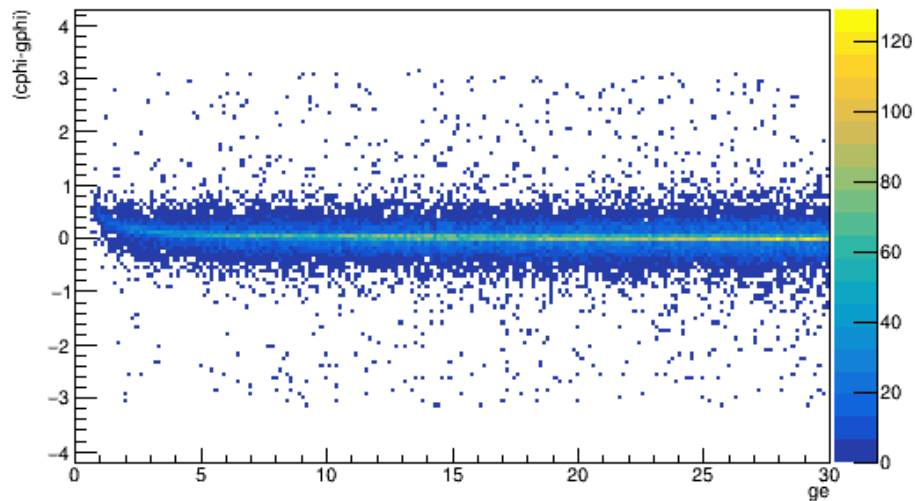
$\Delta \eta$ vs $g\eta$ (HCALOUT)



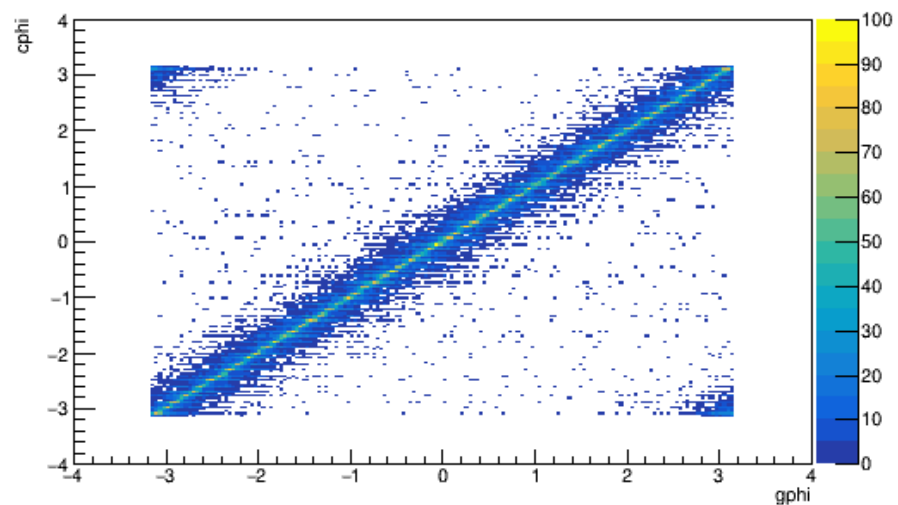
η vs $g\eta$ (HCALOUT)



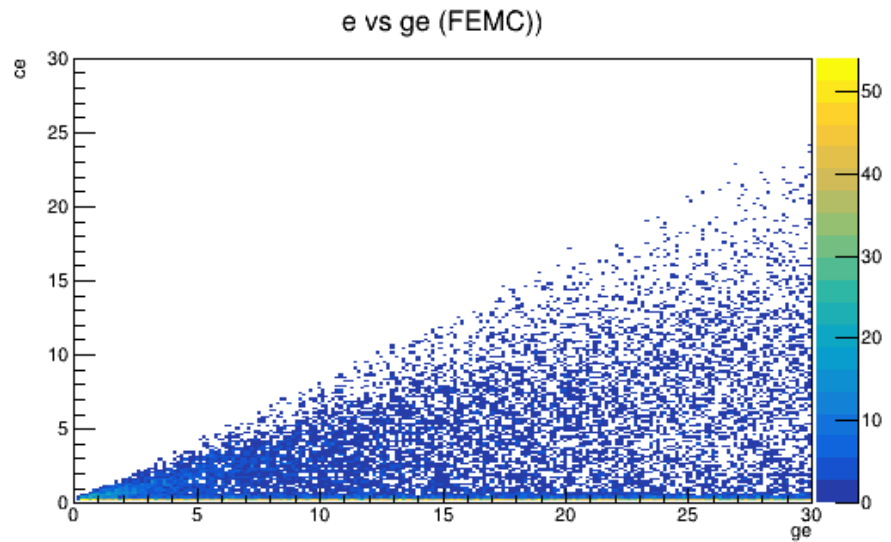
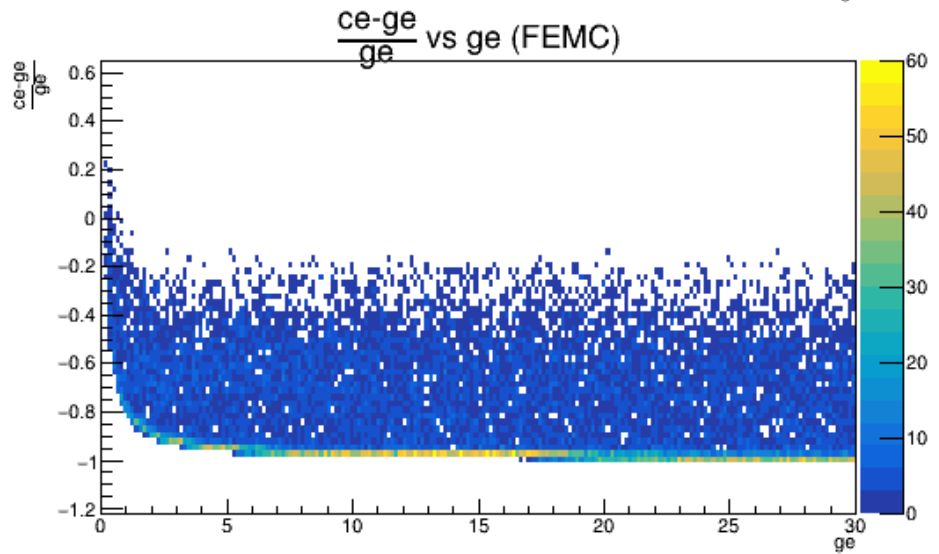
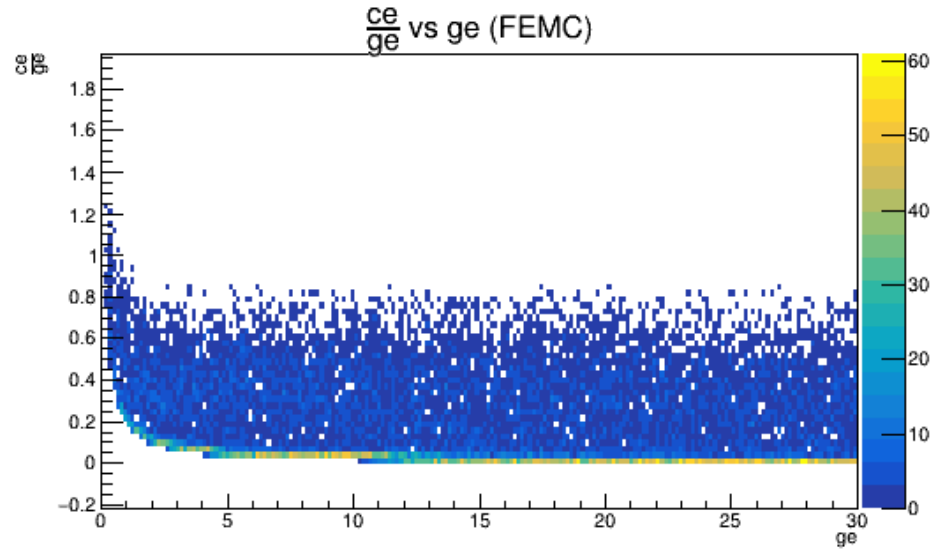
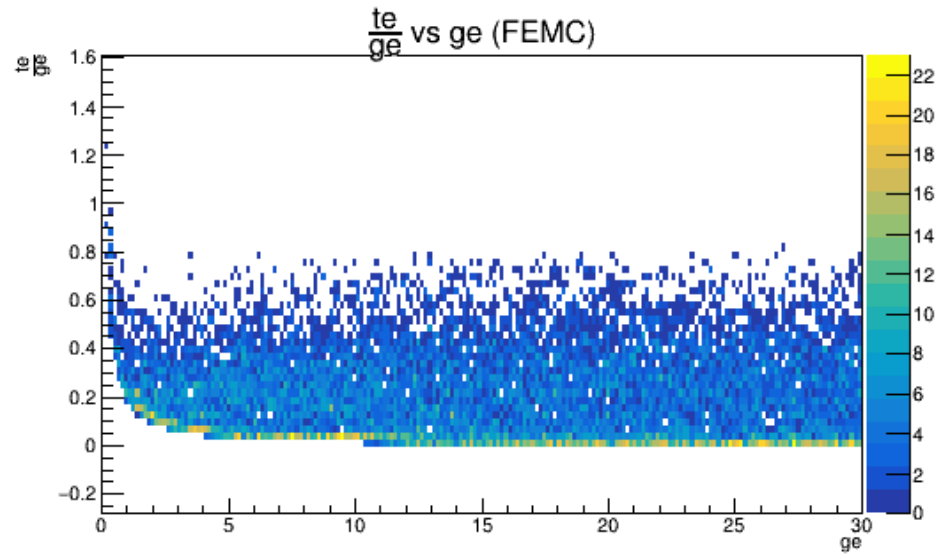
$\Delta \phi$ vs $g\eta$ (HCALOUT)



ϕ vs $g\phi$ (HCALOUT)

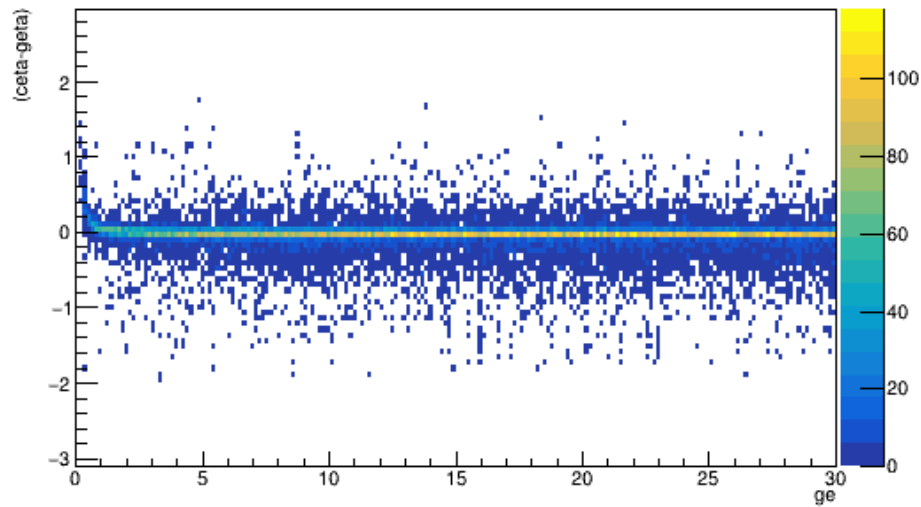


FEMC: η : 1.3 to 3.3

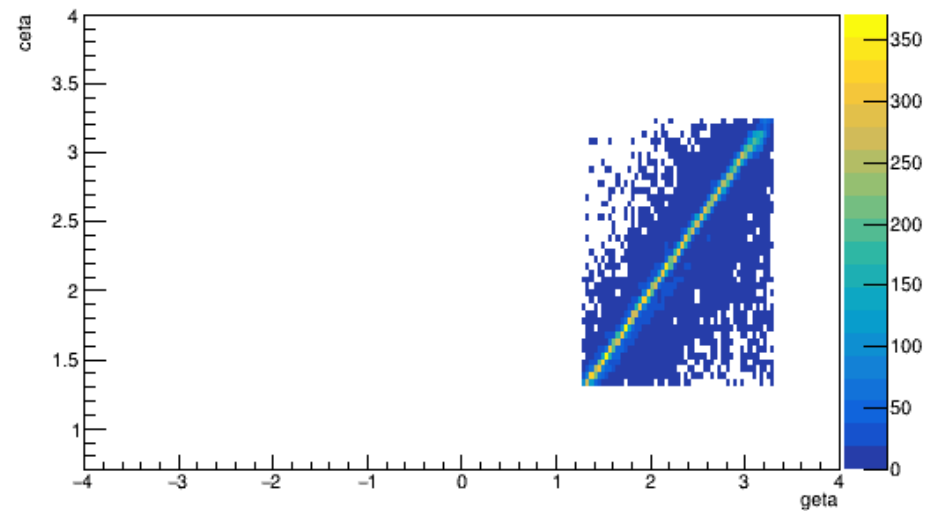


FEMC: η : 1.3 to 3.3

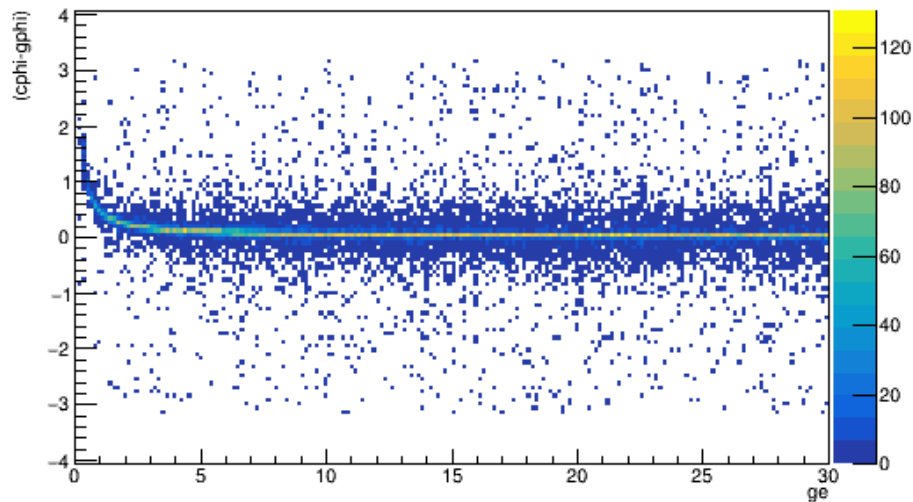
$\Delta \eta$ vs $g\eta$ (FEMC)



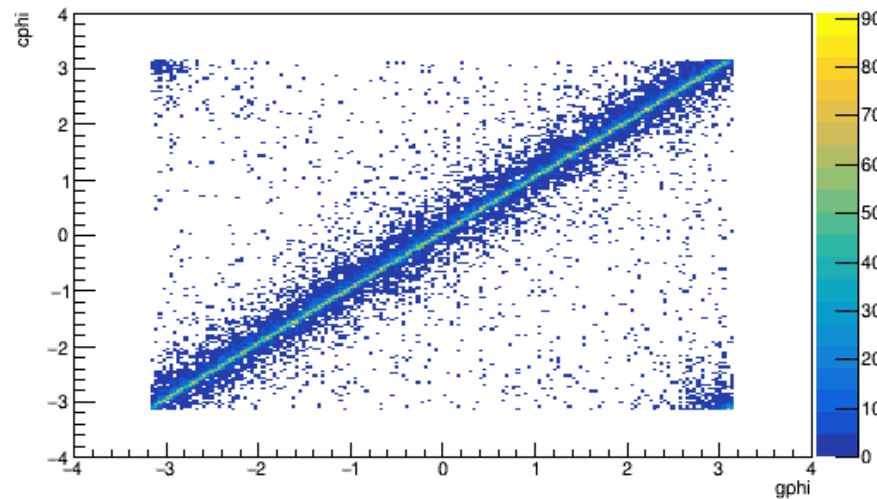
η vs $g\eta$ (FEMC)



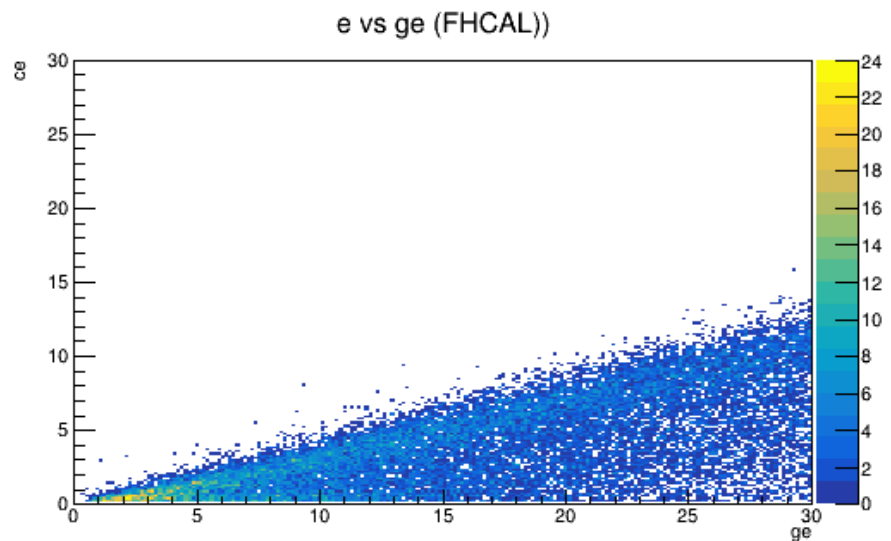
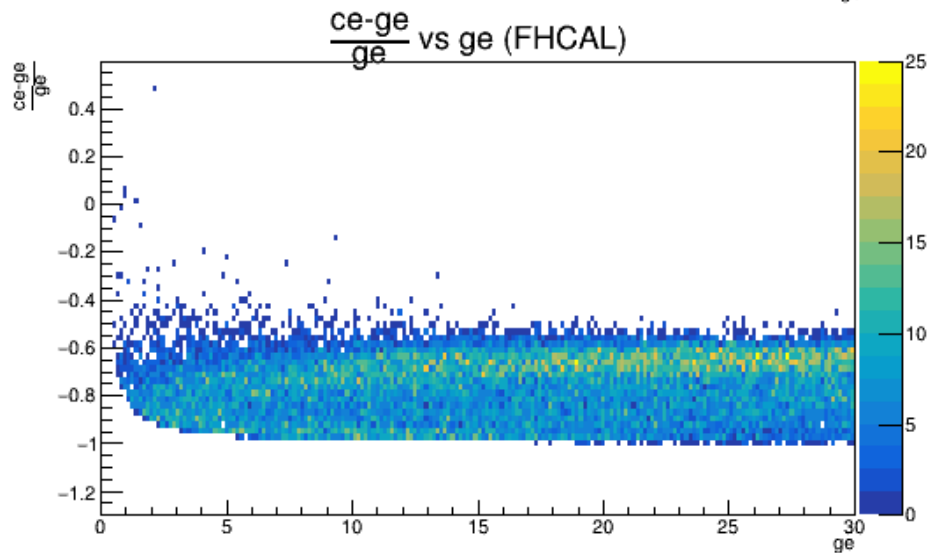
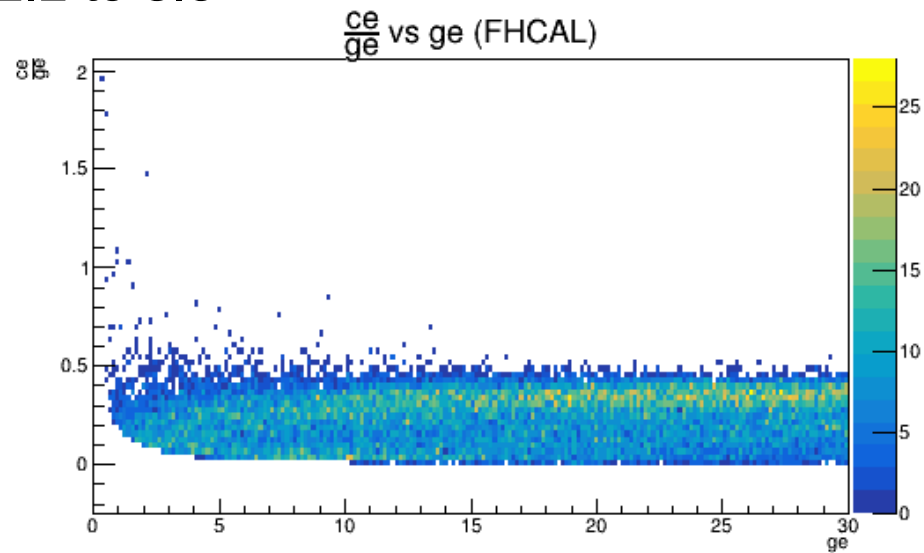
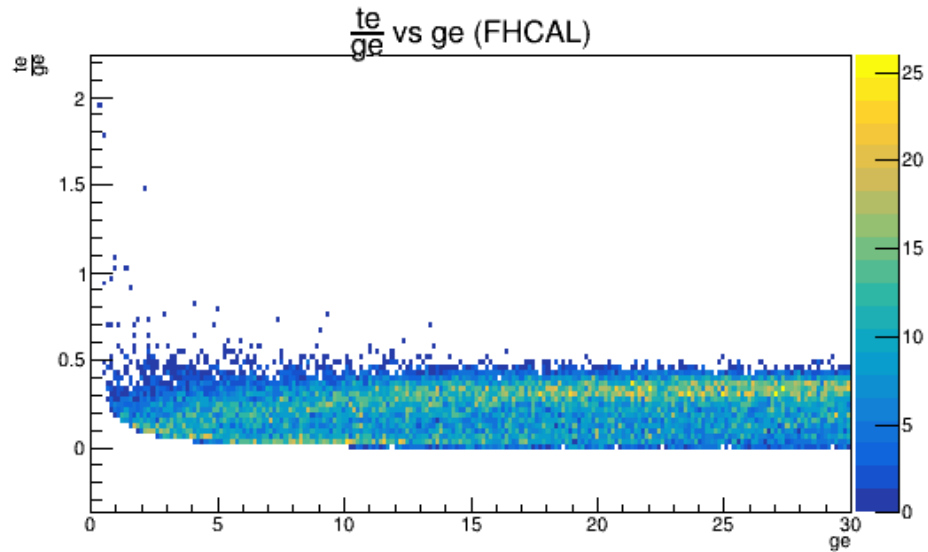
$\Delta \phi$ vs $g\eta$ (FEMC)



