HGC PFRecHit Study

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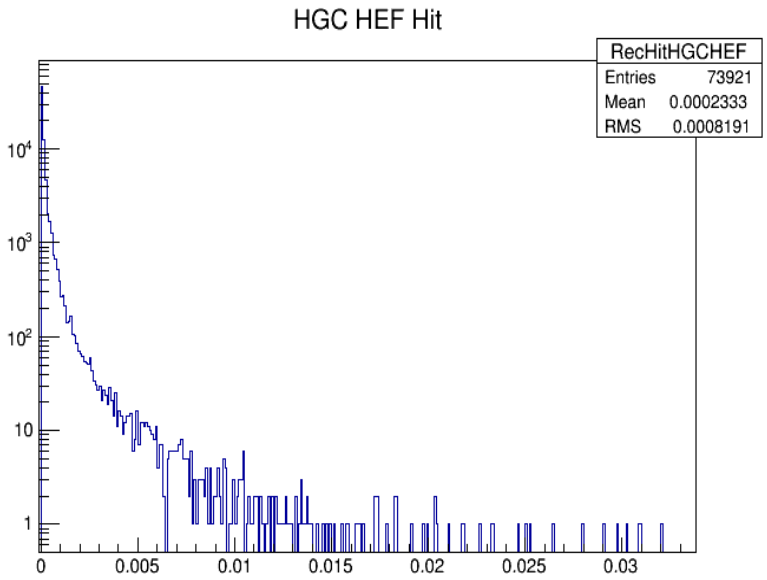
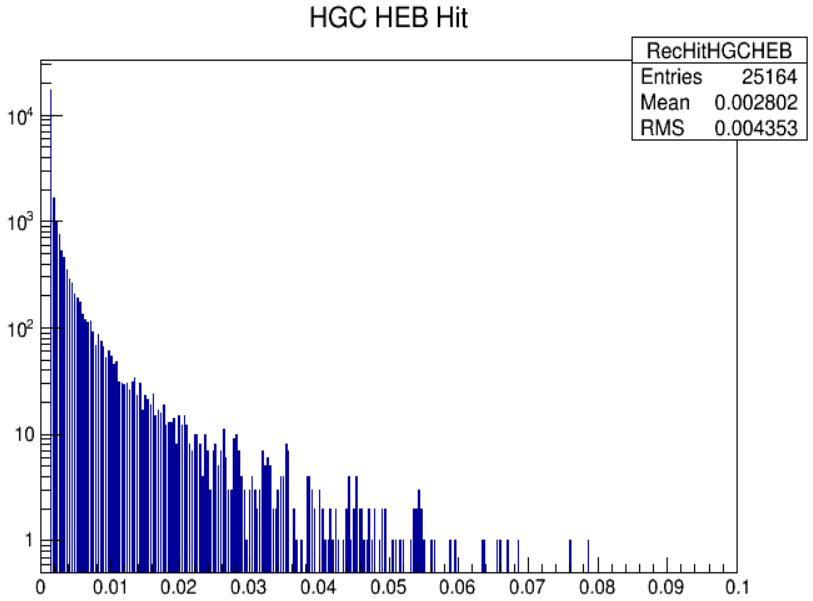
Samples

- Valery produced small samples to study SLH18
- /afs/cern.ch/work/v/vandreev/public/pileup/ step3_v4_QCD_Pt_80_120_14TeV_PU.root
- /afs/cern.ch/work/v/vandreev/public/nopileup/ step3_V4_SingleElectronPt35.root
- /afs/cern.ch/work/v/vandreev/public/nopileup/ step3_v4_QCD_Pt_80_120_14TeV_noPU.root

Plan

- Would like to look at the rechit energy and timing information
- Start from HGCalRecHit, energy, timing
- Energy threshold, timing and noise cleaning done to get PFRecHit
- Make PFClusters from PFRecHits
- PFClusters->PFBlocks->PFCandidate





Collections

HGCHits

- edm::Handle<edm::SortedCollection<HGCRecHit, edm::StrictWeakOrdering<HGCRecHit>> > fheeRecHit
- iEvent.getByLabel("HGCalRecHit","HGCEERecHits",fheeRecHit);

PFRecHit

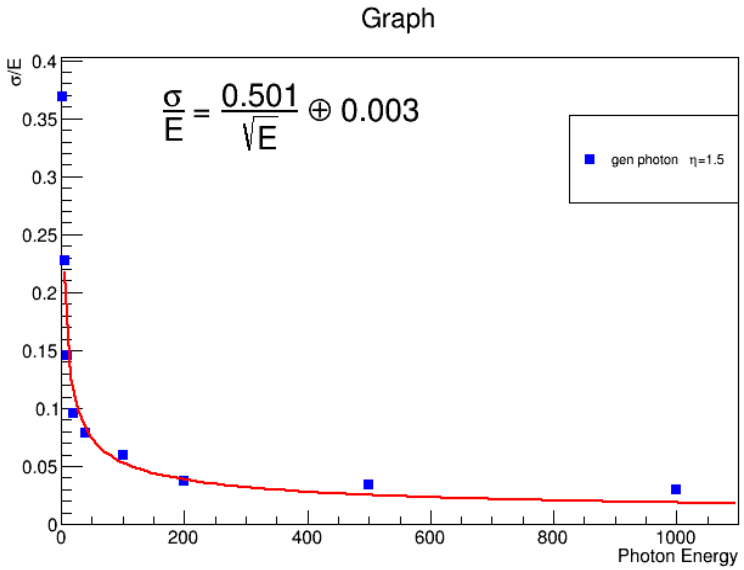
- edm::Handle<std::vector<reco::PFRecHit> > PfhitHGCEE;
- iEvent.getByLabel("particleFlowRecHitHGCHEF","Cleaned",PFhitHGCEE);

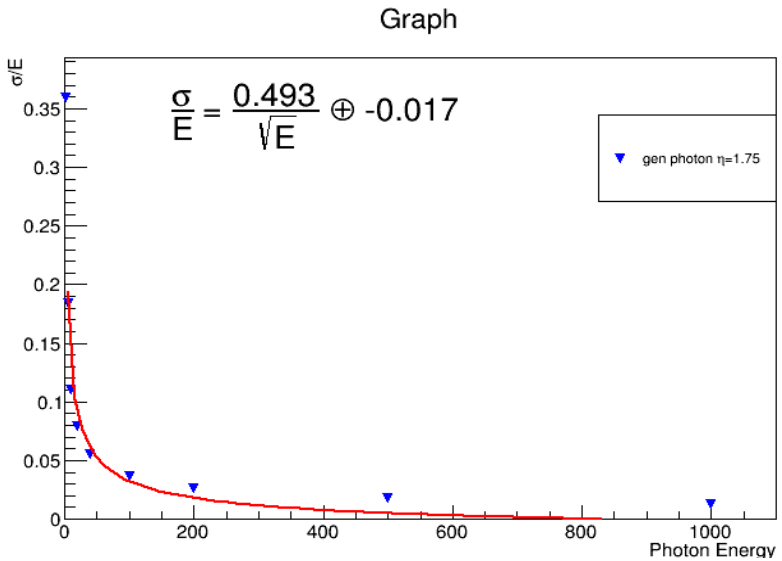
PFClusters

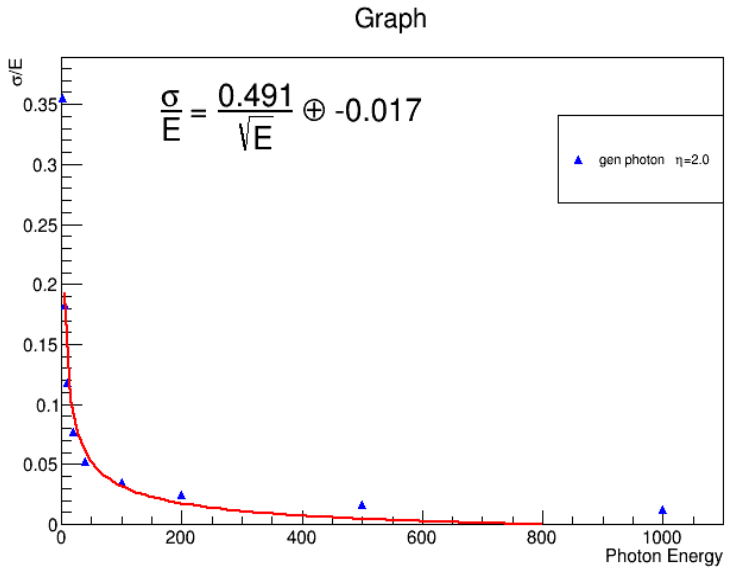
- edm::Handle<std::vector<reco::PFCluster> > PFClusters;
- iEvent.getByLabel("particleFlowClusterHGCHEF",PFClusters);

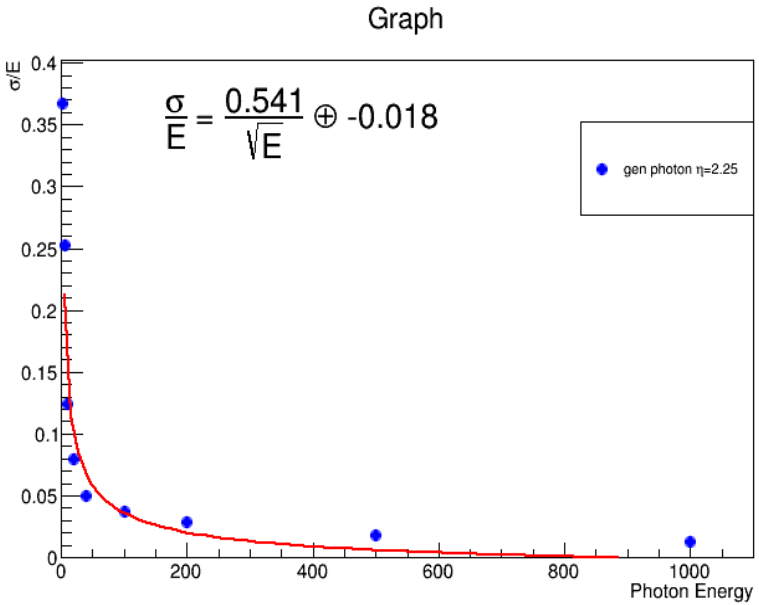
To stay simple looked at size of each collection. PFRecHit returns zero always even though HGCRecHit and PFClusters have non-zero size.

Relative Res. w.r.t eta

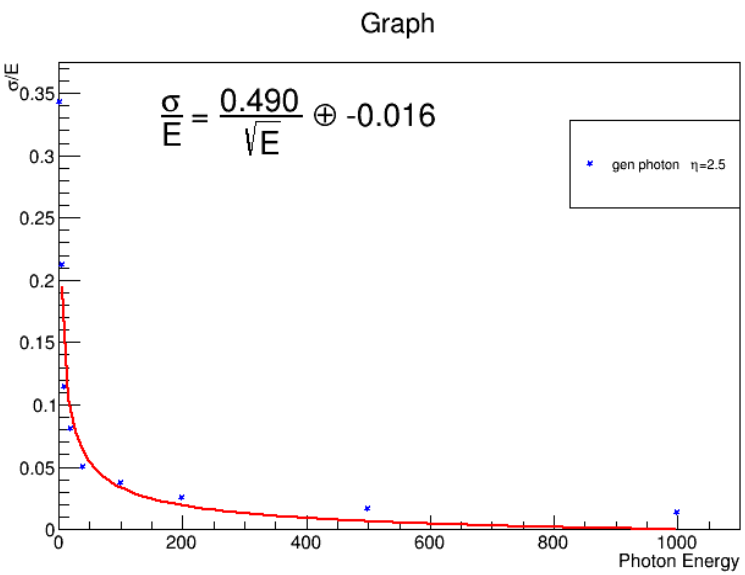


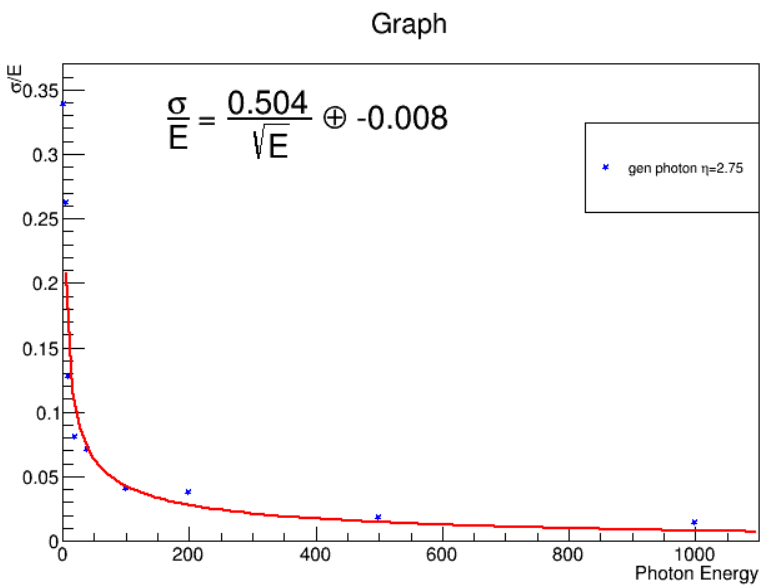






Relative Res. w.r.t eta





- Stochastic term for HGCEE at sim hit level ~25%
- CMSSW_6_2_0_SLHC17 seems to have some improvent
- Eta= 2.25 doesn't follow trend?

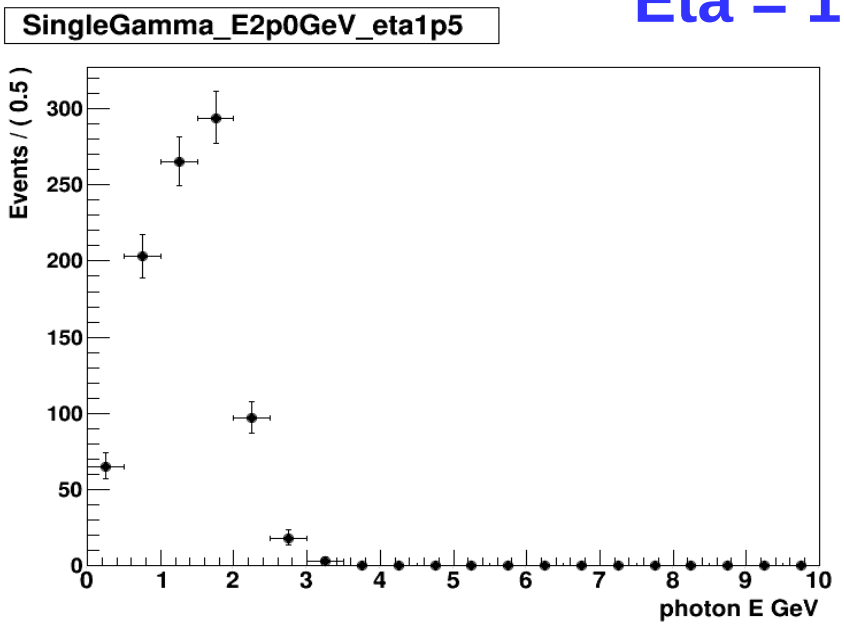
Summary

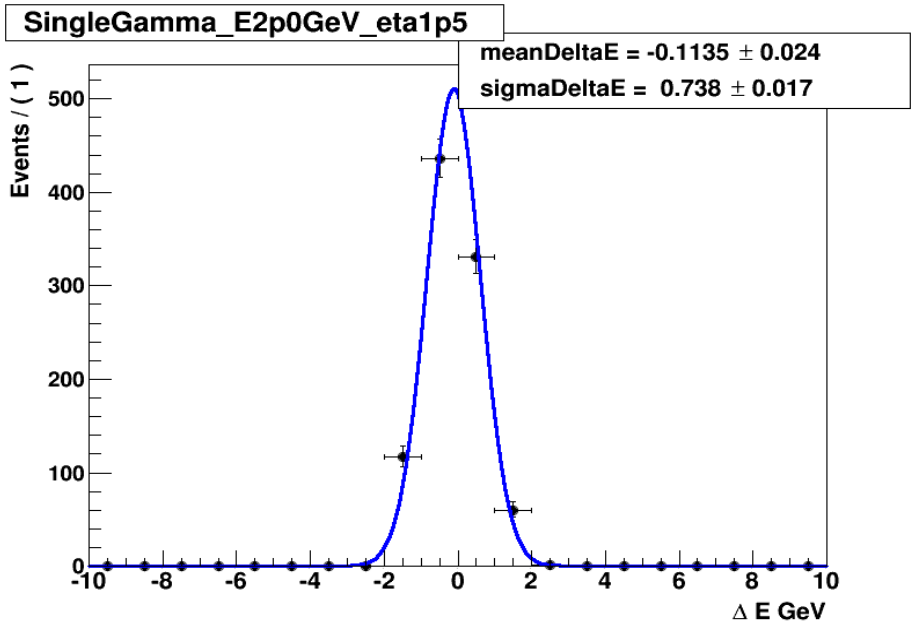
- Tried to get RecHit information,

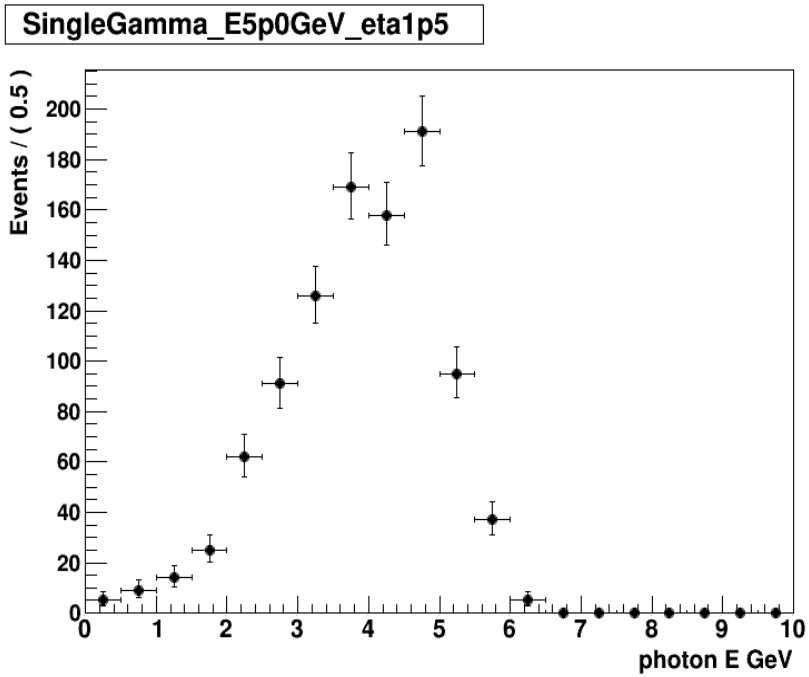
  it seems like only detId and energy is stored now
- Need help to find other variables
- PFRecHits missing?
- Fixes done on SLHC17 release seems to increase some resolution
- Need to Validate with SLHC18

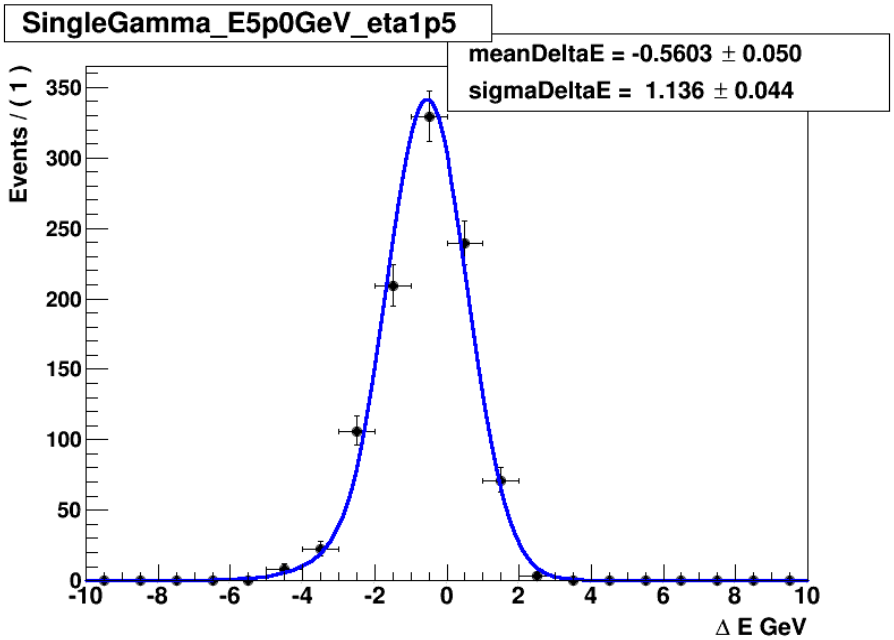
Backup SLHC17 release

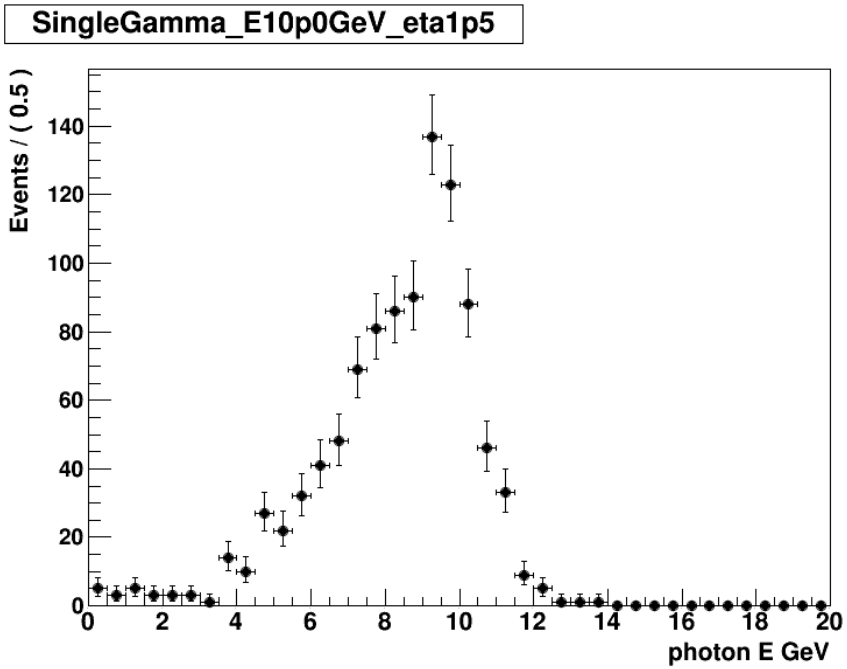
Eta = 1.5

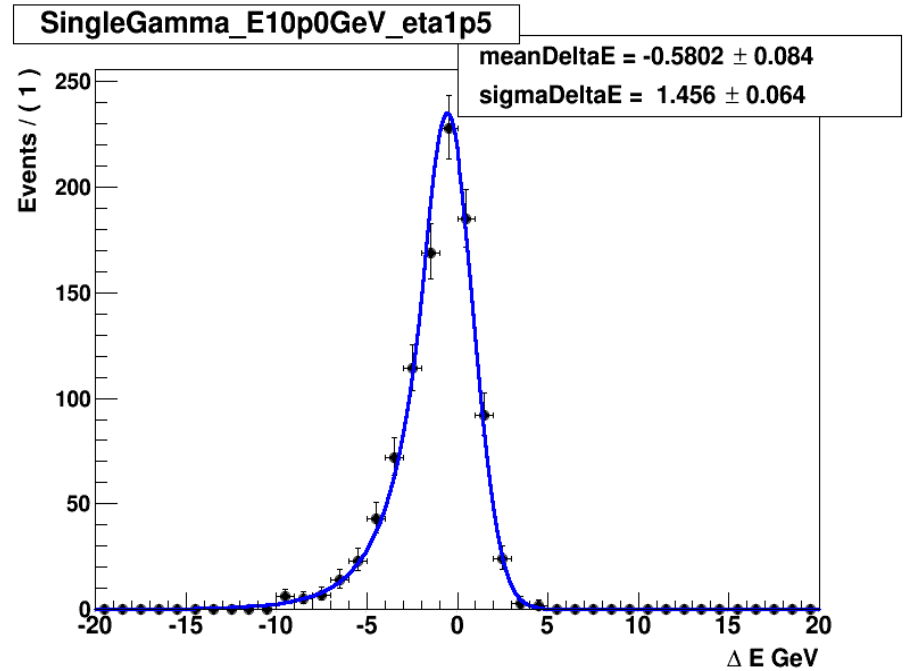

SingleGamma_E2p0GeV_eta1p5
Events / (0.5)
photon E GeV

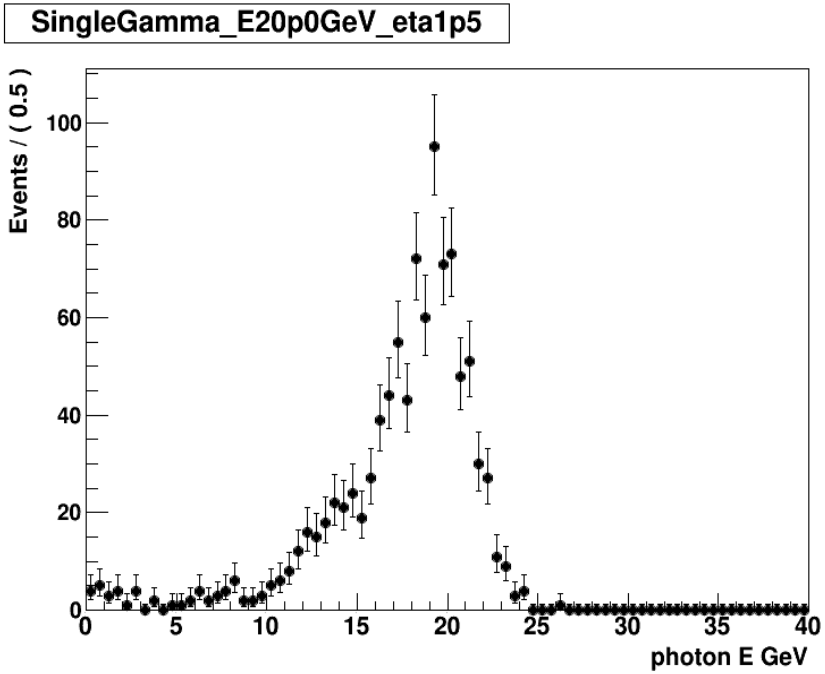

SingleGamma_E2p0GeV_eta1p5
meanDeltaE = -0.1135 ± 0.024
sigmaDeltaE = 0.738 ± 0.017
Events / (1)
Δ E GeV

