Fun4All Calorimeter Plots: Muon Energy Parameterization for excluding MIP energy deposition in calorimeters

Simran
Lokesh Kumar
Panjab University, Chandigarh, INDIA

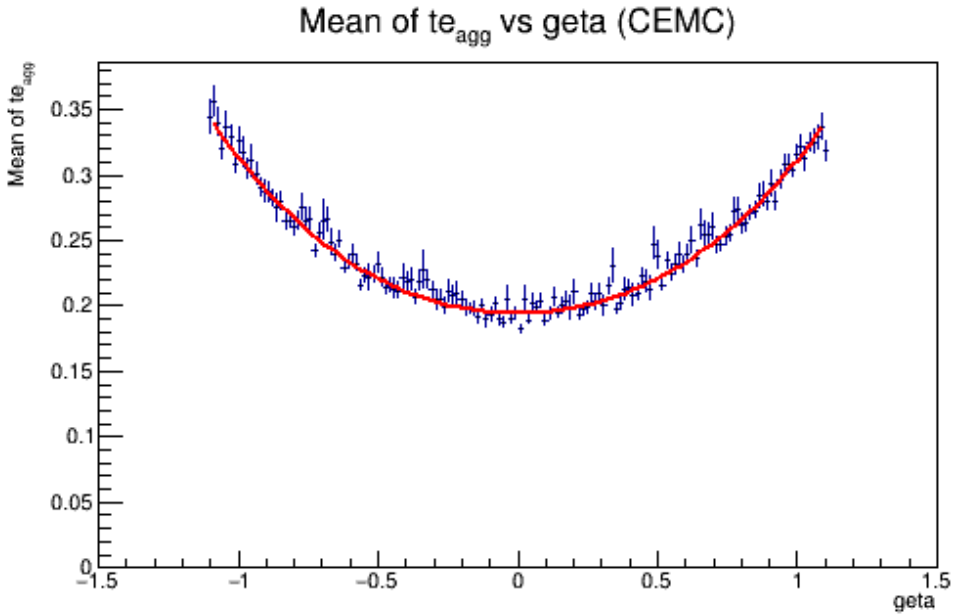
Fun4All QA Biweekly Meeting
November 26, 2021

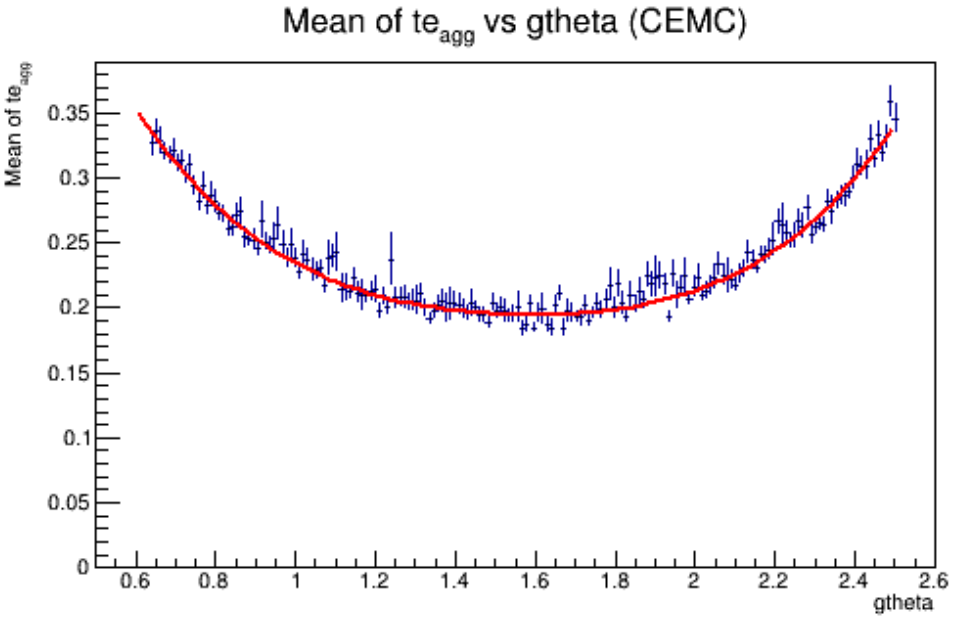
Specifications:

- Particles: mu-
- Given energy (ge): 4 GeV
- Events: 42300 (pi-), 46900 (mu-)
  (Generated by Sagar & Siddhant)
- Pseudorapidity cuts on calorimeters:
  - EEMC: η = -3.5 to -1.7
  - CEMC: η = -1.1 to 1.1
  - HCALIN: η = -1.1 to 1.1
  - HCALOUT: η = -1.1 to 1.1
  - FEMC: η = 1.3 to 3.3
  - FHCAL: η = 1.3 to 3.3

CEMC

η = -1.1 to 1.1





Fit Parameters:

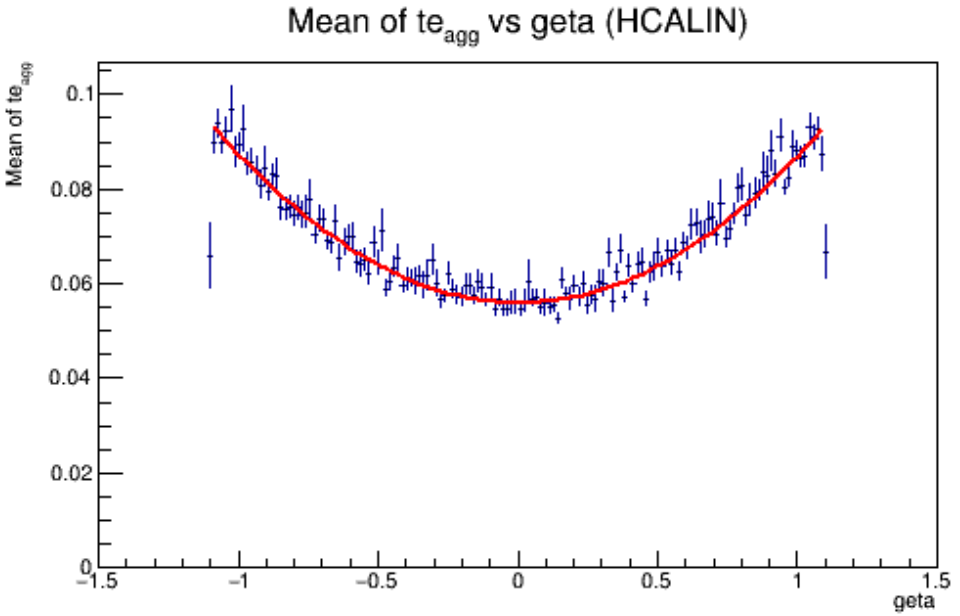
Chi2	=	149.543
NDf	=	141
p0	=	0.194234 +/- 0.000941435
p1	=	0.000578177 +/- 0.00241696
p2	=	0.103445 +/- 0.00574531
p3	=	-0.00153889 +/- 0.00331659
p4	=	0.0150181 +/- 0.00581853

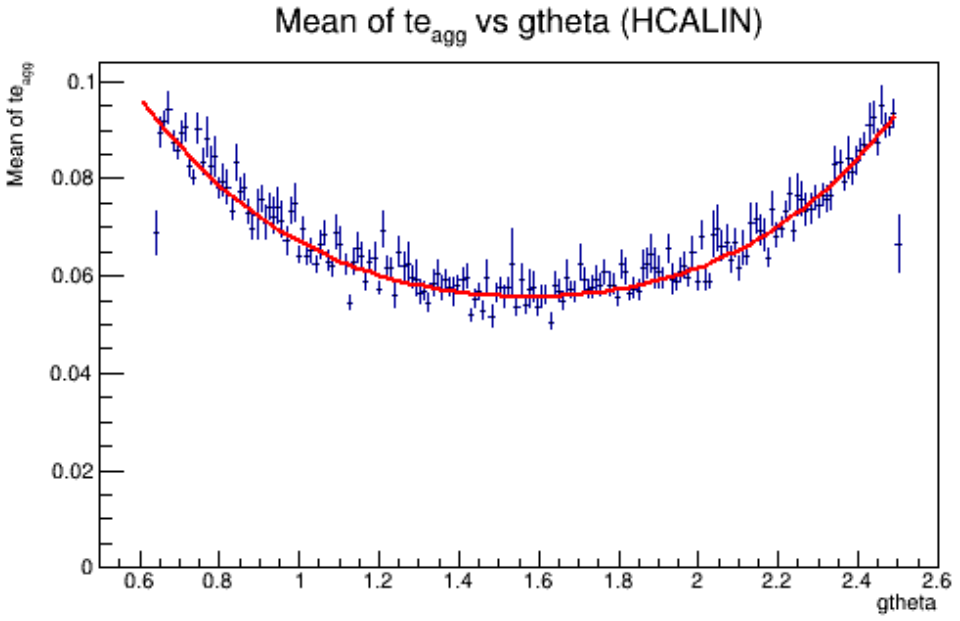
Fit Parameters:

Chi2	=	166.126
NDf	=	172
p0	=	0.909604 +/- 0.0475301
p1	=	-1.53469 +/- 0.140591
p2	=	1.29423 +/- 0.147215
p3	=	-0.518374 +/- 0.0652193
p4	=	0.0839454 +/- 0.0103859

HCALIN

η = -1.1 to 1.1





Fit Parameters:

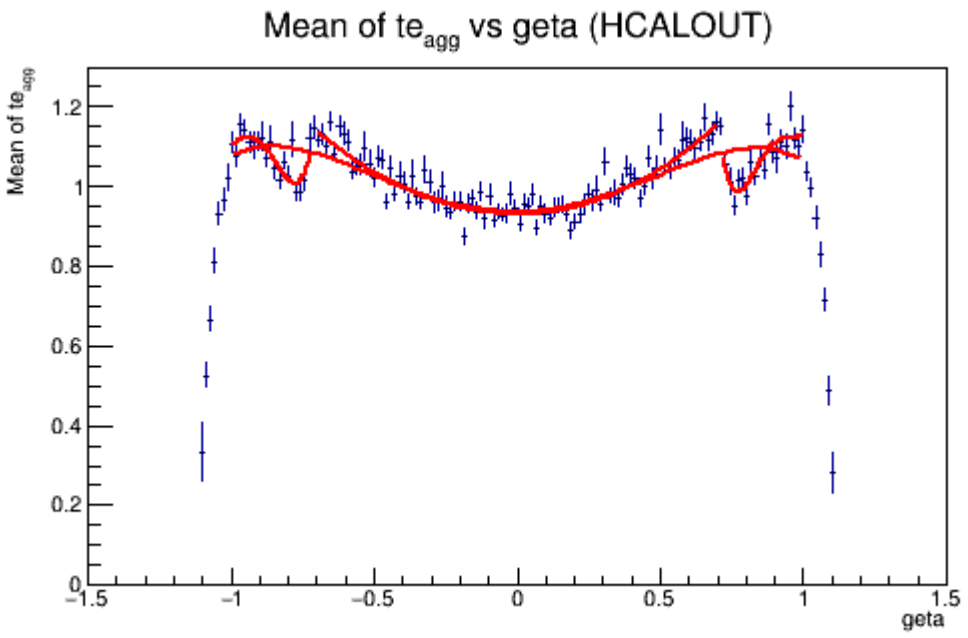
Chi2	=	156.571	
NDf	=	141	
p0	=	0.0559873	+/- 0.000324819
p1	=	-0.000247043	+/- 0.000802791
p2	=	0.0317966	+/- 0.00199821
p3	=	6.93985e-06	+/- 0.00105954
p4	=	-0.000539691	+/- 0.00194613

Fit Parameters:

Chi2	=	251.626	
NDf	=	172	
p0	=	0.219535	+/- 0.0156624
p1	=	-0.32489	+/- 0.046583
p2	=	0.252978	+/- 0.048989
p3	=	-0.0960235	+/- 0.0217613
p4	=	0.0155163	+/- 0.00346844

HCALOUT

η = -1.1 to 1.1



Fit Parameters:
First Fit:

Chi2	=	20.7915		
NDf	=	14		
p0	=	158.013	+/-	123.581
p1	=	701.127	+/-	577.685
p2	=	1165.48	+/-	1009.23
p3	=	854.825	+/-	780.997
p4	=	233.557	+/-	225.889

Second Fit:

Chi2	=	122.067		
NDf	=	89		
p0	=	0.931014	+/-	0.00454508
p1	=	0.00391691	+/-	0.016264
p2	=	0.440681	+/-	0.0603766
p3	=	0.0197272	+/-	0.0498769
P4	=	0.0155829	+/-	0.137233

Third Fit:

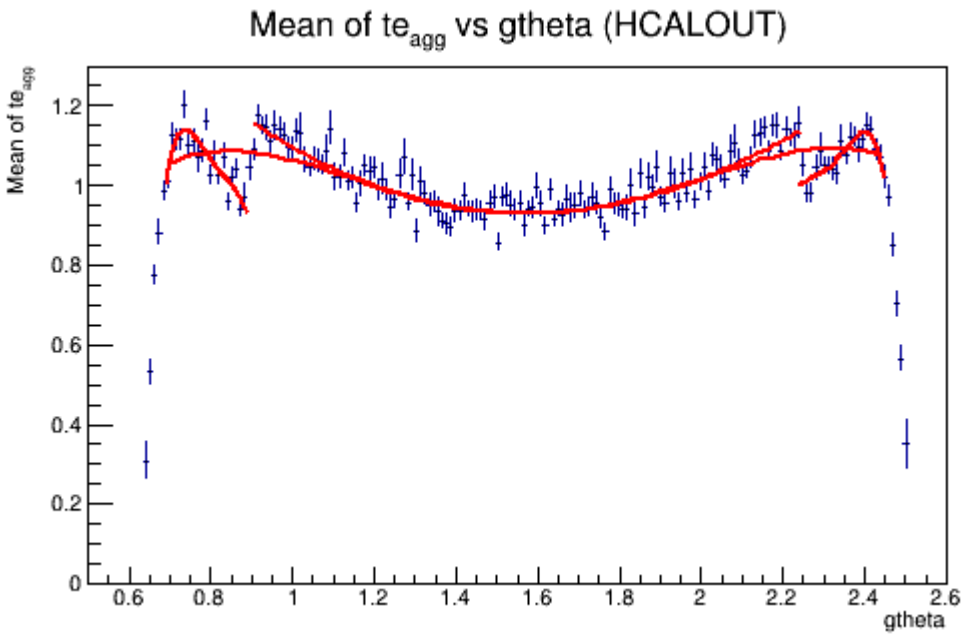
Chi2	=	23.5507		
NDf	=	14		
p0	=	219.928	+/-	113.974
p1	=	-994.416	+/-	535.96
p2	=	1684.14	+/-	941.919
p3	=	-1260.86	+/-	733.234
P4	=	352.348	+/-	213.326

Overall Fit::

1	p0	-1.25048e+02	2.10613e-02	2.98137e-05	-4.87411e-03
2	p1	9.77718e+01	3.83121e-02	2.85847e-05	6.66269e-04
3	p2	-9.49430e+02	5.06062e-02	2.26362e-04	-2.28801e-03
4	p3	1.35356e+02	5.98122e-02	4.46263e-05	4.35504e-04
5	p4	-1.95396e+02	6.86477e-02	5.09093e-05	-1.58137e-03
6	p5	3.20349e+01	2.10588e-02	1.57423e-05	-4.86087e-03
7	p6	7.98889e+02	3.83144e-02	1.90470e-04	6.65527e-04
8	p7	2.15614e+02	5.06035e-02	5.14063e-05	-2.28890e-03
9	p8	9.90160e+02	5.98166e-02	2.36073e-04	4.33010e-04
10	p9	3.81466e+01	6.86570e-02	5.09093e-05	-1.56813e-03
11	p10	9.39494e+01	2.10623e-02	2.23993e-05	-4.87079e-03
12	p11	-8.96654e+02	3.83156e-02	2.13779e-04	6.65659e-04
13	p12	7.34265e+02	5.06062e-02	1.75062e-04	-2.28771e-03
14	p13	-1.12553e+03	5.98172e-02	2.68347e-04	4.32523e-04
15	p14	1.56937e+02	6.86455e-02	5.09093e-05	-1.58080e-03