ϕ vs $g\phi$ (FEMC)

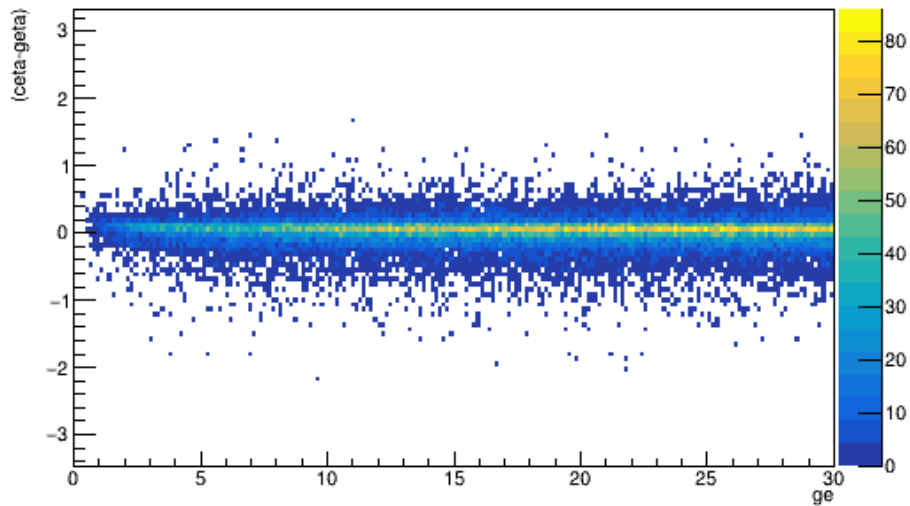


FHCAL: η : 1.2 to 3.5

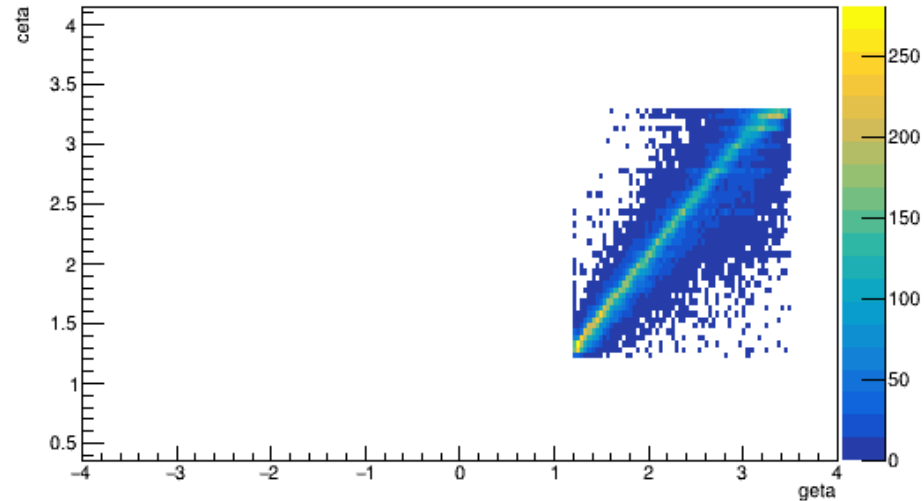


FHCAL: η : 1.2 to 3.5

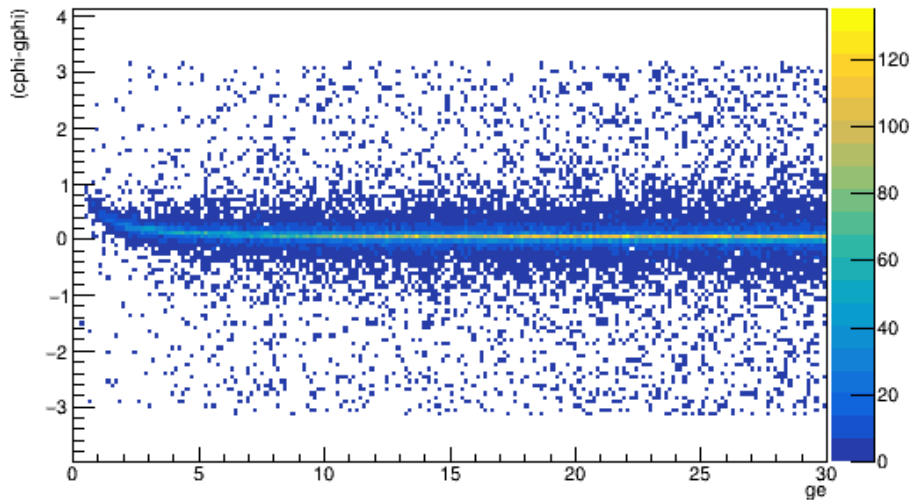
$\Delta \eta$ vs g_e (FHCAL)



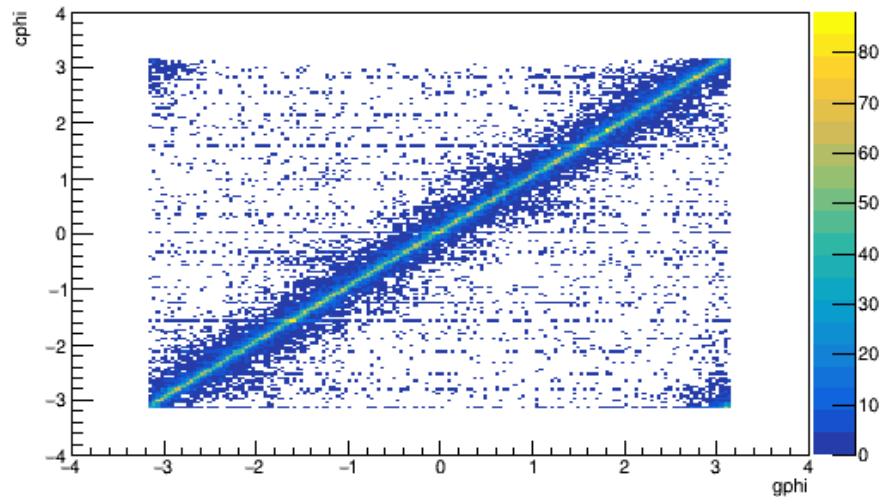
η vs g_e (FHCAL)



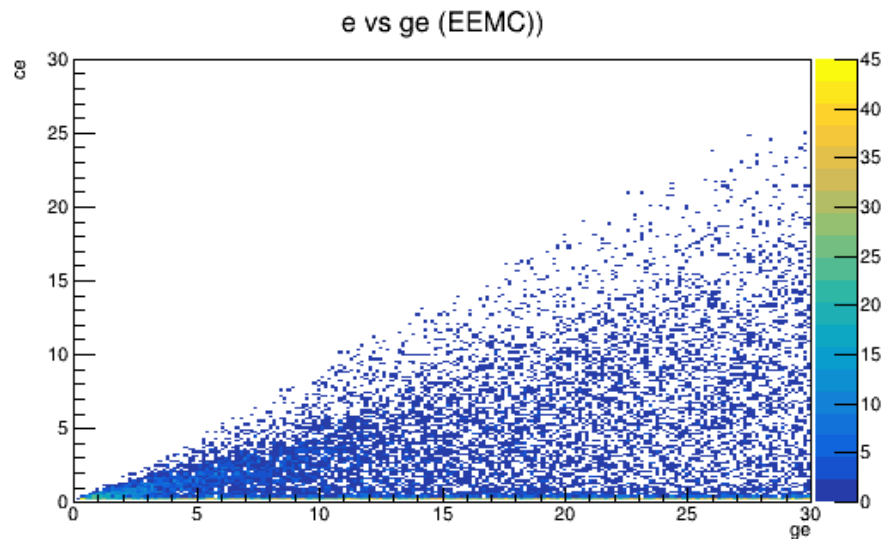
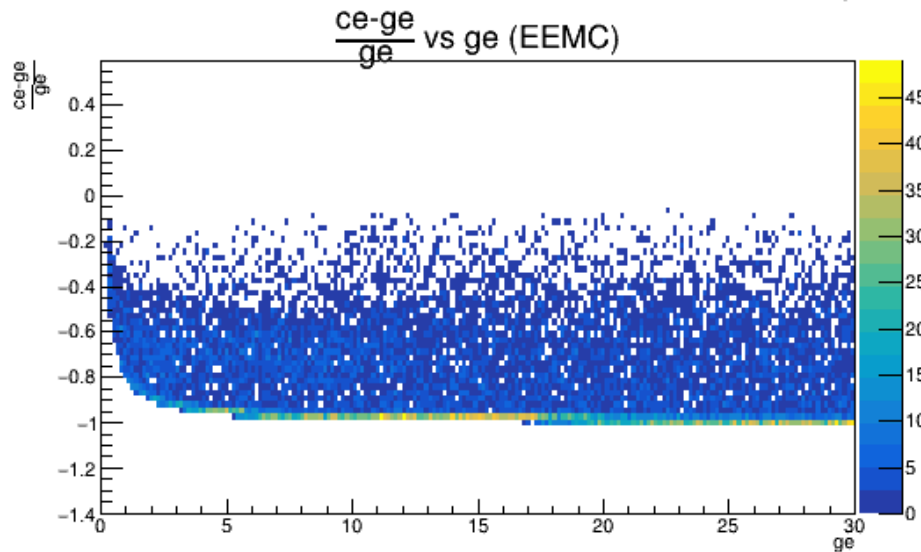
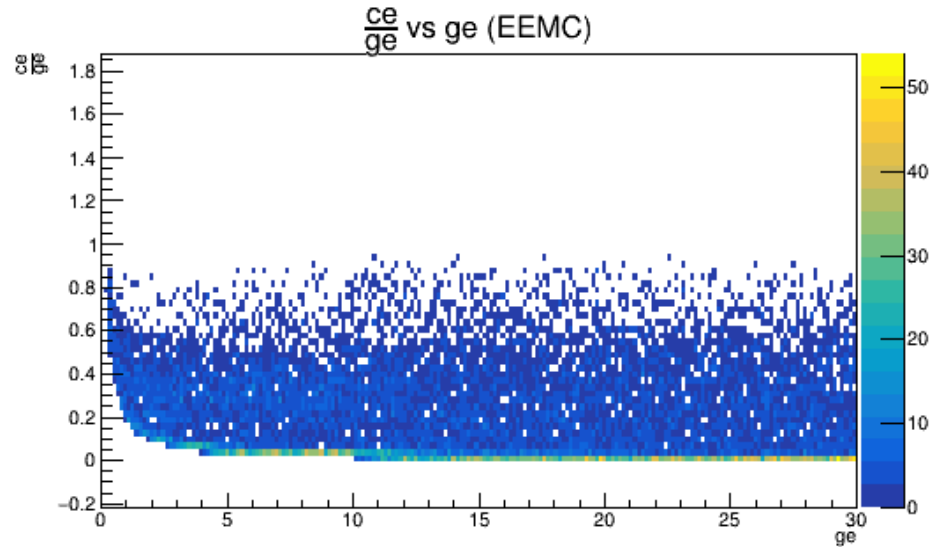
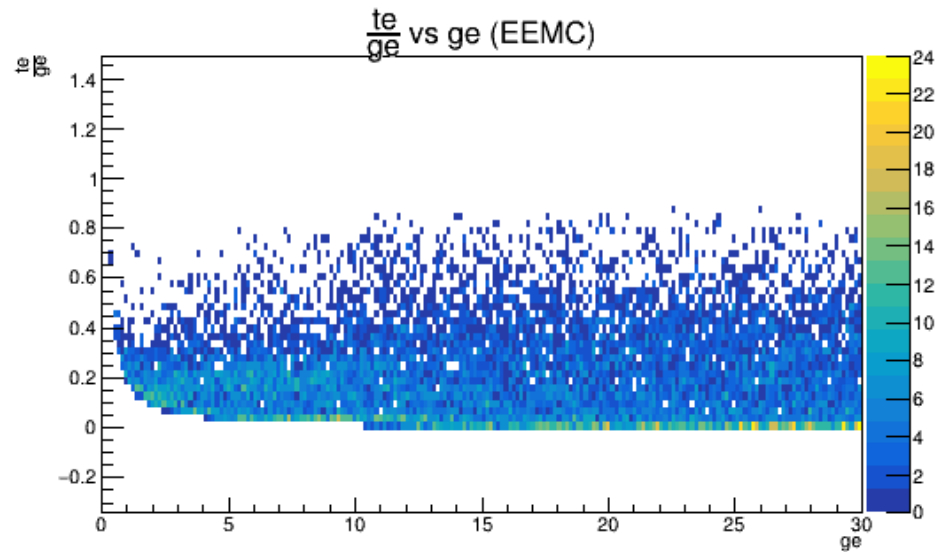
$\Delta \phi$ vs g_e (FHCAL)



ϕ vs g_ϕ (FHCAL)

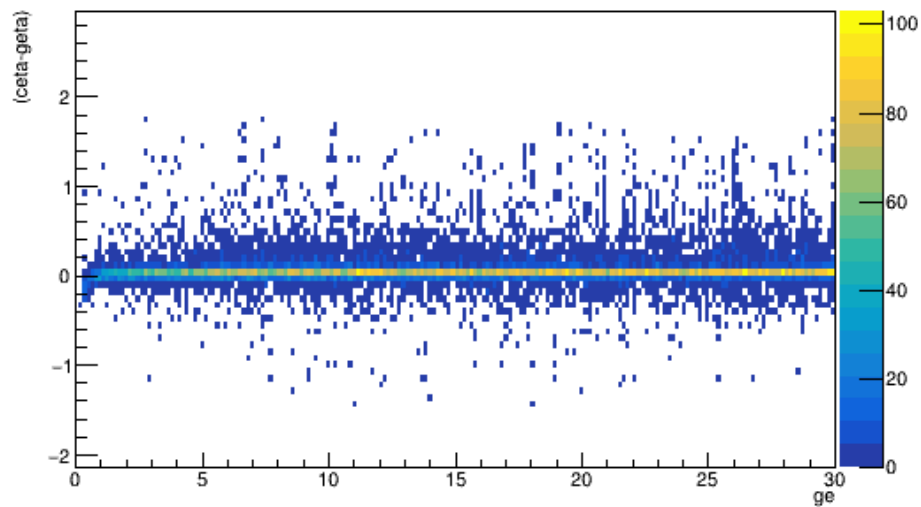


EEMC: η : -3.5 to -1.7

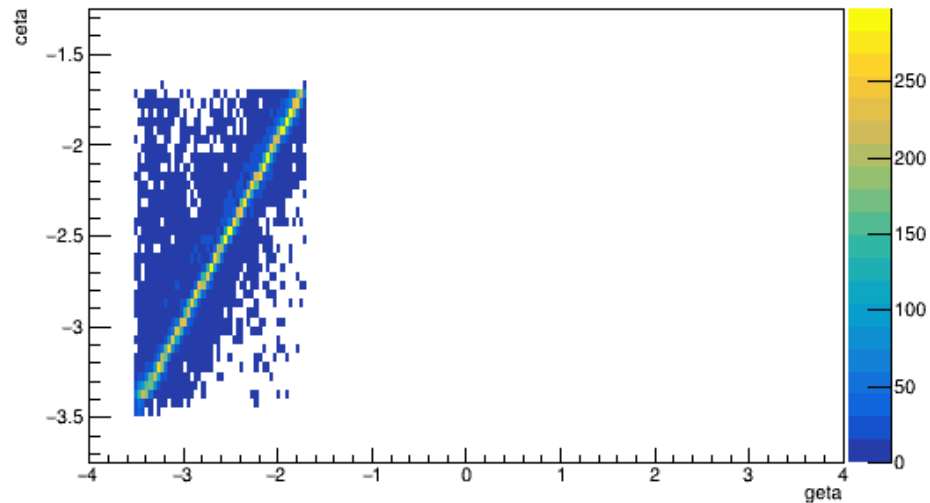


EEMC: η : -3.5 to -1.7

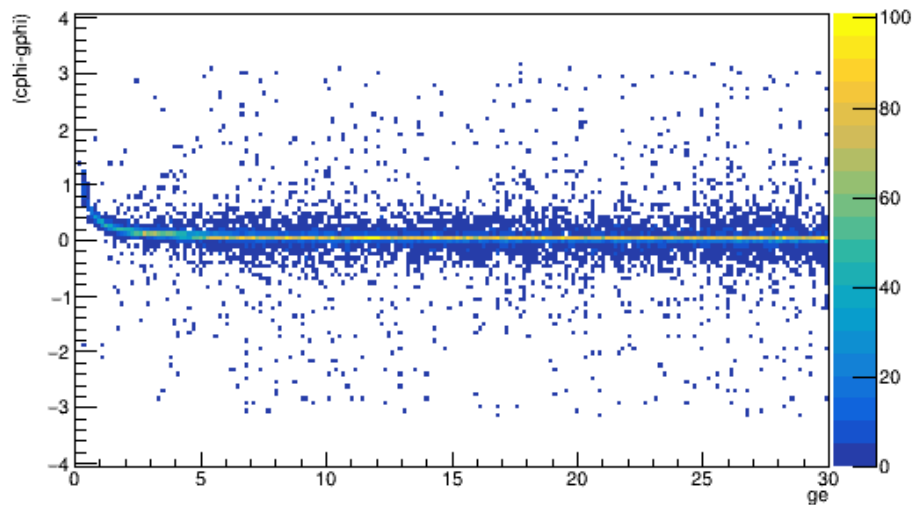
$\Delta \eta$ vs $g\eta$ (EEMC)