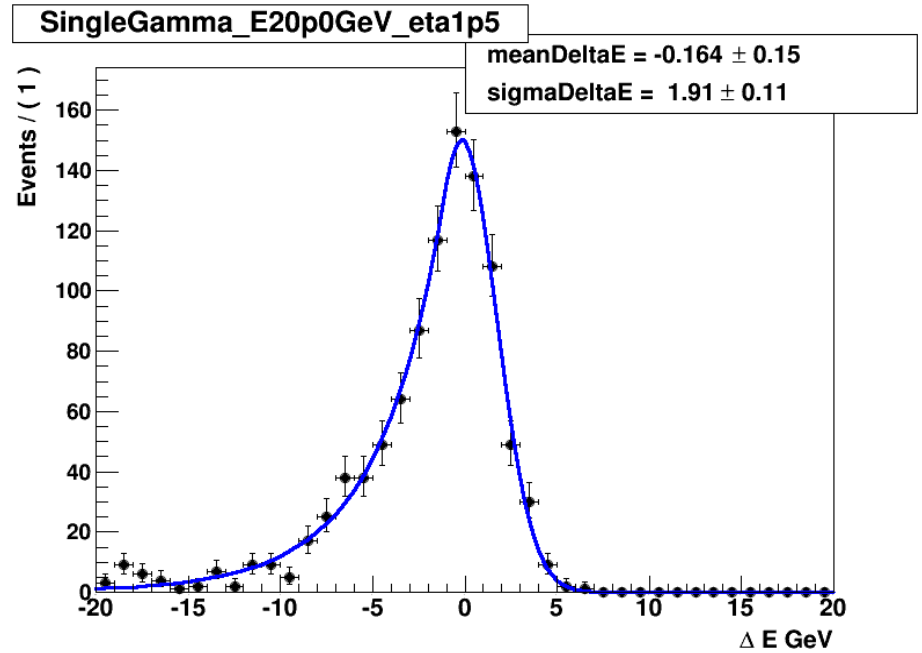

SingleGamma_E5p0GeV_eta1p5
Events / (0.5)
photon E GeV

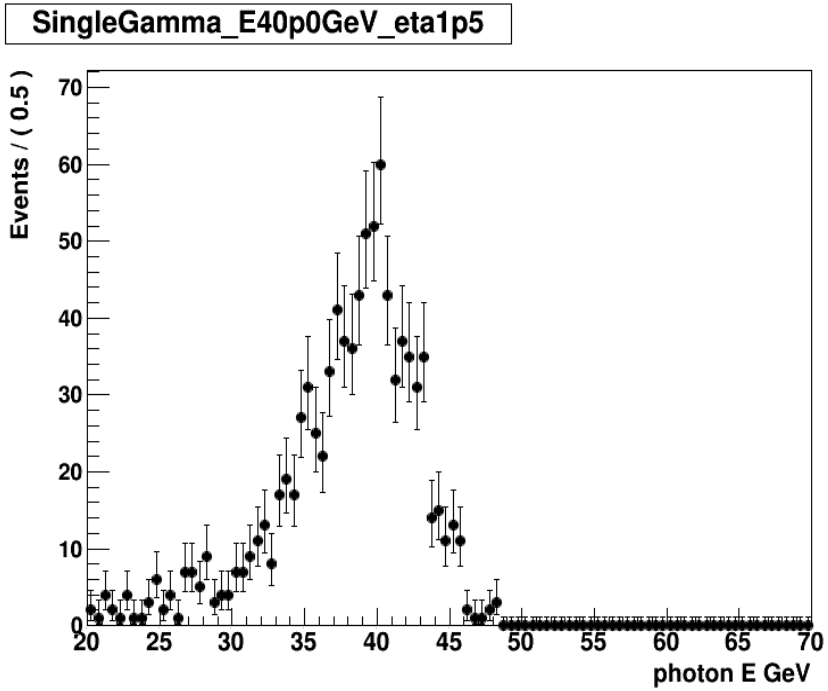

SingleGamma_E5p0GeV_eta1p5
meanDeltaE = -0.5603 ± 0.050
sigmaDeltaE = 1.136 ± 0.044
Events / (1)
Δ E GeV

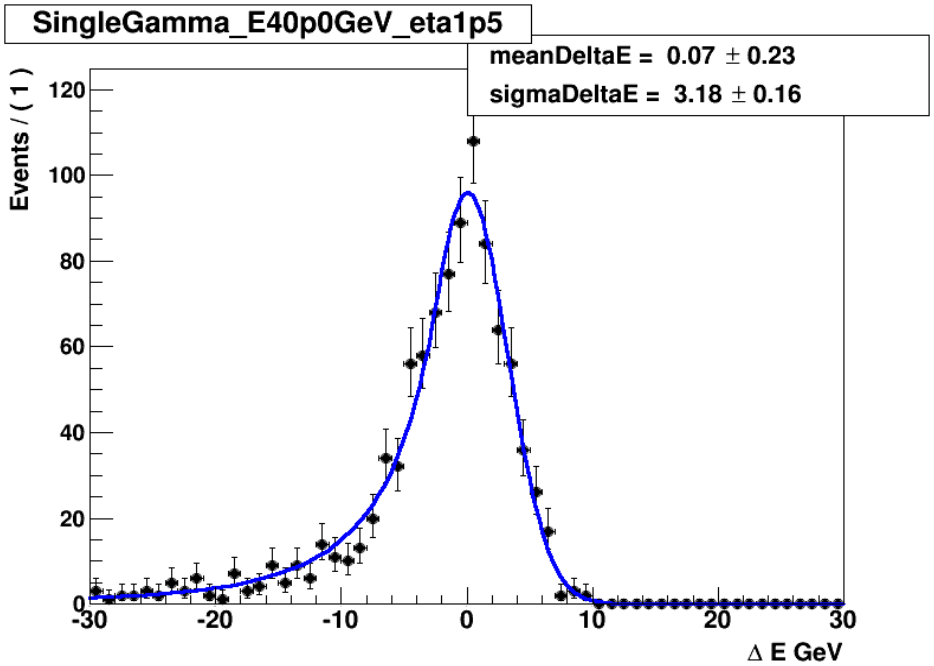

SingleGamma_E10p0GeV_eta1p5
Events / (0.5)
photon E GeV

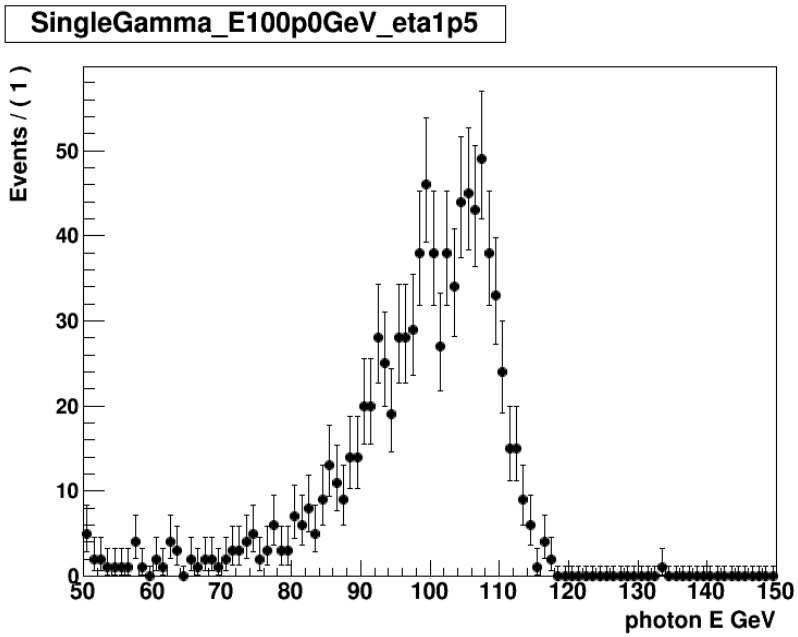

SingleGamma_E10p0GeV_eta1p5
meanDeltaE = -0.5802 ± 0.084
sigmaDeltaE = 1.456 ± 0.064
Events / (1)
Δ E GeV

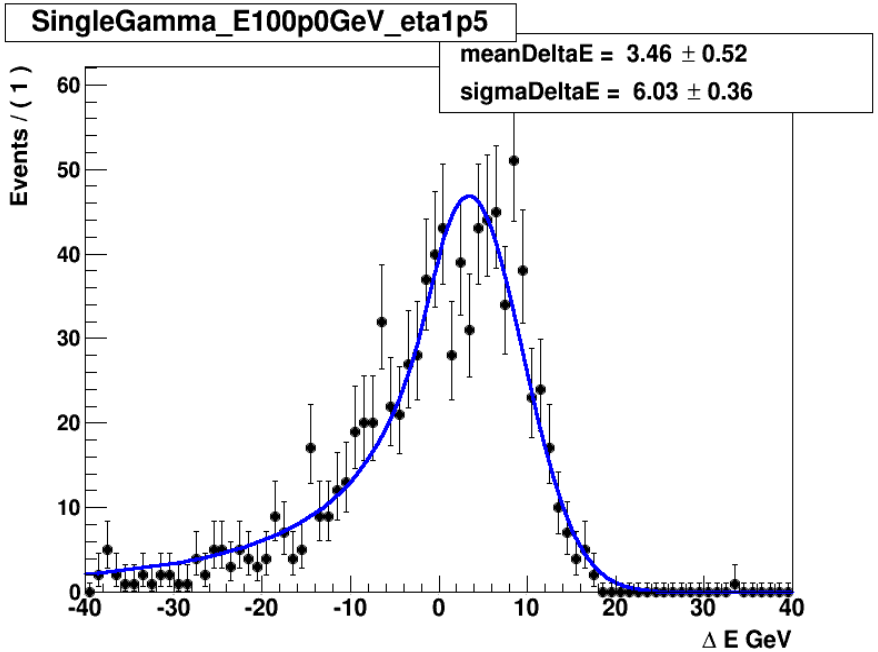

SingleGamma_E20p0GeV_eta1p5
Events / (0.5)
photon E GeV

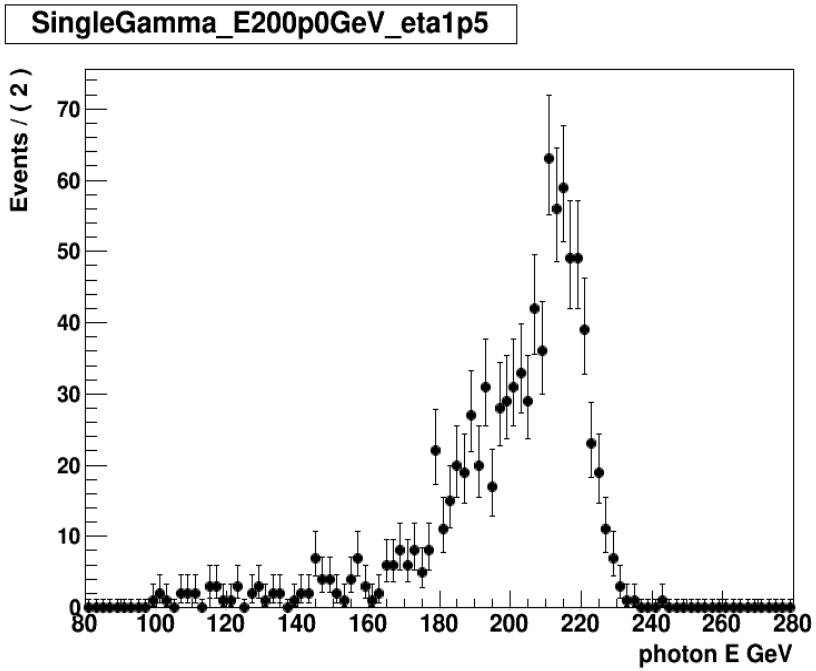

SingleGamma_E20p0GeV_eta1p5
meanDeltaE = -0.164 ± 0.15
sigmaDeltaE = 1.91 ± 0.11
Events / (1)
Δ E GeV

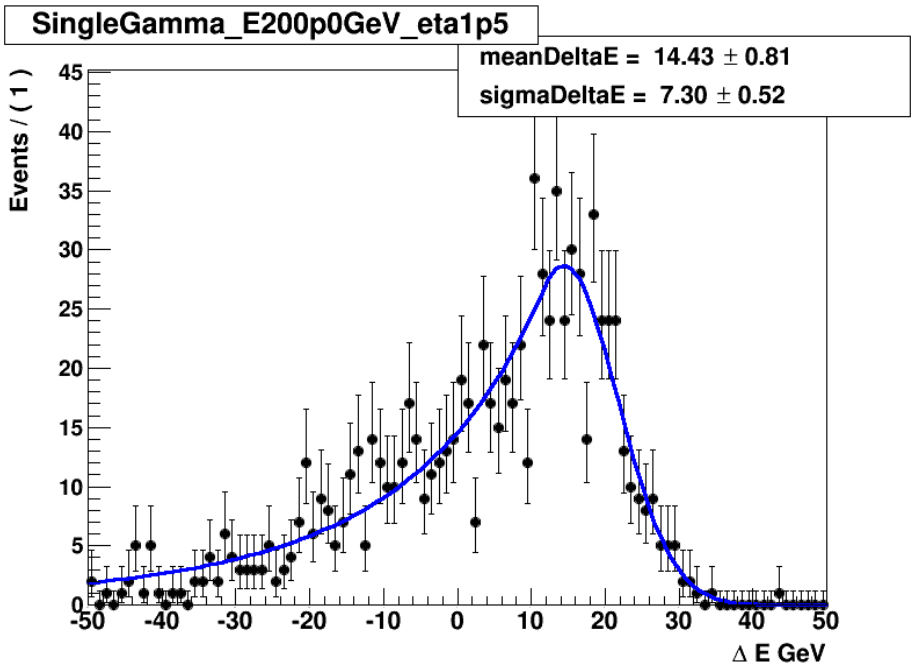

SingleGamma_E40p0GeV_eta1p5
Events / (0.5)
photon E GeV

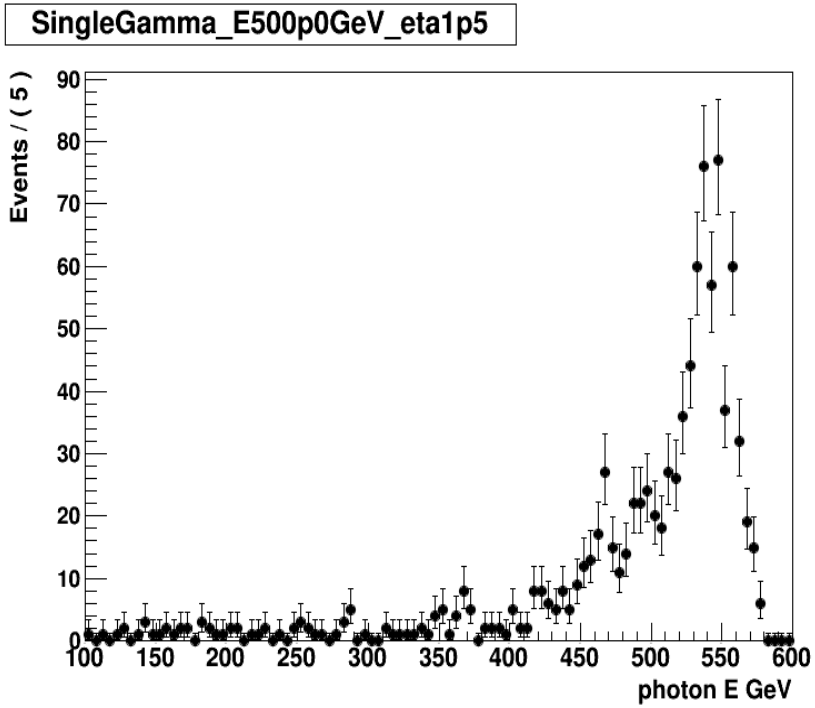

SingleGamma_E40p0GeV_eta1p5
meanDeltaE = 0.07 ± 0.23
sigmaDeltaE = 3.18 ± 0.16
Events / (1)
Δ E GeV

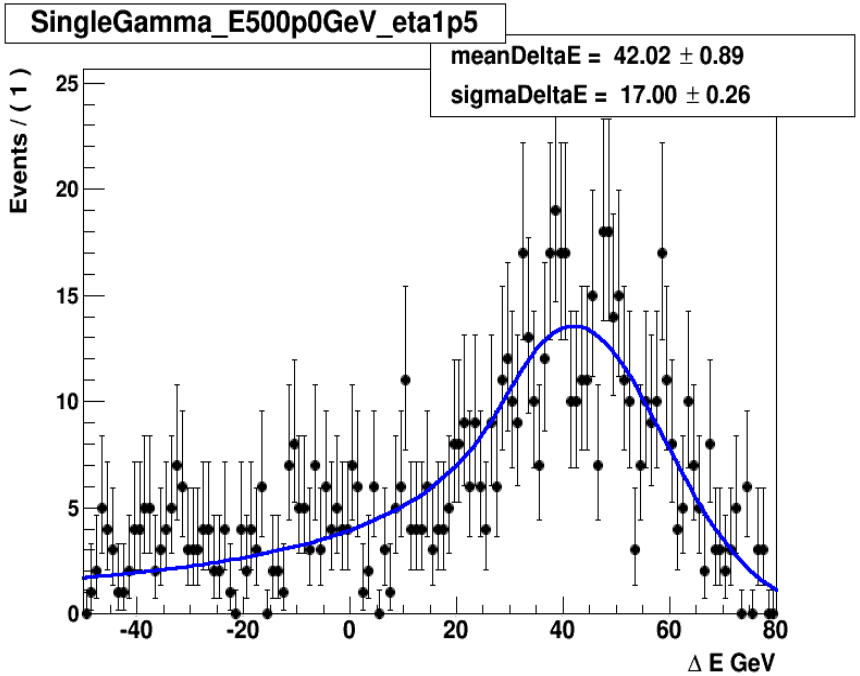

SingleGamma_E100p0GeV_eta1p5
Events / (1)
photon E GeV

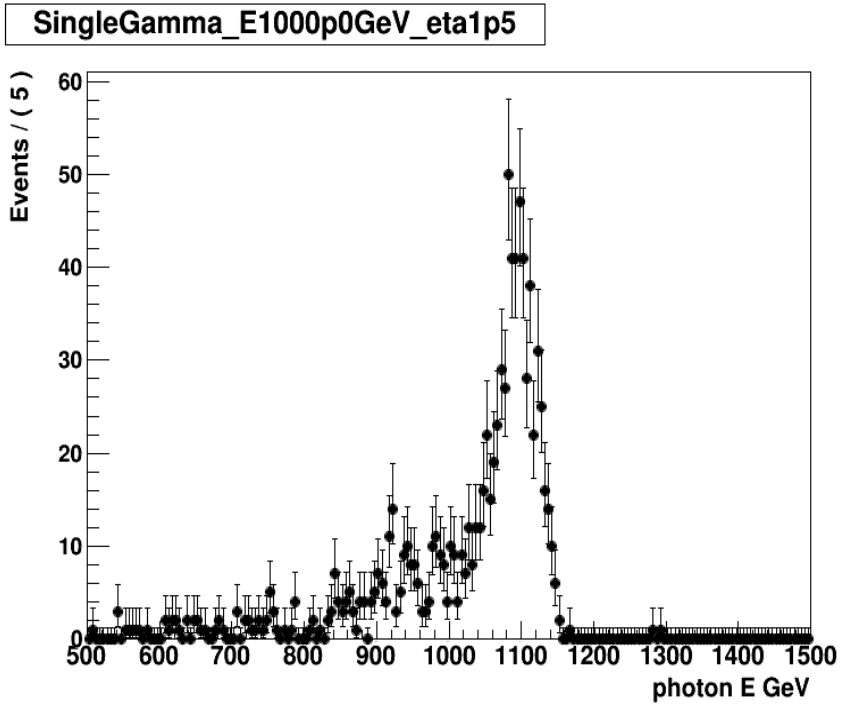

SingleGamma_E100p0GeV_eta1p5
meanDeltaE = 3.46 ± 0.52
sigmaDeltaE = 6.03 ± 0.36
Events / (1)
Δ E GeV