HCALOUT

η = -1.1 to 1.1



Fit Parameters:

First Fit:

Chi2	=	37.3489		
NDf	=	14		
p0	=	-566.453	+/-	334.472
p1	=	2807.66	+/-	1708.87
p2	=	-5198.61	+/-	3267.37
p3	=	4271.62	+/-	2770.92
p4	=	-1314.88	+/-	879.435

Second Fit:

Chi2	=	177.164		
NDf	=	124		
p0	=	2.13783	+/-	0.835702
p1	=	-1.41452	+/-	2.28919
p2	=	0.259774	+/-	2.28853
p3	=	0.13983	+/-	0.991498
p4	=	-0.028156	+/-	0.157372

Third Fit:

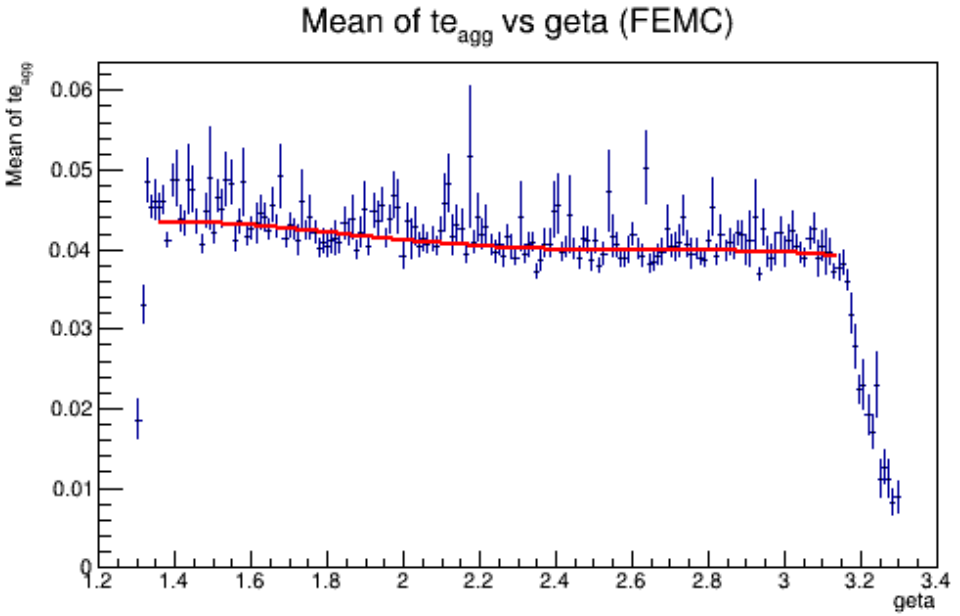
Chi2	=	14.9977		
NDf	=	15		
p0	=	-27130.1	+/-	22481.6
p1	=	46893.9	+/-	38313.7
p2	=	-30387.5	+/-	24479.6
p3	=	8749.46	+/-	6949.7
p4	=	-944.454	+/-	739.692