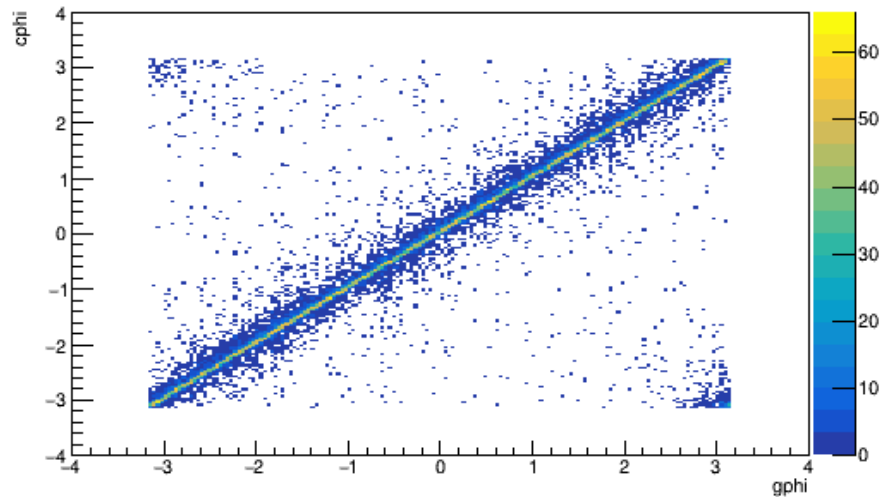
η vs $g\eta$ (EEMC)



$\Delta \phi$ vs $g\phi$ (EEMC)



ϕ vs $g\phi$ (EEMC)



Added energies

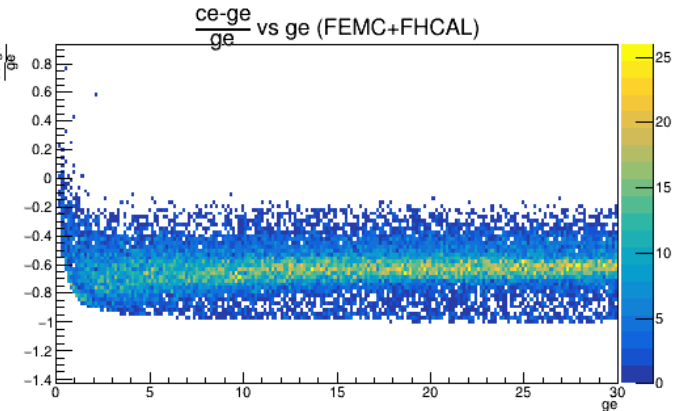
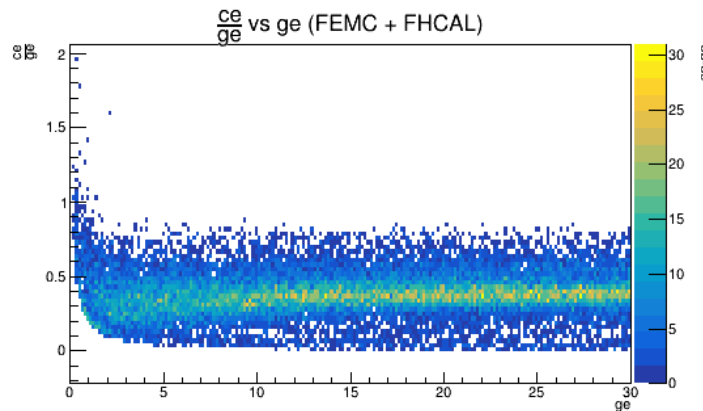
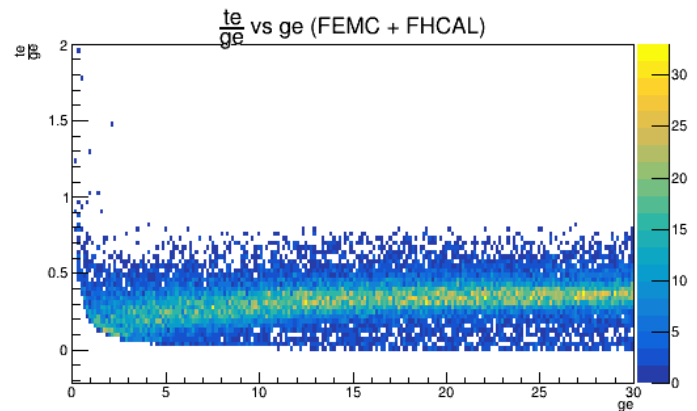
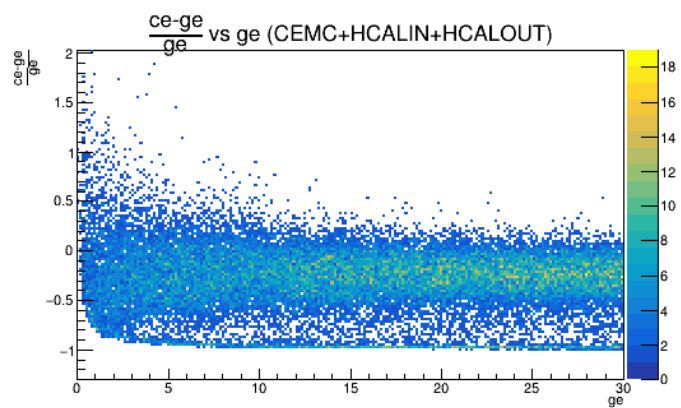
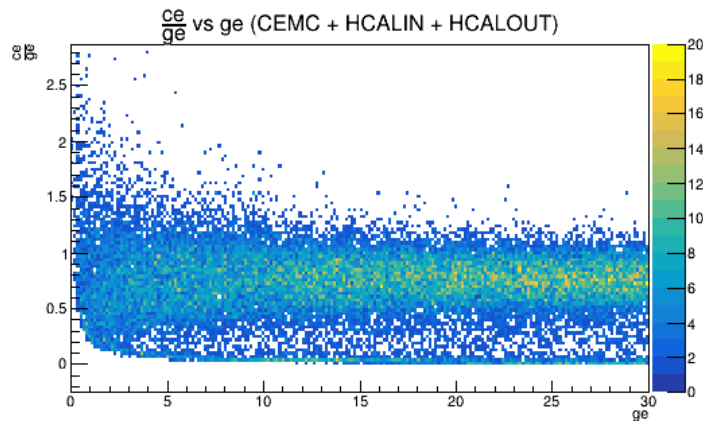
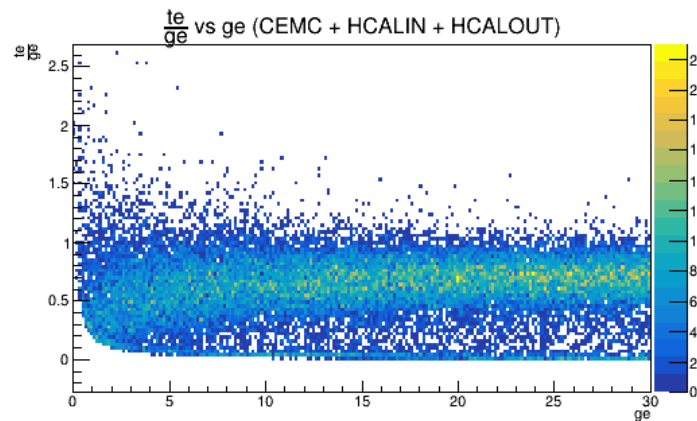
CEMC: η : -1.5 to 1.2

HCALIN: η : -1.1 to 1.1

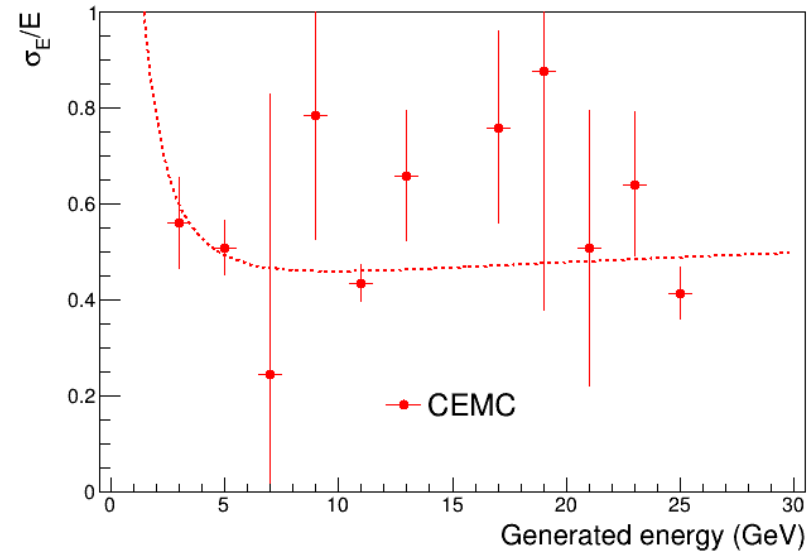
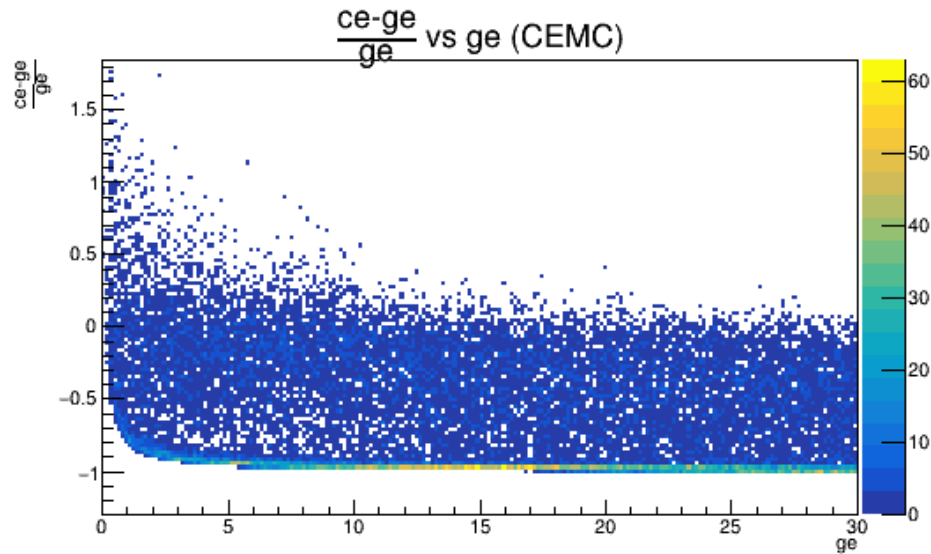
HCALOUT: η : -1.1 to 1.1

FEMC: η : 1.3 to 3.3

FHCAL: η : 1.2 to 3.5



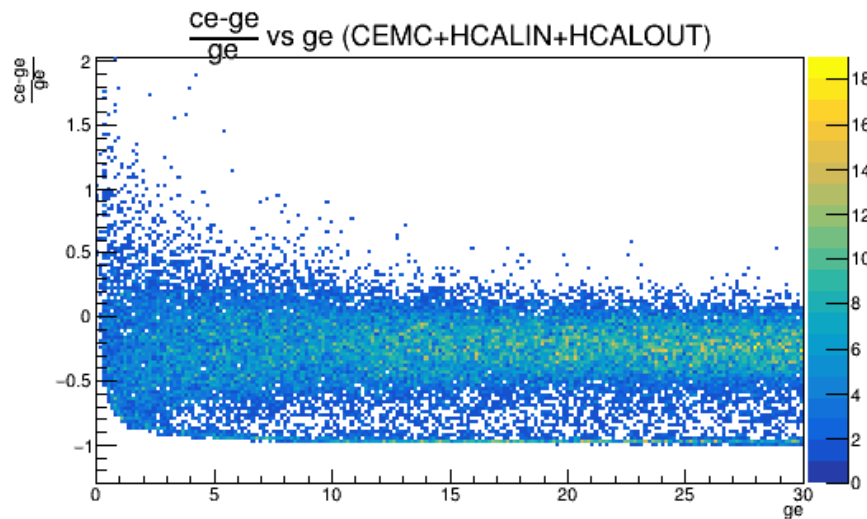
Pion – Energy resolution (CEMC)



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

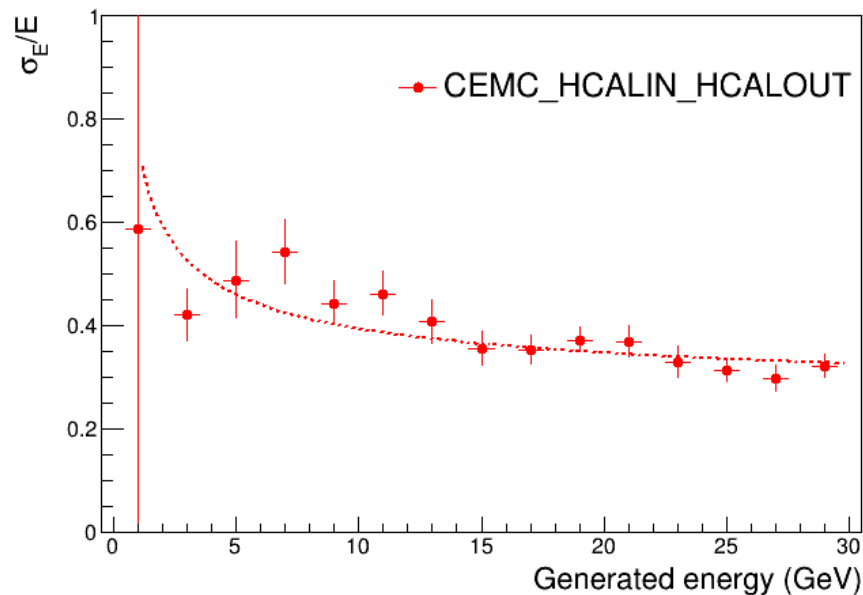
[0]: 0.669487(67%)
[1]: -1.32119(132%)
[2]: 2.07294(207%)

Pion – Energy resolution (CEMC+HCALIN+HCALOUT)

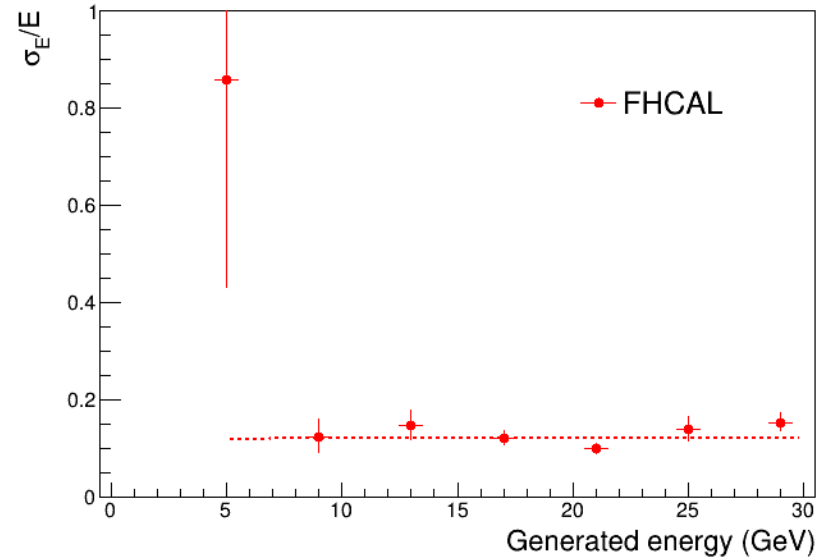
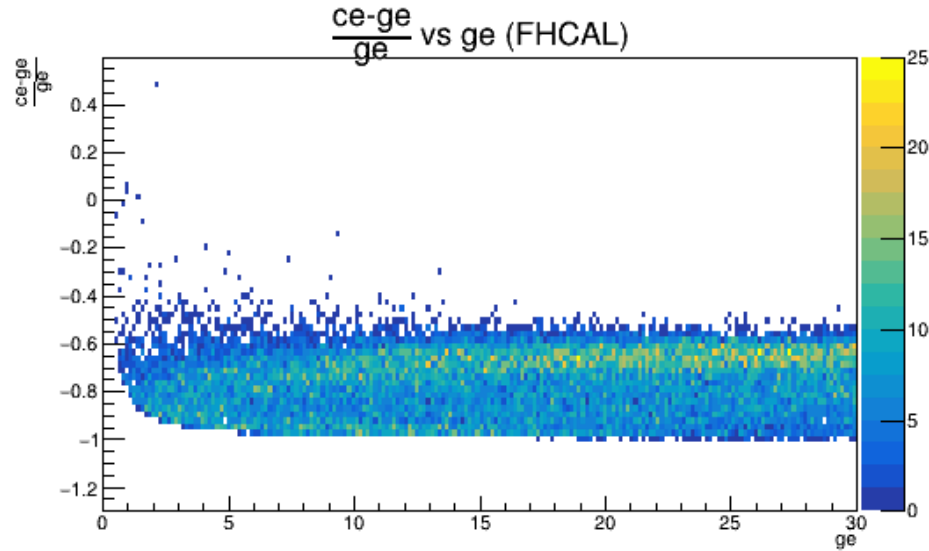


$$y = [0] + [1] / \sqrt{x}$$

[0]: 0.23405(23%)
[1]: 0.505559(50%)



Pion – Energy resolution (FHCAL)