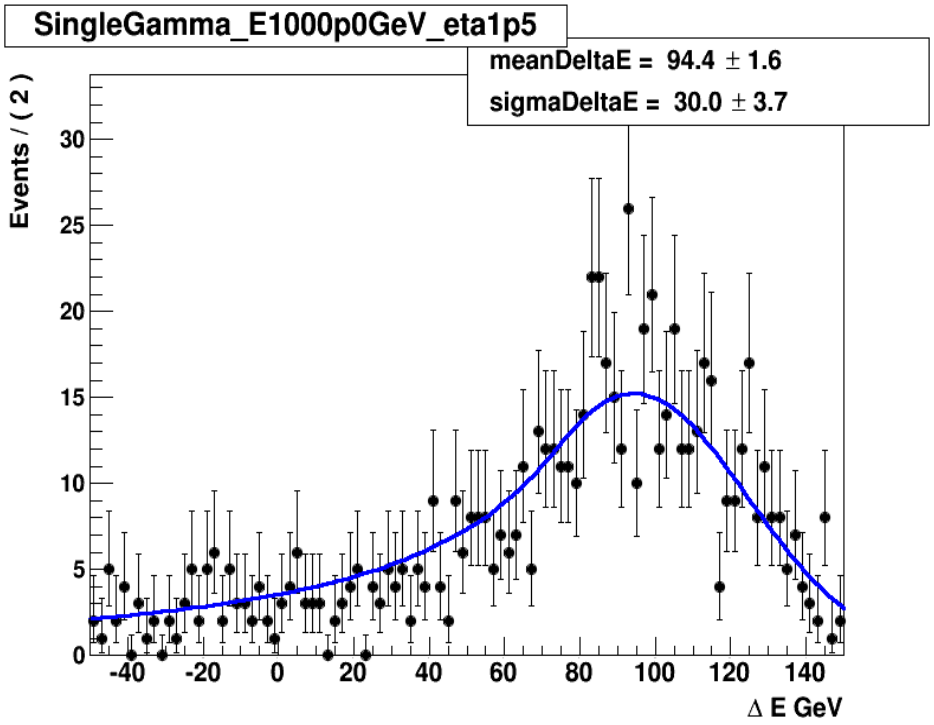

SingleGamma_E200p0GeV_eta1p5
Events / (2)
photon E GeV


SingleGamma_E200p0GeV_eta1p5
meanDeltaE = 14.43 ± 0.81
sigmaDeltaE = 7.30 ± 0.52
Events / (1)
Δ E GeV

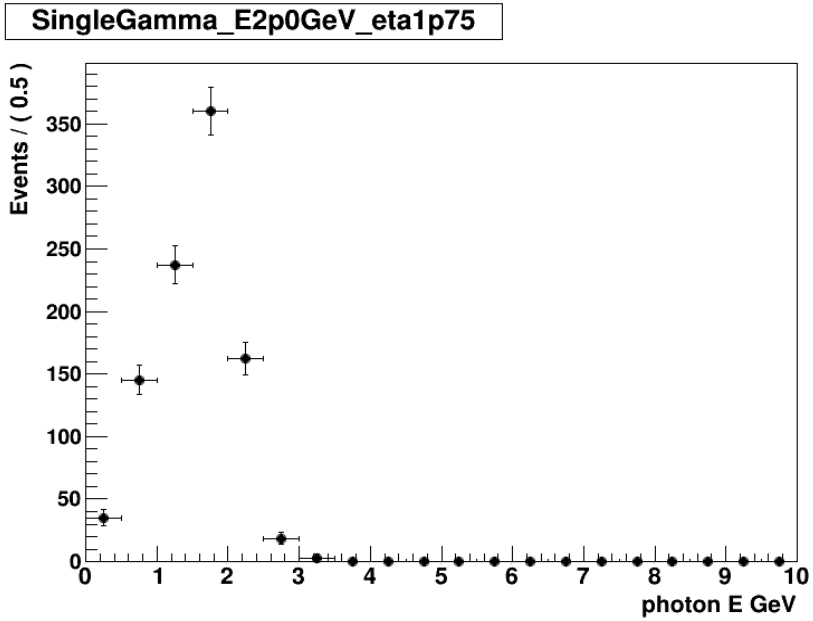

SingleGamma_E500p0GeV_eta1p5
Events / (5)
photon E GeV

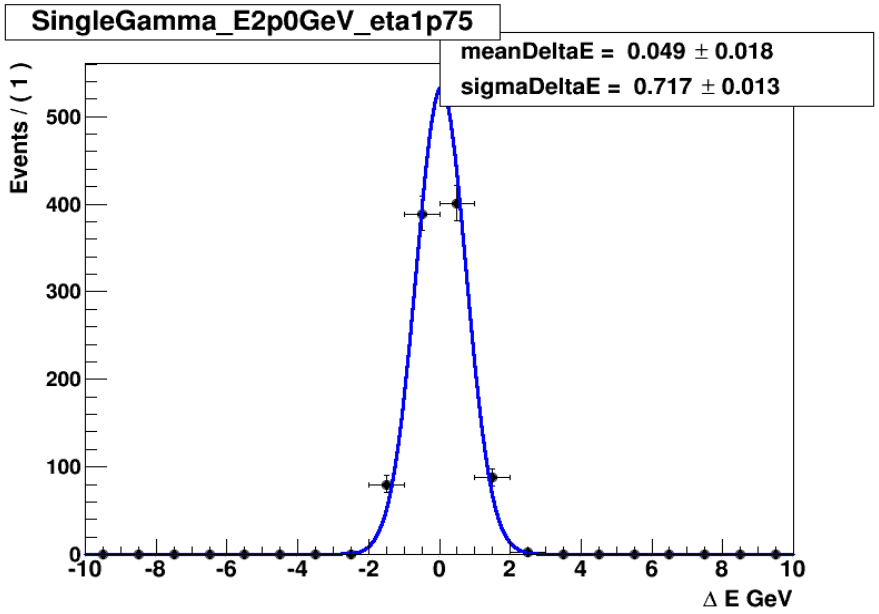

SingleGamma_E500p0GeV_eta1p5
meanDeltaE = 42.02 ± 0.89
sigmaDeltaE = 17.00 ± 0.26
Events / (1)
Δ E GeV

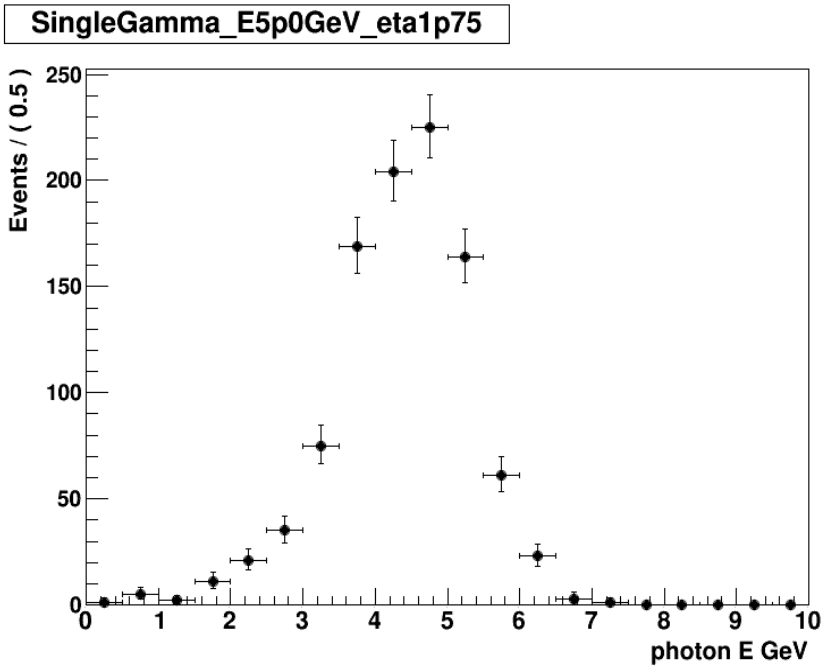

SingleGamma_E1000p0GeV_eta1p5
Events / (5)
photon E GeV

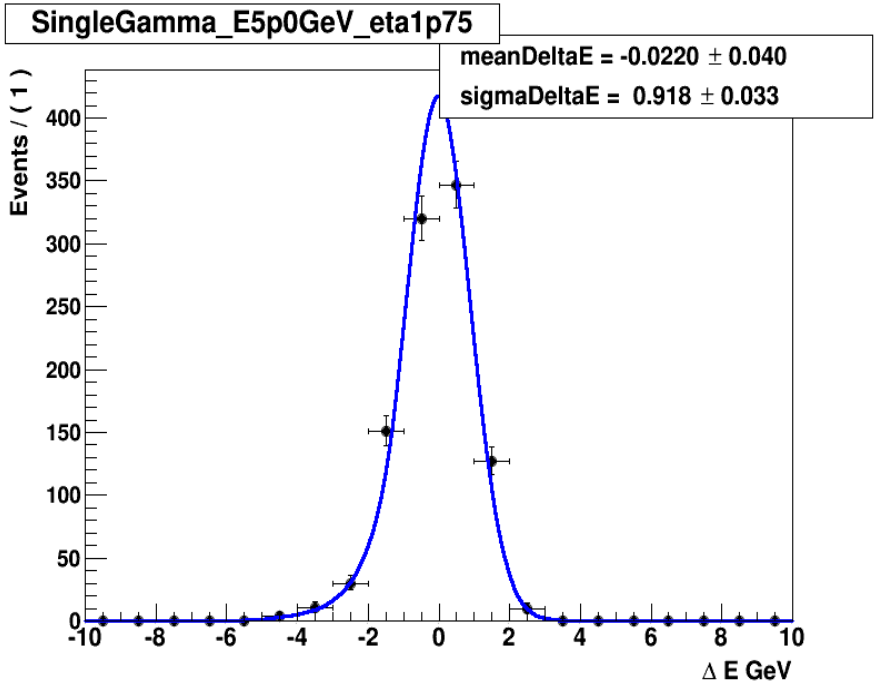

SingleGamma_E1000p0GeV_eta1p5
meanDeltaE = 94.4 ± 1.6
sigmaDeltaE = 30.0 ± 3.7
Events / (2)
Δ E GeV

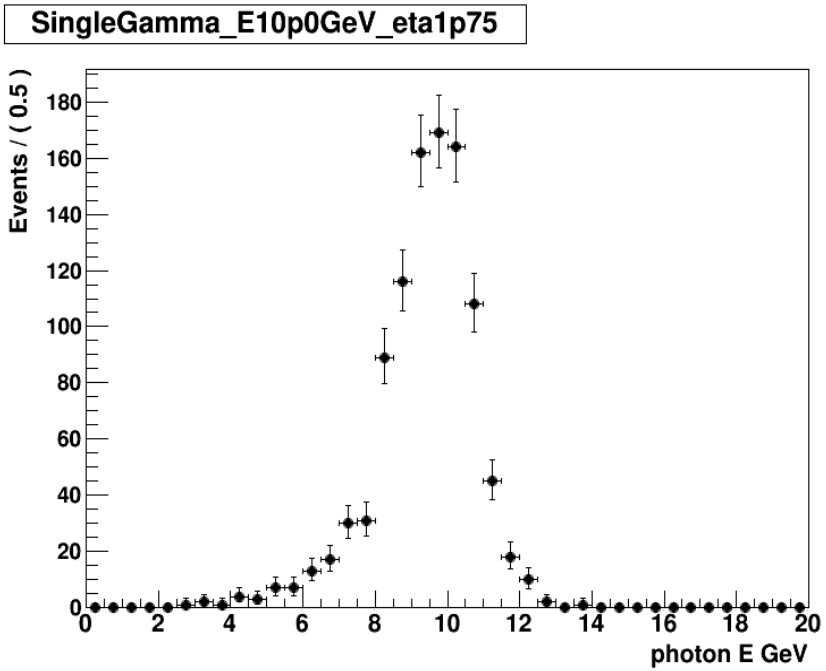
Eta = 1.75

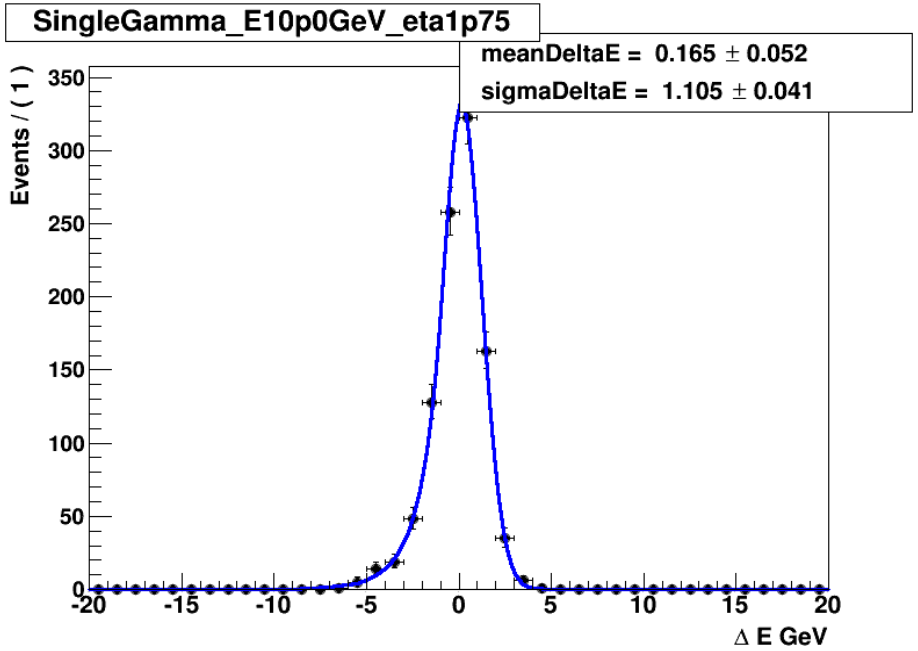

SingleGamma_E2p0GeV_eta1p75
Events / (0.5)
photon E GeV

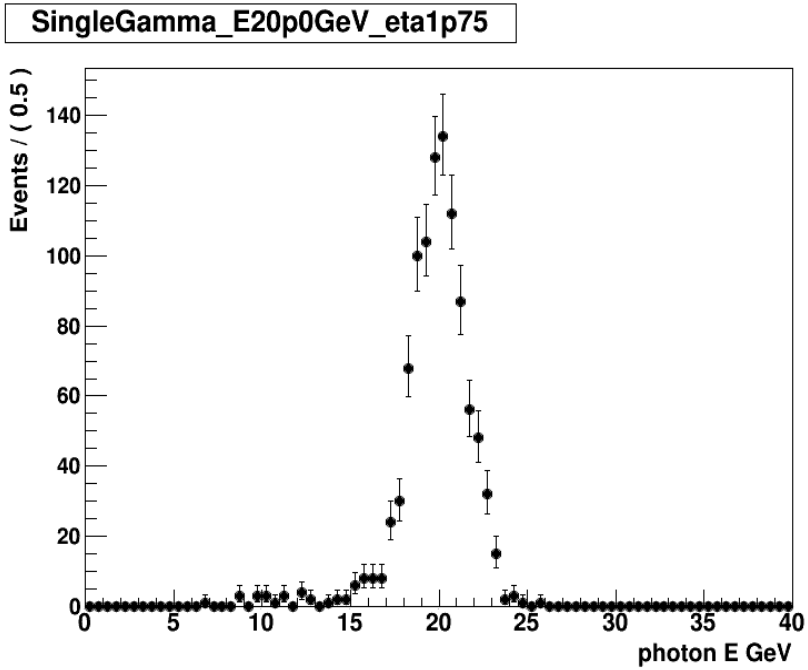

SingleGamma_E2p0GeV_eta1p75
meanDeltaE = 0.049 ± 0.018
sigmaDeltaE = 0.717 ± 0.013
Events / (1)
Δ E GeV

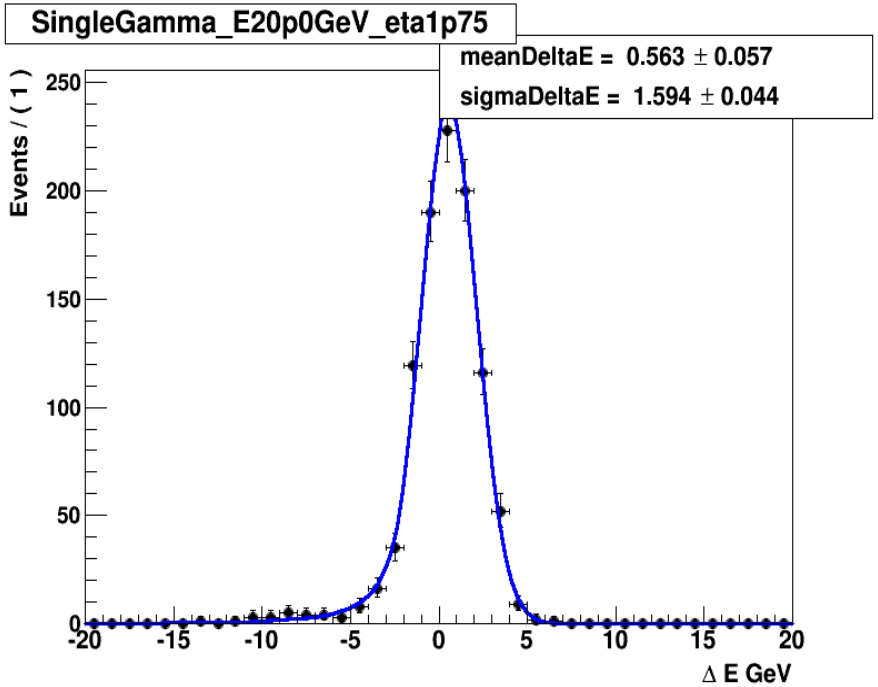

SingleGamma_E5p0GeV_eta1p75
Events / (0.5)
photon E GeV

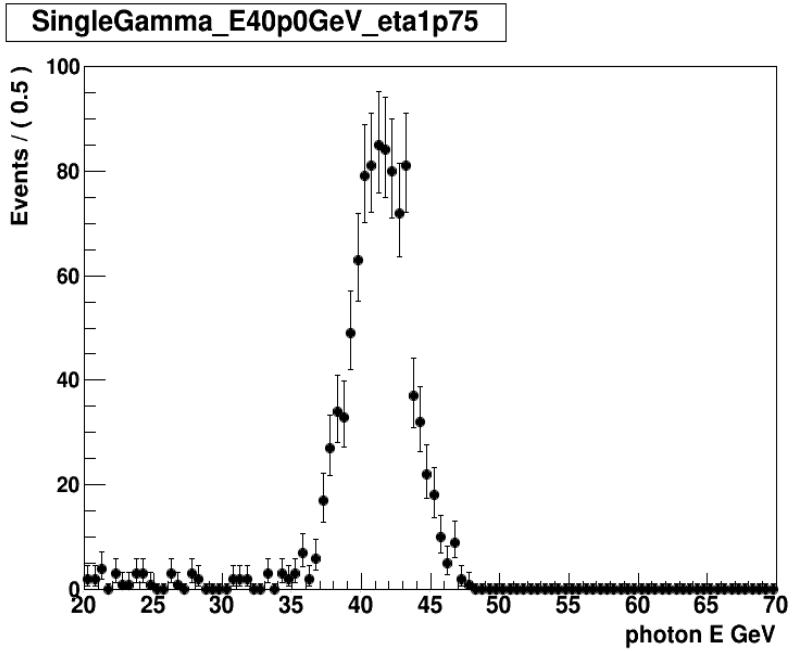

SingleGamma_E5p0GeV_eta1p75
meanDeltaE = -0.0220 ± 0.040
sigmaDeltaE = 0.918 ± 0.033
Events / (1)
Δ E GeV

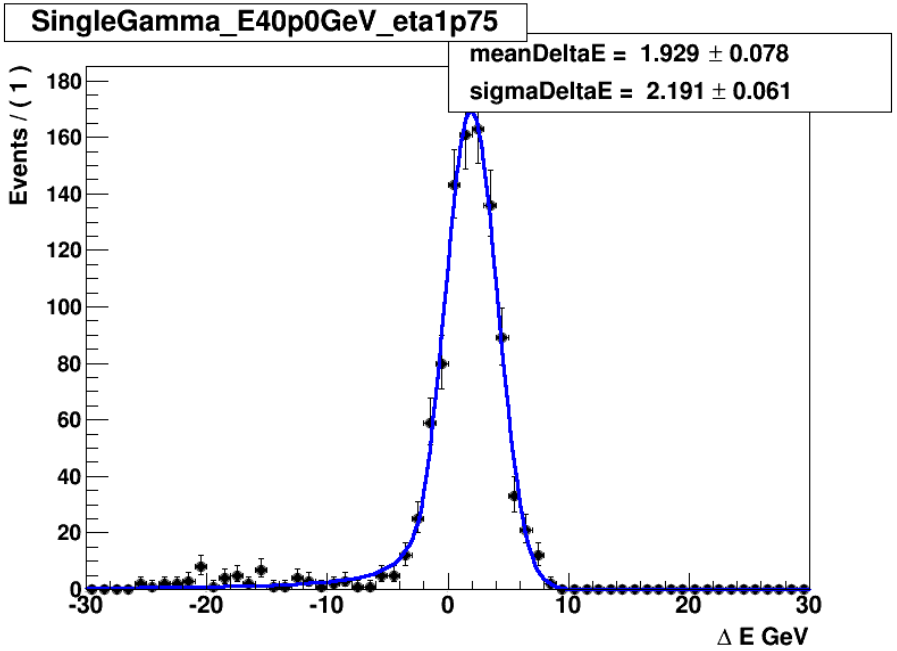

SingleGamma_E10p0GeV_eta1p75
Events / (0.5)
photon E GeV

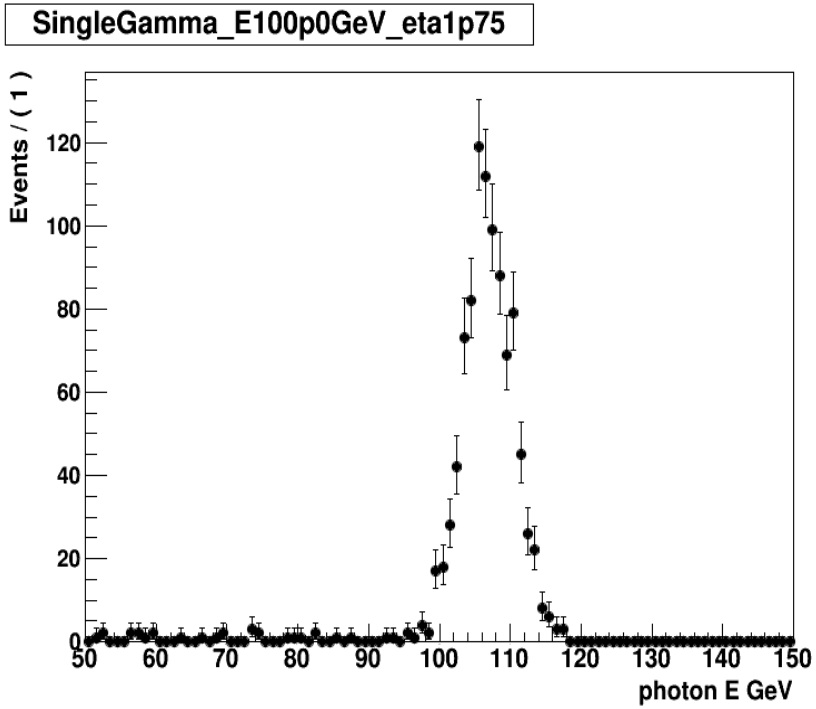

SingleGamma_E10p0GeV_eta1p75
meanDeltaE = 0.165 ± 0.052
sigmaDeltaE = 1.105 ± 0.041
Events / (1)
Δ E GeV

