



Simulation Statistics

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Contents

Histograms for energy resolution of detectors by applying manual clustering, 100 MeV energy cut on aggregate towers and incorporating slice-wise recalibration for the electrons detected by EEMC. The last slide shows the effect of using a 100 MeV energy cut on individual towers for the sake of comparison.

Simulation Parameters

- Particles: e^-
- Events: 150,000 e^- (100,000 \rightarrow 0-30 GeV/c, 50000 \rightarrow 0-10 GeV/c)
- momentum (p): 0 to 30 GeV/c
- Pseudorapidity (η): -4 to 4
- Azimuth (Φ): $-\pi$ to π

Cuts:

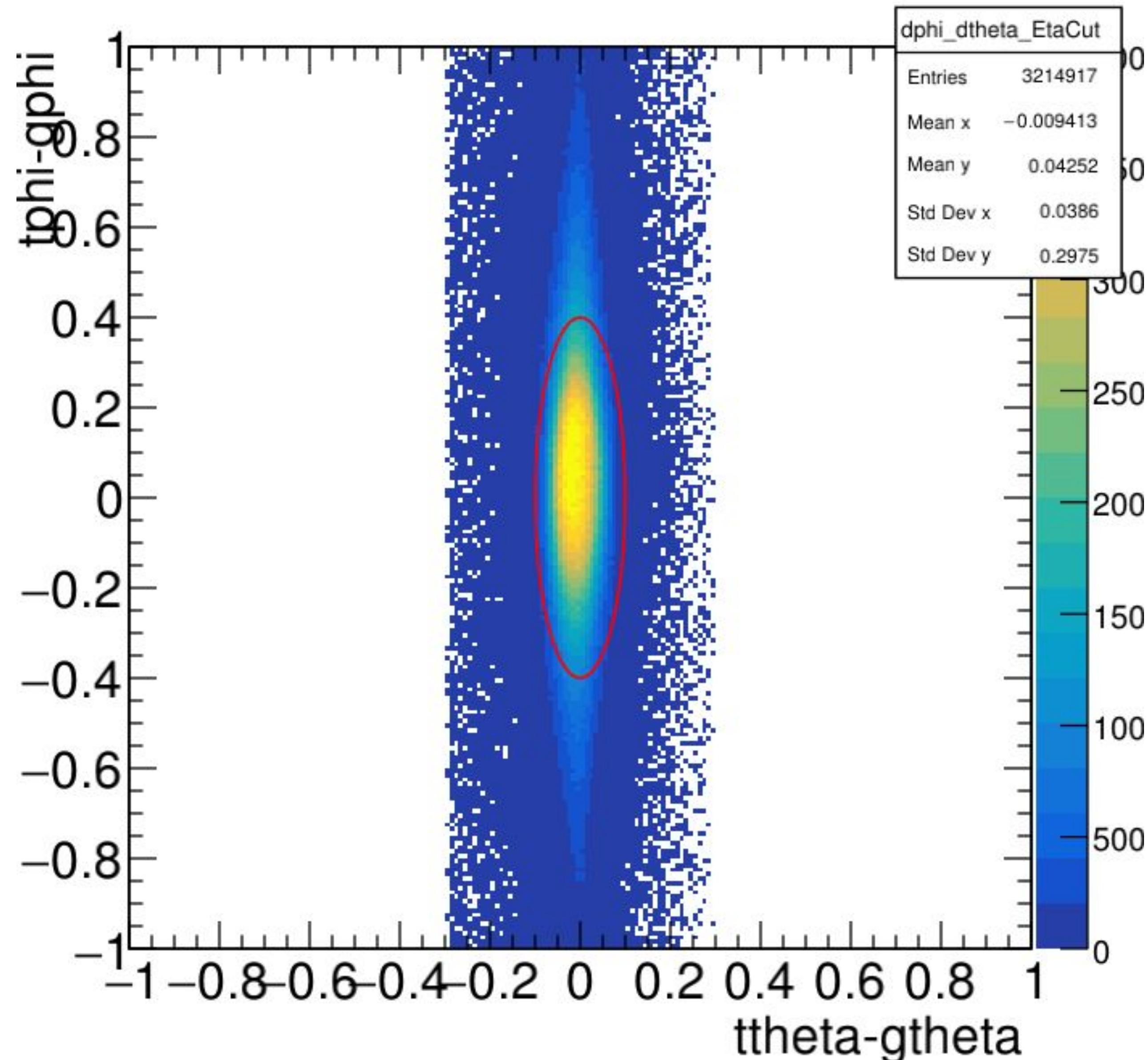
- Detector-wise η cuts (intersection of η ranges in case of detector combinations)
- Detector-wise Elliptical cuts in $d\phi$ vs $d\theta$ plots (simultaneously included in case of detector combinations)
- Energy cut on Towers (100 MeV)

A teal geometric graphic consisting of several overlapping triangles and quadrilaterals, creating a faceted, crystalline appearance. It is positioned on the left side of the slide.

EEMC (e^-)

EEMC (e^-)

Elliptical cut on dphi vs dtheta, Explicit η cut: -3.5 to -1.7, 100 MeV Energy Cut



Elliptical Cut: Only the towers within the elliptical region (centered at origin) are considered for further analysis.

Dimensions:

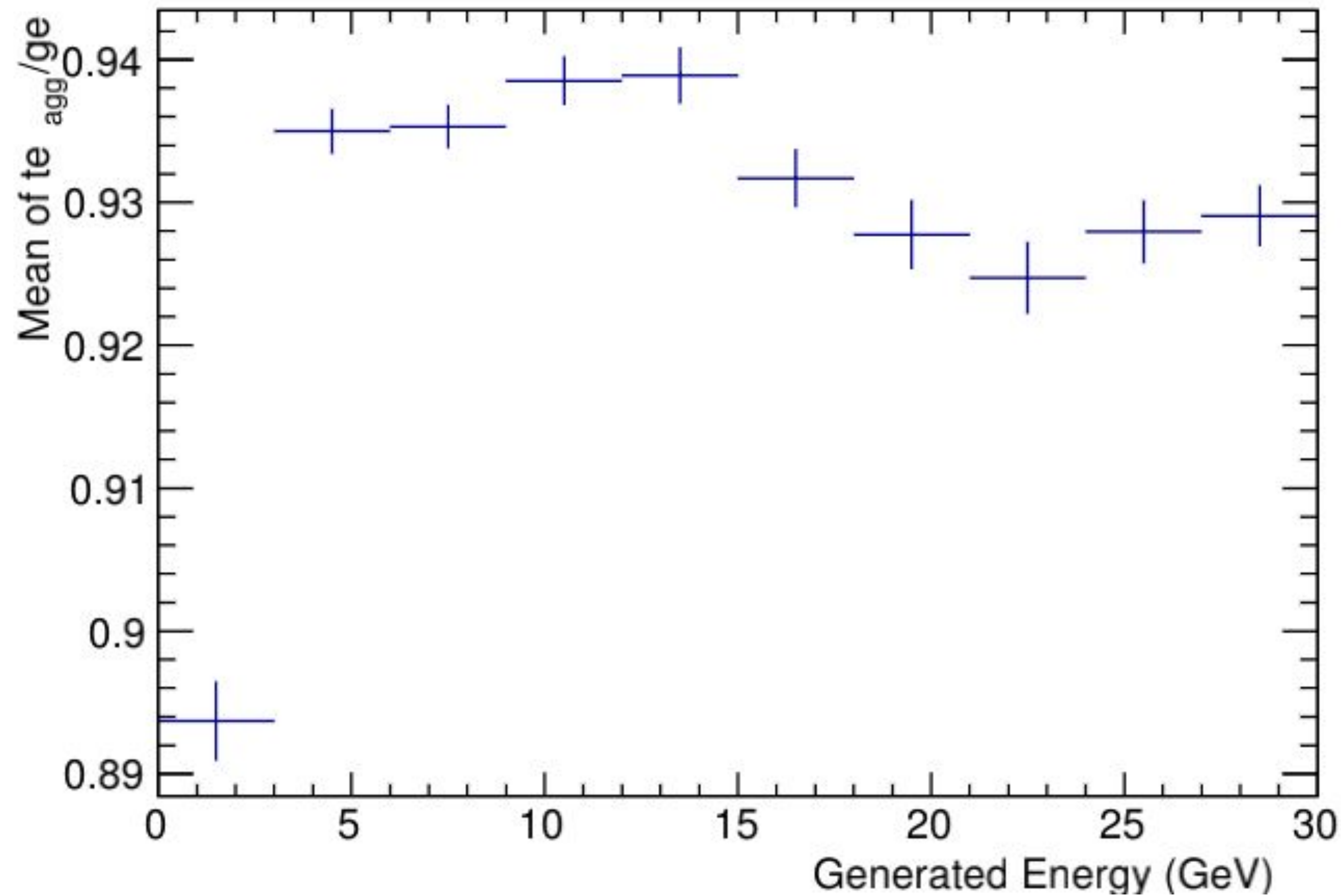
semi-minor axis = 0.10 units
semi-major axis = 0.40 units

EEMC (e^-)

Elliptical cut on dphi vs dtheta

Explicit η cut: -3.5 to -1.7

100 MeV Energy Cut



($t_e \rightarrow t_e/\text{recalibrationFactor}$)

Each slice of $(t_{e_agg}-g_e)/g_e$ vs g_e plot will be recalibrated on the basis of dividing by a recalibration factor which equals to the Mean of t_{e_agg}/g_e corresponding to that particular slice in this plot.