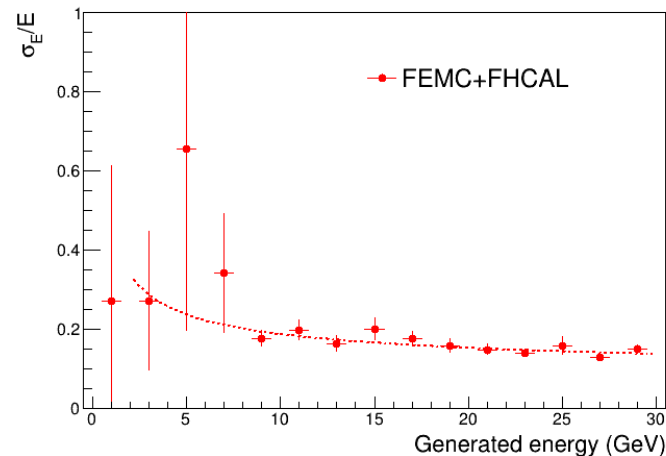
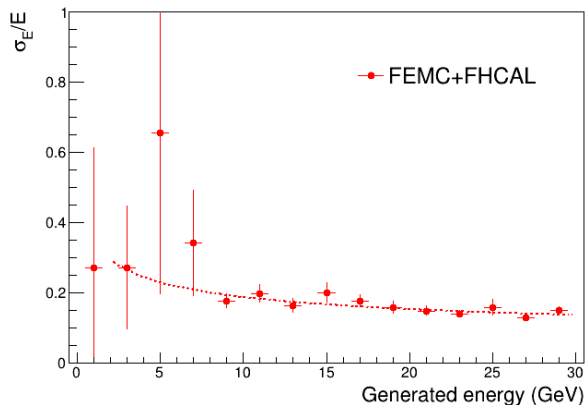
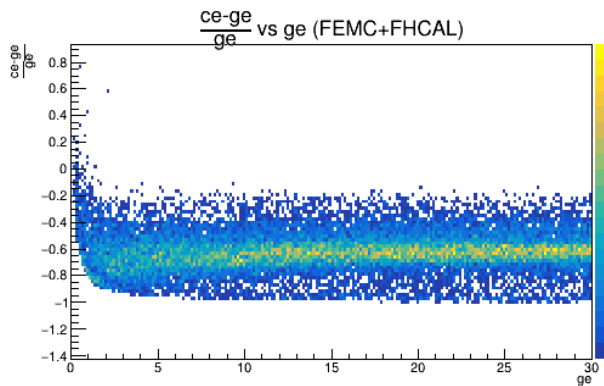


$$y=[0] + [1] / \text{sqrt}(x)$$

[0]: 0.121882(12%)

[1]: -0.00561015(0.5%)

Pion – Energy resolution (FEMC+FHCAL)



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

[0]: 0.0537935(5.3%)
 [1]: 0.492320(49%)
 [2]: -0.218007(22%)

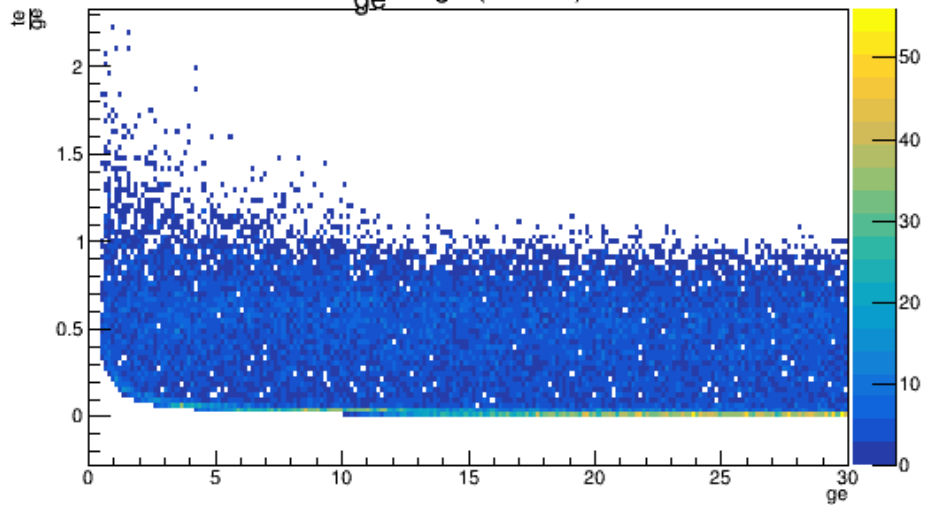
$$y=[0] + [1] / \text{sqrt}(x)$$

[0]: 0.0675946(7%)
 [1]: 0.379943(38%)

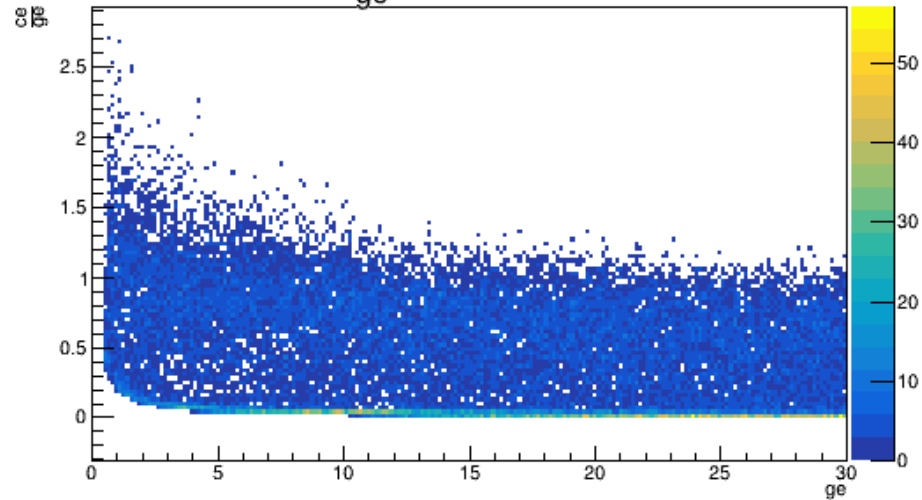
Kaon

CEMC: η : -1.5 to 1.2

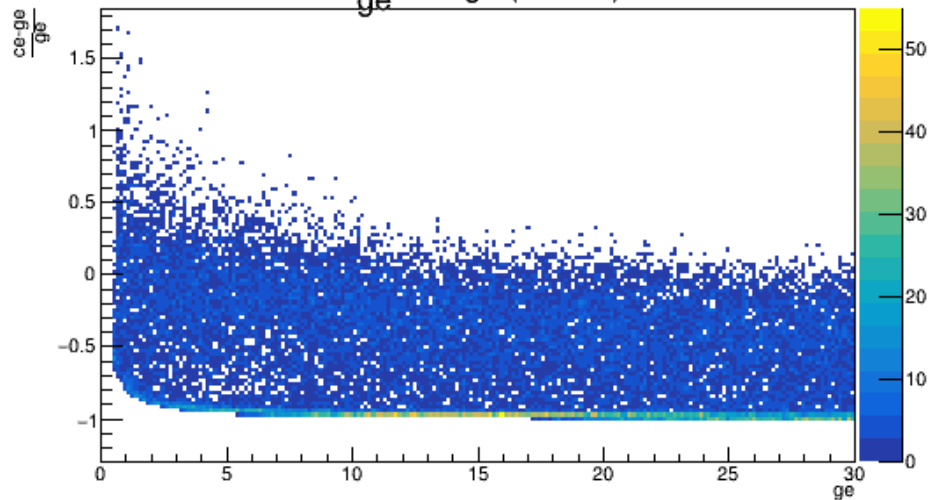
$\frac{te}{ge}$ vs ge (CEMC)



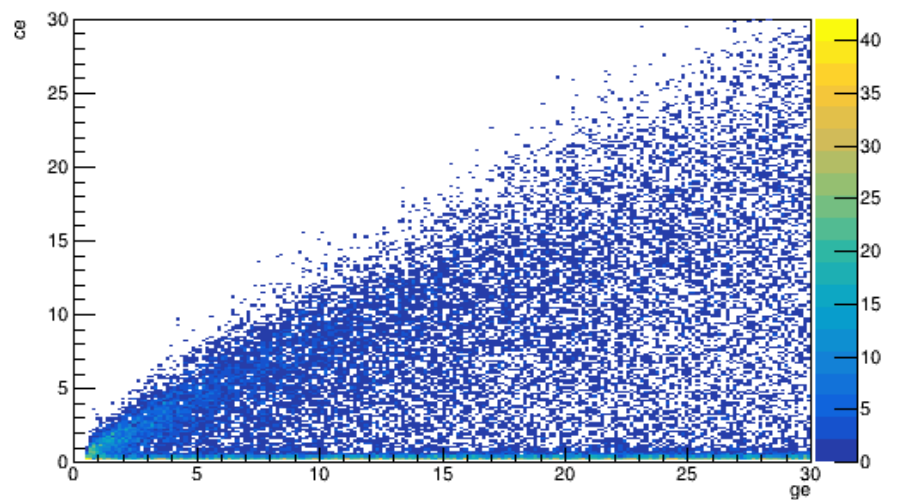
$\frac{ce}{ge}$ vs ge (CEMC)



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

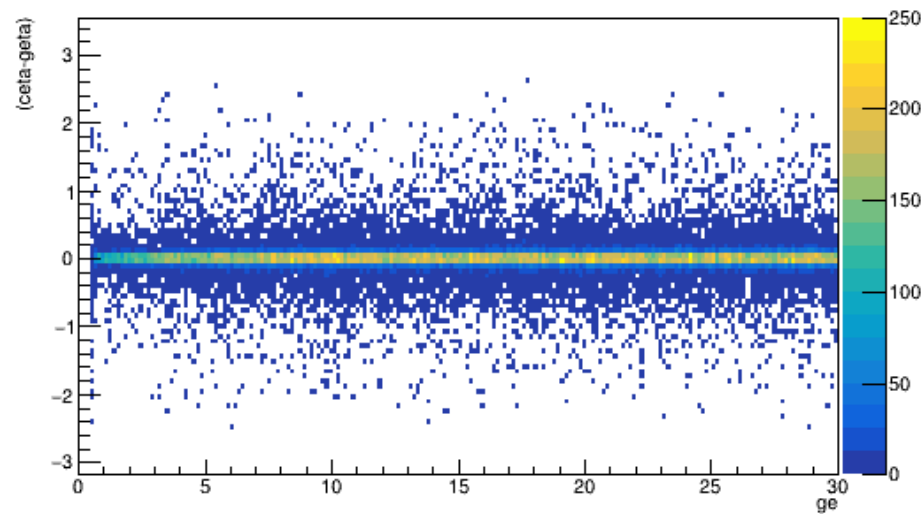


e vs ge (CEMC)

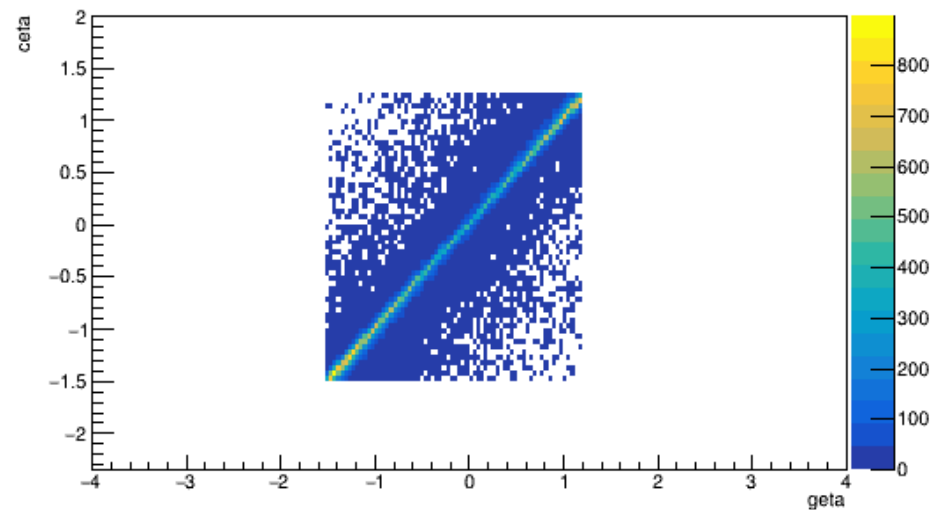


CEMC: η : -1.5 to 1.2

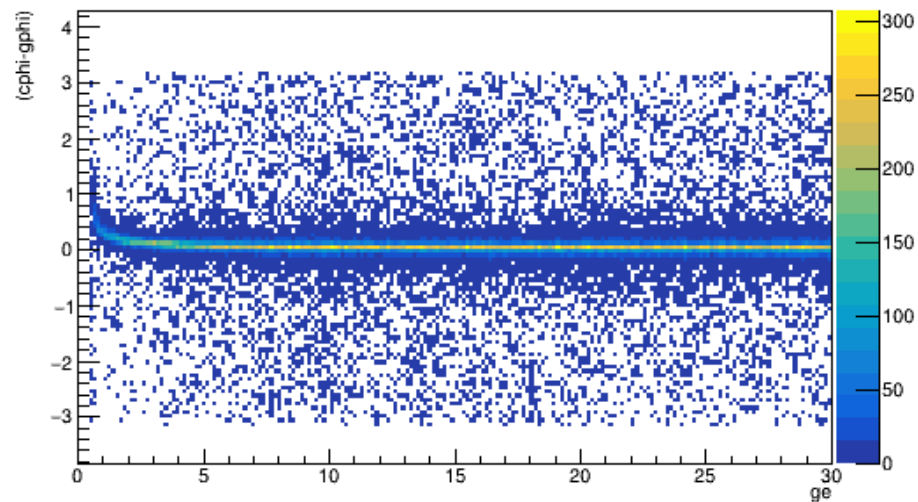
$\Delta \eta$ vs $g\eta$ (CEMC)



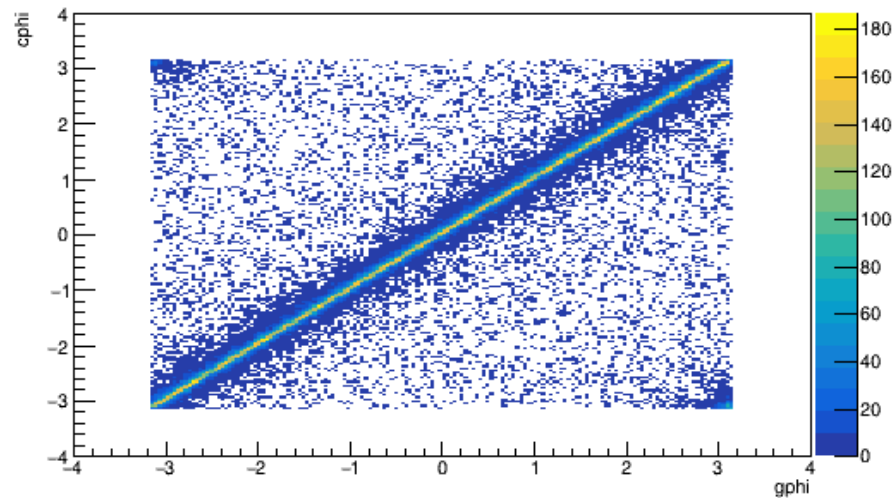
η vs $g\eta$ (CEMC)



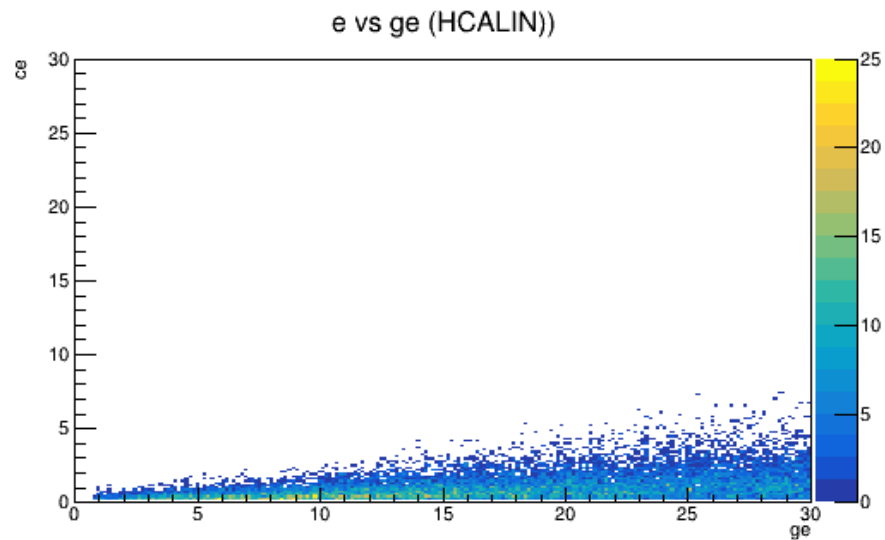
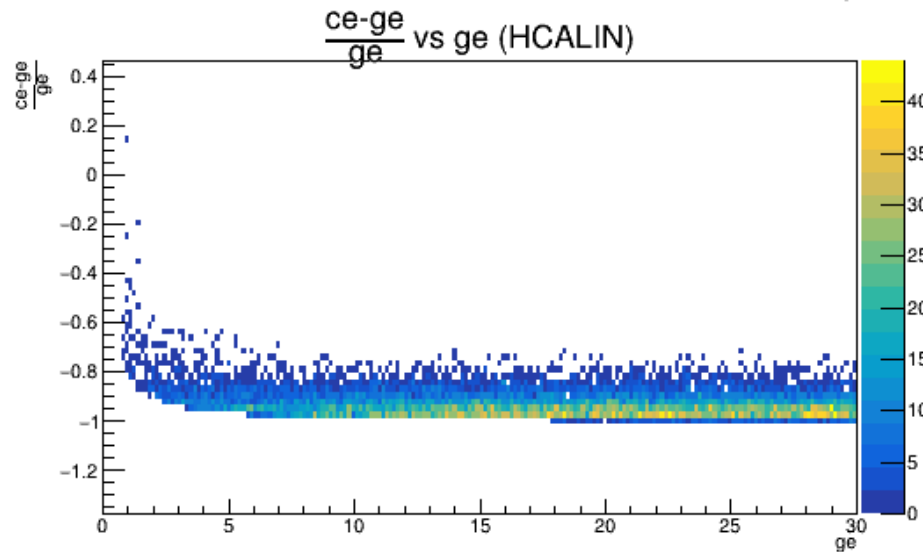
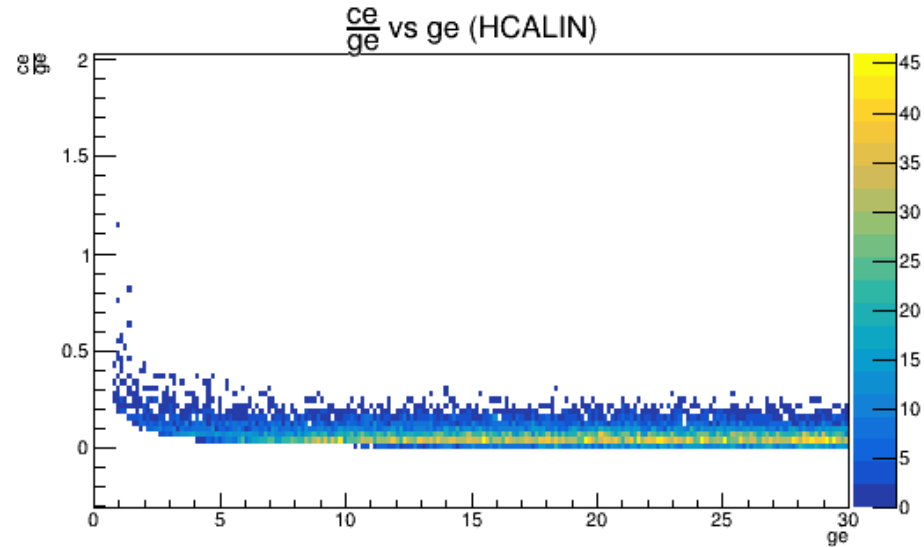
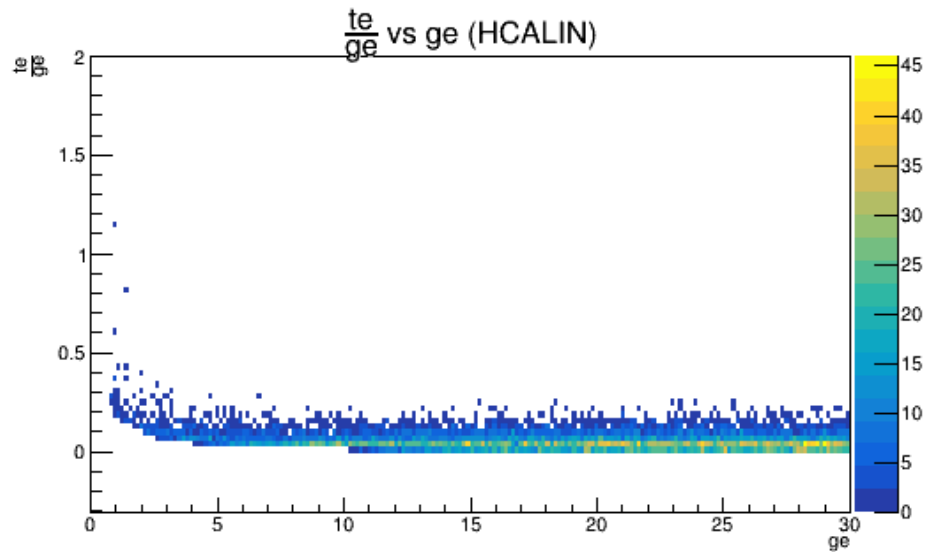
$\Delta \phi$ vs $g\eta$ (CEMC)