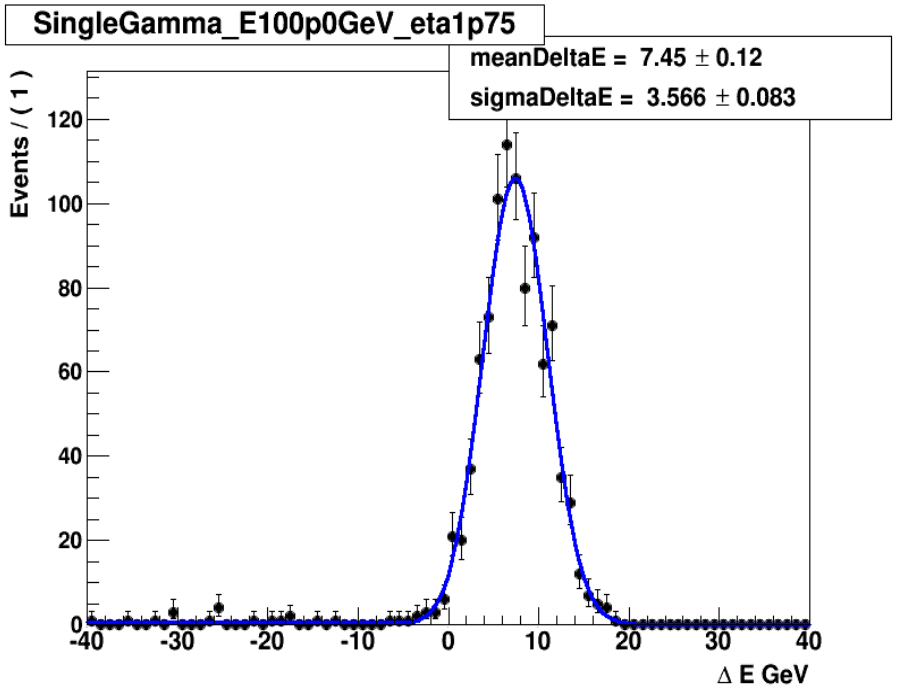

SingleGamma_E20p0GeV_eta1p75
Events / (0.5)
photon E GeV

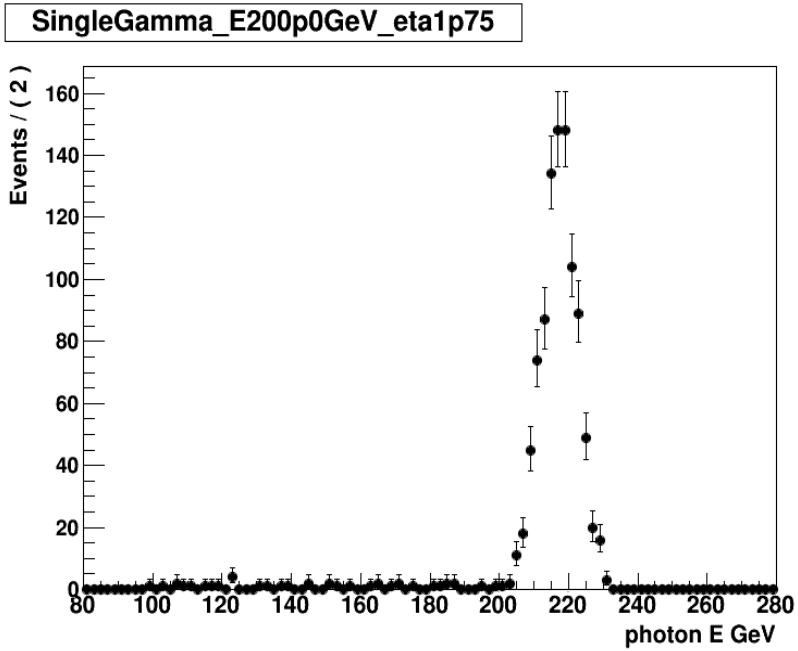

SingleGamma_E20p0GeV_eta1p75
meanDeltaE = 0.563 ± 0.057
sigmaDeltaE = 1.594 ± 0.044
Events / (1)
Δ E GeV

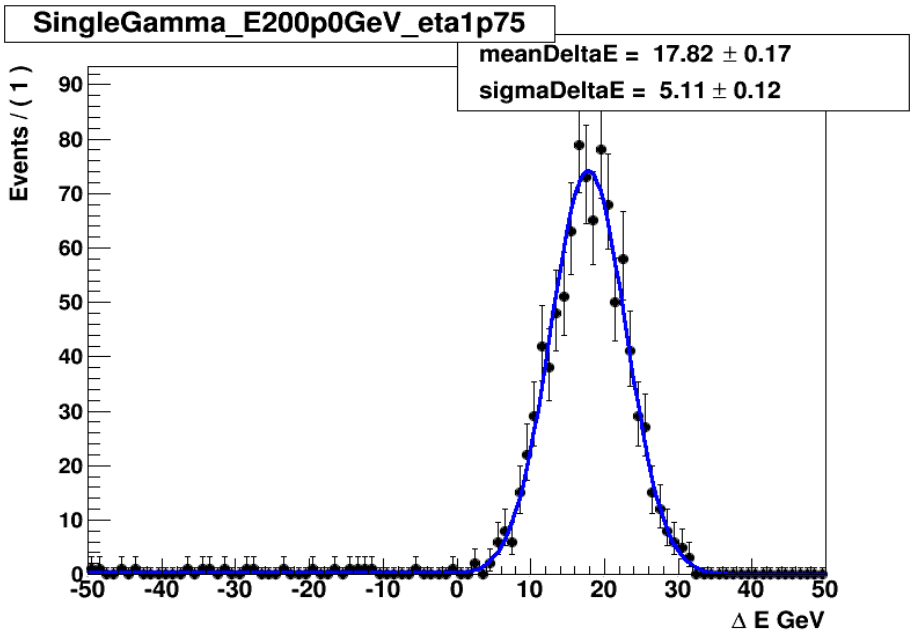

SingleGamma_E40p0GeV_eta1p75
Events / (0.5)
photon E GeV

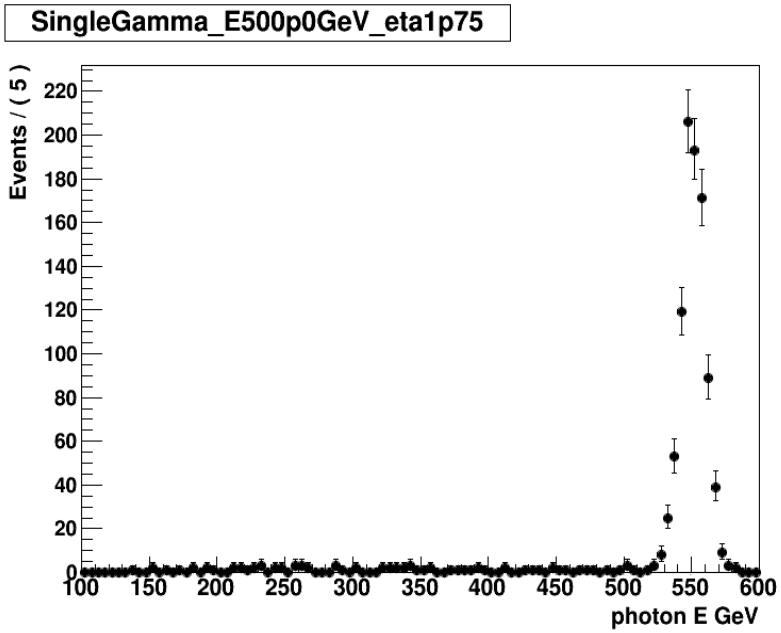

SingleGamma_E40p0GeV_eta1p75
meanDeltaE = 1.929 ± 0.078
sigmaDeltaE = 2.191 ± 0.061
Events / (1)
Δ E GeV

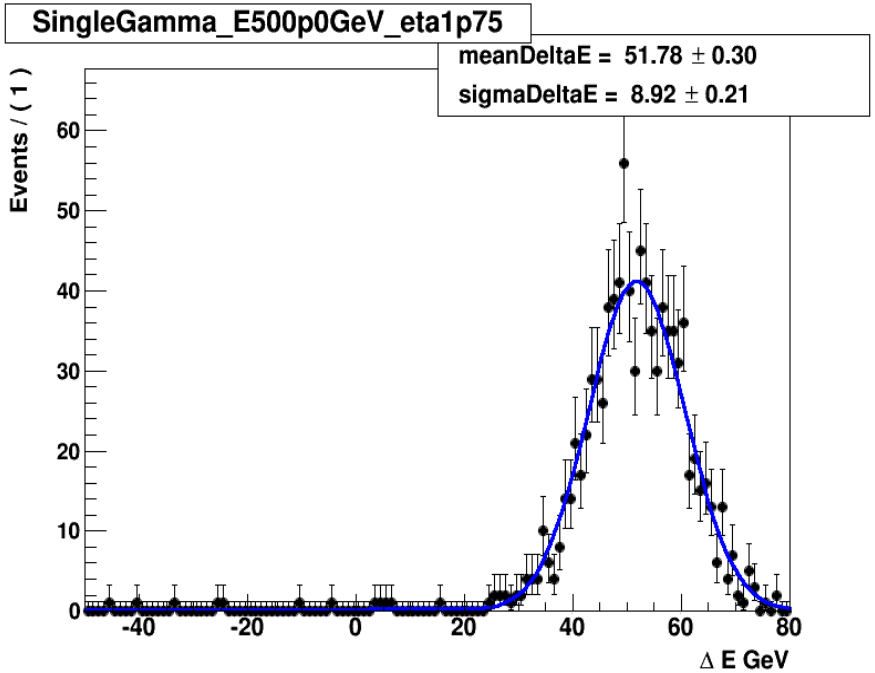

SingleGamma_E100p0GeV_eta1p75
Events / (1)
photon E GeV

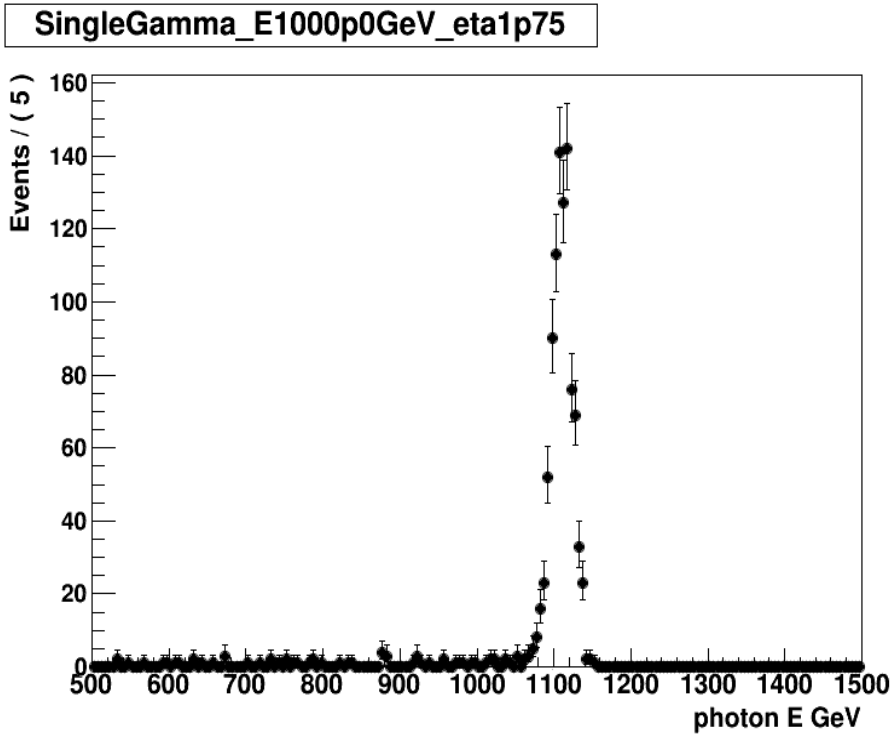

SingleGamma_E100p0GeV_eta1p75
meanDeltaE = 7.45 ± 0.12
sigmaDeltaE = 3.566 ± 0.083
Events / (1)
Δ E GeV

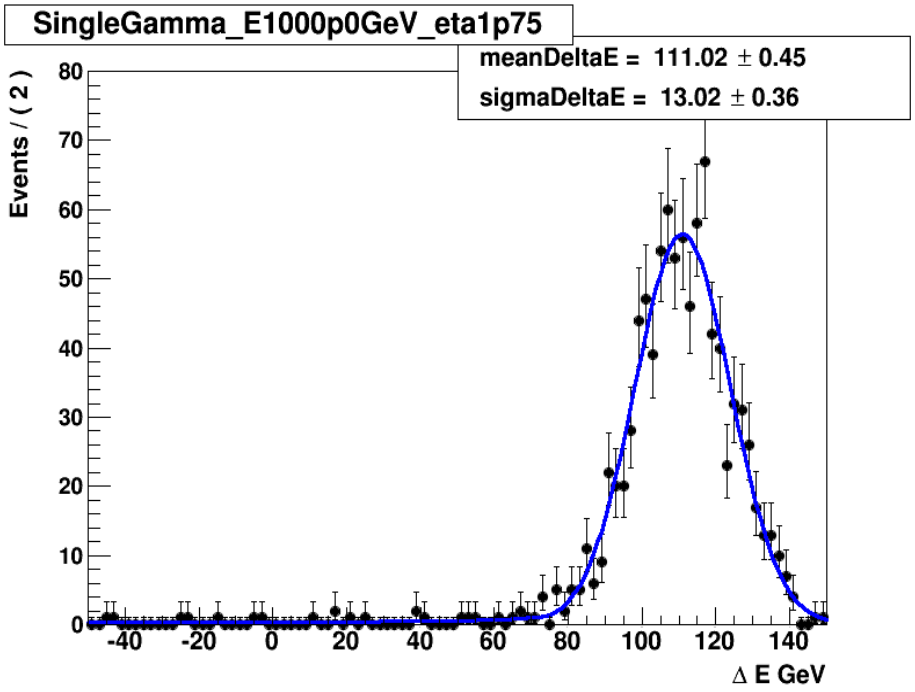

SingleGamma_E200p0GeV_eta1p75
Events / (2)
photon E GeV


SingleGamma_E200p0GeV_eta1p75
meanDeltaE = 17.82 ± 0.17
sigmaDeltaE = 5.11 ± 0.12
Events / (1)
Δ E GeV

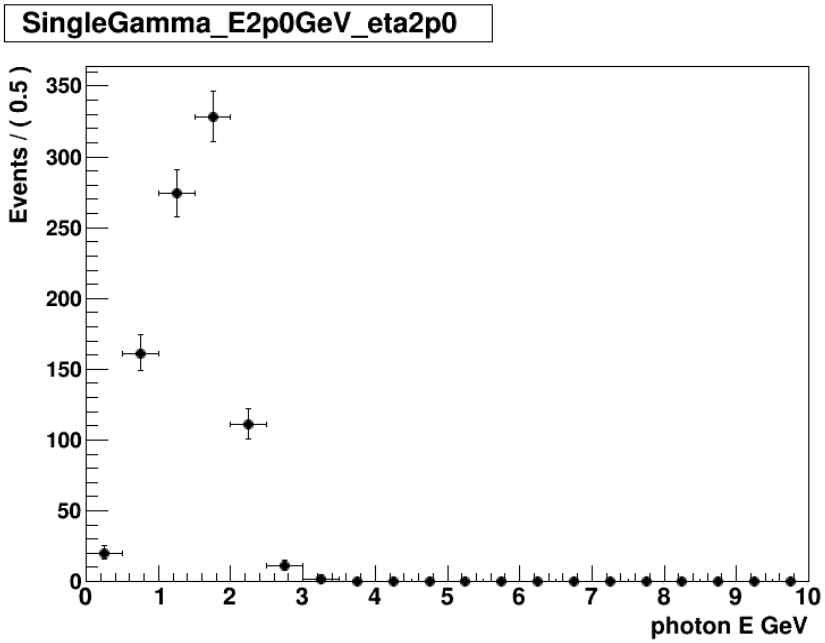

SingleGamma_E500p0GeV_eta1p75
Events / (5)
photon E GeV

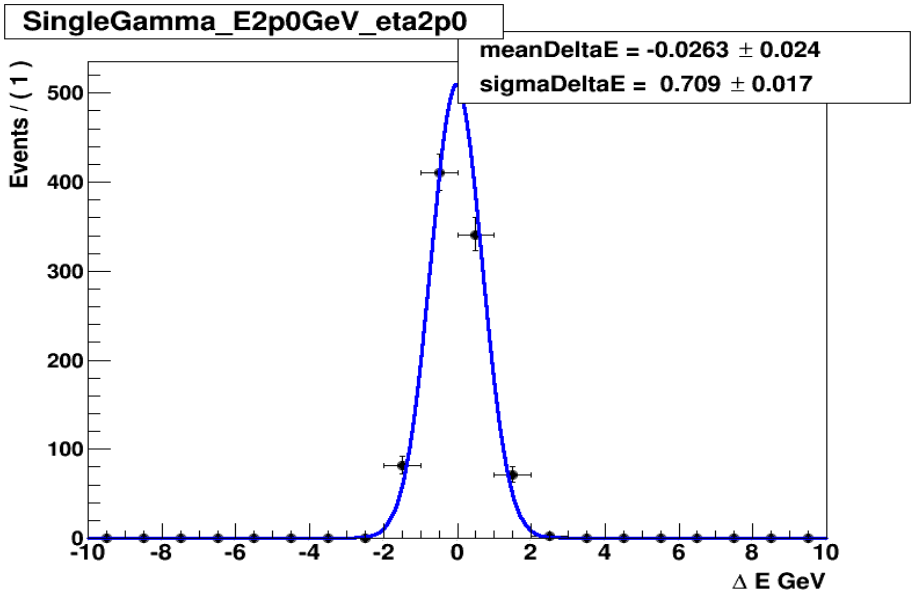

SingleGamma_E500p0GeV_eta1p75
meanDeltaE = 51.78 ± 0.30
sigmaDeltaE = 8.92 ± 0.21
Events / (1)
Δ E GeV

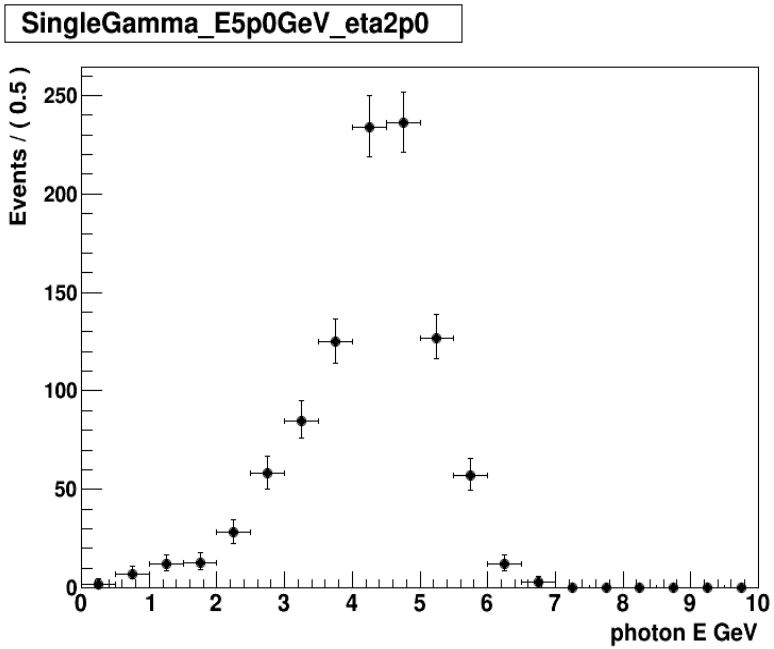

SingleGamma_E1000p0GeV_eta1p75
Events / (5)
photon E GeV

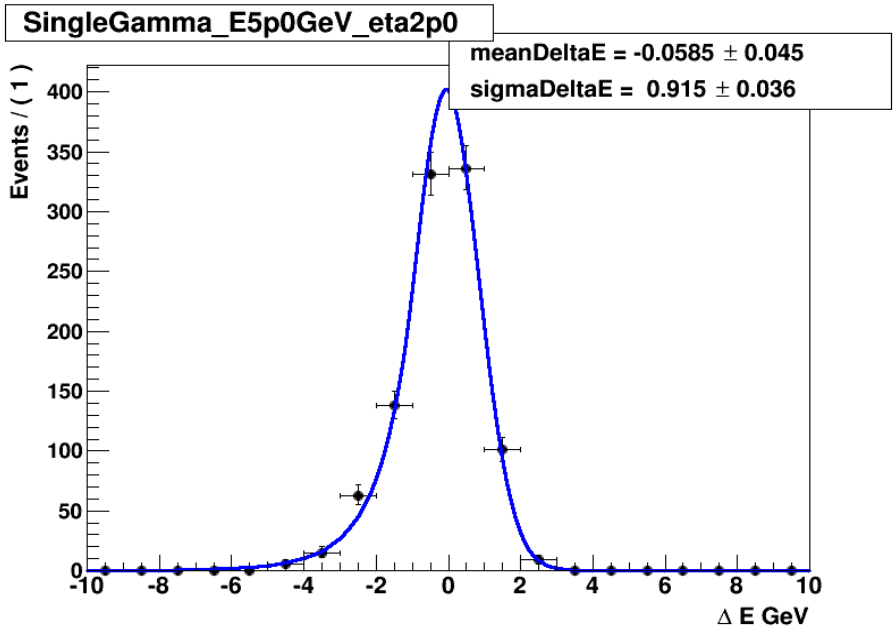

SingleGamma_E1000p0GeV_eta1p75
meanDeltaE = 111.02 ± 0.45
sigmaDeltaE = 13.02 ± 0.36
Events / (2)
Δ E GeV