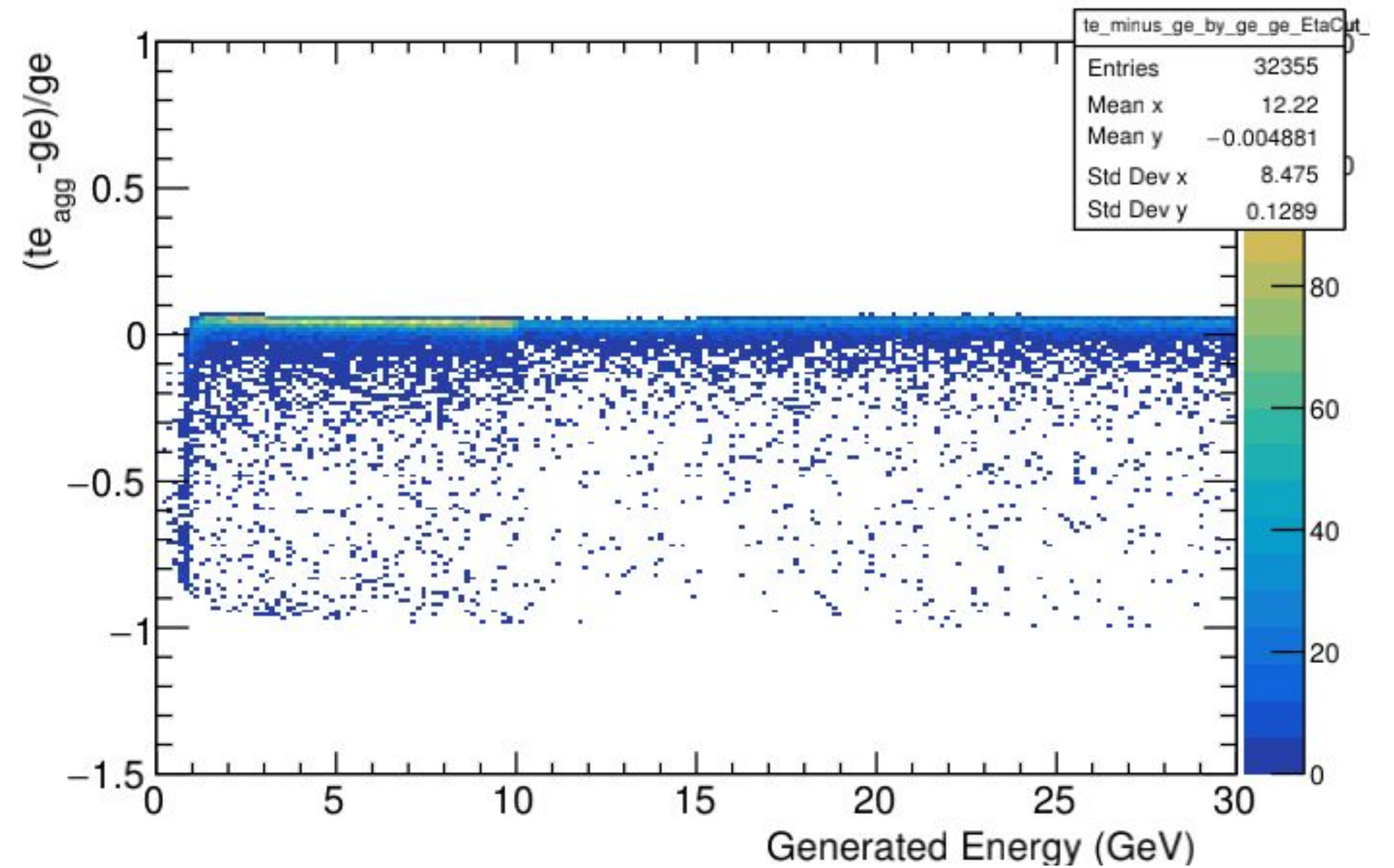
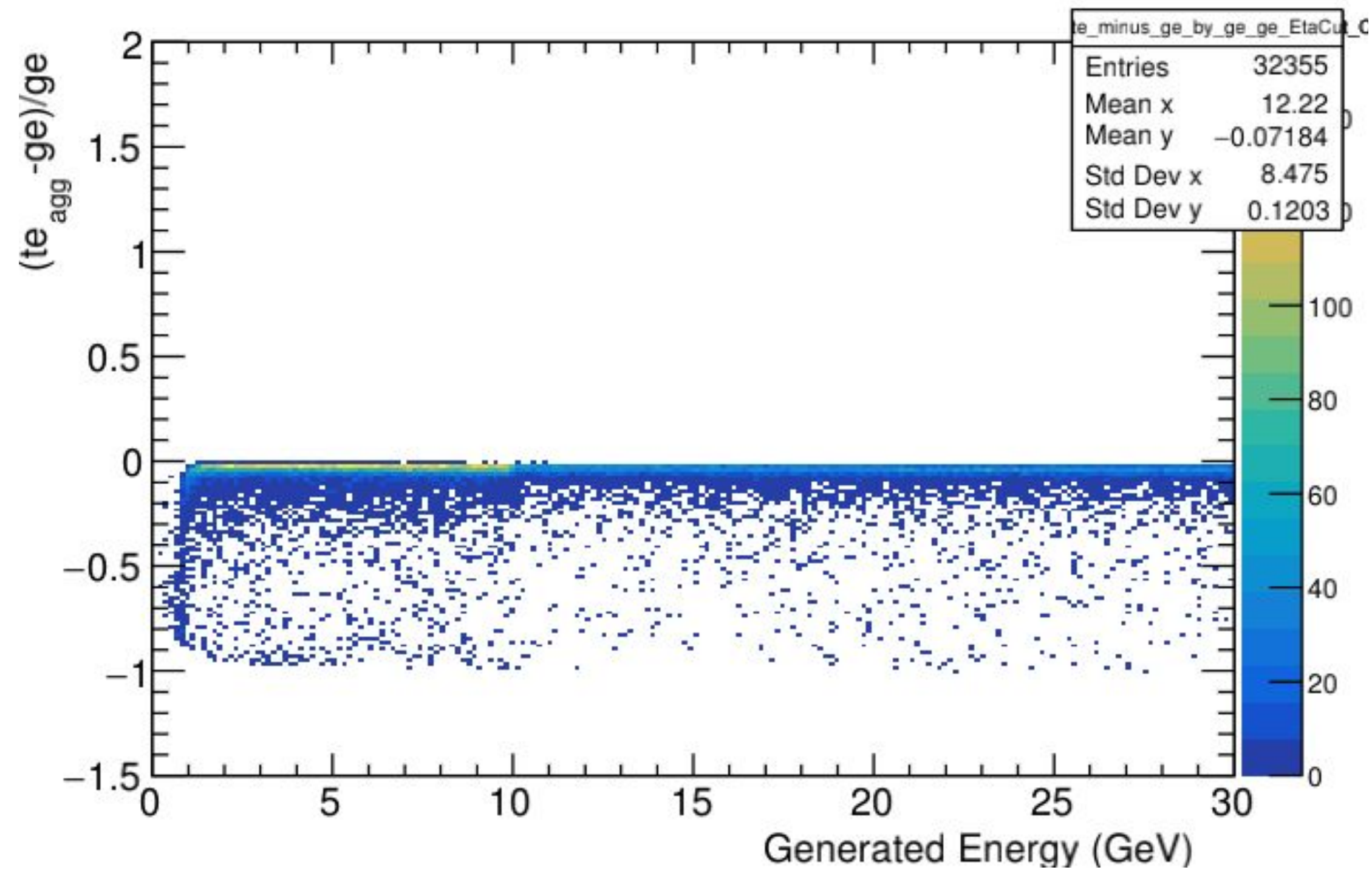
*The Recalibration factor for the first slice has been decided manually because the value from this plot doesn't seem to be optimum.

recalibrationFactor of first slice = 0.93

EEMC (e^-)