ϕ vs $g\phi$ (CEMC)

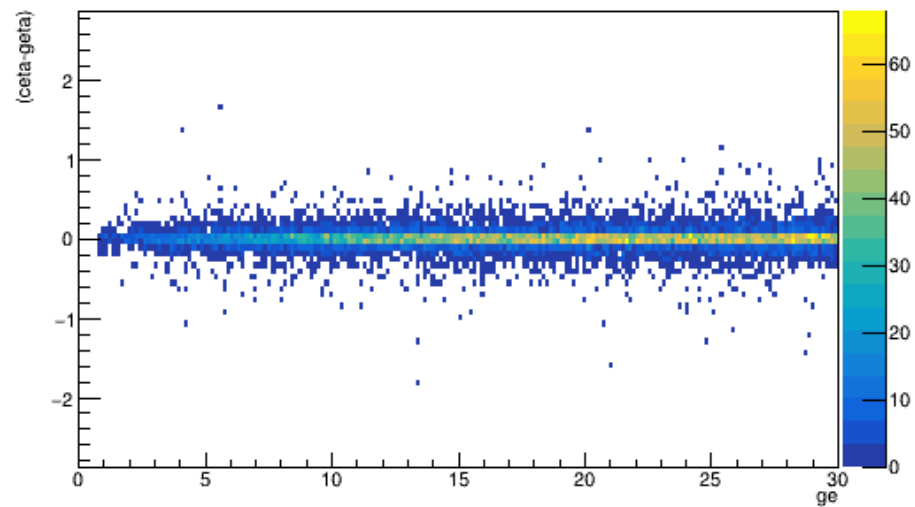


HCALIN: η : -1.1 to 1.1

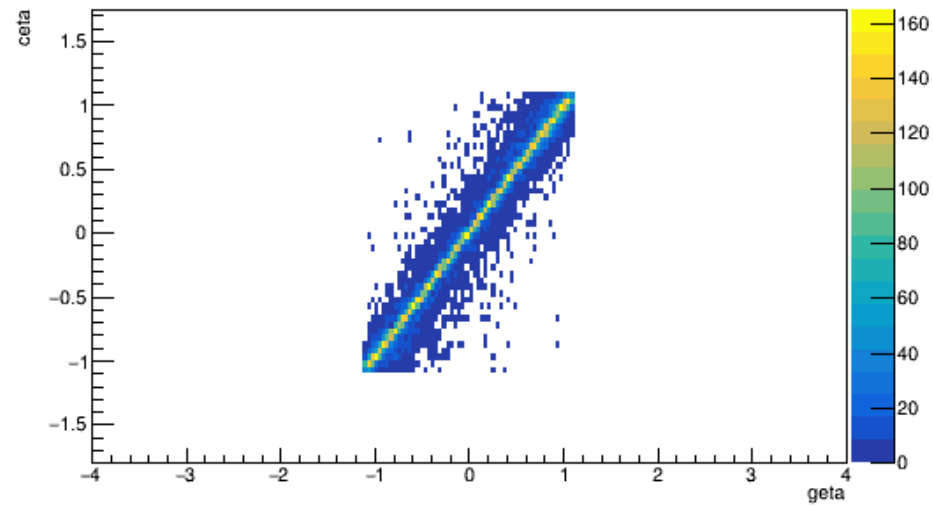


HCALIN: η : -1.1 to 1.1

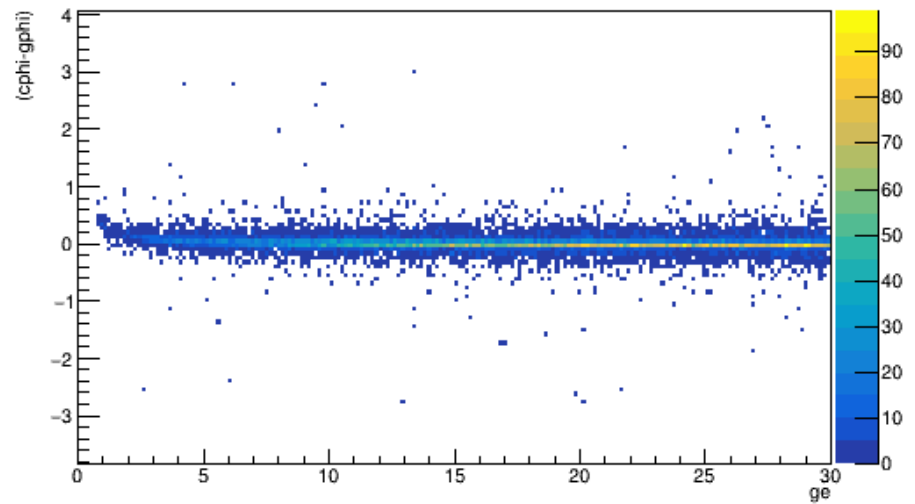
$\Delta \eta$ vs $g\eta$ (HCALIN)



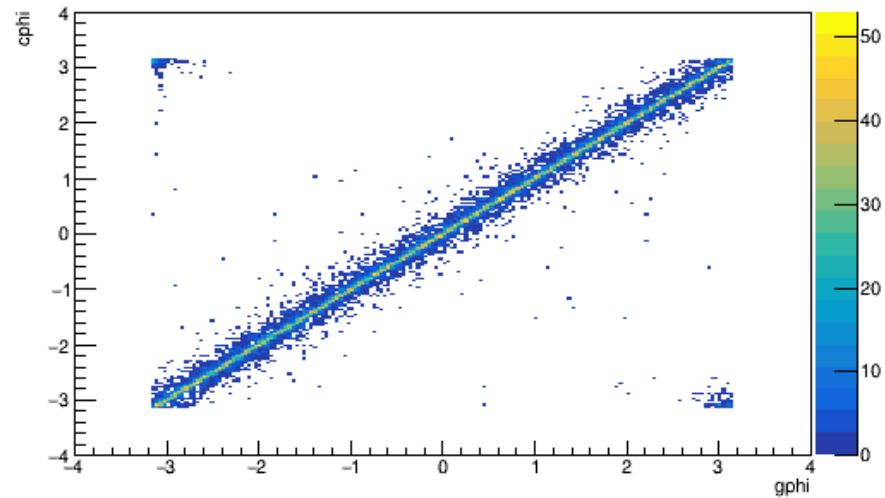
η vs $g\eta$ (HCALIN)



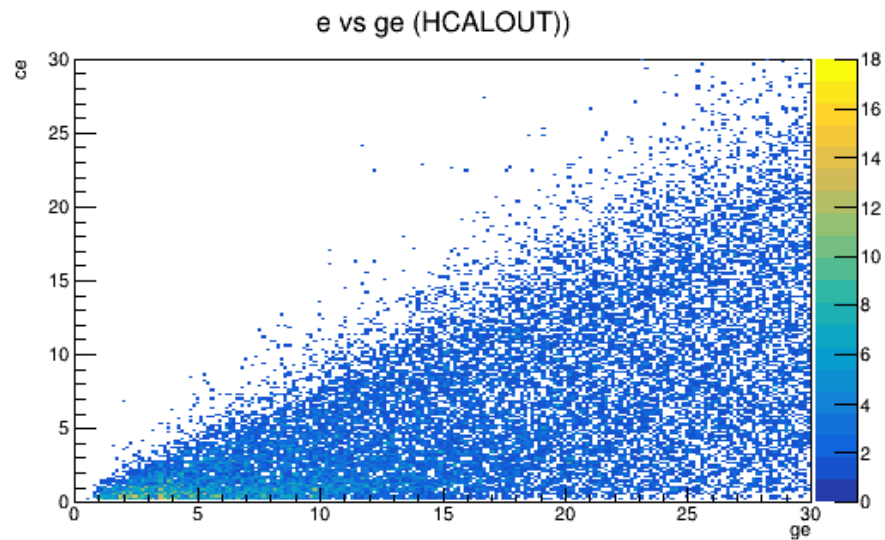
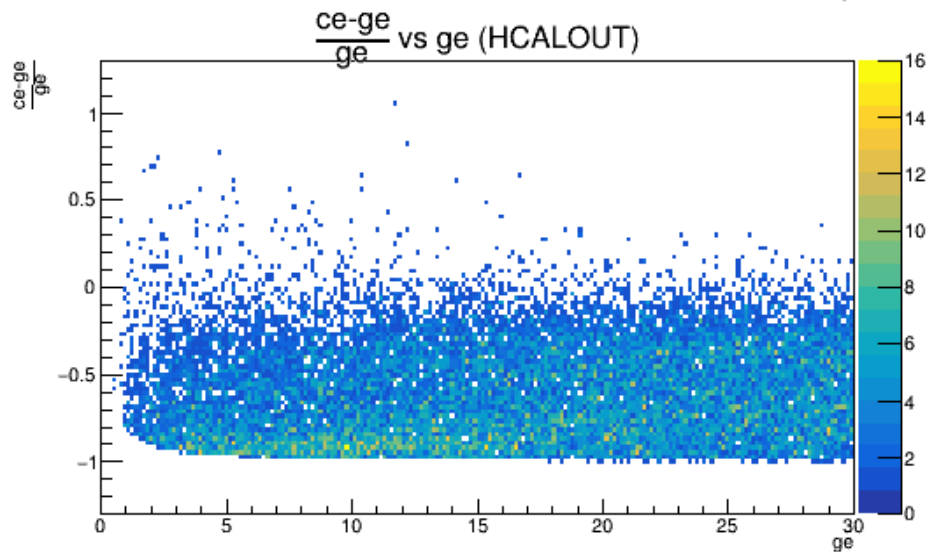
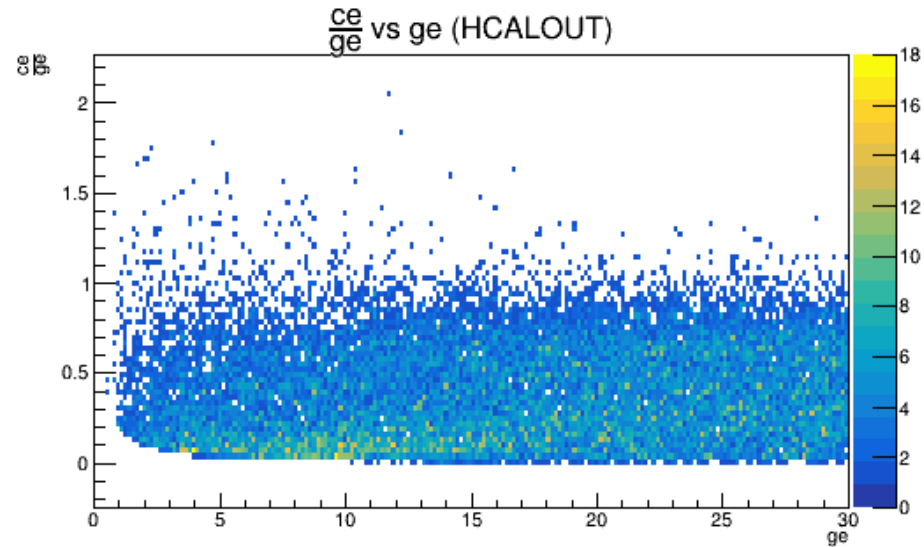
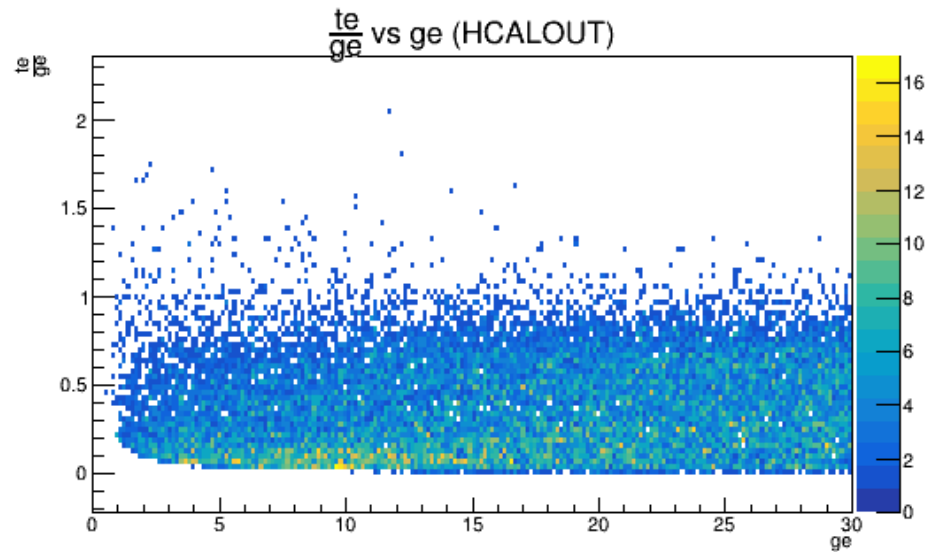
$\Delta \phi$ vs $g\eta$ (HCALIN)



ϕ vs $g\phi$ (HCALIN)

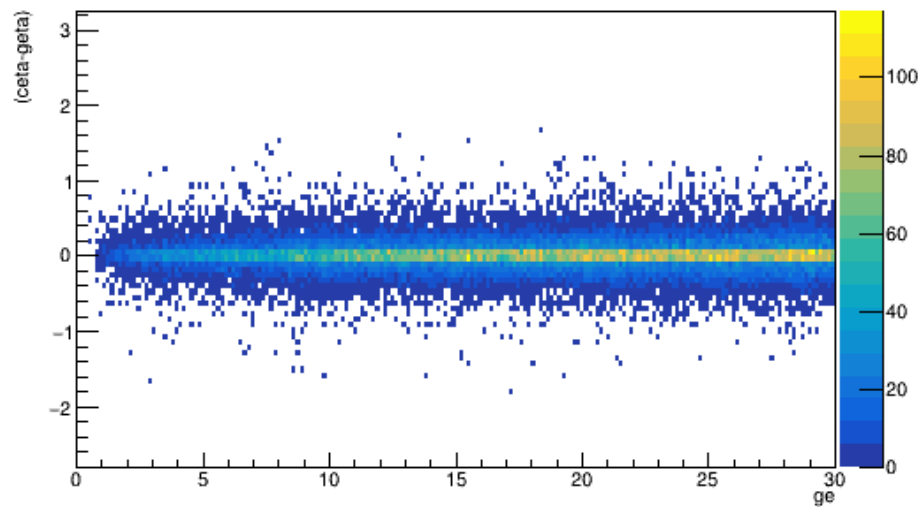


HCALOUT: η : -1.1 to 1.1

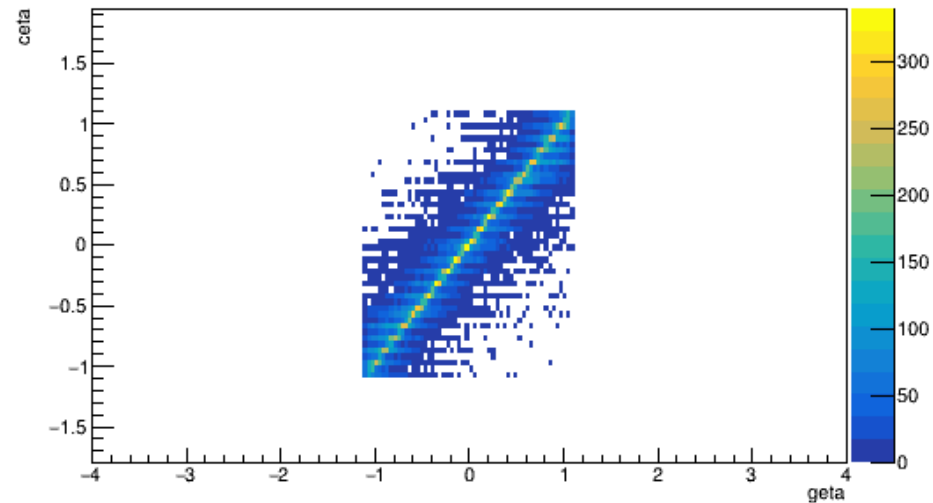


HCALOUT: η : -1.1 to 1.1

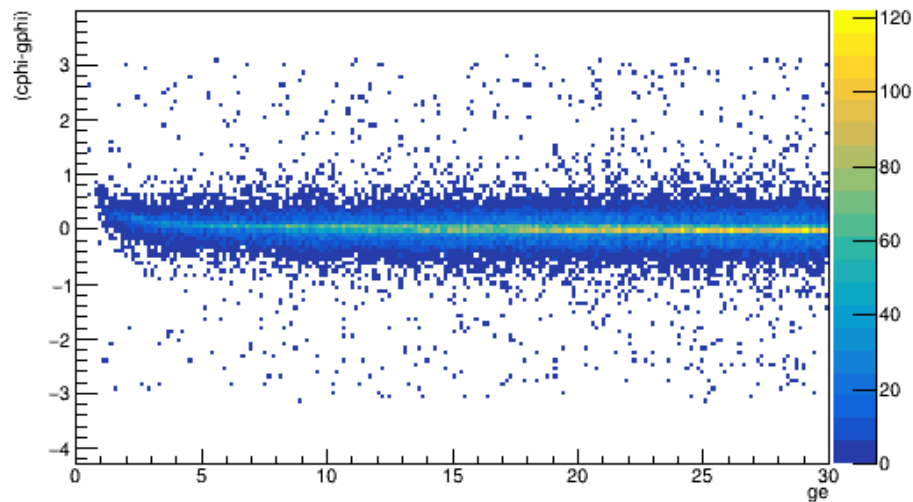
$\Delta \eta$ vs g_e (HCALOUT)