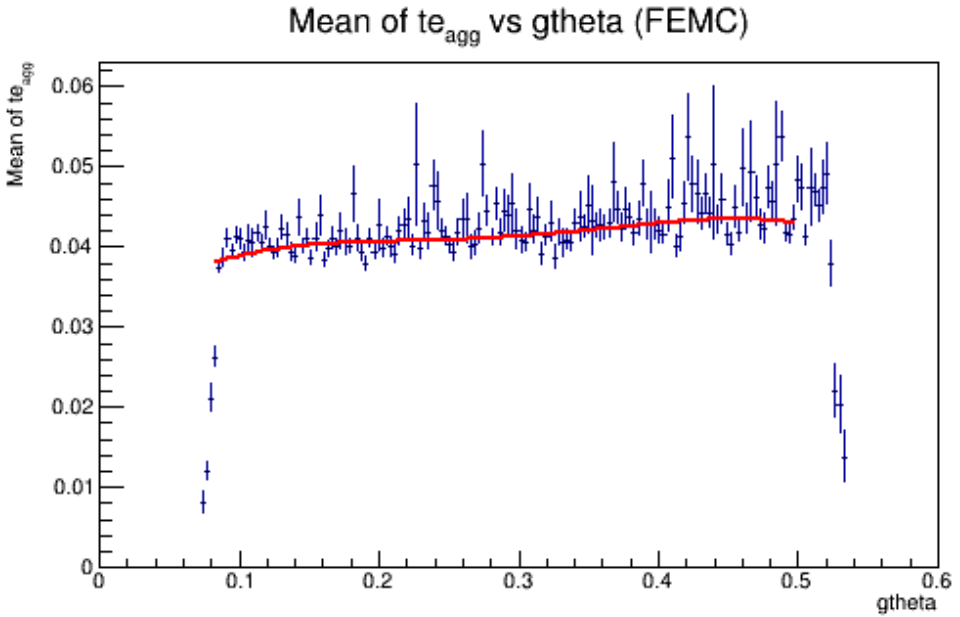
Overall Fit::

1	p0	9.23327e+03	1.56388e-02	2.20138e-03	3.24287e-06
2	p1	-1.65659e+04	1.03788e-02	3.94962e-03	5.78201e-06
3	p2	1.18597e+04	5.46718e-03	2.82758e-03	1.03502e-05
4	p3	-4.33913e+03	2.66740e-03	2.06906e-04	2.77718e-05
5	p4	7.52913e+02	1.14878e-03	1.79508e-04	5.49876e-05
6	p5	8.66468e+03	1.56388e-02	4.13164e-04	2.81731e-06
7	p6	-1.37568e+04	1.03788e-02	3.27988e-03	4.83734e-06
8	p7	6.66085e+03	5.46718e-03	1.58807e-03	1.07419e-05
9	p8	-6.76509e+01	2.66624e-03	3.22585e-06	-1.43913e-04
10	p9	-5.61937e+02	1.14878e-03	1.33976e-04	4.65643e-05
11	p10	-1.78989e+04	1.56388e-02	4.26744e-03	2.90552e-06
12	p11	3.03294e+04	1.03788e-02	7.23109e-03	5.63123e-06
13	p12	-1.85280e+04	5.46718e-03	4.41743e-03	1.11092e-05
14	p13	4.41018e+03	2.66740e-03	1.05147e-03	3.21940e-05
15	p14	-1.91513e+02	1.14878e-03	4.56602e-05	4.73500e-05

FEMC

η = 1.3 to 3.3





Fit Parameters:

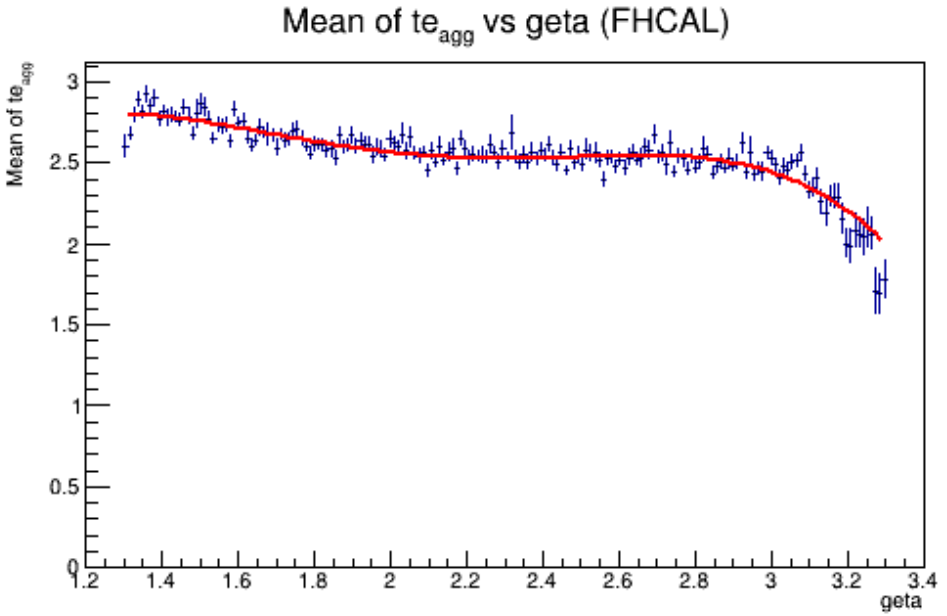
Chi2	=	169.538	
NDf	=	158	
p0	=	-0.0322764	+/- 0.0578795
p1	=	0.15447	+/- 0.109756
p2	=	-0.112236	+/- 0.076266
p3	=	0.0342293	+/- 0.0230412
p4	=	-0.00377252	+/- 0.00255721