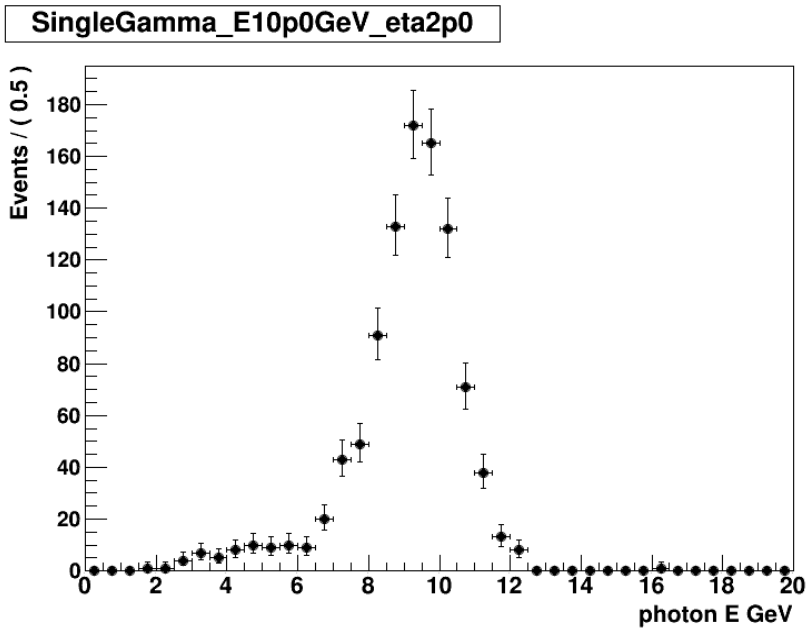
Eta = 2.0

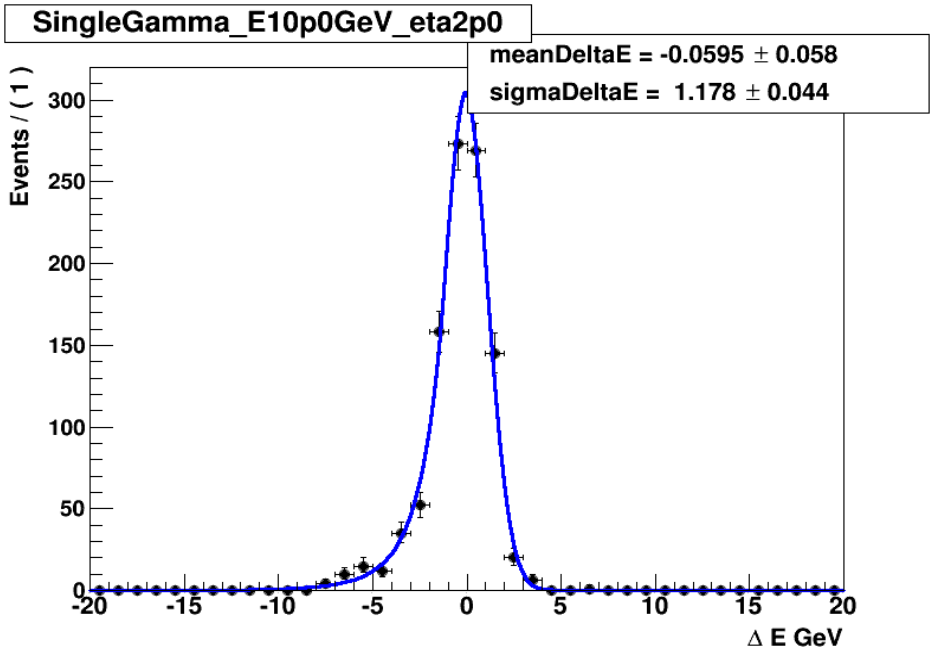

SingleGamma_E2p0GeV_eta2p0
Events / (0.5)
photon E GeV

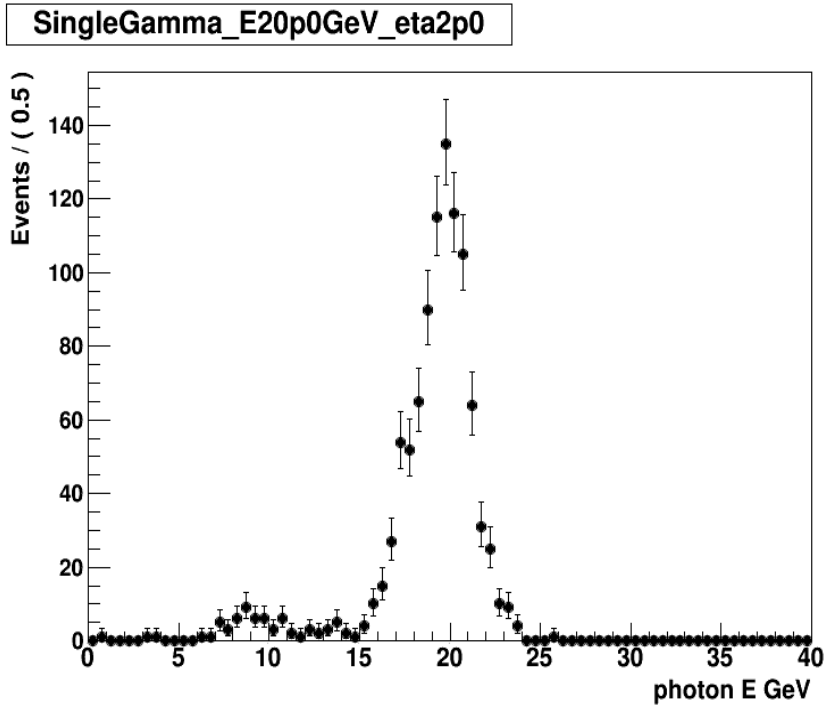

SingleGamma_E2p0GeV_eta2p0
meanDeltaE = -0.0263 ± 0.024
sigmaDeltaE = 0.709 ± 0.017
Events / (1)
Δ E GeV

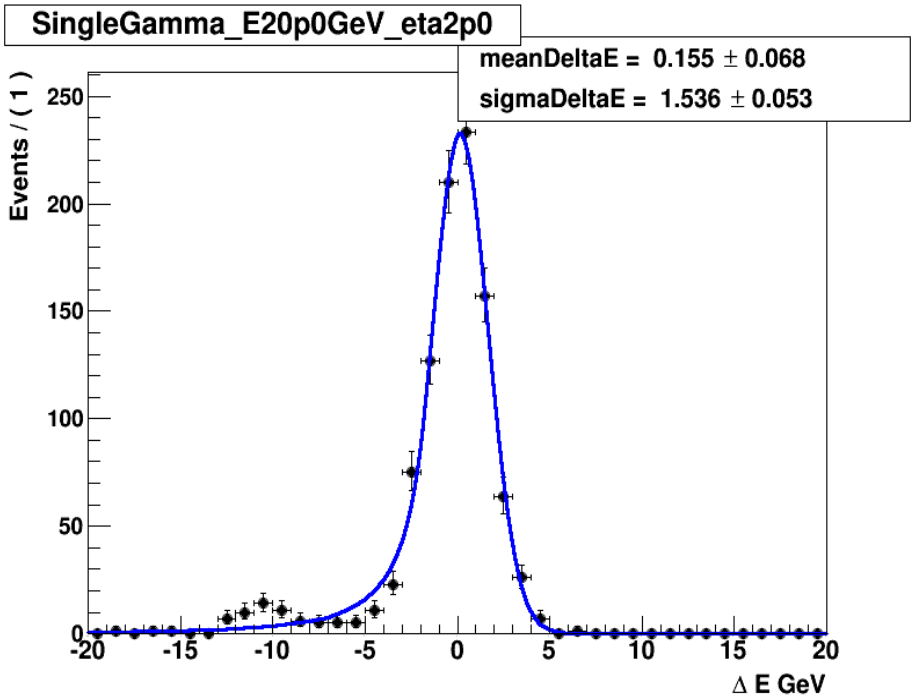

SingleGamma_E5p0GeV_eta2p0
Events / (0.5)
photon E GeV

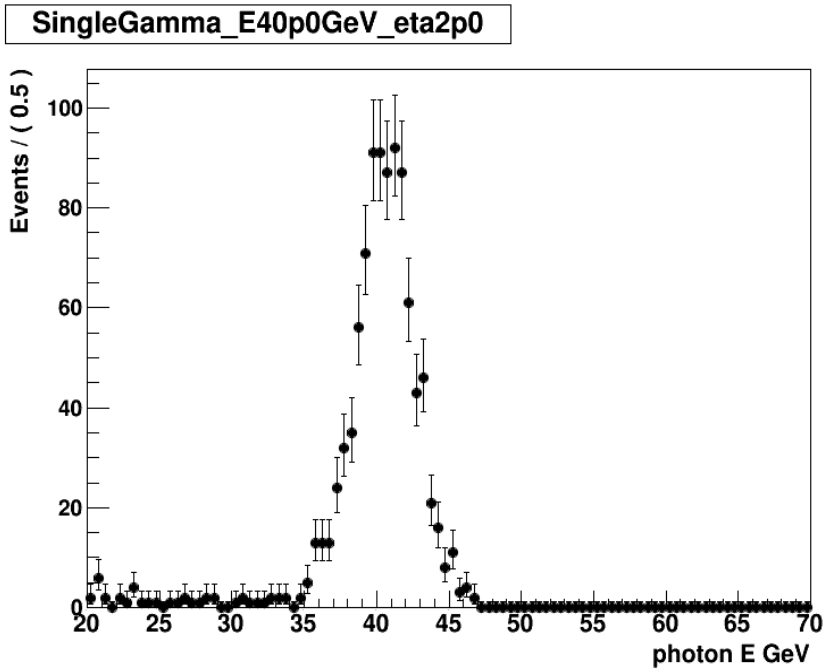

SingleGamma_E5p0GeV_eta2p0
meanDeltaE = -0.0585 ± 0.045
sigmaDeltaE = 0.915 ± 0.036
Events / (1)
Δ E GeV

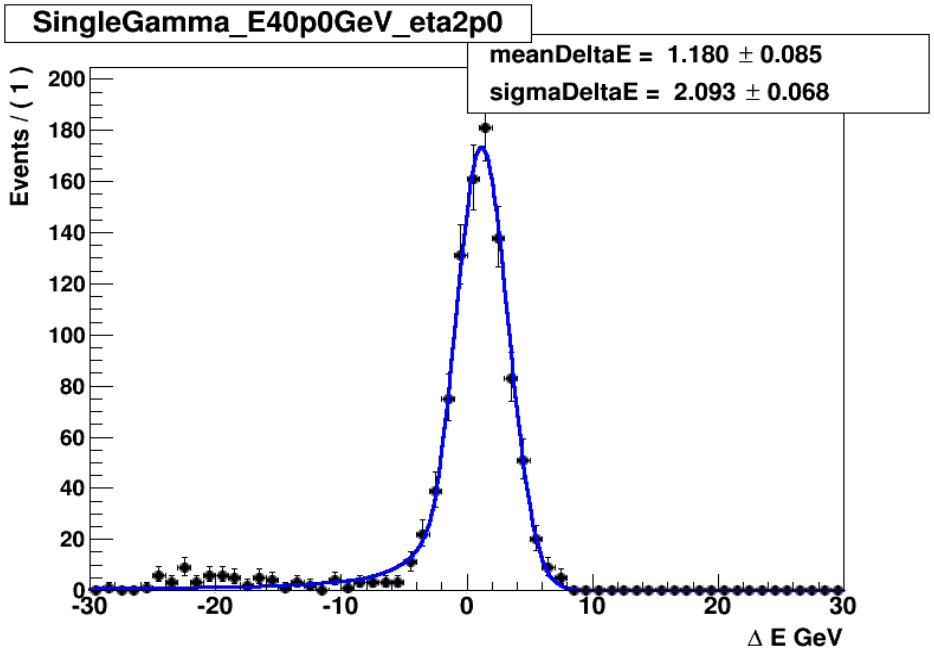

SingleGamma_E10p0GeV_eta2p0
Events / (0.5)
photon E GeV

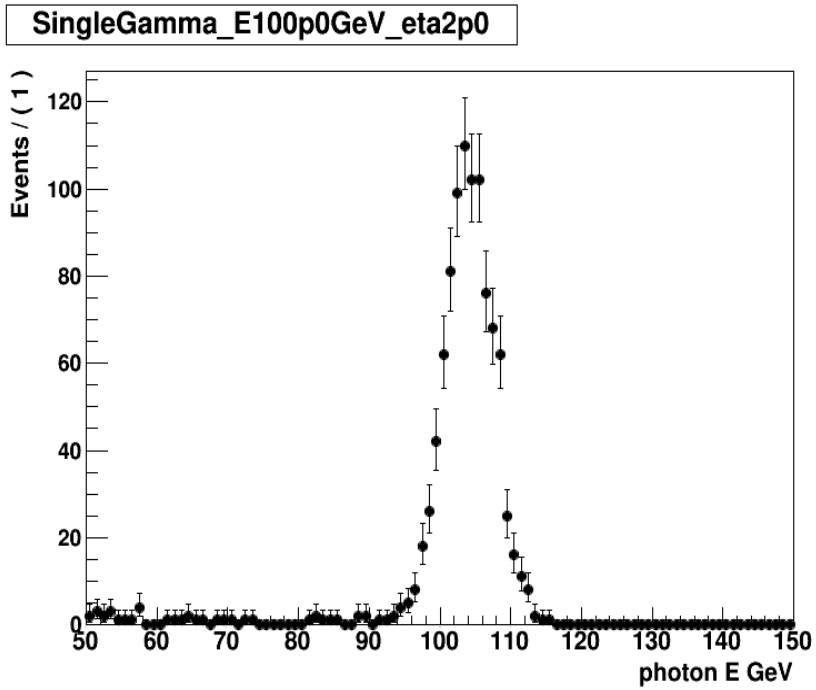

SingleGamma_E10p0GeV_eta2p0
meanDeltaE = -0.0595 ± 0.058
sigmaDeltaE = 1.178 ± 0.044
Events / (1)
Δ E GeV

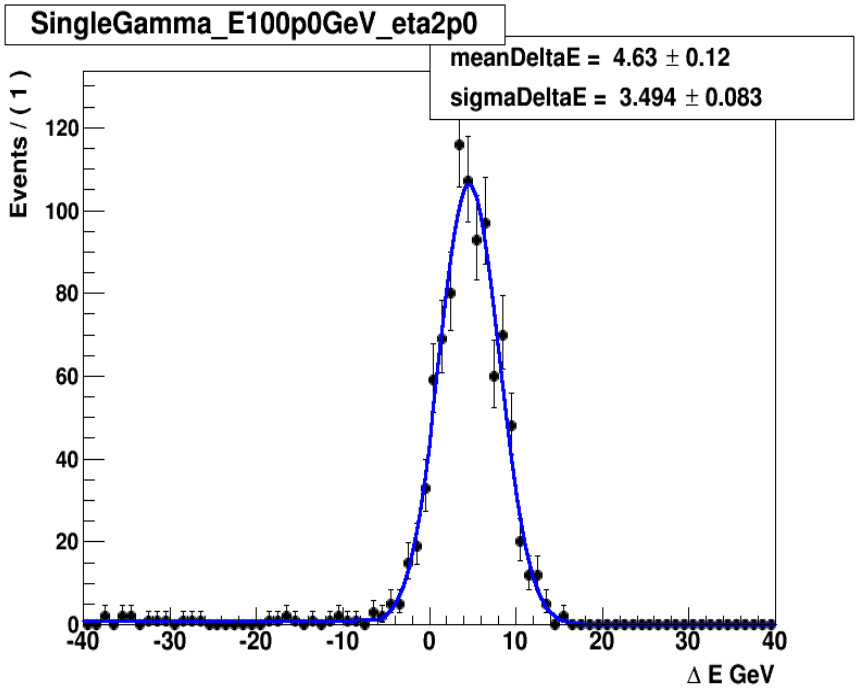

SingleGamma_E20p0GeV_eta2p0
Events / (0.5)
photon E GeV

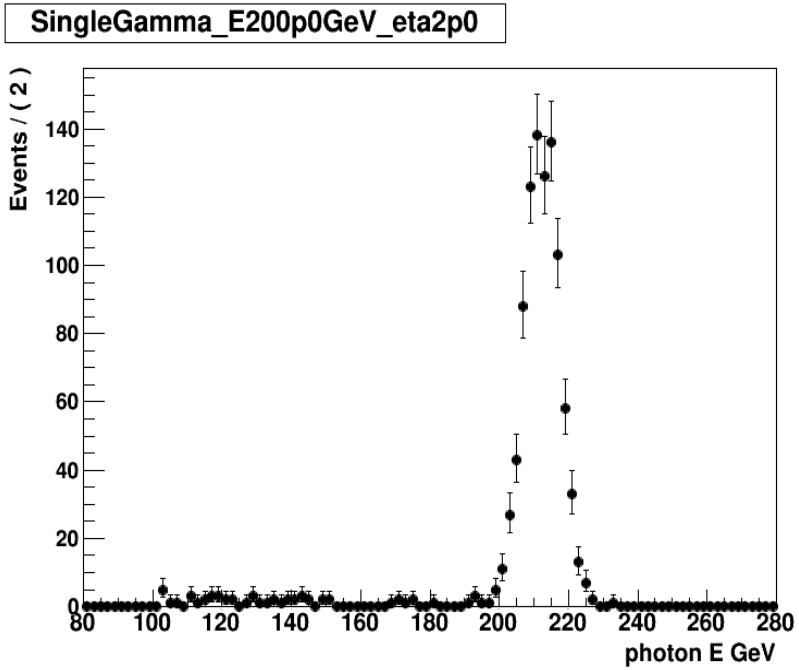

SingleGamma_E20p0GeV_eta2p0
meanDeltaE = 0.155 ± 0.068
sigmaDeltaE = 1.536 ± 0.053
Events / (1)
Δ E GeV

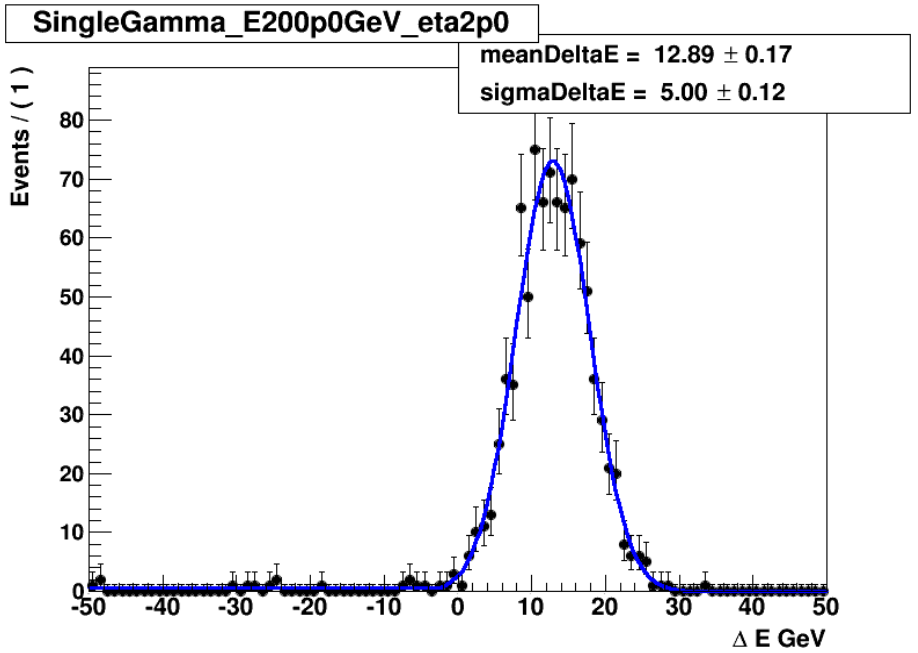

SingleGamma_E40p0GeV_eta2p0
Events / (0.5)
photon E GeV

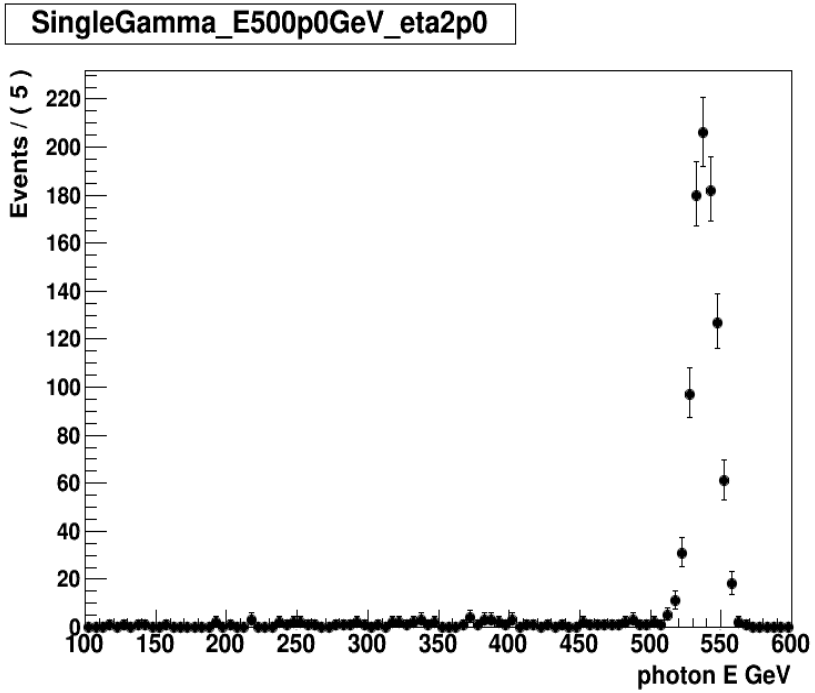

SingleGamma_E40p0GeV_eta2p0
meanDeltaE = 1.180 ± 0.085
sigmaDeltaE = 2.093 ± 0.068
Events / (1)
Δ E GeV

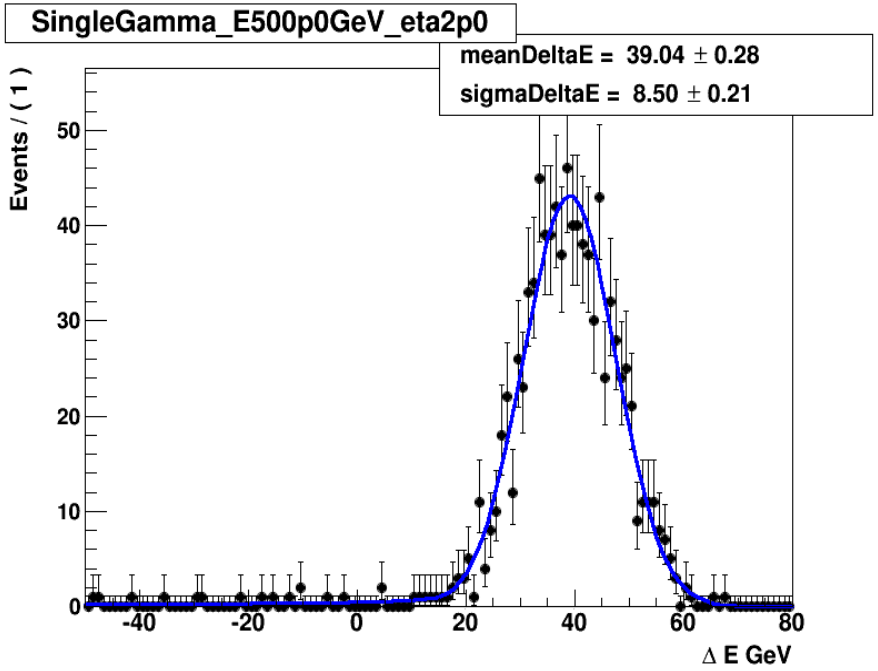

SingleGamma_E100p0GeV_eta2p0
Events / (1)
photon E GeV

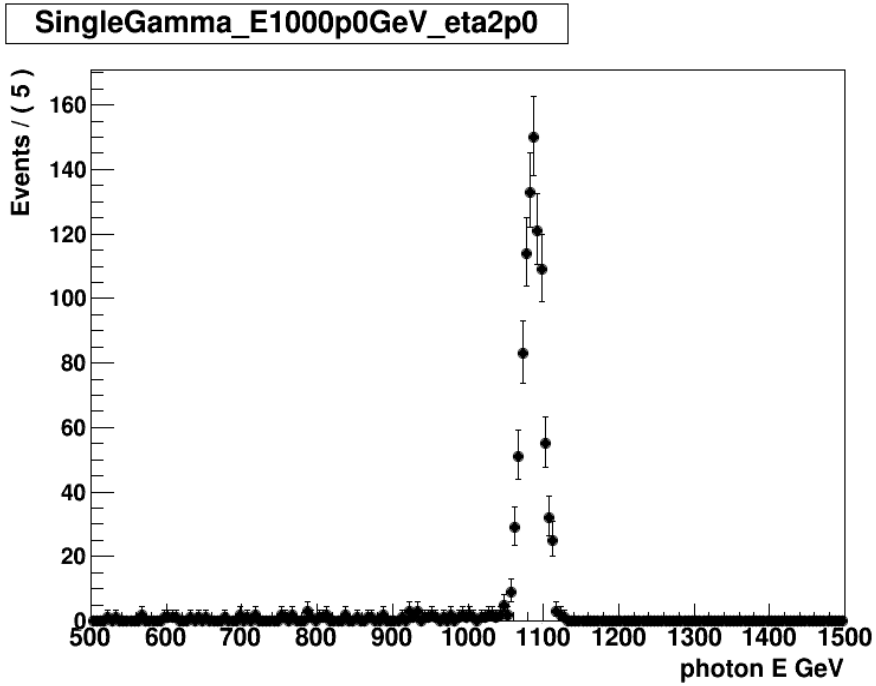

SingleGamma_E100p0GeV_eta2p0
meanDeltaE = 4.63 ± 0.12
sigmaDeltaE = 3.494 ± 0.083
Events / (1)
Δ E GeV