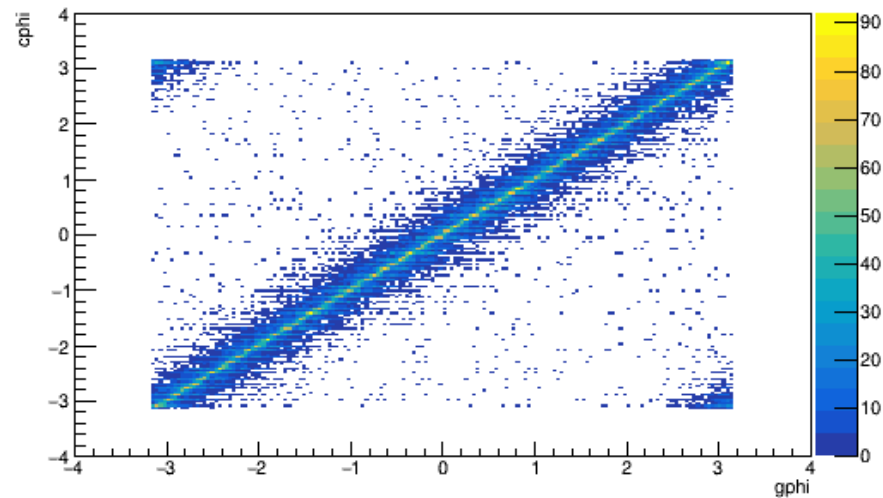
η vs g_e (HCALOUT)



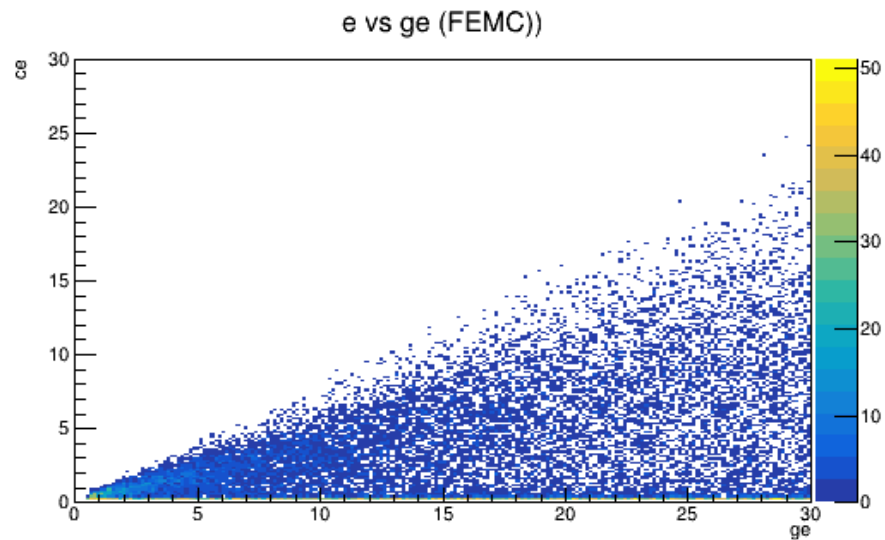
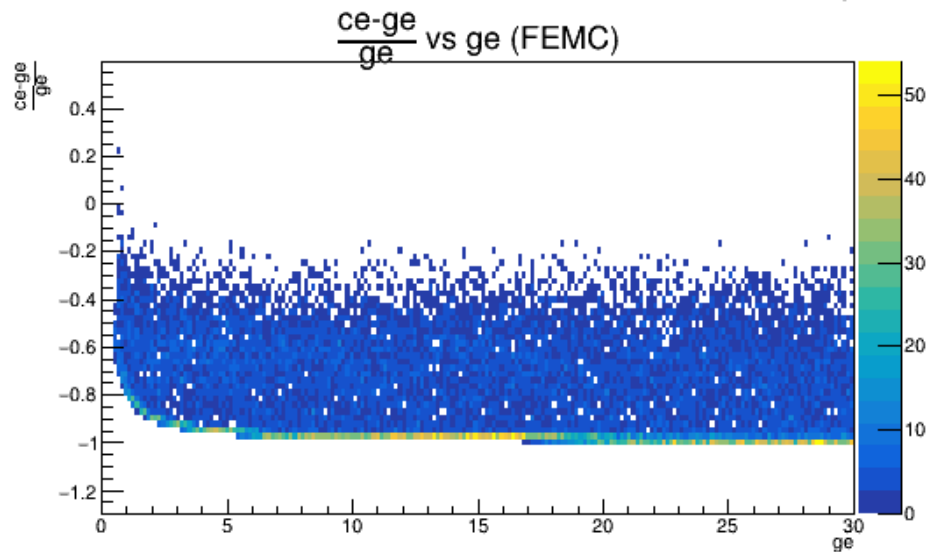
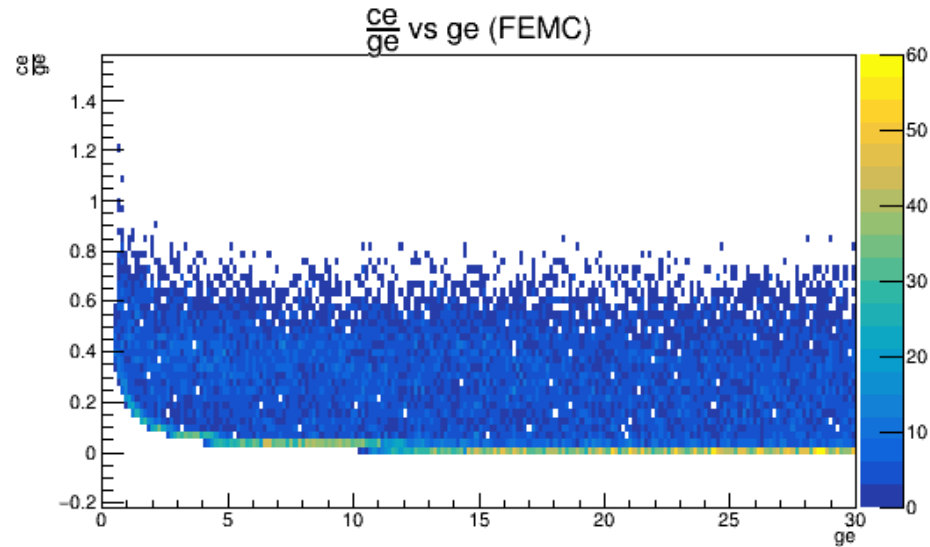
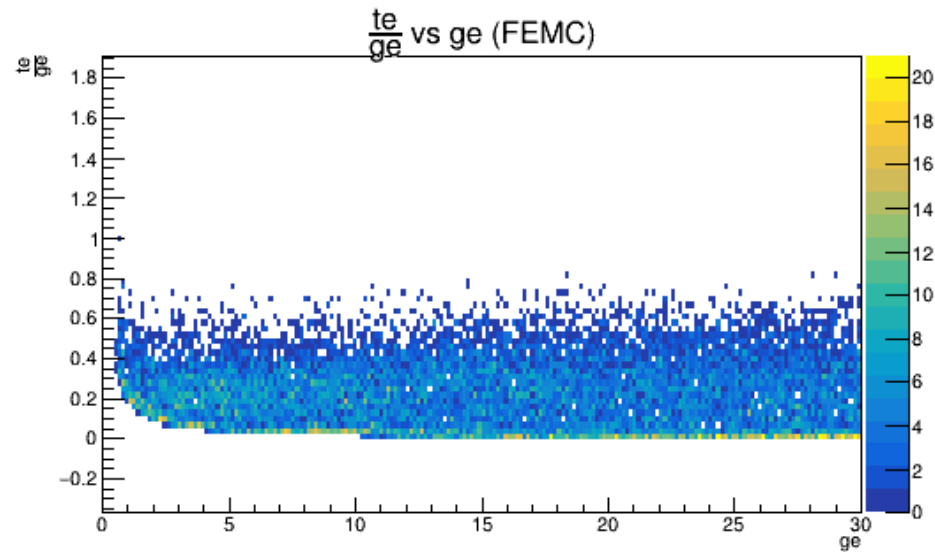
$\Delta \phi$ vs g_e (HCALOUT)



ϕ vs g_{ϕ} (HCALOUT)

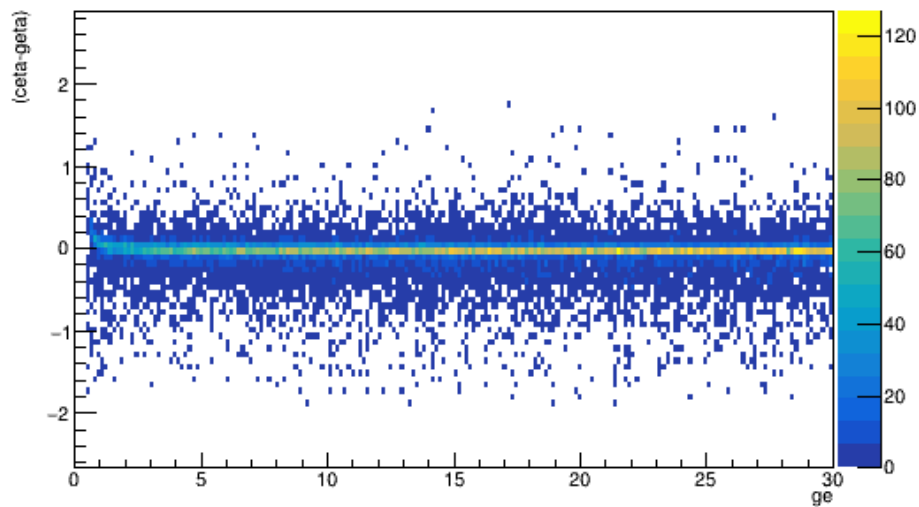


FEMC: η : 1.3 to 3.3

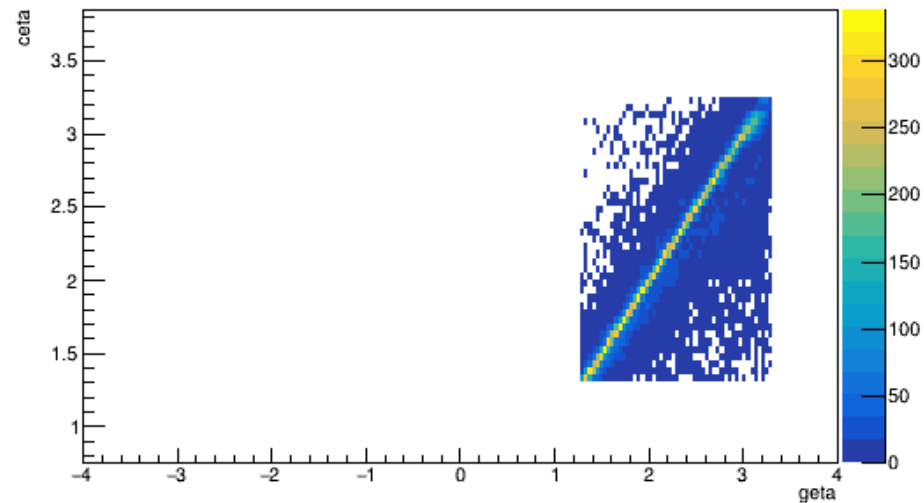


FEMC: η : 1.3 to 3.3

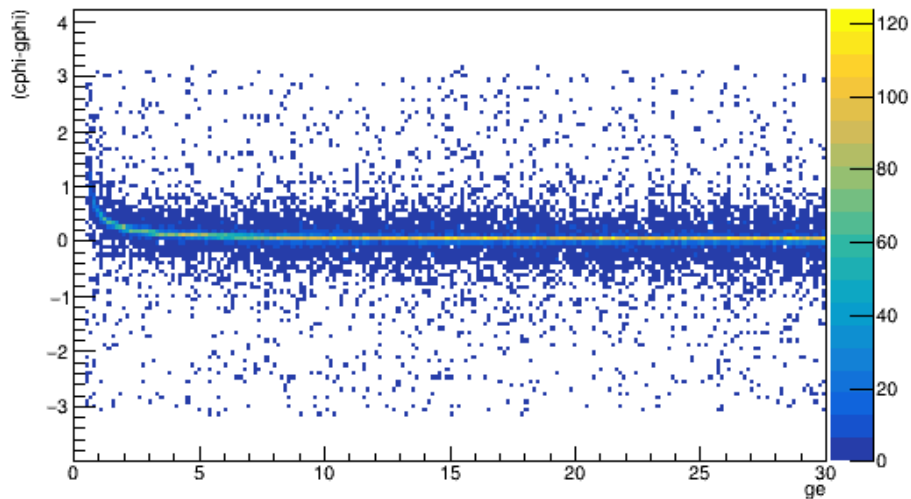
$\Delta \eta$ vs $g\eta$ (FEMC)



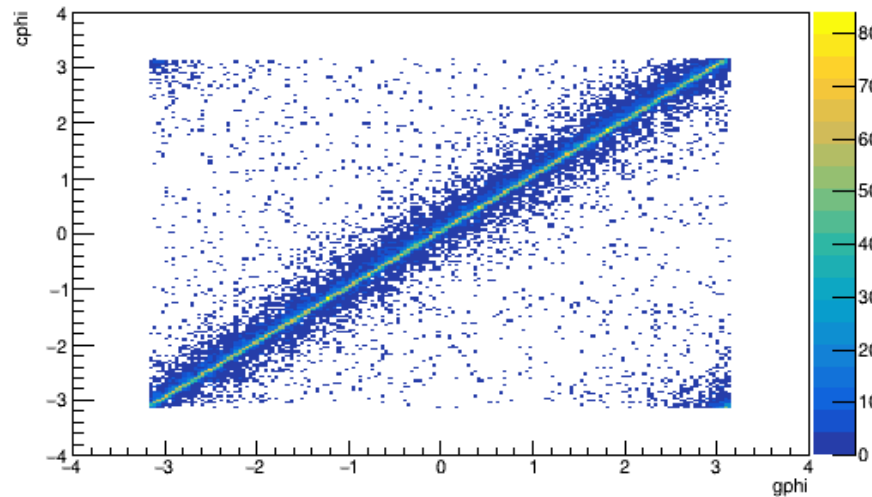
η vs $g\eta$ (FEMC)



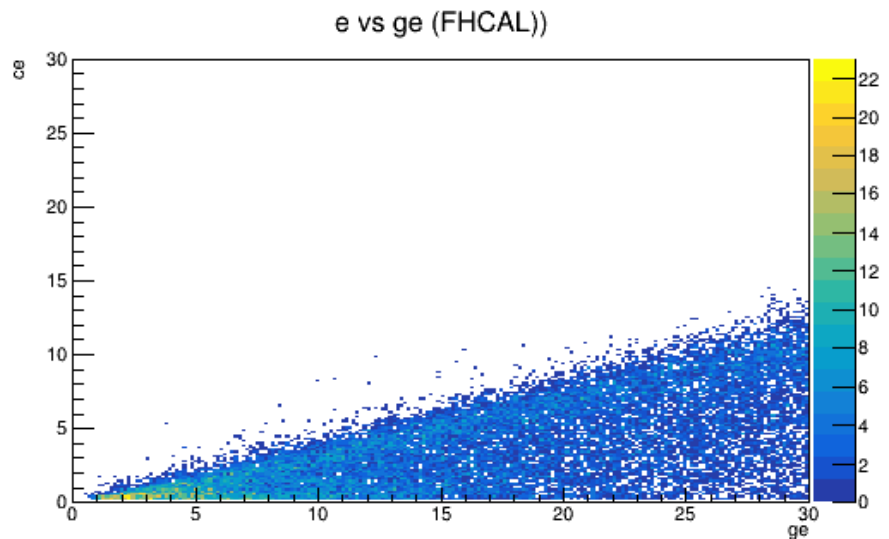
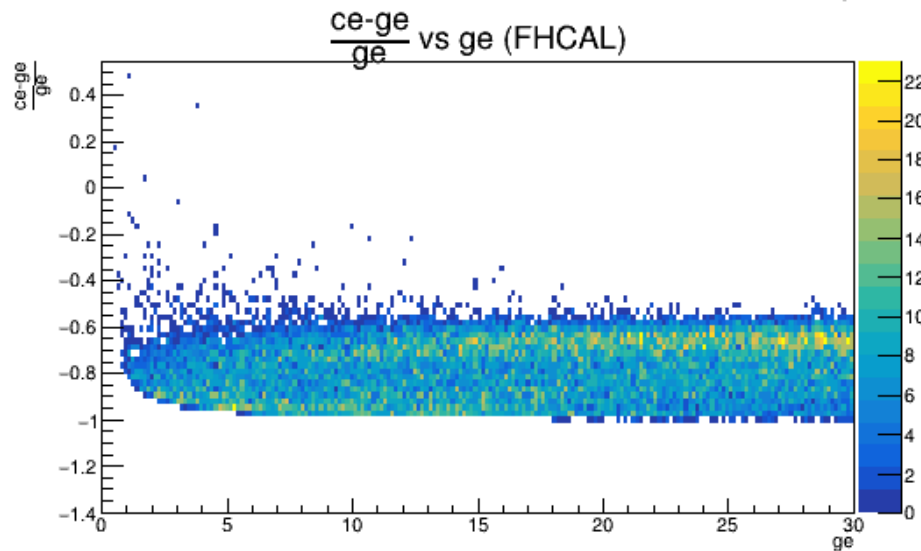
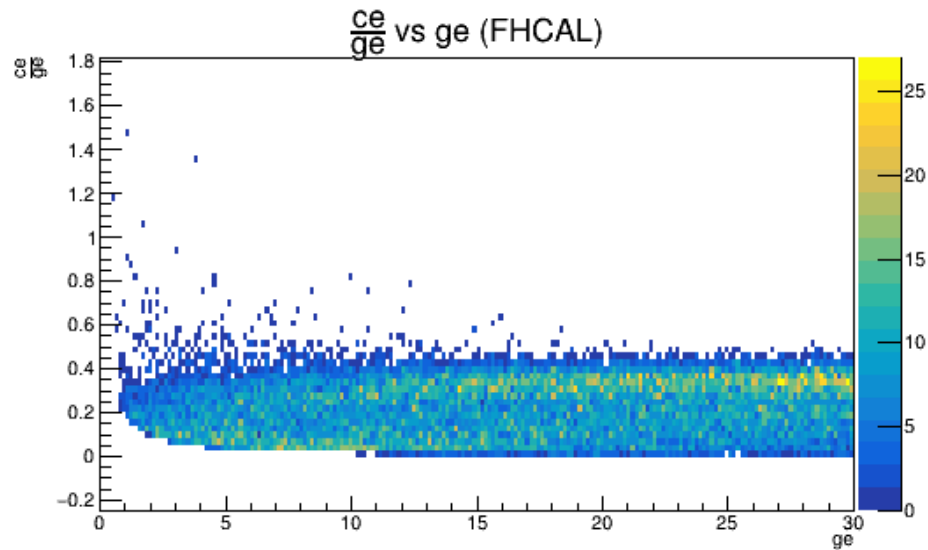
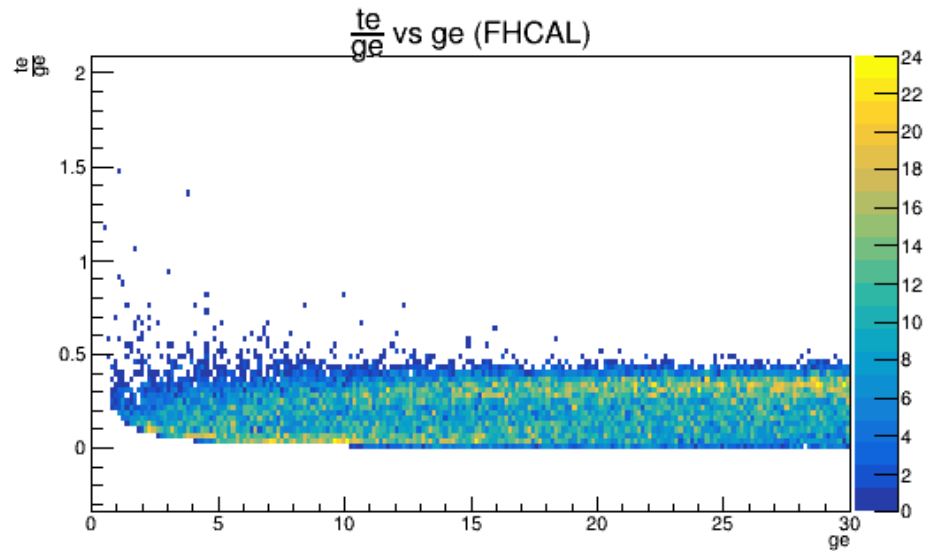
$\Delta \phi$ vs $g\phi$ (FEMC)