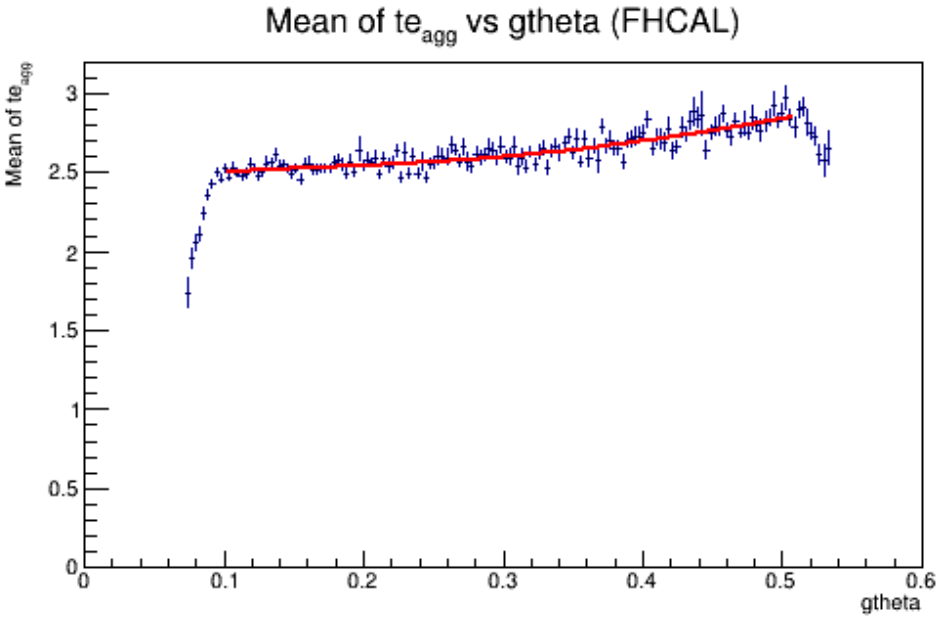
Fit Parameters:

Chi2	=	248.415	
NDf	=	135	
p0	=	0.0294791	+/- 0.00350009
p1	=	0.166993	+/- 0.0645632
p2	=	-0.933551	+/- 0.402994
p3	=	2.27771	+/- 1.02192
p4	=	-1.94256	+/- 0.901521

FHCAL

η = 1.3 to 3.3





Fit Parameters:

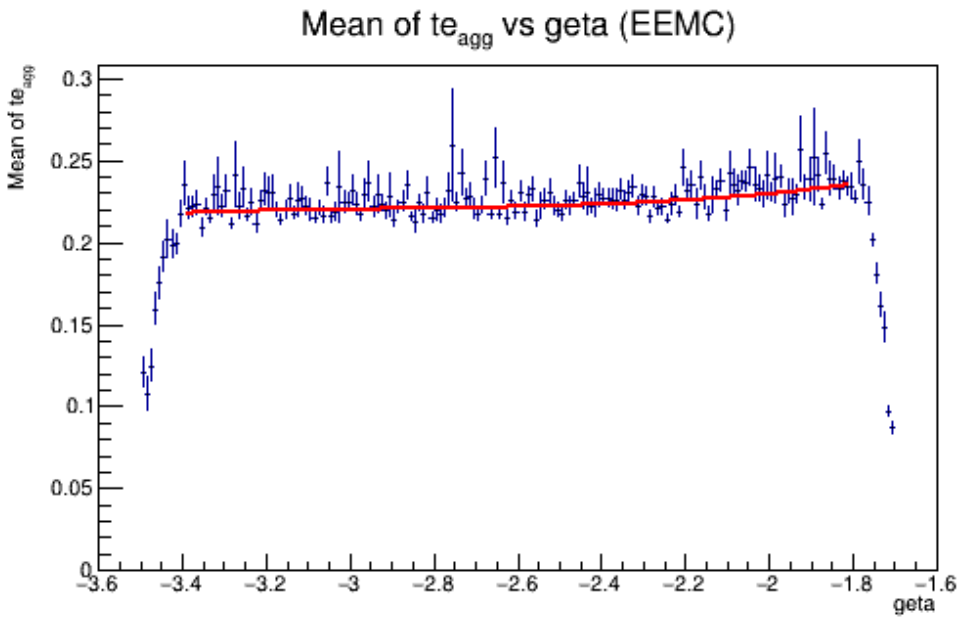
Chi2	=	269.703	
NDf	=	177	
p0	=	-3.82236	+/- 1.2522
p1	=	14.7284	+/- 2.38151
p2	=	-11.6751	+/- 1.65639
p3	=	3.88625	+/- 0.500042
p4	=	-0.466332	+/- 0.0553757

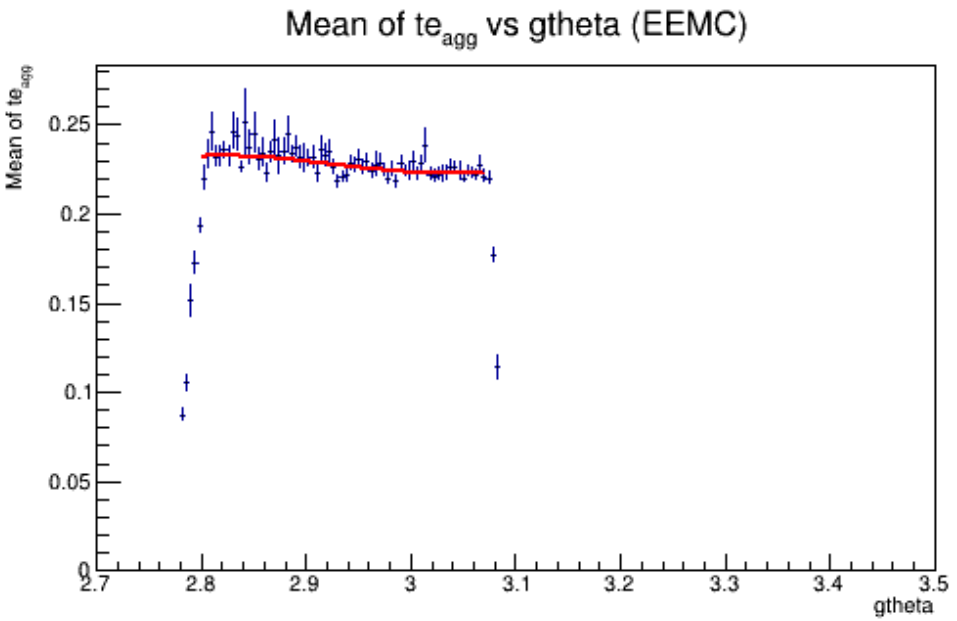
Fit Parameters:

Chi2	=	147.538	
NDf	=	132	
p0	=	2.41413	+/- 0.150802
p1	=	1.38762	+/- 2.53245
p2	=	-6.83399	+/- 14.6637
p3	=	18.1749	+/- 35.0616
p4	=	-13.2886	+/- 29.5315

EEMC

η = -3.5 to -1.7





Fit Parameters:

Chi2	=	161.676	
NDf	=	156	
p0	=	0.43764	+/- 0.109899
p1	=	0.217348	+/- 0.130493
p2	=	0.073581	+/- 0.0508592
p3	=	0.00843088	+/- 0.00650988

Fit Parameters:

Chi2	=	55.5617	
NDf	=	64	
p0	=	-50.6166	+/- 43.4924
p1	=	52.2504	+/- 44.3555
p2	=	-17.8747	+/- 15.0728
p3	=	2.0356	+/- 1.70669

THE END