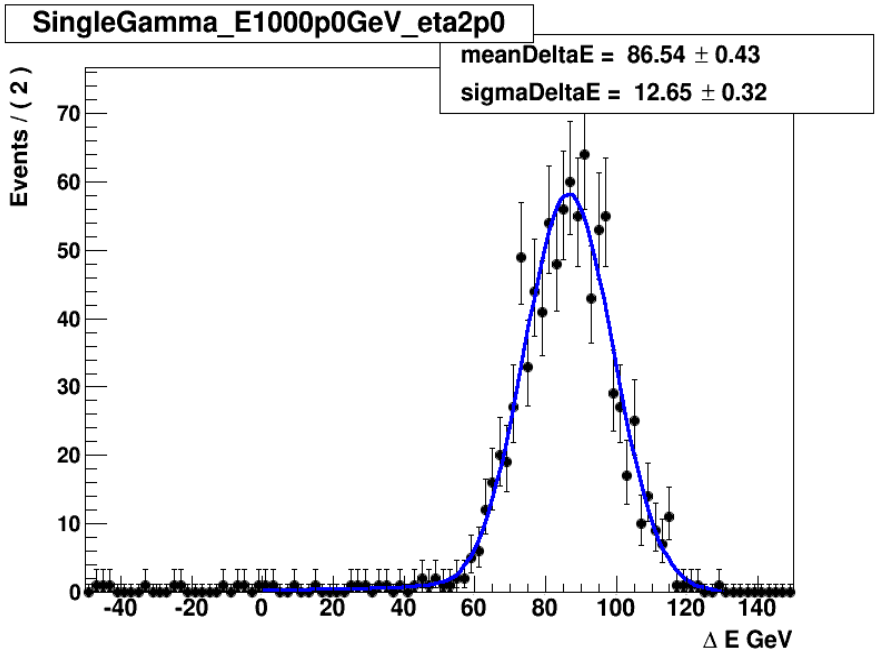

SingleGamma_E200p0GeV_eta2p0
Events / (2)
photon E GeV


SingleGamma_E200p0GeV_eta2p0
meanDeltaE = 12.89 ± 0.17
sigmaDeltaE = 5.00 ± 0.12
Events / (1)
Δ E GeV

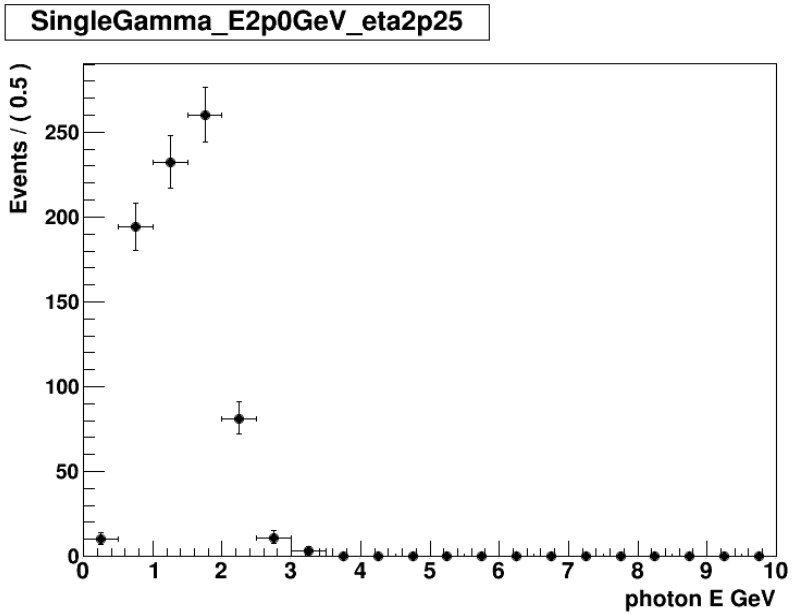

SingleGamma_E500p0GeV_eta2p0
Events / (5)
photon E GeV

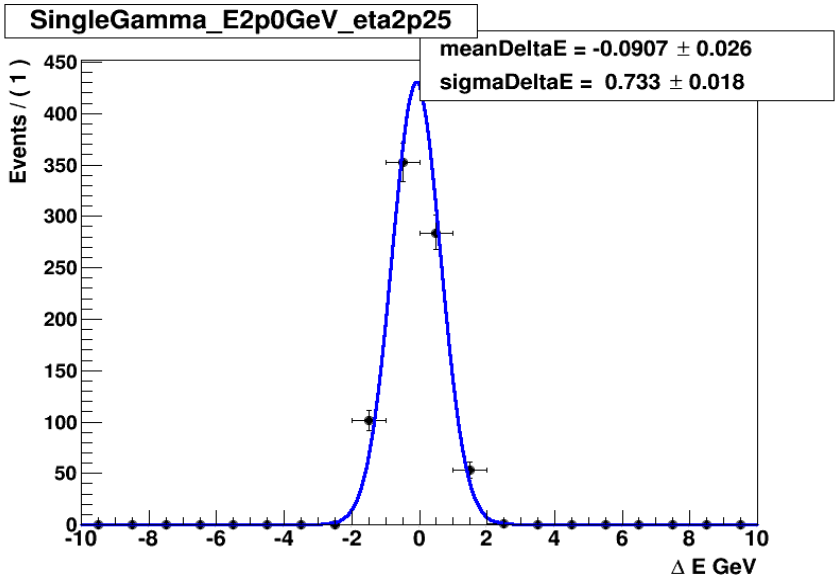

SingleGamma_E500p0GeV_eta2p0
meanDeltaE = 39.04 ± 0.28
sigmaDeltaE = 8.50 ± 0.21
Events / (1)
Δ E GeV

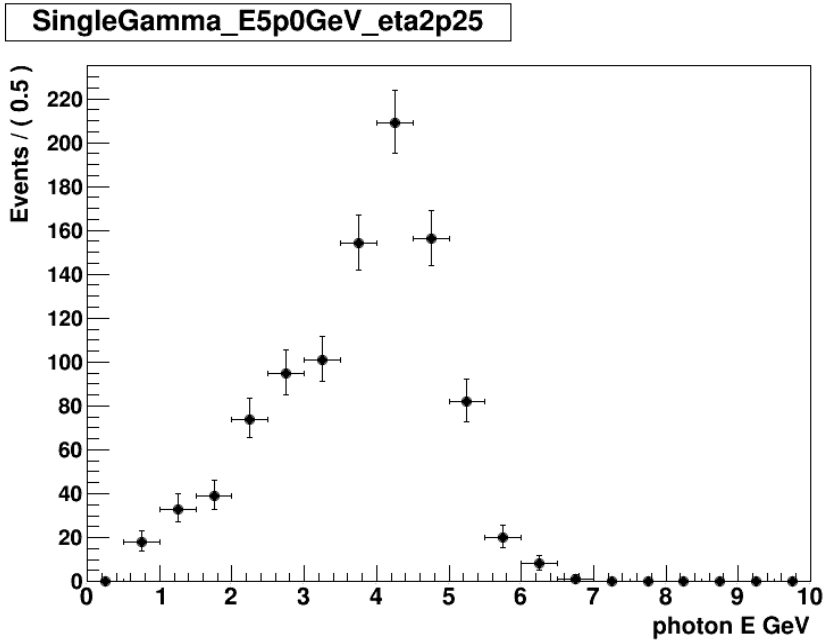

SingleGamma_E1000p0GeV_eta2p0
Events / (5)
photon E GeV

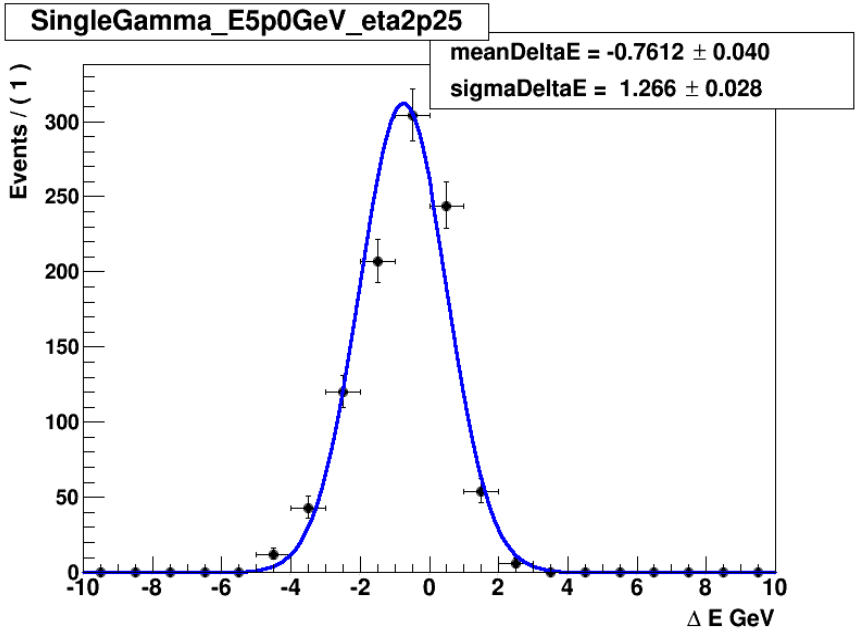

SingleGamma_E1000p0GeV_eta2p0
meanDeltaE = 86.54 ± 0.43
sigmaDeltaE = 12.65 ± 0.32
Events / (2)
Δ E GeV

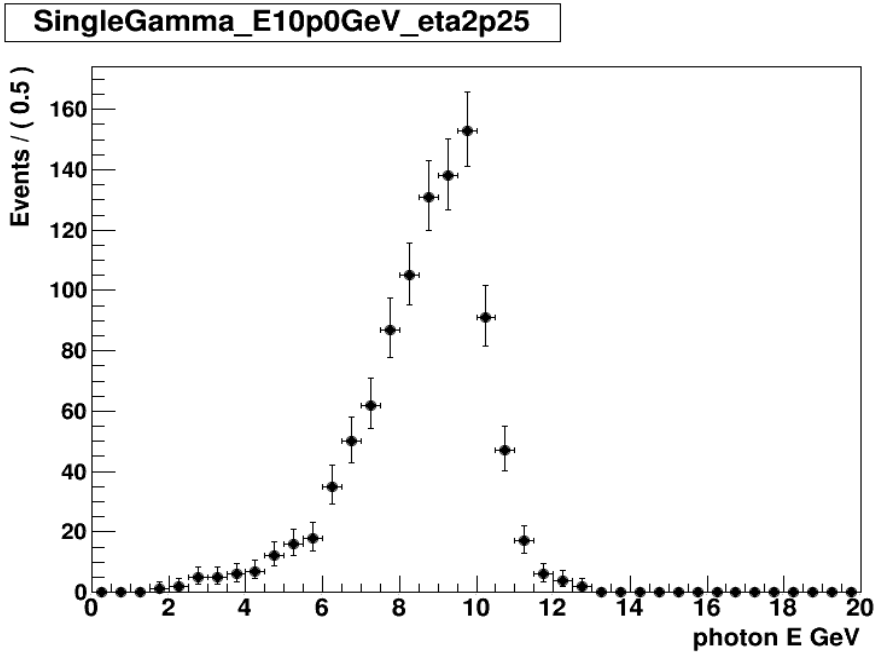
Eta = 2.25

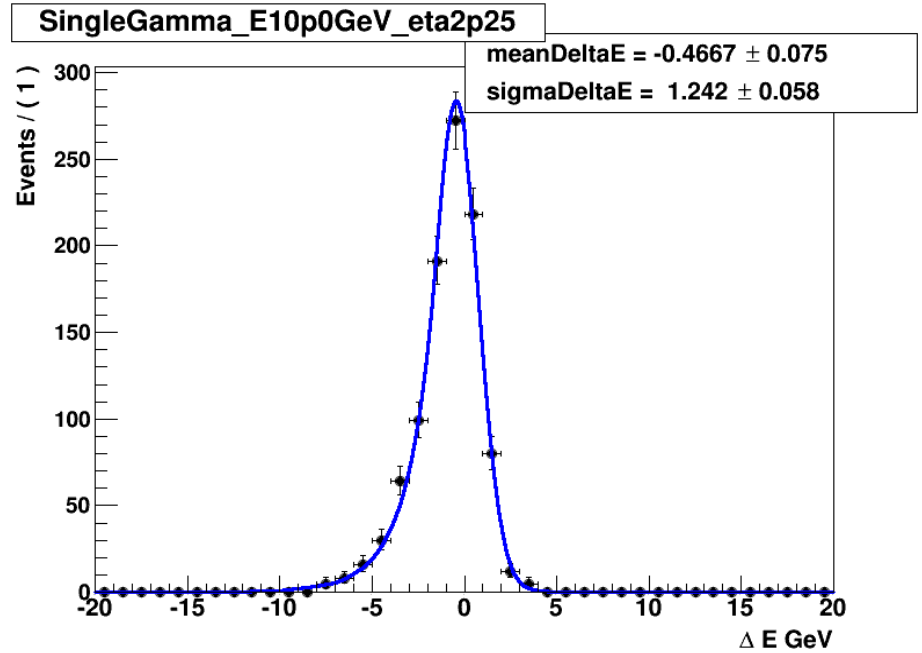

SingleGamma_E2p0GeV_eta2p25
Events / (0.5)
photon E GeV

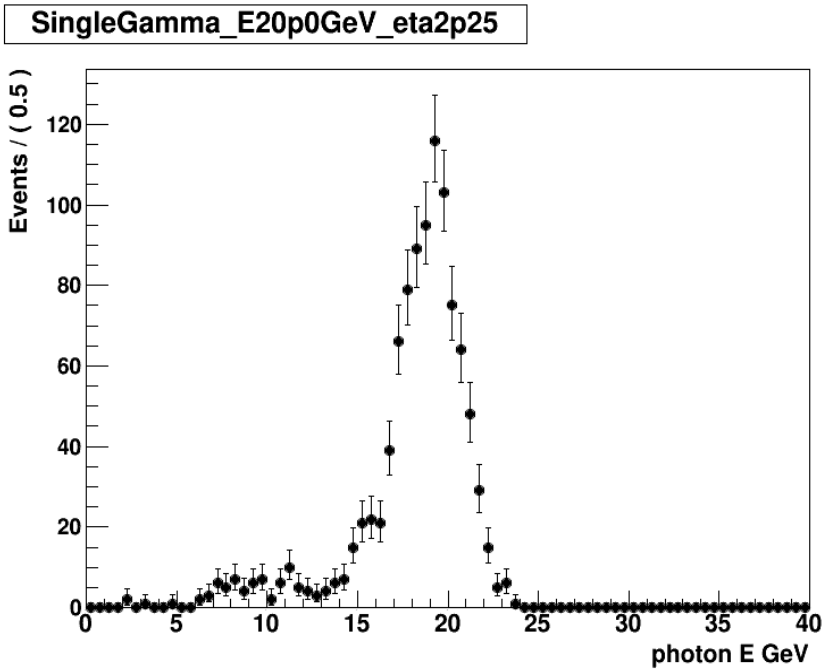

SingleGamma_E2p0GeV_eta2p25
meanDeltaE = -0.0907 ± 0.026
sigmaDeltaE = 0.733 ± 0.018
Events / (1)
Δ E GeV

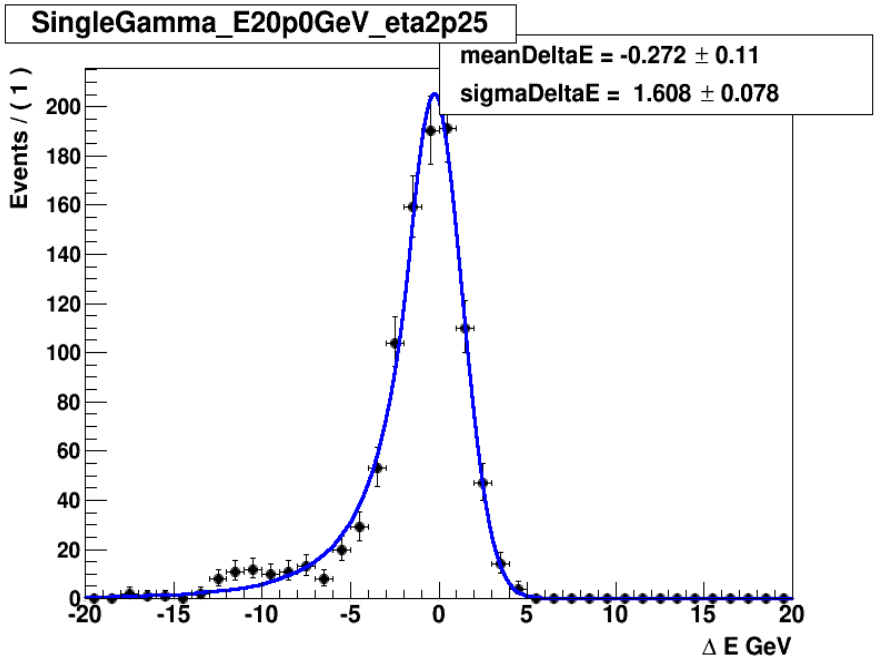

SingleGamma_E5p0GeV_eta2p25
Events / (0.5)
photon E GeV

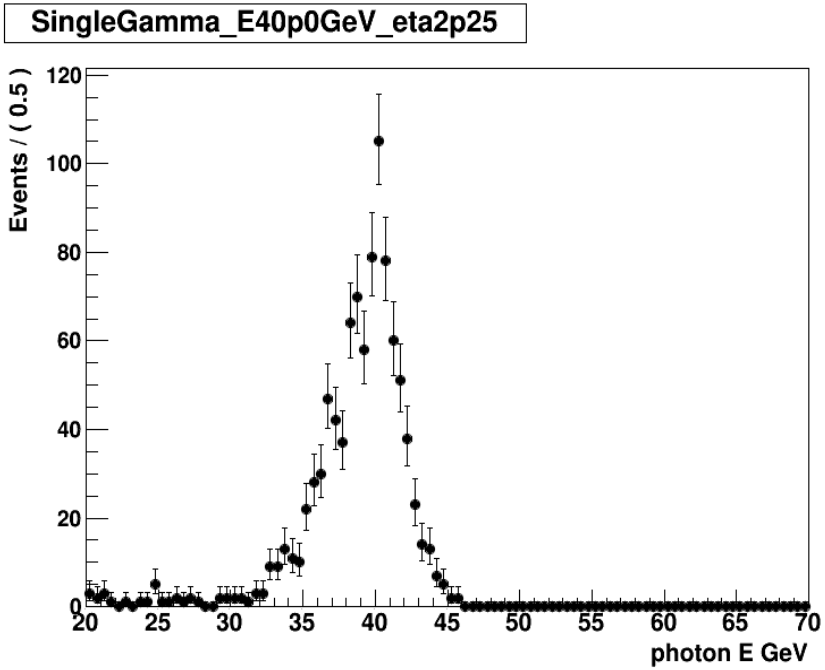

SingleGamma_E5p0GeV_eta2p25
meanDeltaE = -0.7612 ± 0.040
sigmaDeltaE = 1.266 ± 0.028
Events / (1)
Δ E GeV

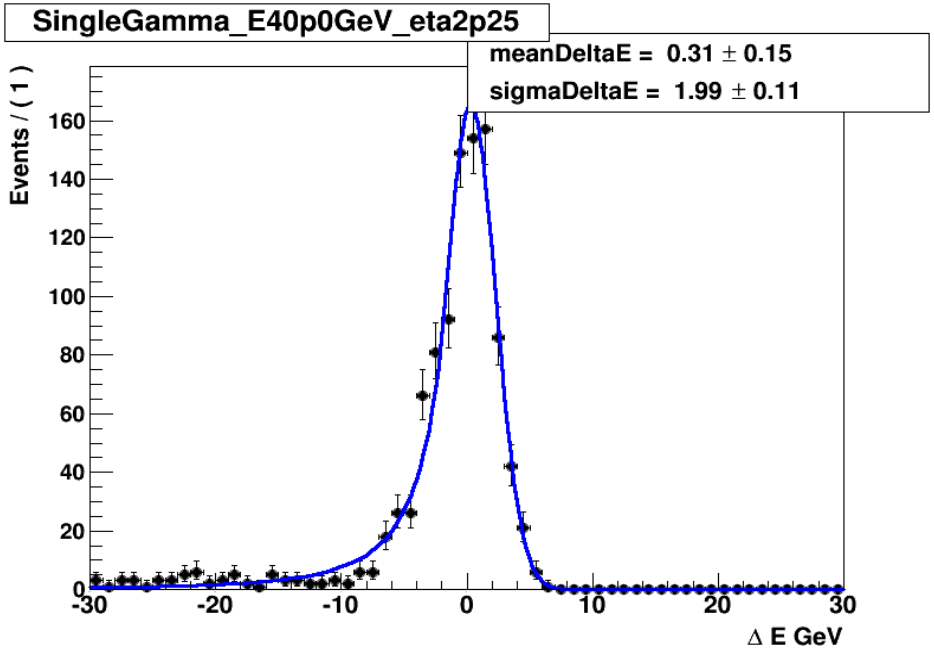

SingleGamma_E10p0GeV_eta2p25
Events / (0.5)
photon E GeV

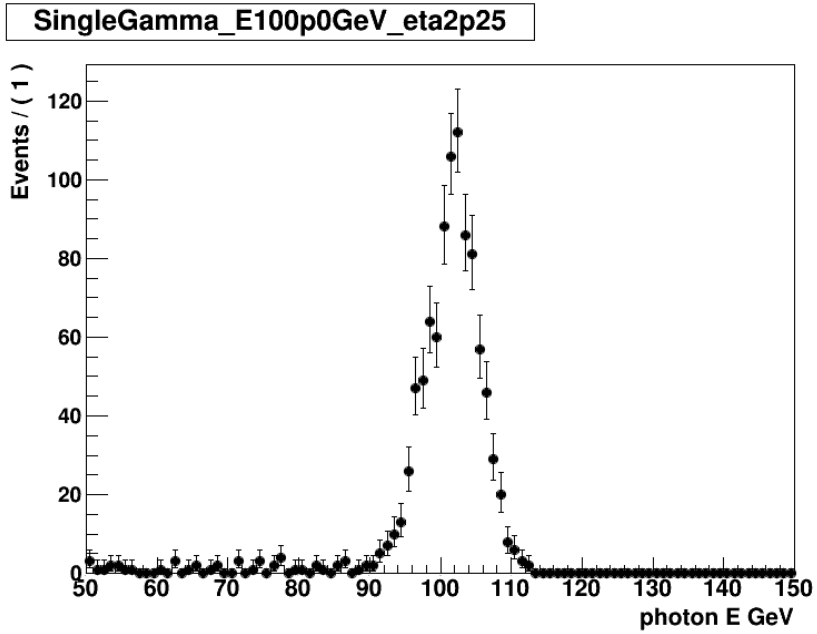

SingleGamma_E10p0GeV_eta2p25
meanDeltaE = -0.4667 ± 0.075
sigmaDeltaE = 1.242 ± 0.058
Events / (1)
Δ E GeV