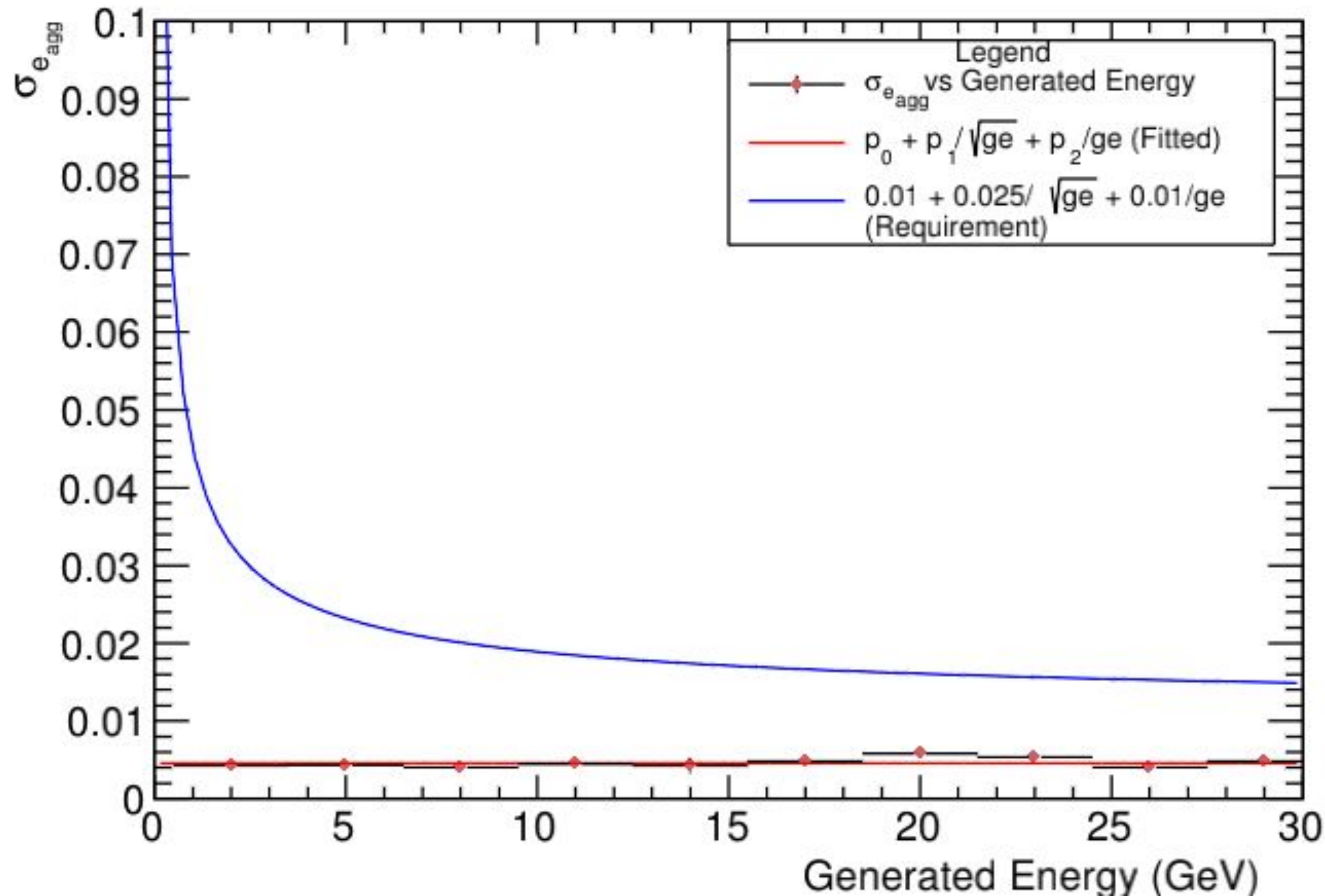
$(te_{agg} - ge)/ge$ vs ge
Explicit η cut: -3.5 to -1.7
100 MeV energy cut

After Recalibration ($te \rightarrow te/recalibrationFactor$)



EEMC (e^-)

$\sigma_{e_{agg}}$ vs g_e
Explicit η cut: -3.5 to -1.7
Elliptical cut
100 MeV Energy Cut



σ_e refers to the standard deviation of the Gaussian fitted to a slice of the recalibrated $(t_{e_{agg}} - g_e) / g_e$ vs g_e plot.
(shown on the previous slide)

Number of bins = 10
Bin Width = 3 GeV

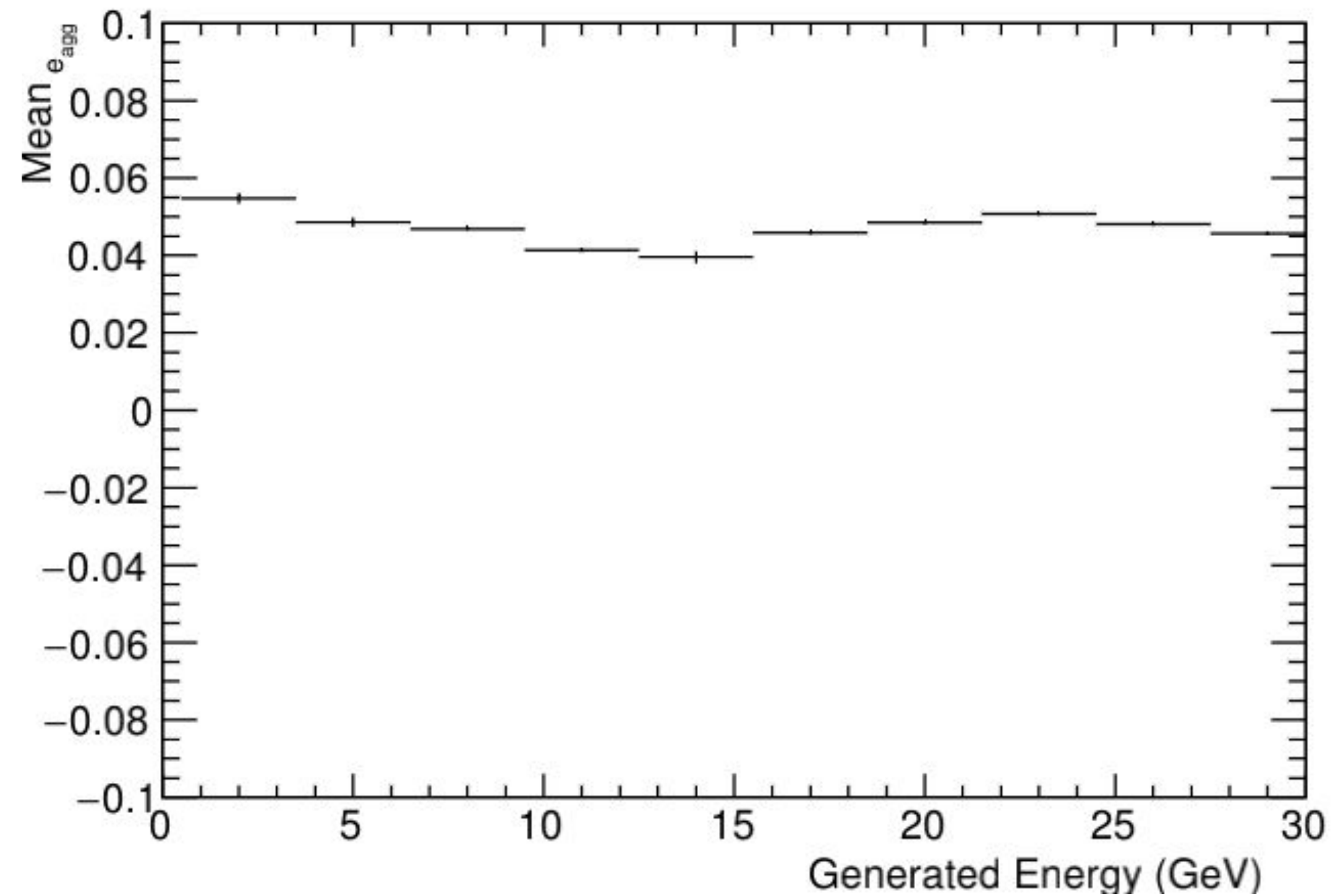
Fit Parameters:

$p_0 = (0.00461132 \pm 0.0000704229)$
 $p_1 = 0 \text{ GeV}^{0.5}$
 $p_2 = 0 \text{ GeV}$