ϕ vs $g\phi$ (FEMC)

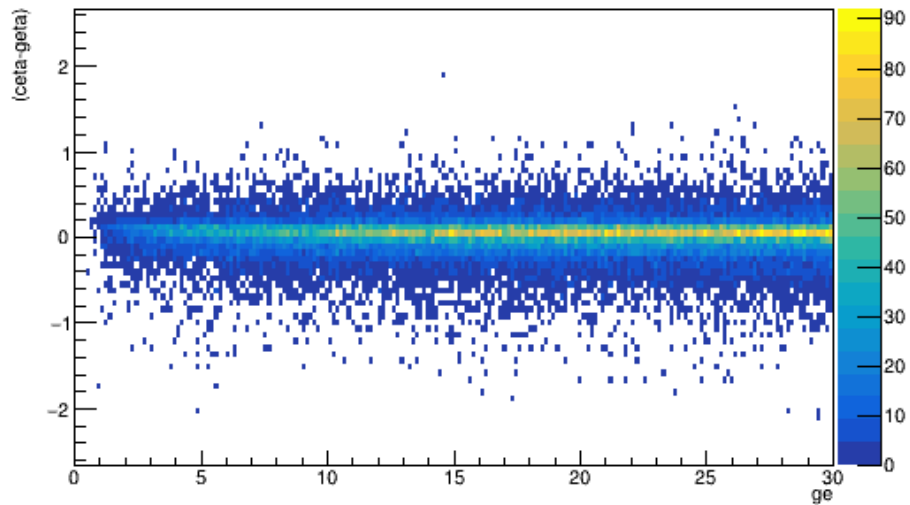


FHCAL: η : 1.2 to 3.5

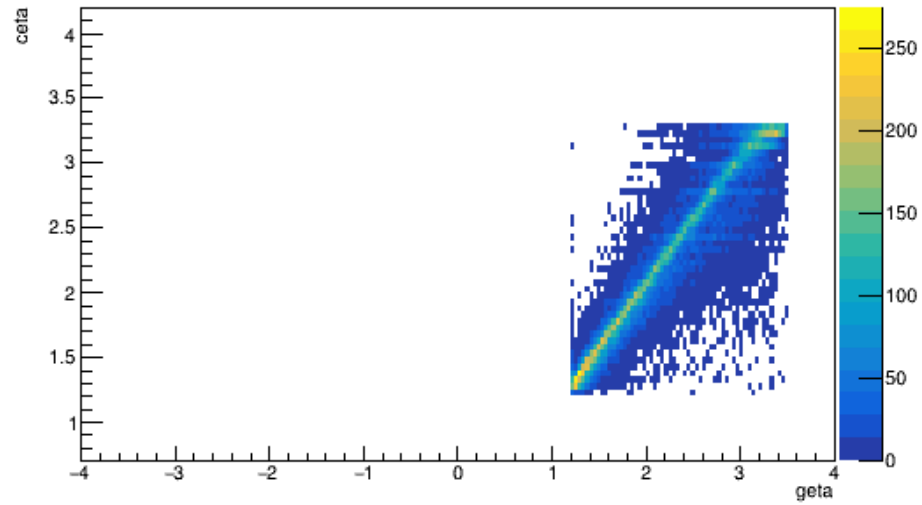


FHCAL: η : 1.2 to 3.5

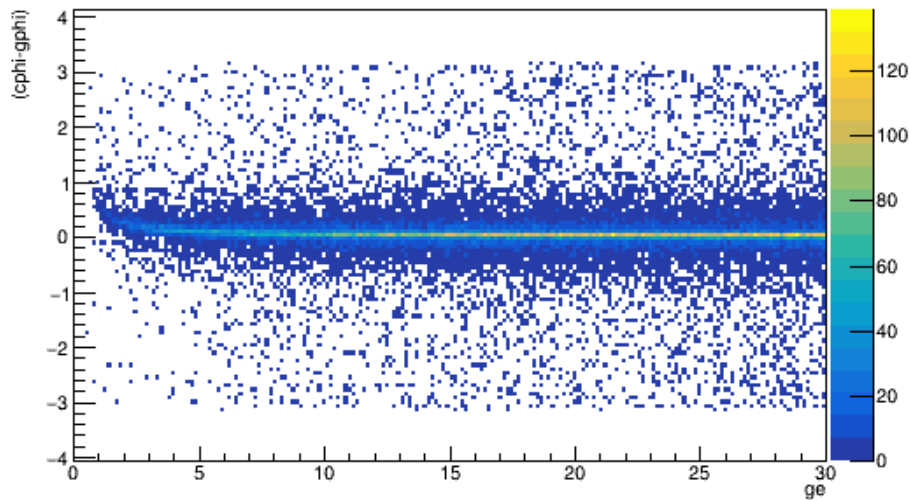
$\Delta \eta$ vs g_e (FHCAL)



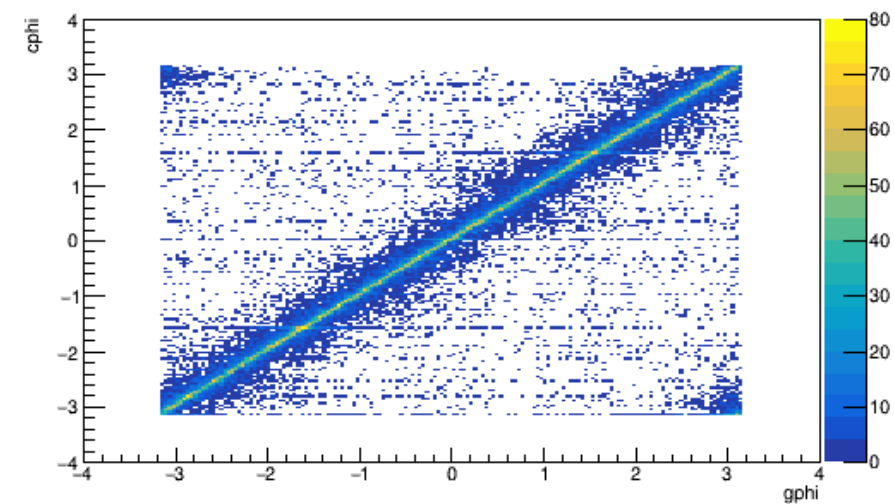
η vs $g\eta$ (FHCAL)



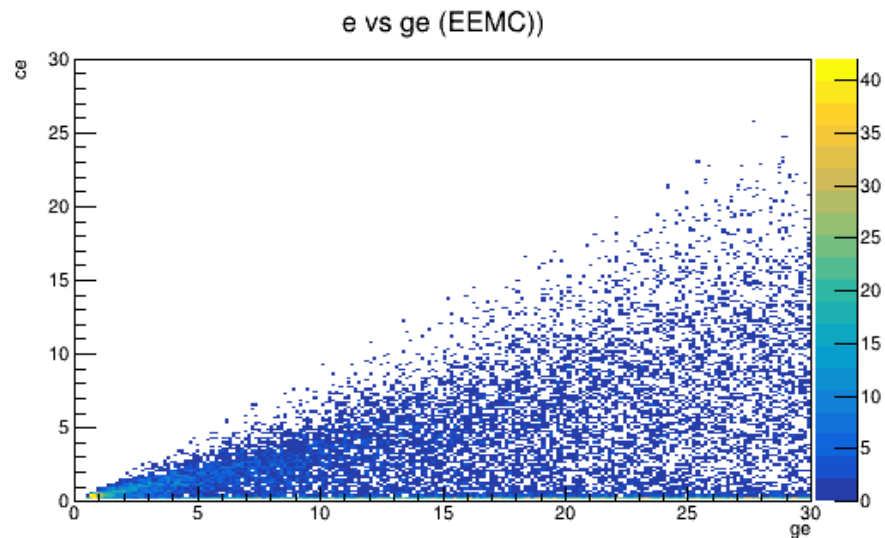
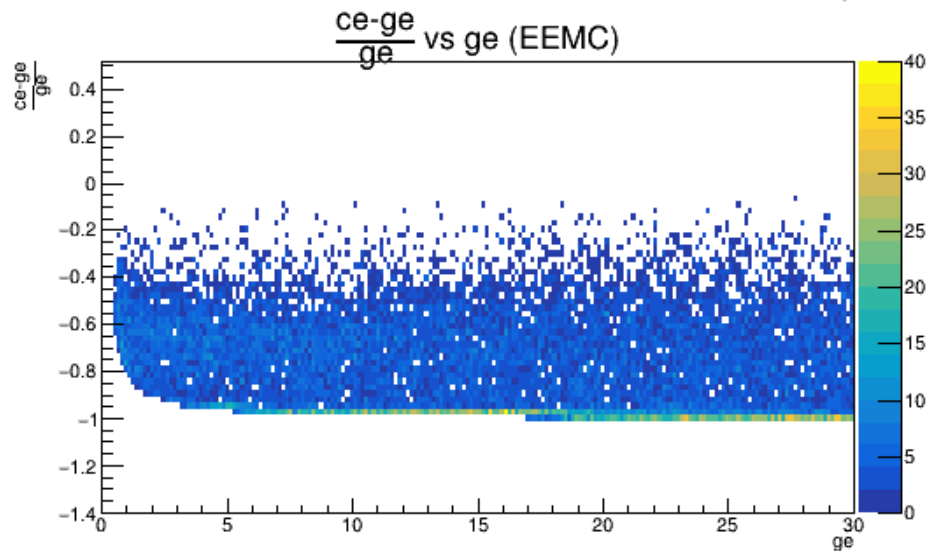
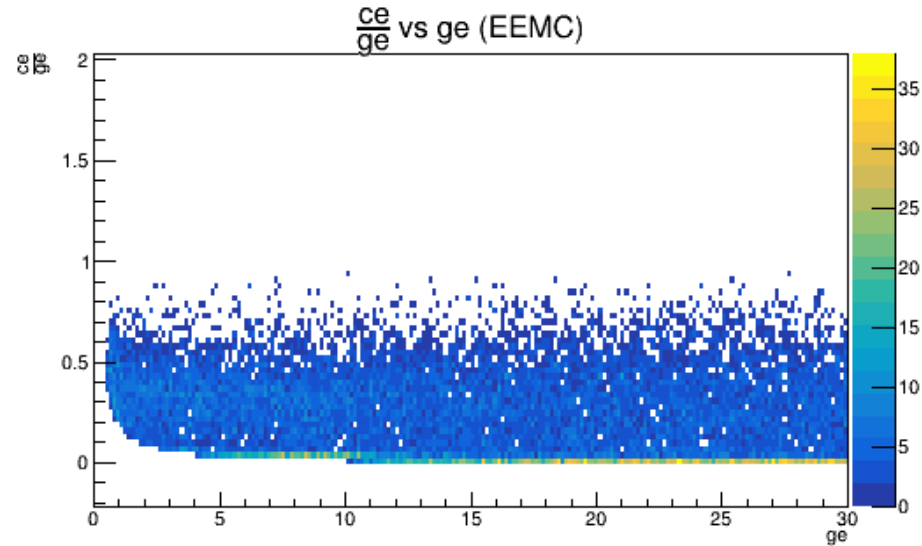
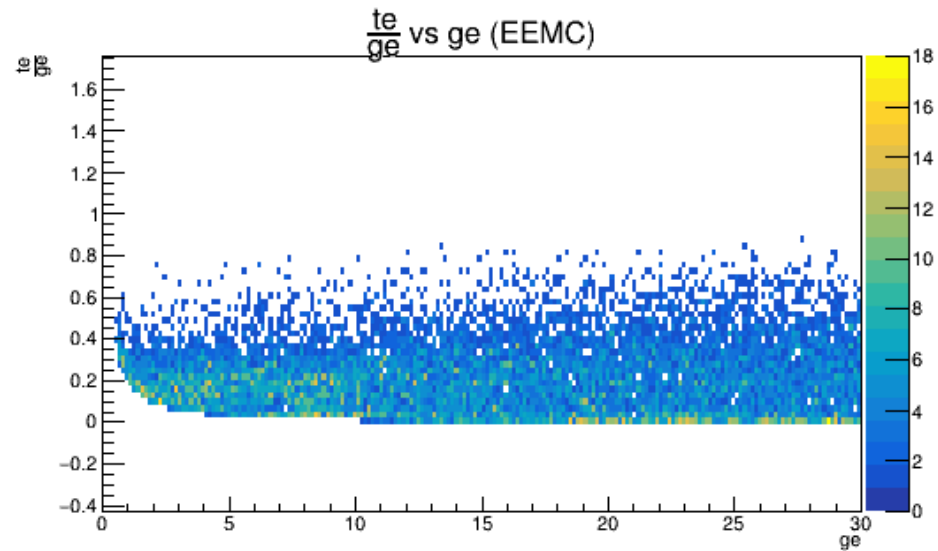
$\Delta \phi$ vs g_e (FHCAL)



ϕ vs $g\phi$ (FHCAL)

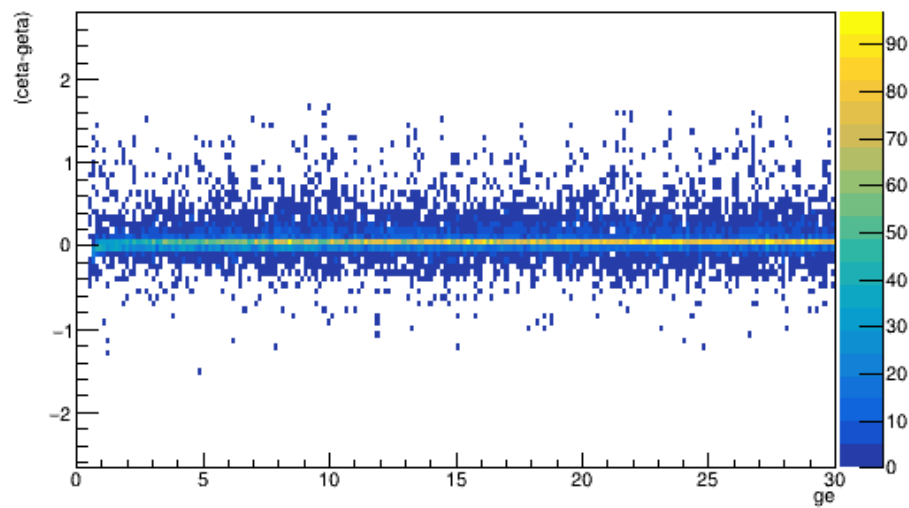


EEMC: η : -3.5 to -1.7

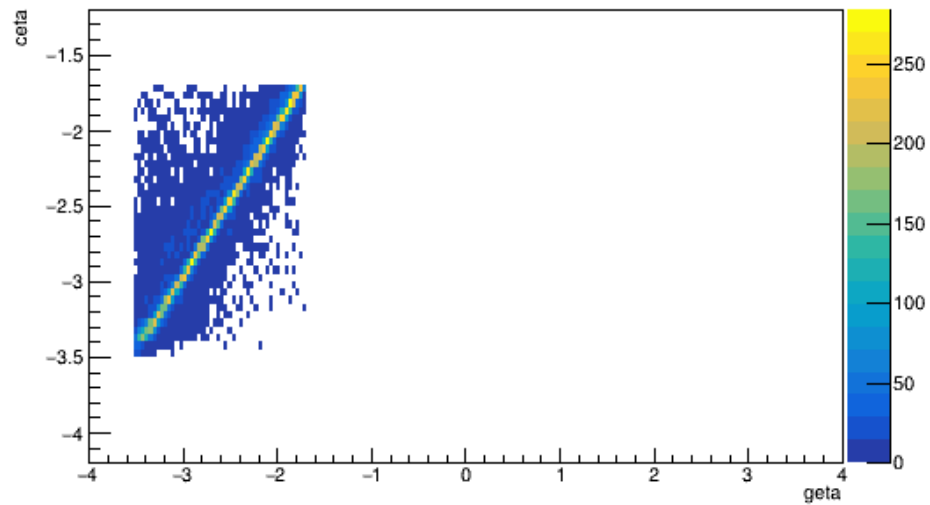


EEMC: η : -3.5 to -1.7

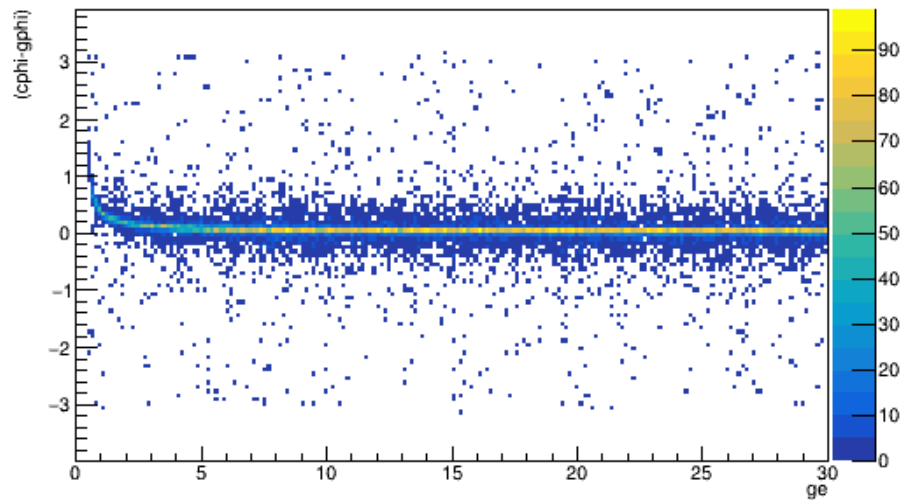
$\Delta \eta$ vs $g\eta$ (EEMC)