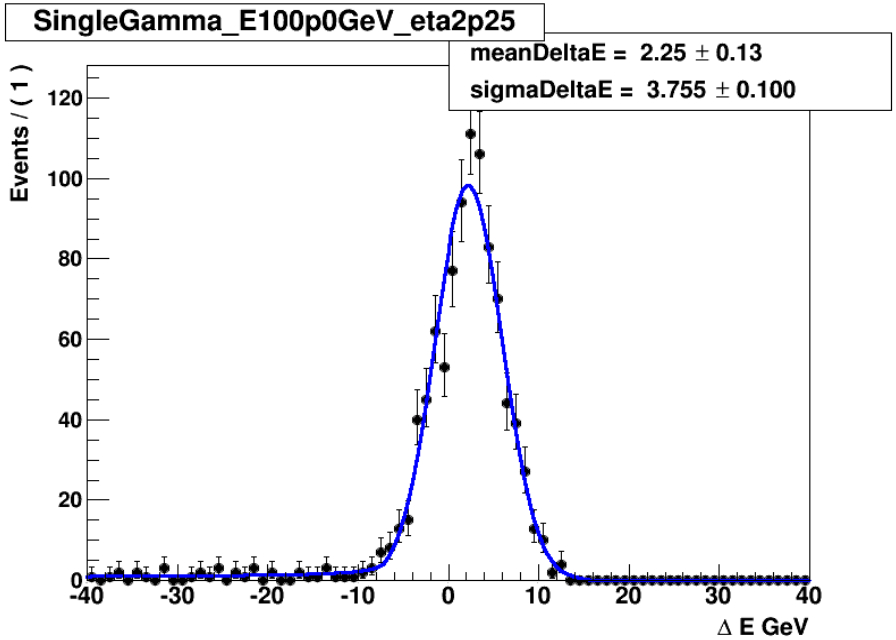

SingleGamma_E20p0GeV_eta2p25
Events / (0.5)
photon E GeV

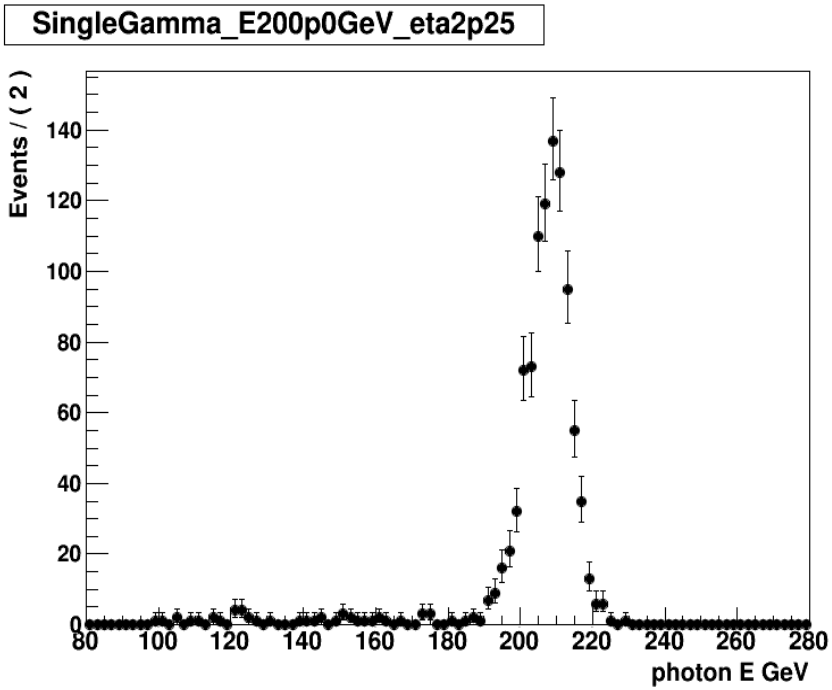

SingleGamma_E20p0GeV_eta2p25
meanDeltaE = -0.272 ± 0.11
sigmaDeltaE = 1.608 ± 0.078
Events / (1)
Δ E GeV

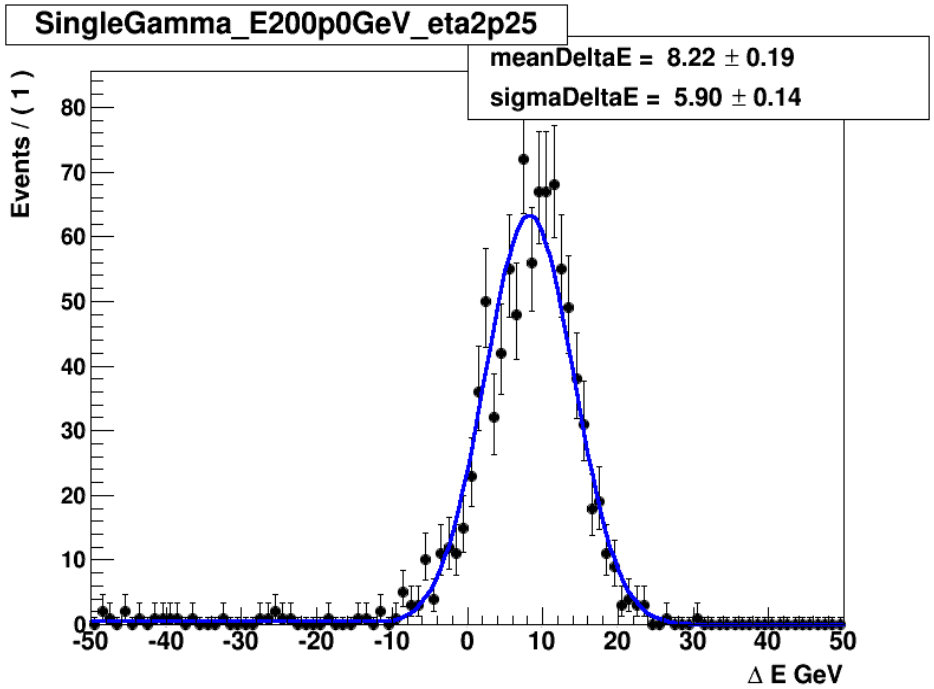

SingleGamma_E40p0GeV_eta2p25
Events / (0.5)
photon E GeV

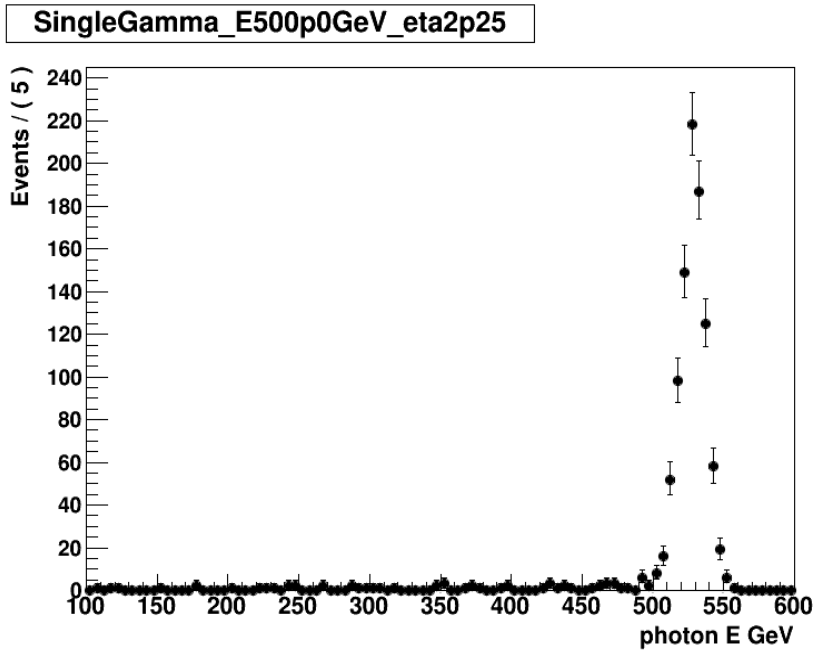

SingleGamma_E40p0GeV_eta2p25
meanDeltaE = 0.31 ± 0.15
sigmaDeltaE = 1.99 ± 0.11
Events / (1)
Δ E GeV

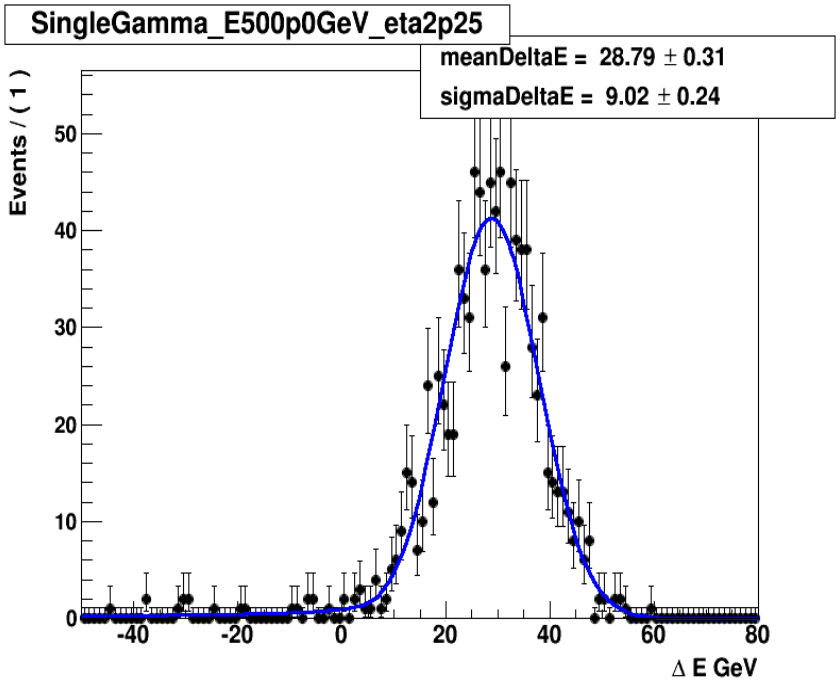

SingleGamma_E100p0GeV_eta2p25
Events / (1)
photon E GeV

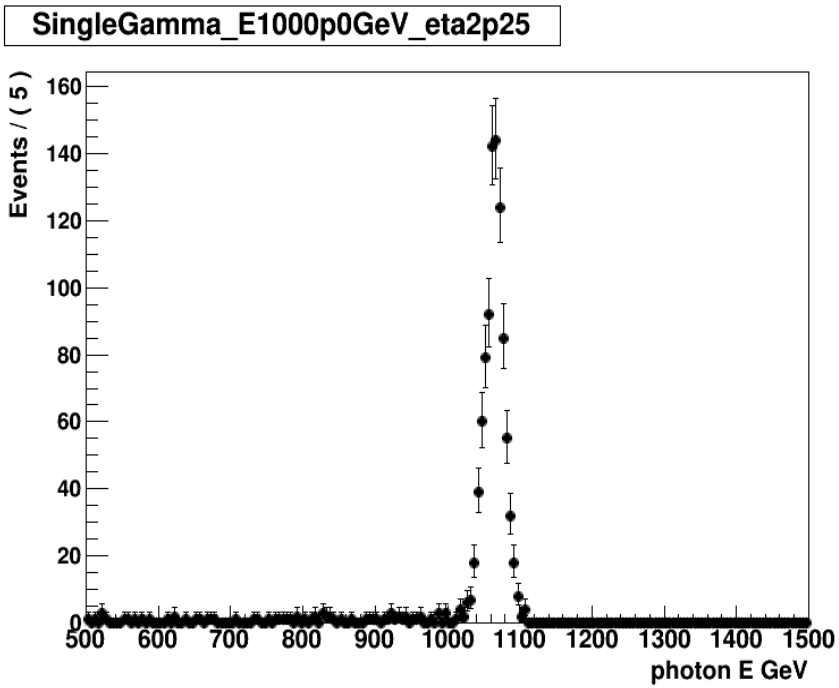

SingleGamma_E100p0GeV_eta2p25
meanDeltaE = 2.25 ± 0.13
sigmaDeltaE = 3.755 ± 0.100
Events / (1)
Δ E GeV

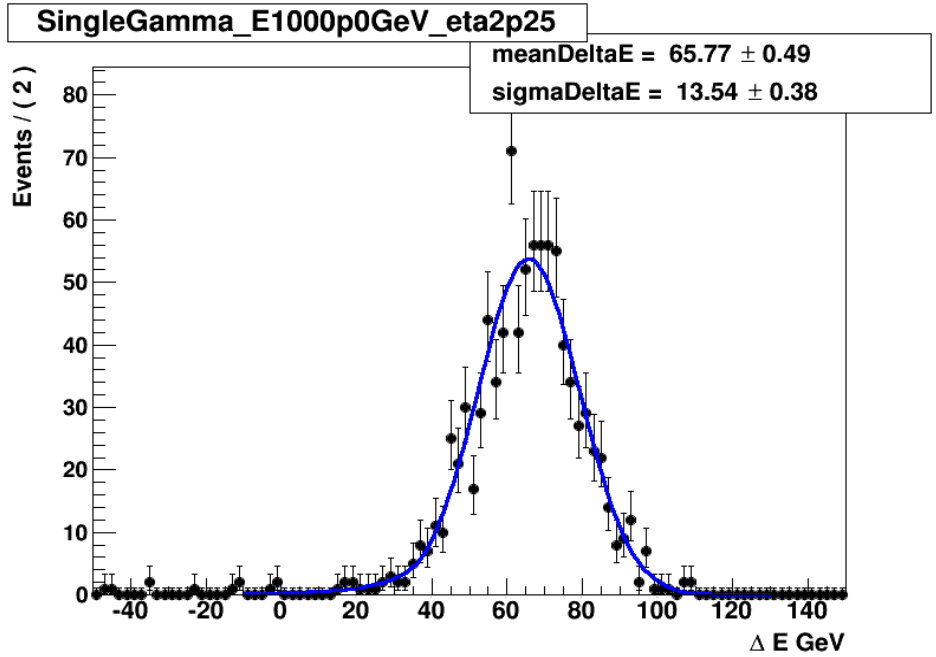

SingleGamma_E200p0GeV_eta2p25
Events / (2)
photon E GeV


SingleGamma_E200p0GeV_eta2p25
meanDeltaE = 8.22 ± 0.19
sigmaDeltaE = 5.90 ± 0.14
Events / (1)
Δ E GeV

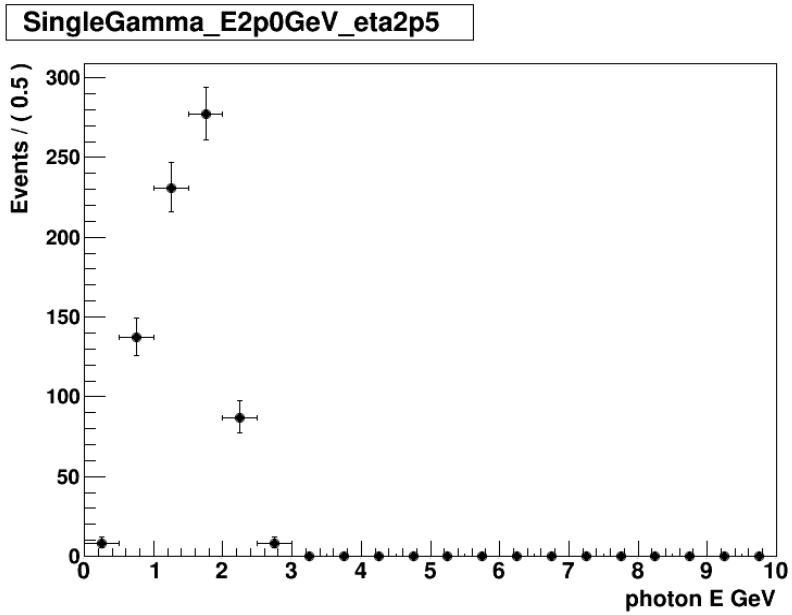

SingleGamma_E500p0GeV_eta2p25
Events / (5)
photon E GeV

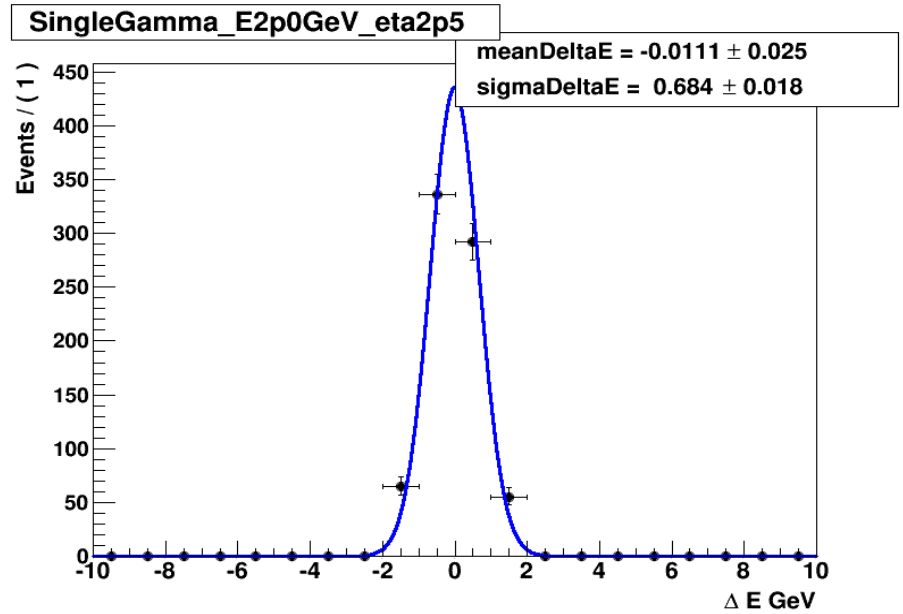

SingleGamma_E500p0GeV_eta2p25
meanDeltaE = 28.79 ± 0.31
sigmaDeltaE = 9.02 ± 0.24
Events / (1)
Δ E GeV

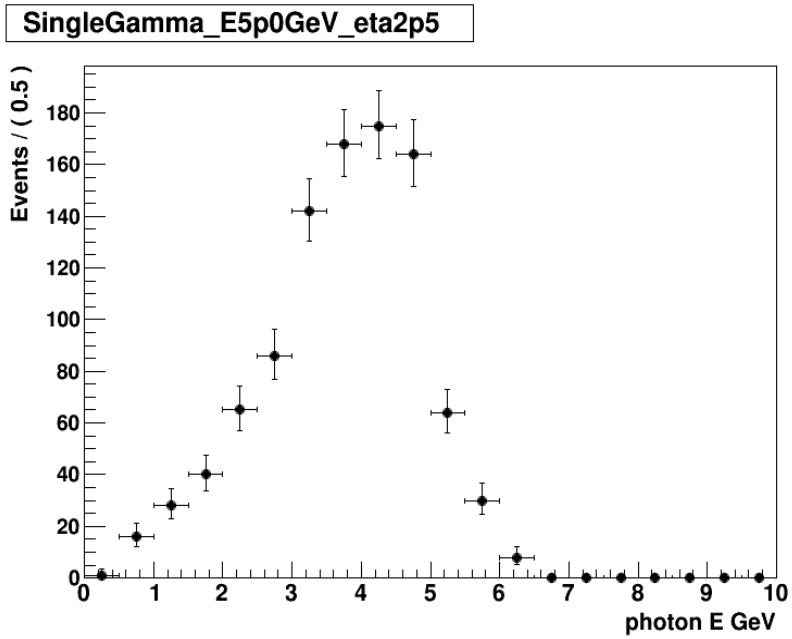

SingleGamma_E1000p0GeV_eta2p25
Events / (5)
photon E GeV

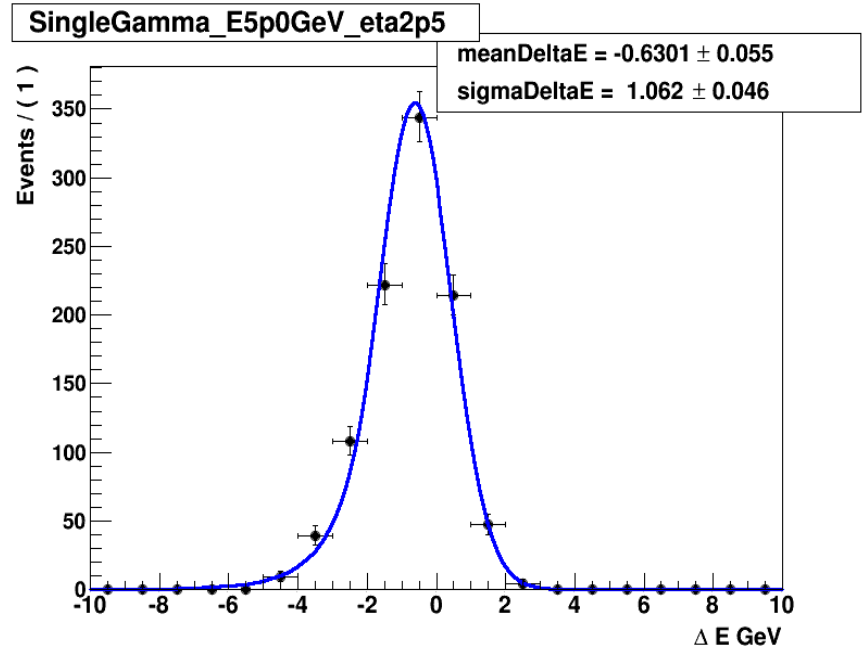

SingleGamma_E1000p0GeV_eta2p25
meanDeltaE = 65.77 ± 0.49
sigmaDeltaE = 13.54 ± 0.38
Events / (2)
Δ E GeV