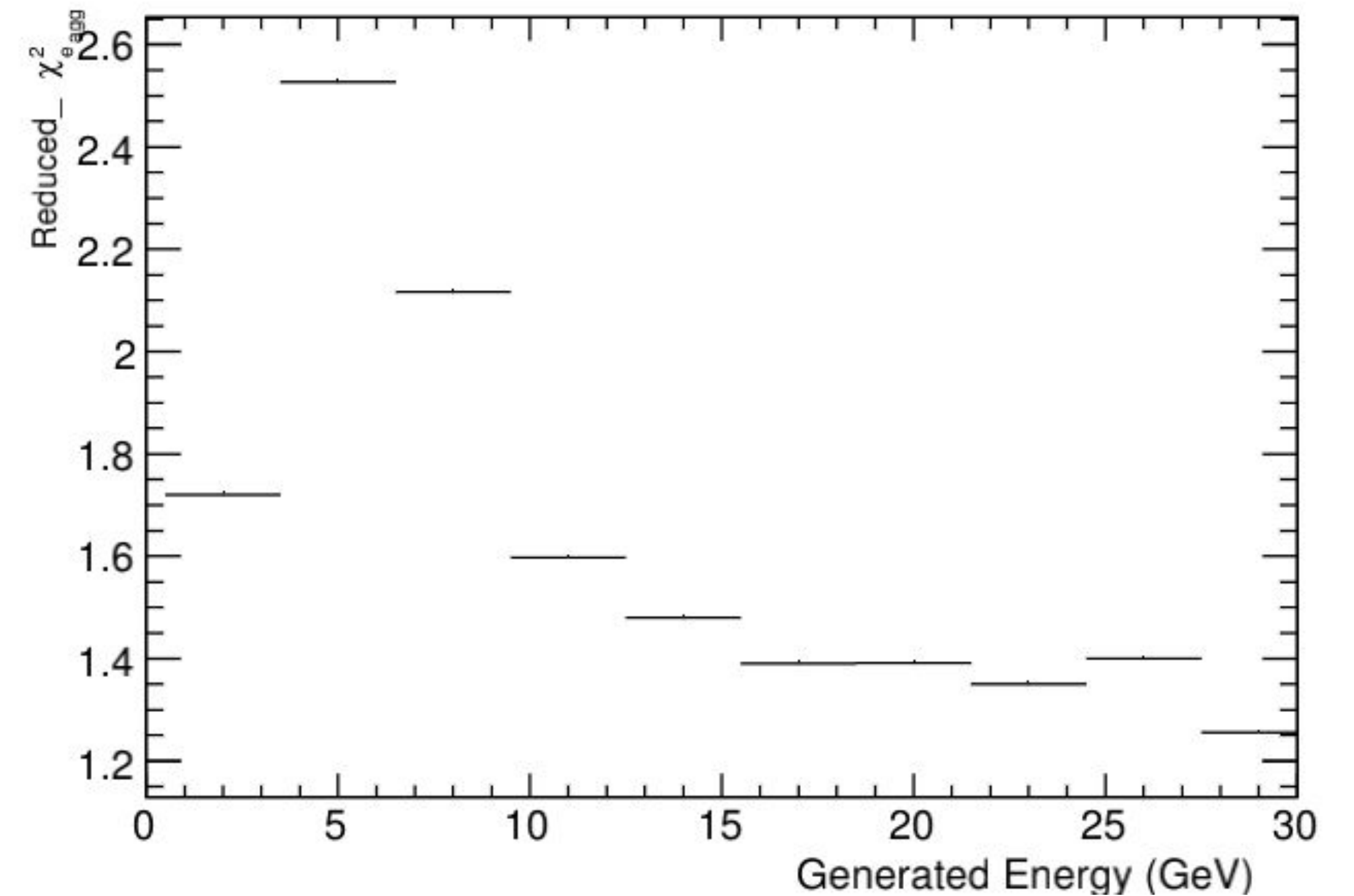
*A straight line has been fitted otherwise a really unusual fit is incorporated by ROOT.

EEMC (e^-)