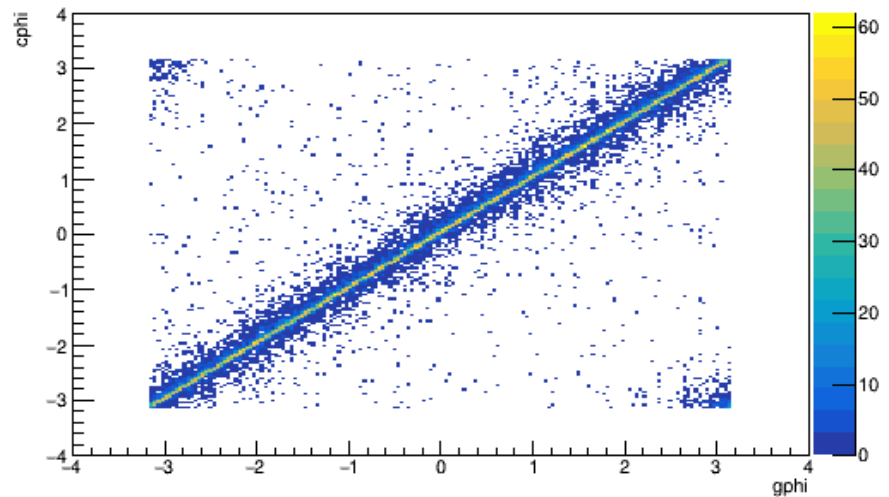
η vs $g\eta$ (EEMC)



$\Delta \phi$ vs $g\phi$ (EEMC)



ϕ vs $g\phi$ (EEMC)



Added energies

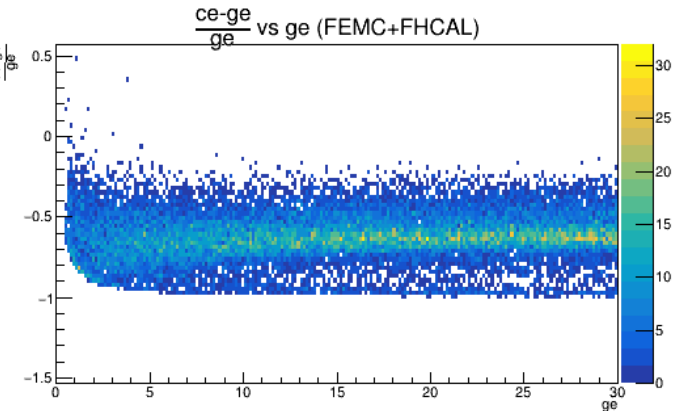
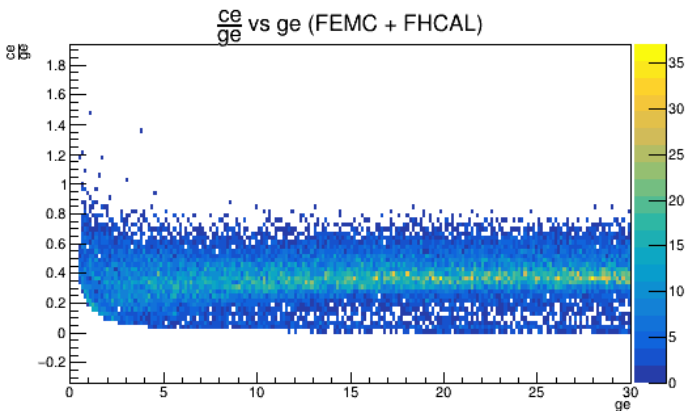
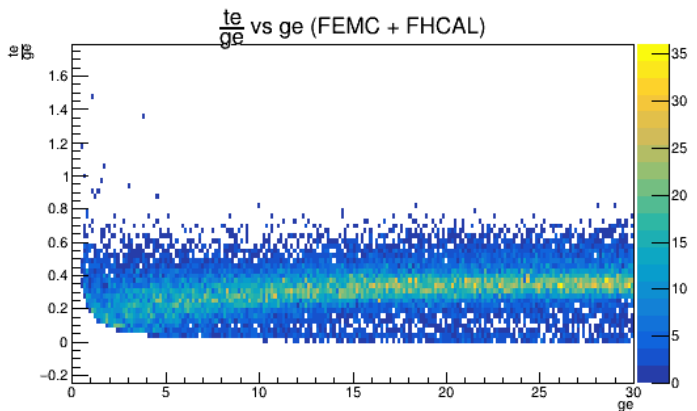
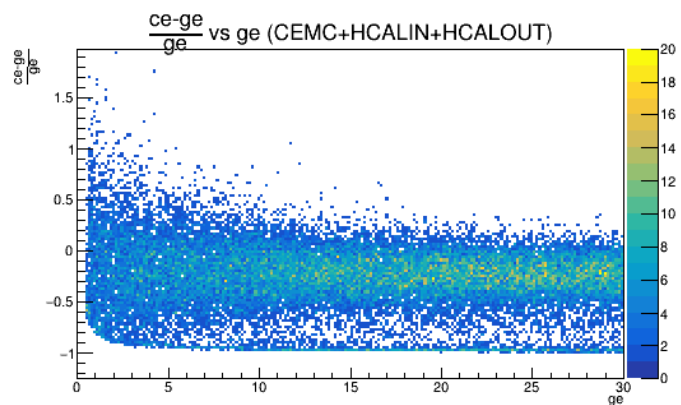
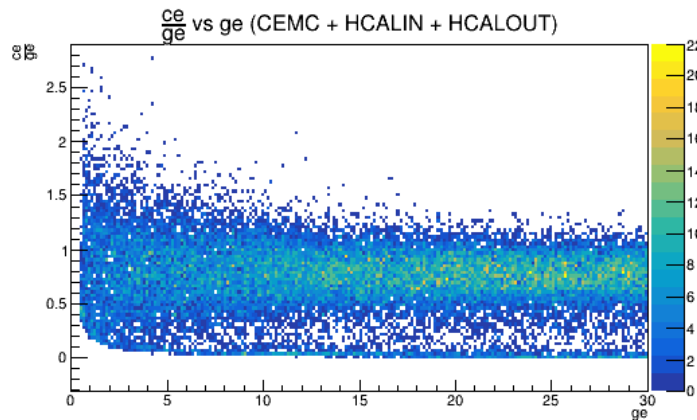
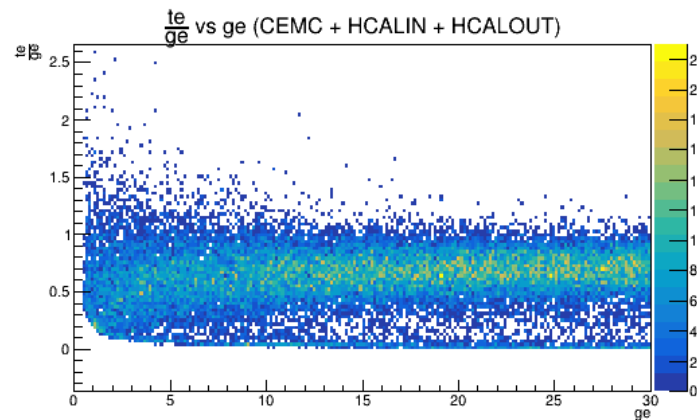
CEMC: η : -1.5 to 1.2

HCALIN: η : -1.1 to 1.1

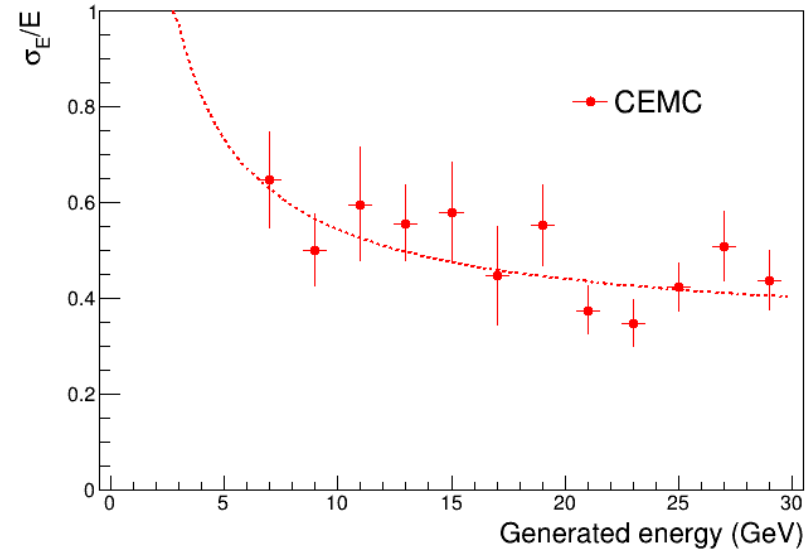
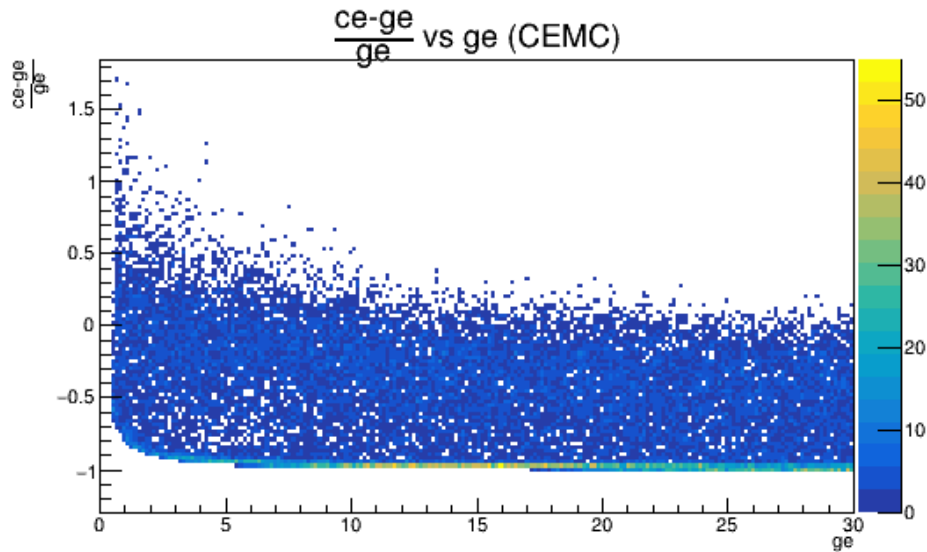
HCALOUT: η : -1.1 to 1.1

FEMC: η : 1.3 to 3.3

FHCAL: η : 1.2 to 3.5



Kaon – Energy resolution (CEMC)



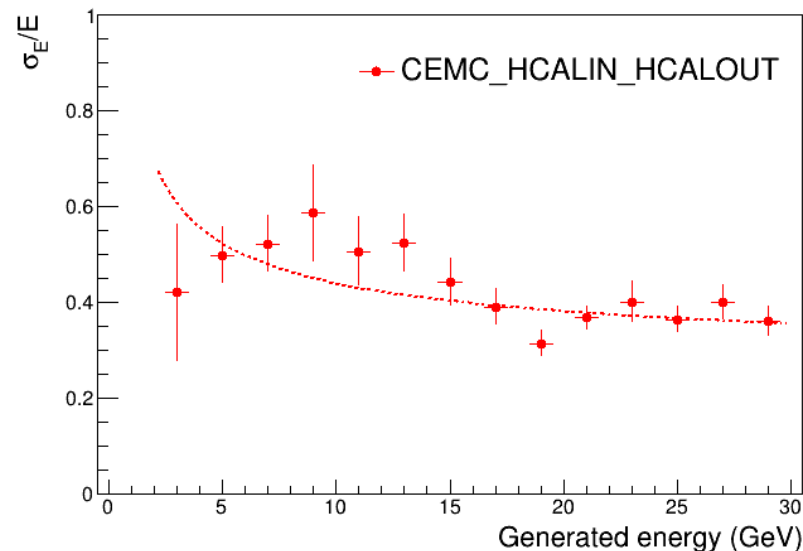
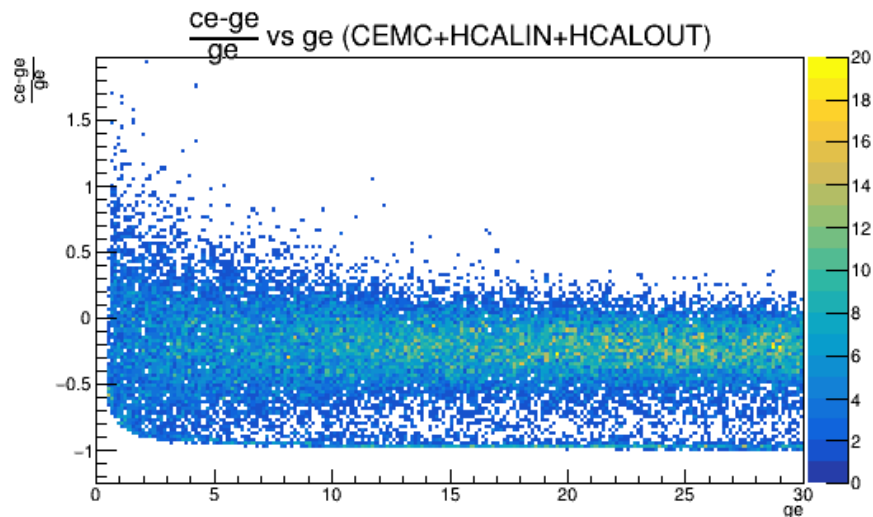
$$y = [0] + [1] / \sqrt{x} + [2] / x$$

[0]: 0.290232(29%)

[1]: 0.354318(35%)

[2]: 1.41699(141%)

Kaon – Energy resolution (CEMC+HCALIN+HCALOUT)

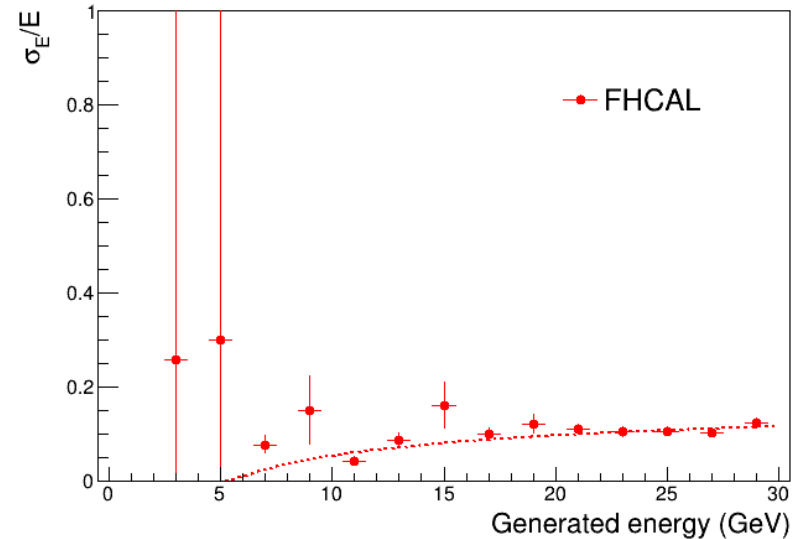
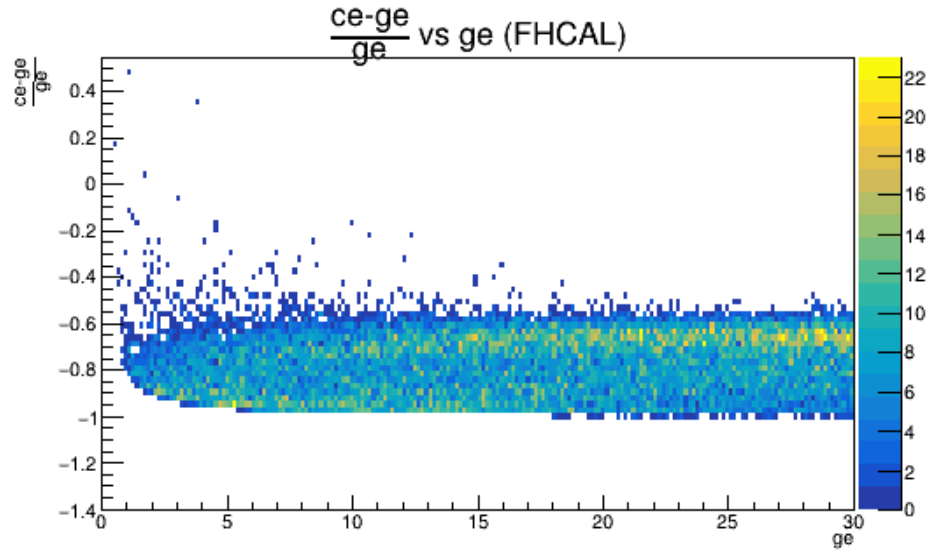


$$y = [0] + [1] / \text{sqrt}(x)$$

[0]: 0.239473 (24%)

[1]: 0.634108(63%)

Kaon – Energy resolution (FHCAL)

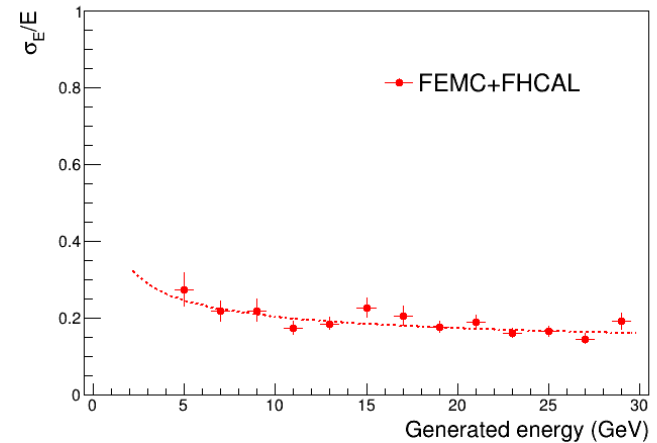
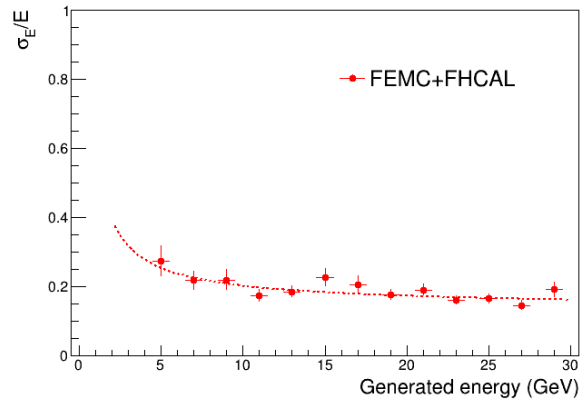
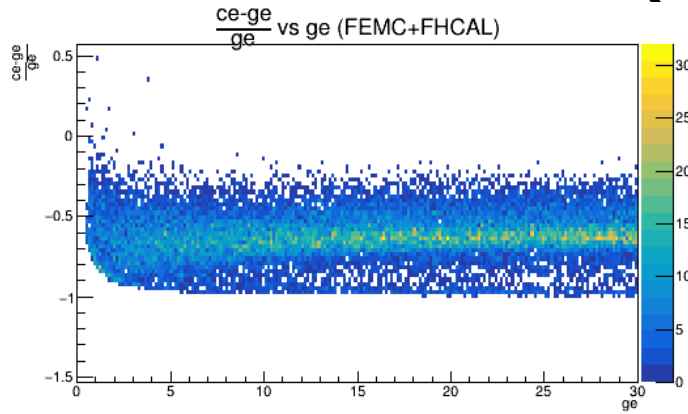


$$y = [0] + [1] / \sqrt{x}$$

[0]: 0.201349(20%)

[1]: -0.466969(47%)

Kaon – Energy resolution (FEMC+FHCAL)



$$y = [0] + [1] / \sqrt{x} + [2] / x$$

[0]: 0.125033(12%)
 [1]: 0.140027(14%)
 [2]: 0.331656(33%)

$$y = [0] + [1] / \sqrt{x}$$

[0]: 0.100481(10%)
 [1]: 0.326227(33%)

THE END