Explicit η cut: -3.5 to -1.7
Elliptical cut, 200 MeV Energy cut



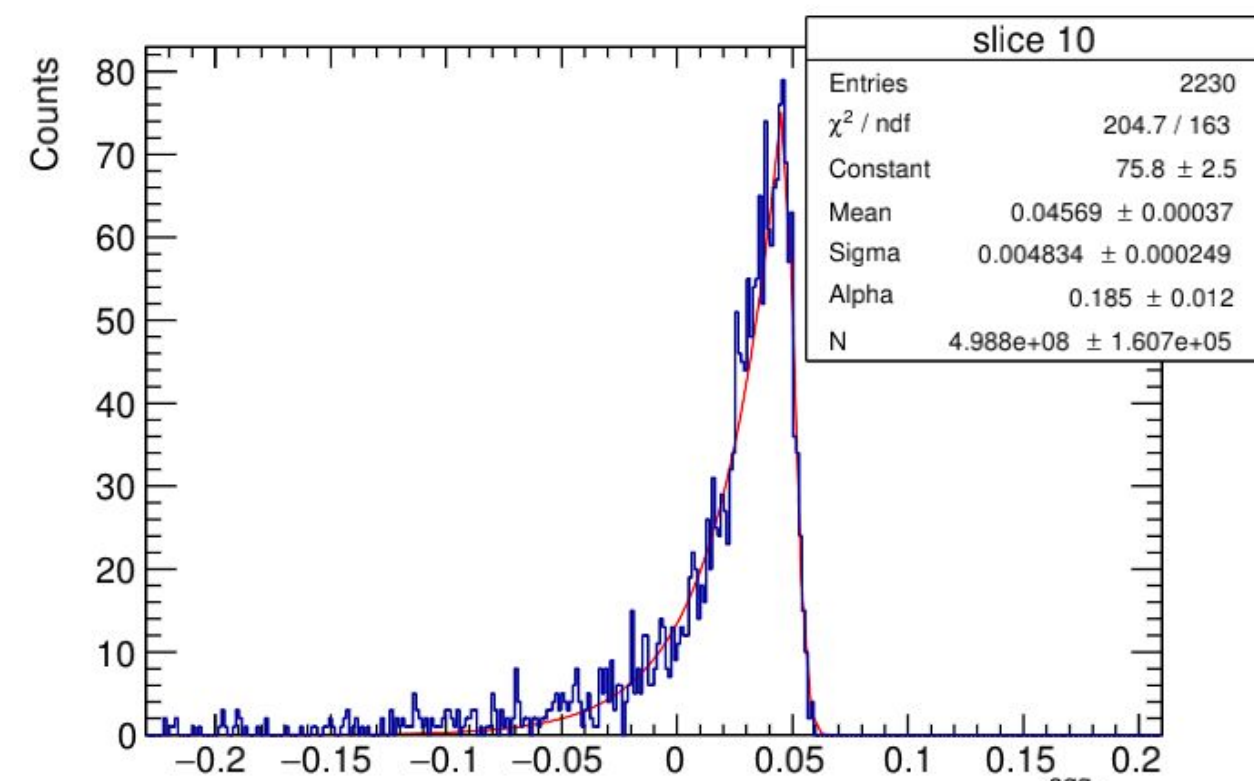
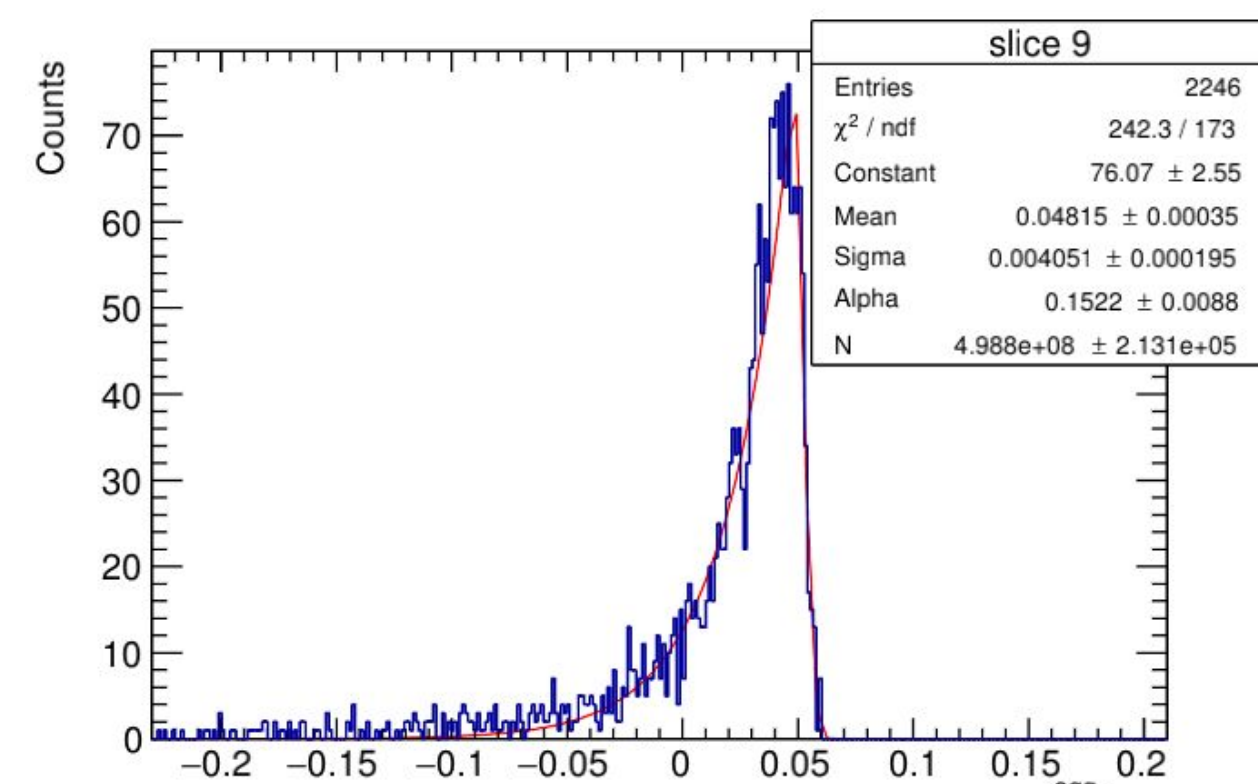
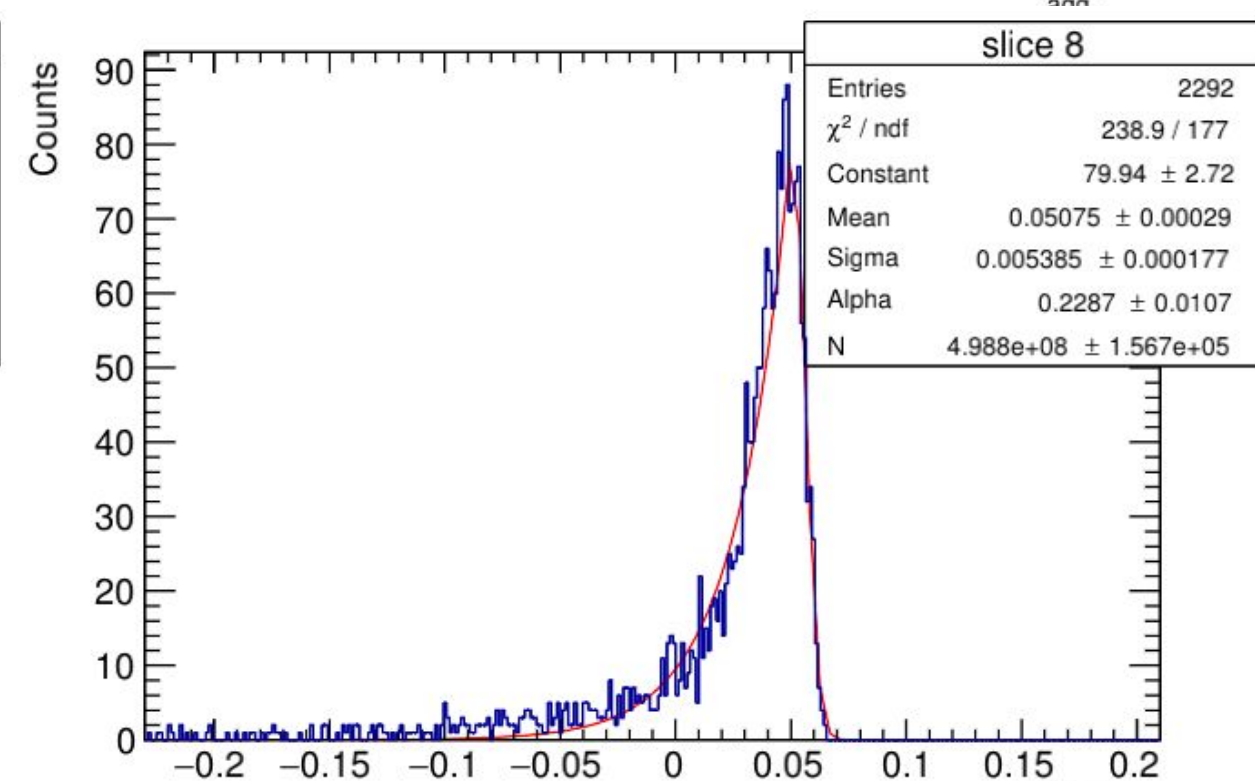
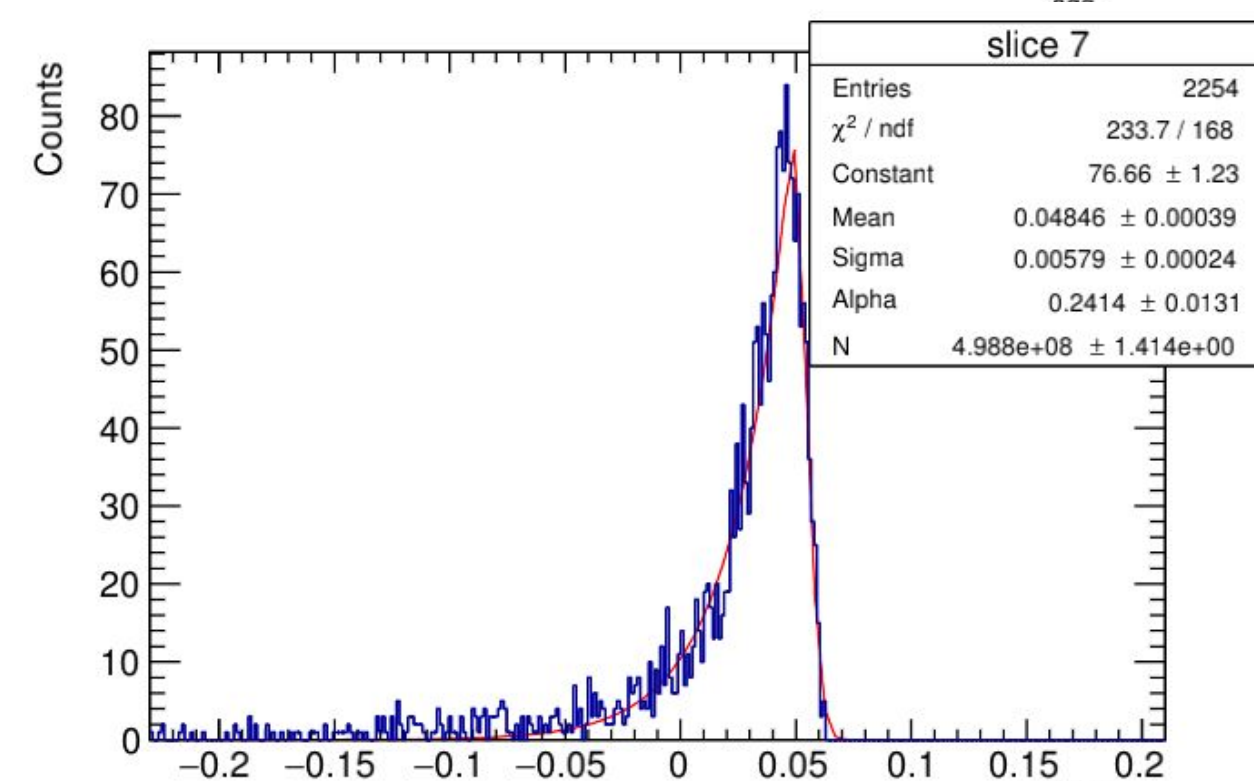
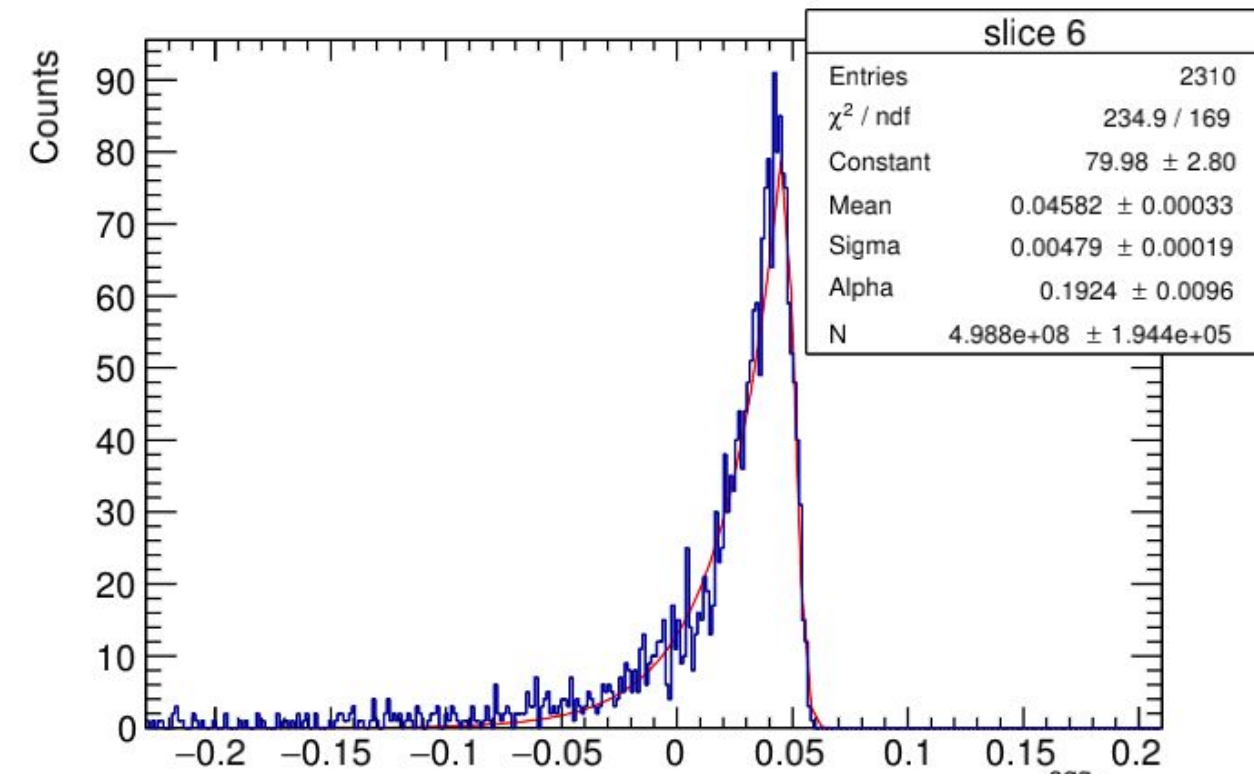
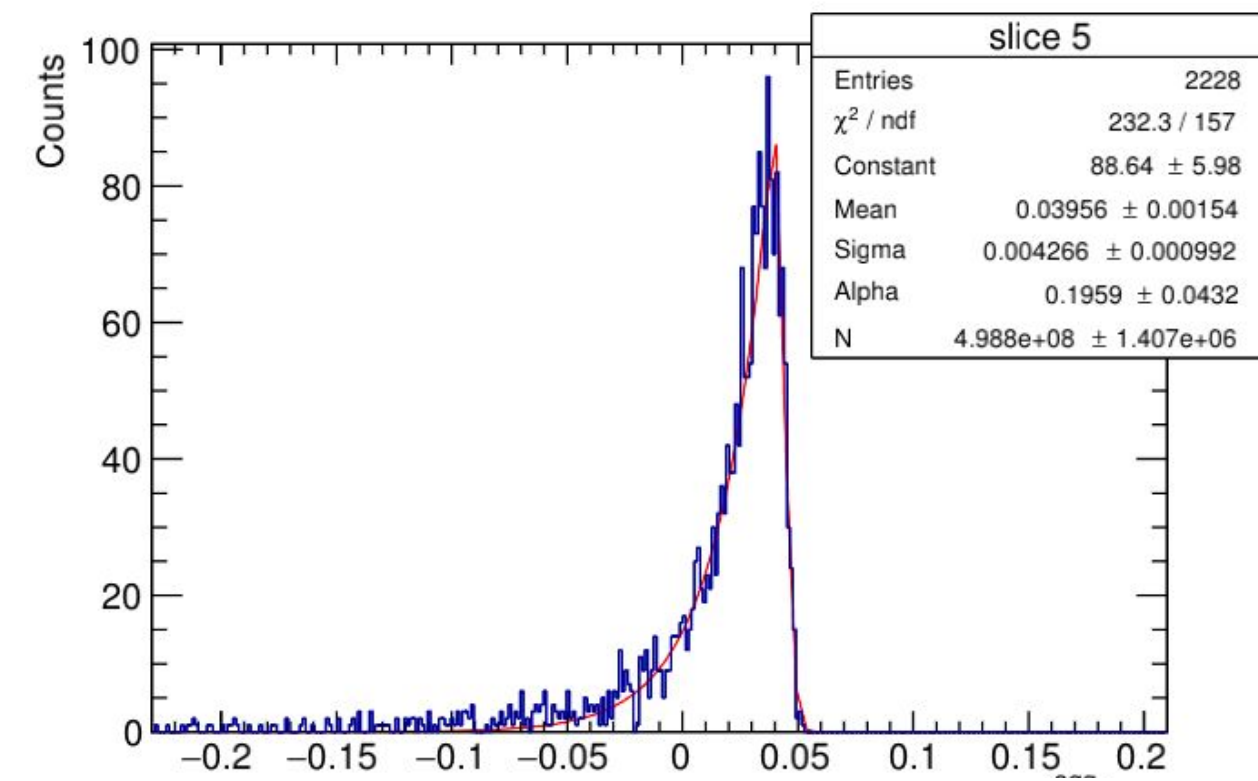
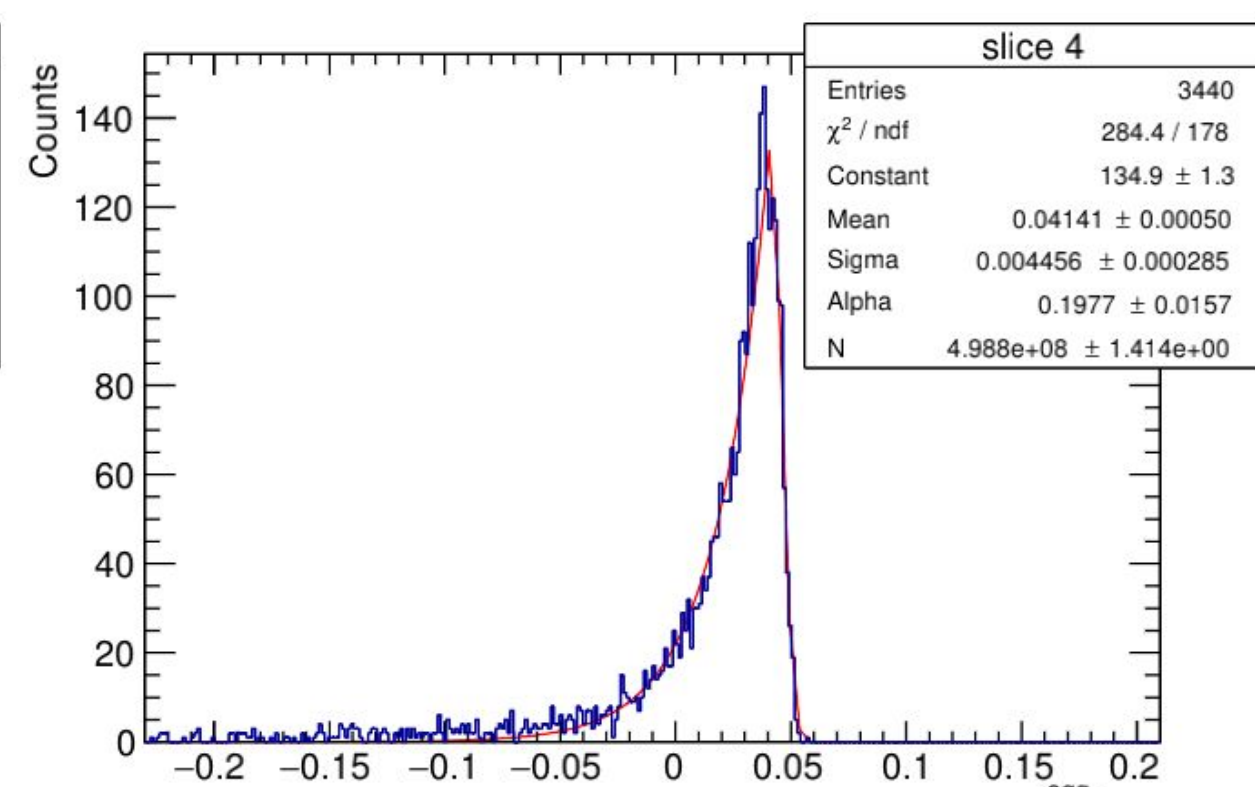
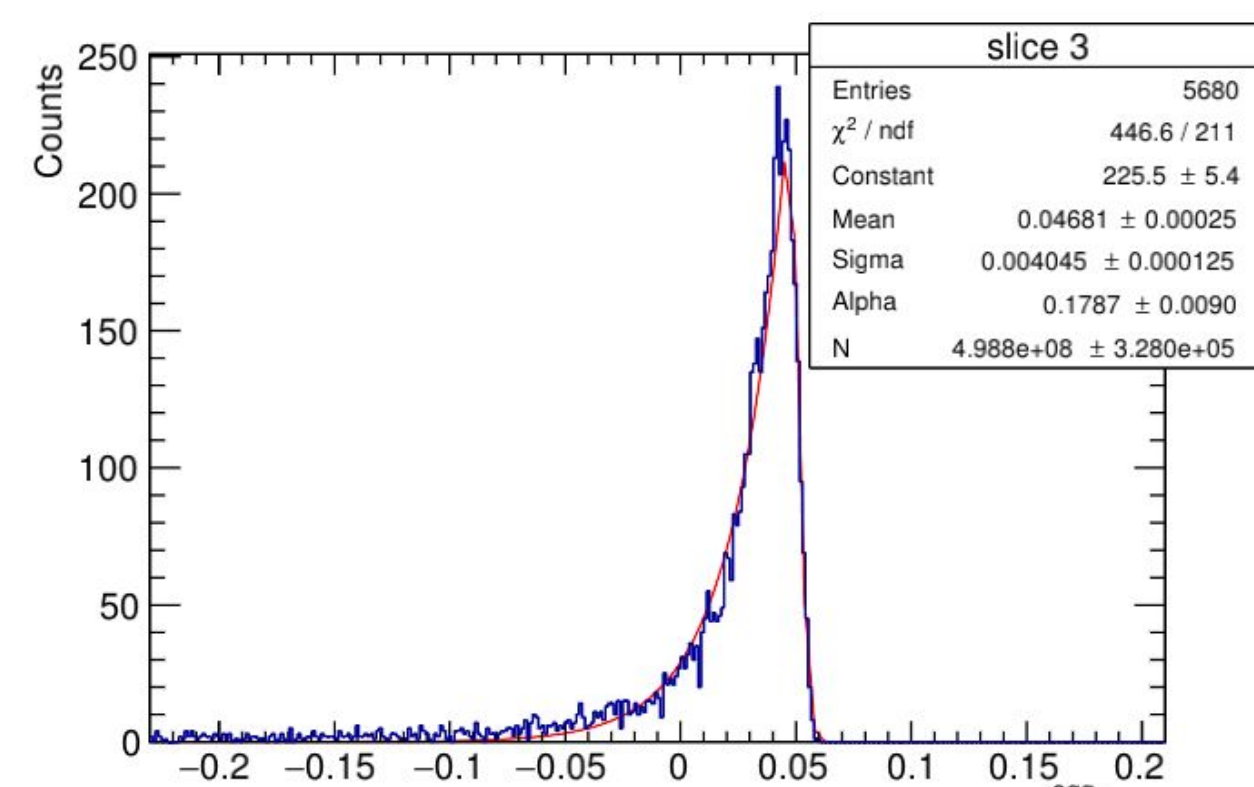
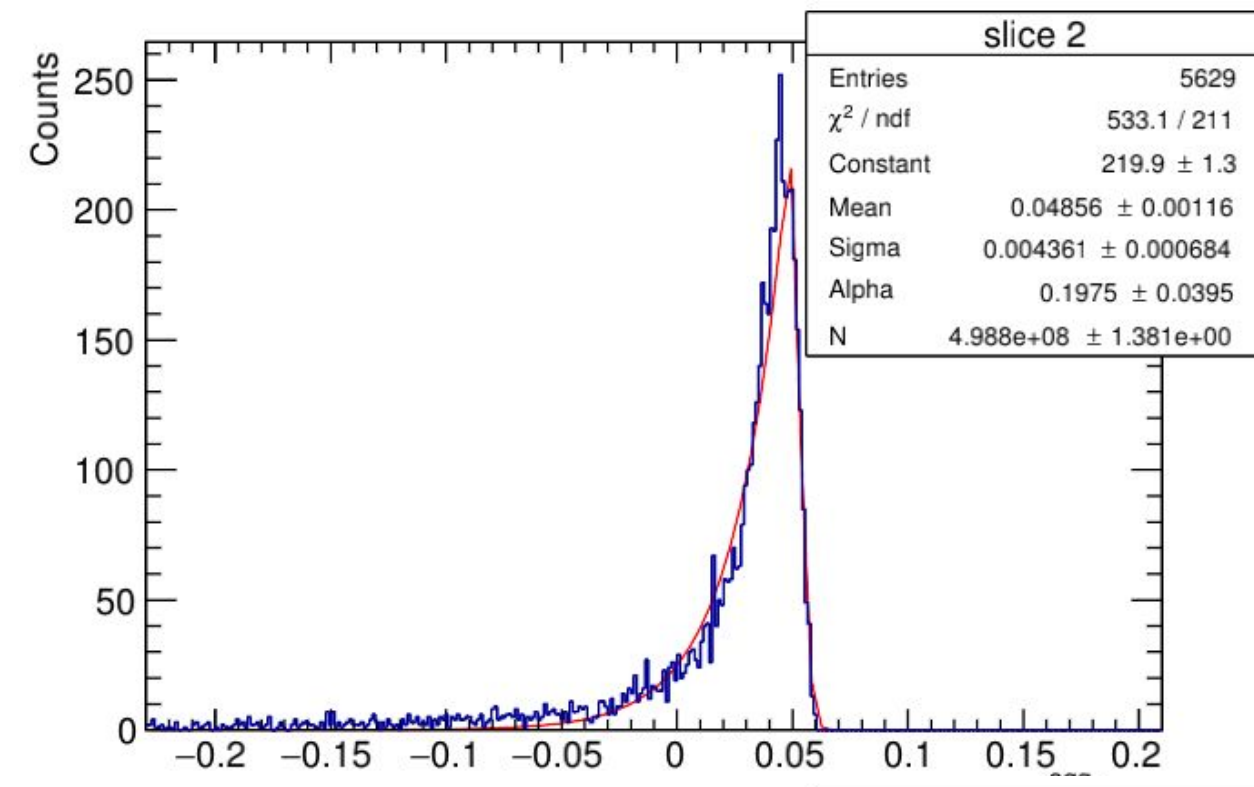
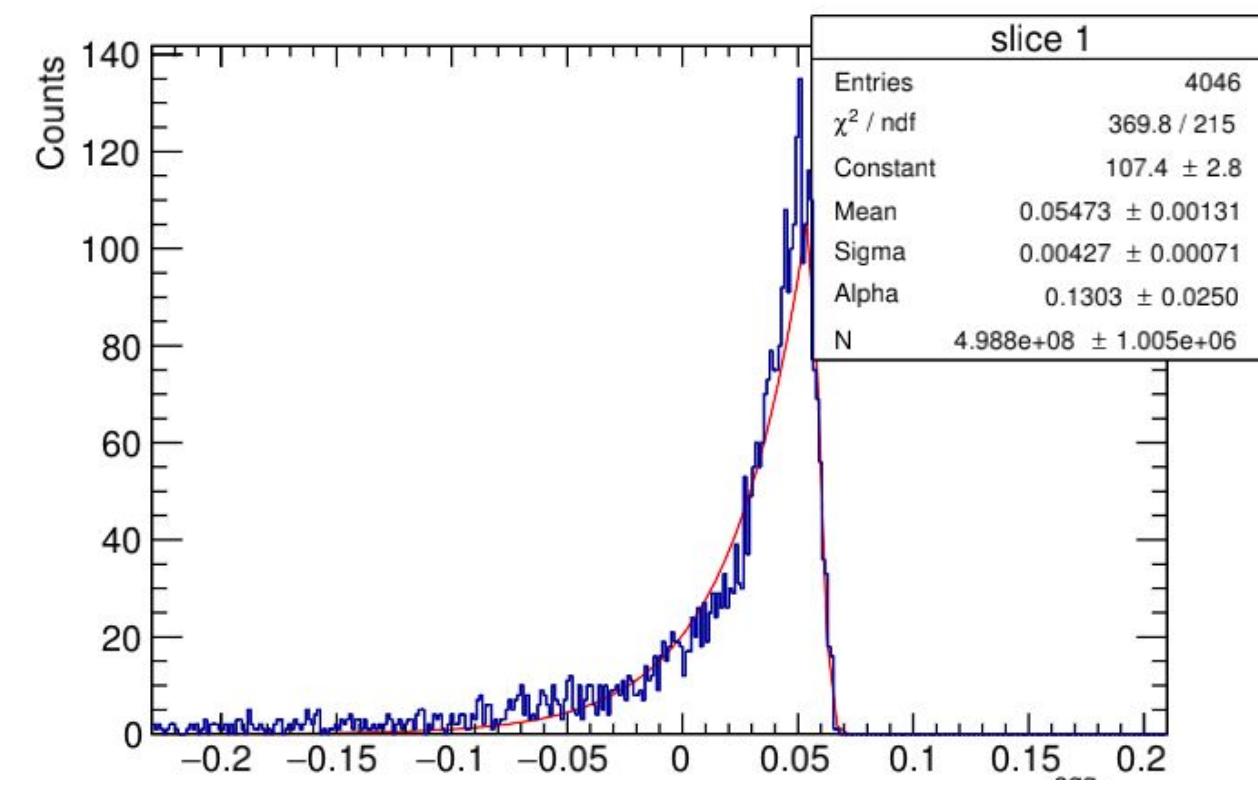
Mean of the crystal ball functions fitted to the slices of the recalibrated $(te_{agg} - ge) / ge$ vs ge plot.



Reduced_ χ^2 of the crystal ball functions fitted to the slices of the recalibrated $(te_{agg} - ge) / ge$ vs ge plot.

EEMC (e^-)

Fitted Crystal Ball Functions



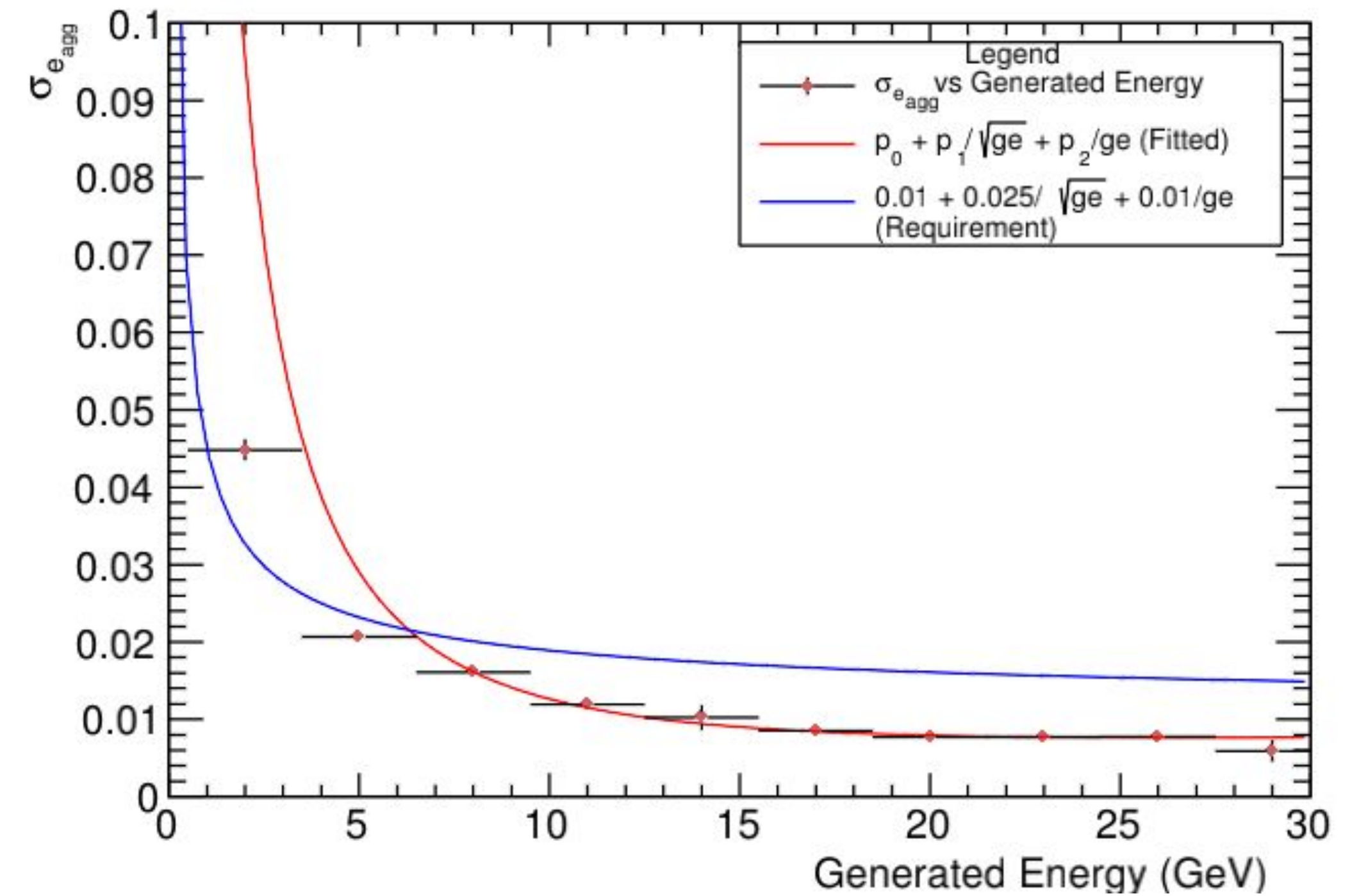
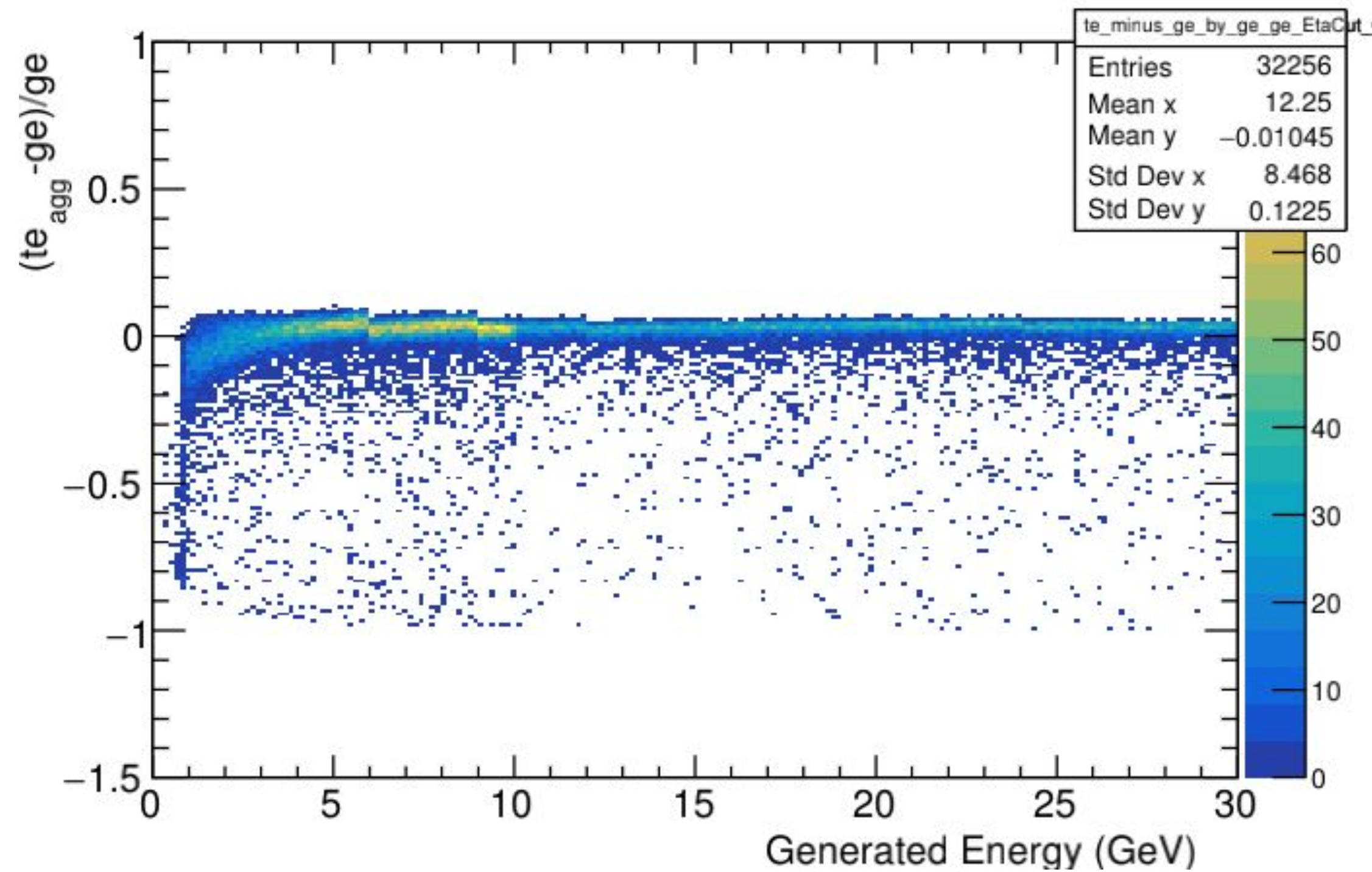
Number of bins = 350
from -0.23 to +0.21

The x-axes denote $\Delta e_{\text{agg}}/\text{ge}$

EEMC (e^-)

$(te_{agg} - ge)/ge$ vs ge
Explicit η cut: -3.5 to -1.7
100 MeV energy cut

After Recalibration ($te \rightarrow te/recalibrationFactor$)



In this slide, the 100 MeV energy cut is applied on individual towers rather than on aggregated ones unlike the previous slides.