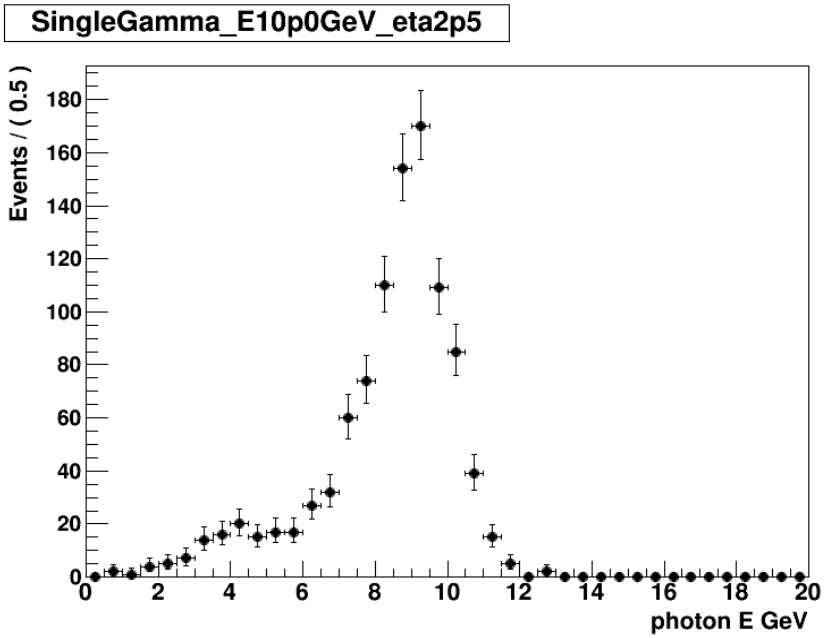
Eta = 2.5

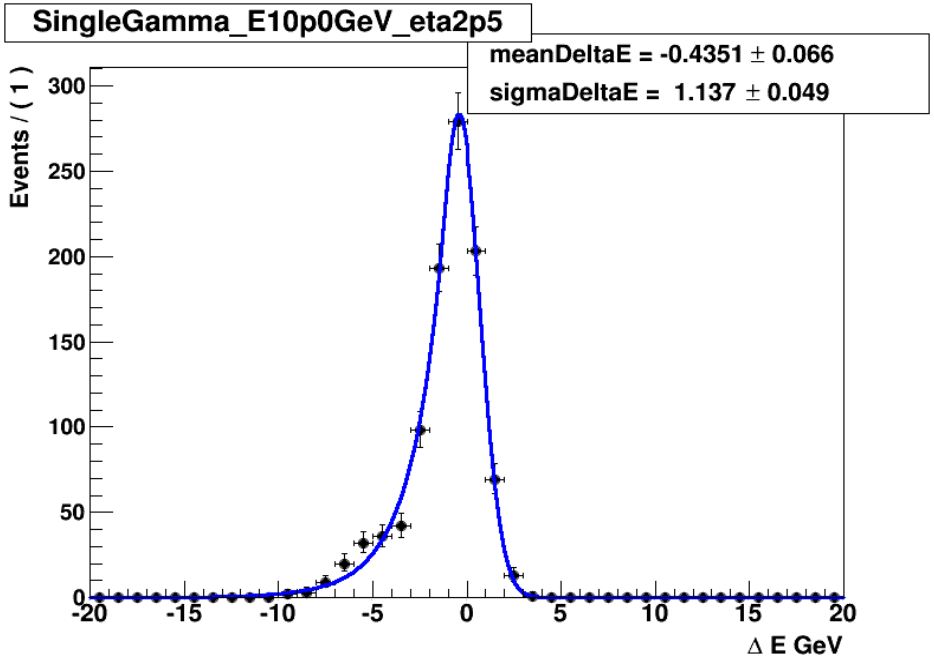

SingleGamma_E2p0GeV_eta2p5
Events / (0.5)
photon E GeV

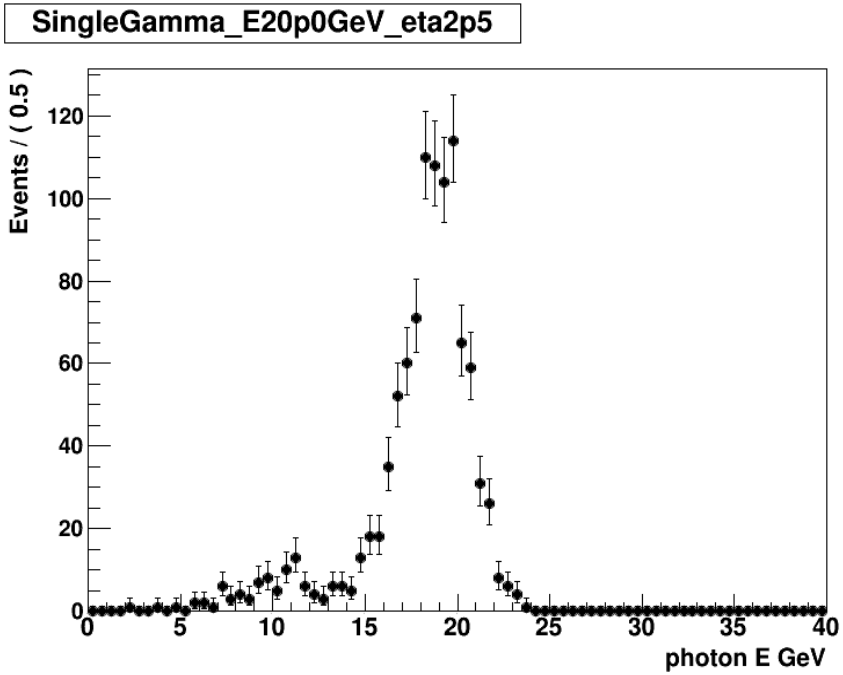

SingleGamma_E2p0GeV_eta2p5
meanDeltaE = -0.0111 ± 0.025
sigmaDeltaE = 0.684 ± 0.018
Events / (1)
Δ E GeV

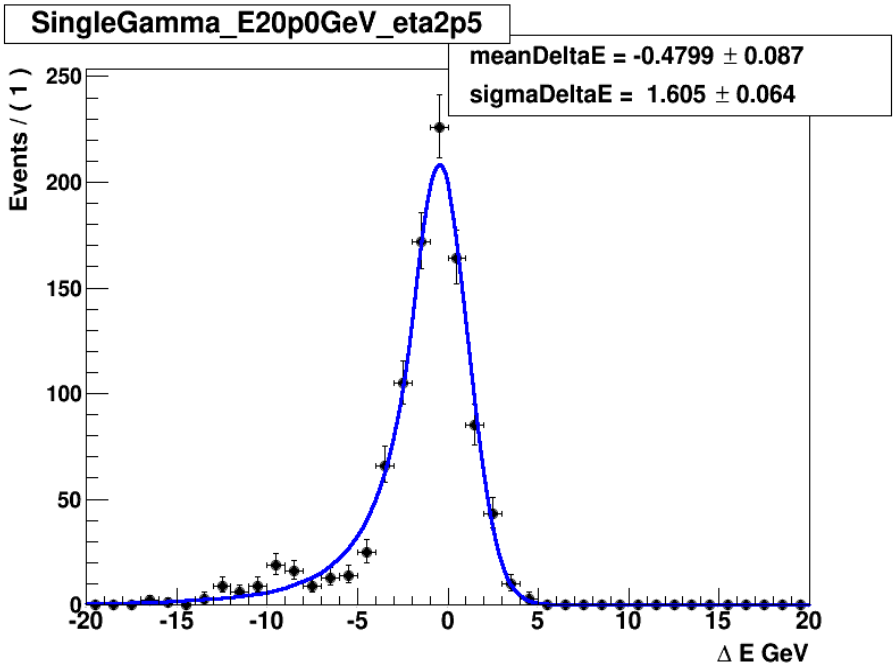

SingleGamma_E5p0GeV_eta2p5
Events / (0.5)
photon E GeV

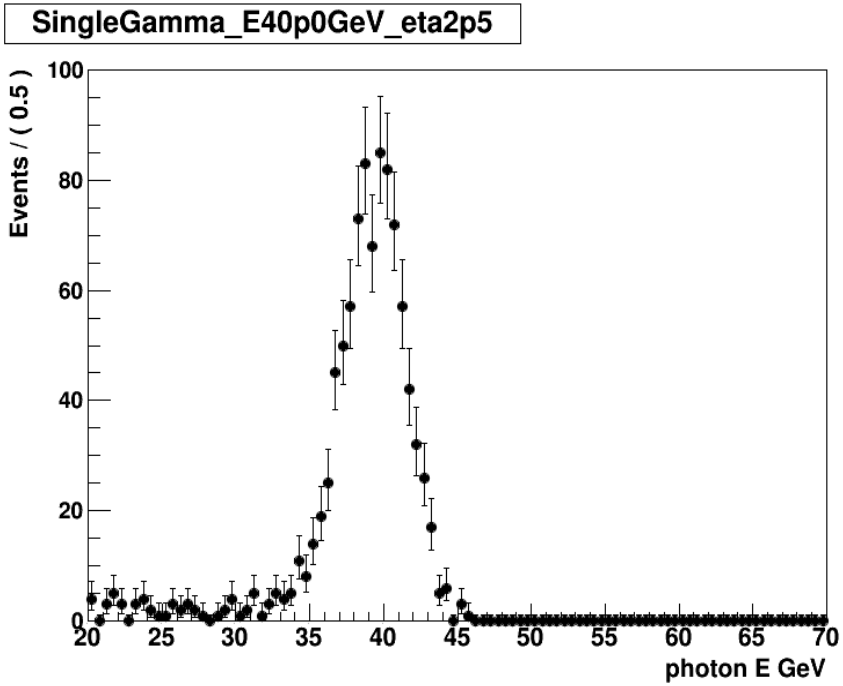

SingleGamma_E5p0GeV_eta2p5
meanDeltaE = -0.6301 ± 0.055
sigmaDeltaE = 1.062 ± 0.046
Events / (1)
Δ E GeV

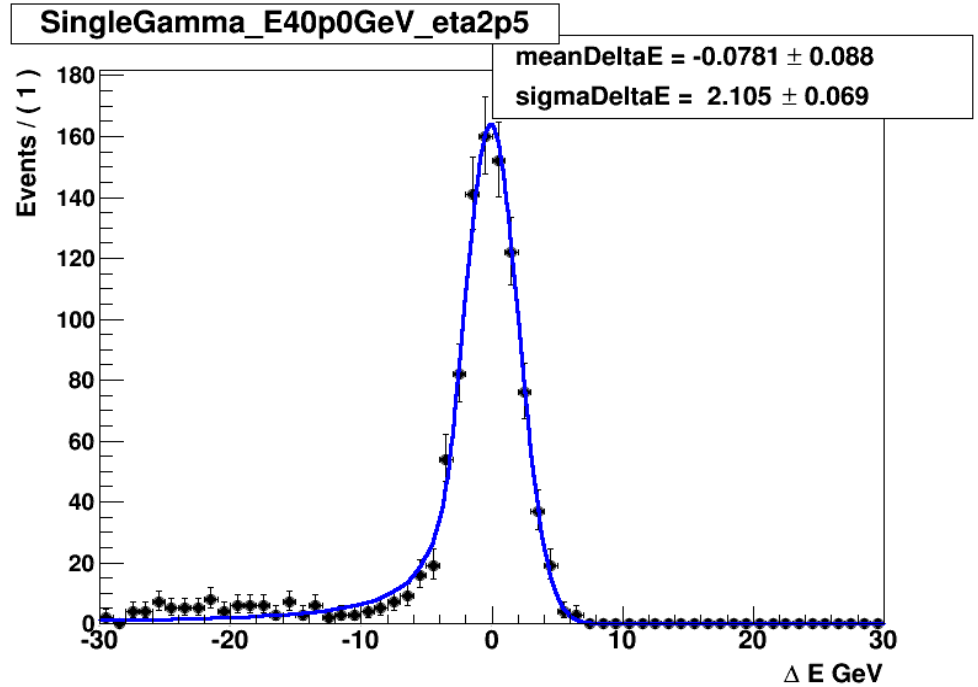

SingleGamma_E10p0GeV_eta2p5
Events / (0.5)
photon E GeV

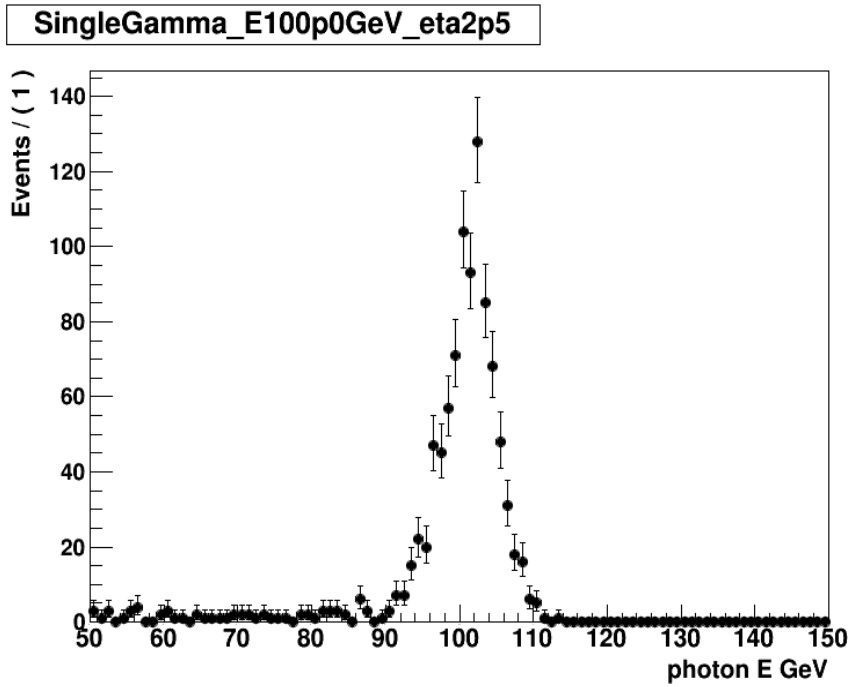

SingleGamma_E10p0GeV_eta2p5
meanDeltaE = -0.4351 ± 0.066
sigmaDeltaE = 1.137 ± 0.049
Events / (1)
Δ E GeV

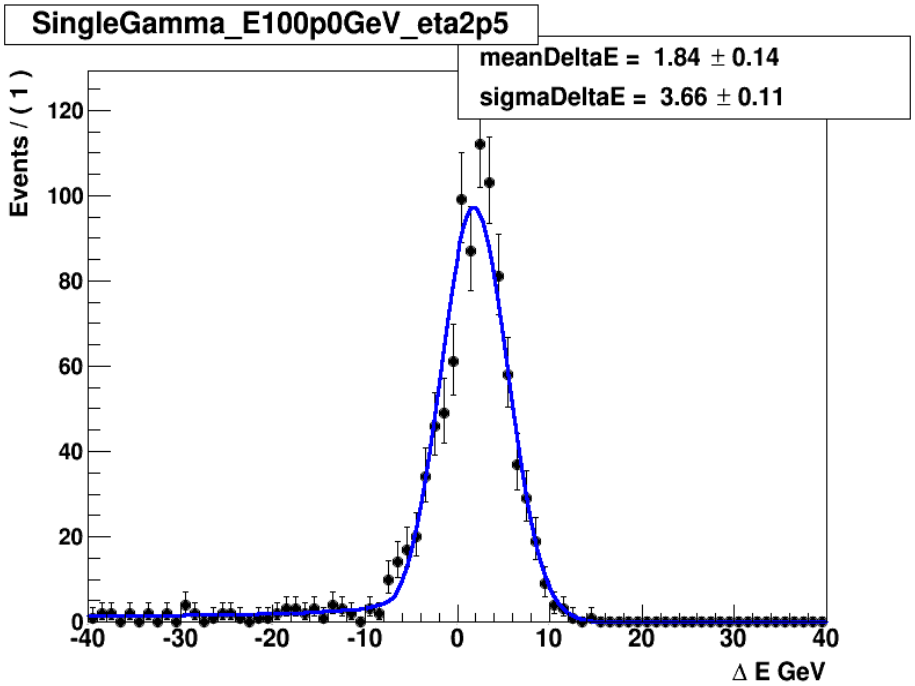

SingleGamma_E20p0GeV_eta2p5
Events / (0.5)
photon E GeV

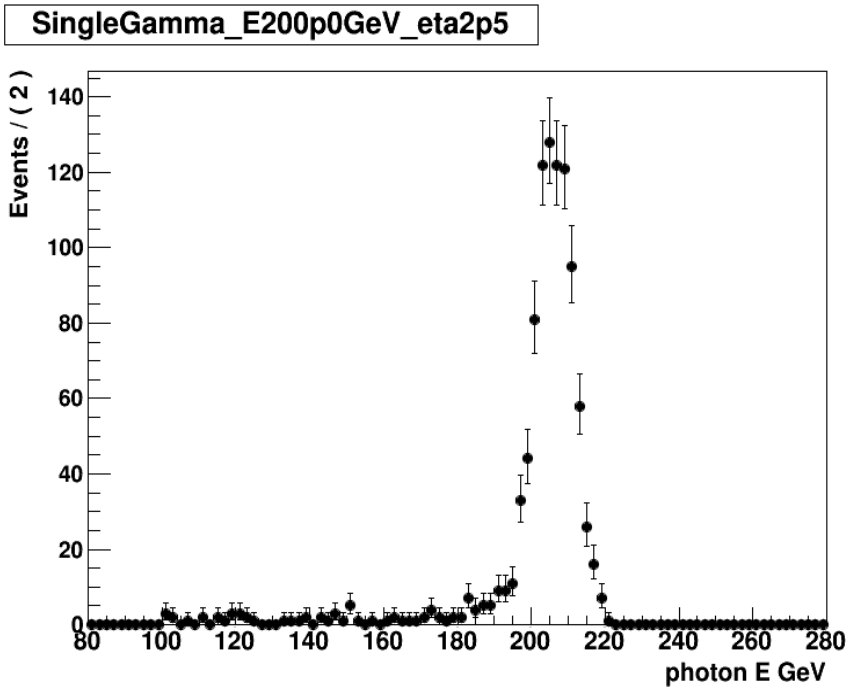

SingleGamma_E20p0GeV_eta2p5
meanDeltaE = -0.4799 ± 0.087
sigmaDeltaE = 1.605 ± 0.064
Events / (1)
Δ E GeV

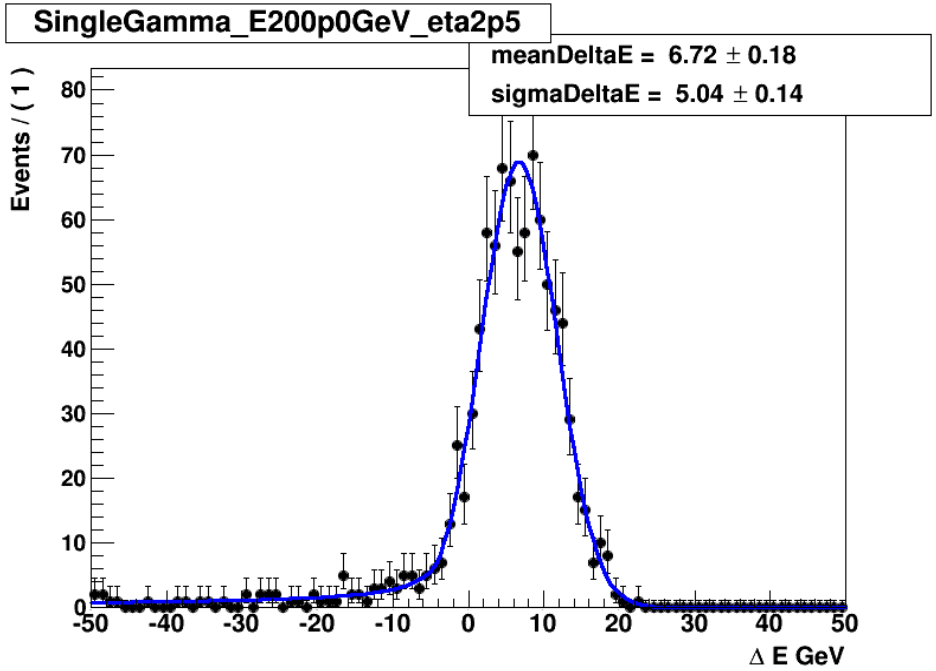

SingleGamma_E40p0GeV_eta2p5
Events / (0.5)
photon E GeV

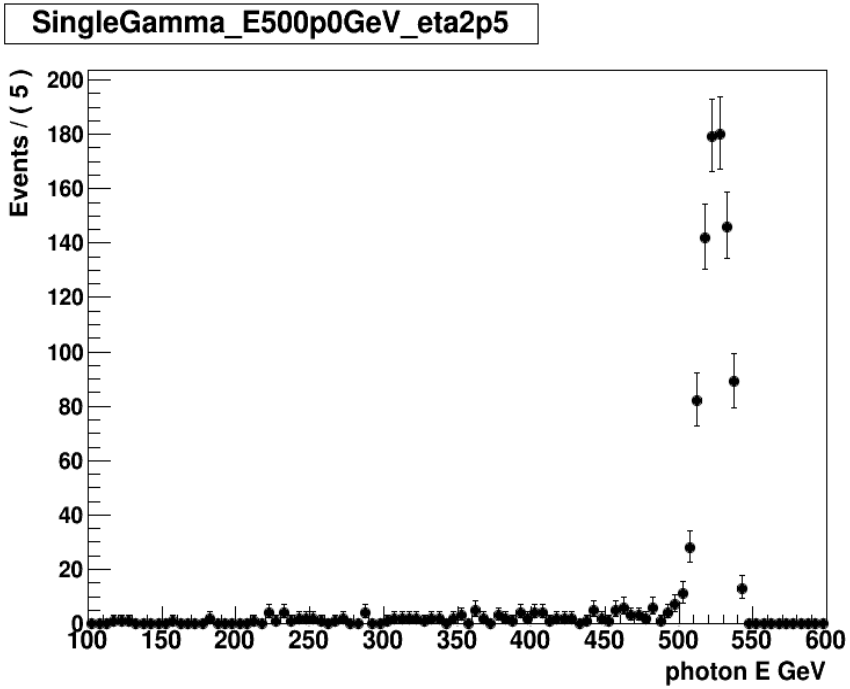

SingleGamma_E40p0GeV_eta2p5
meanDeltaE = -0.0781 ± 0.088
sigmaDeltaE = 2.105 ± 0.069
Events / (1)
Δ E GeV

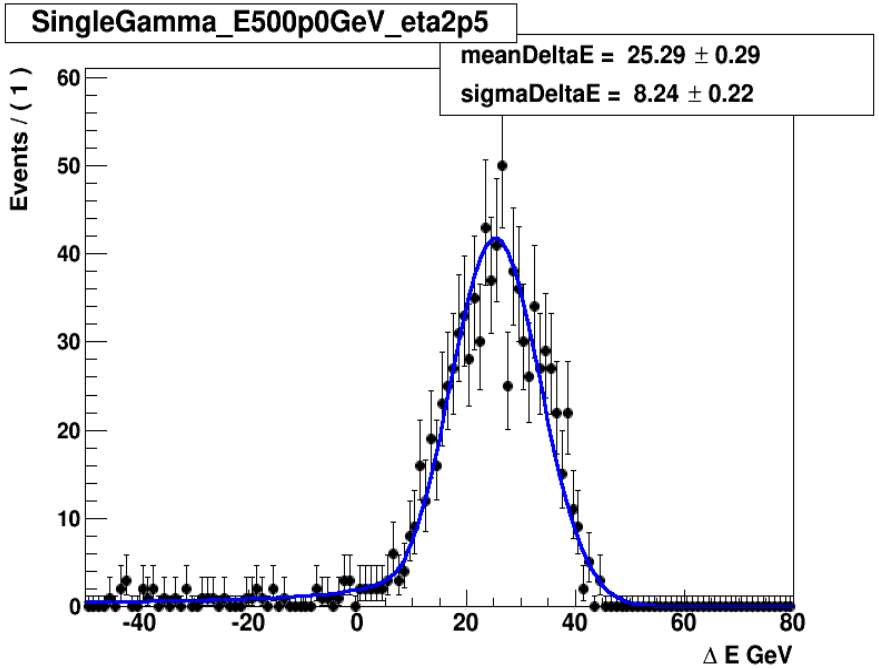

SingleGamma_E100p0GeV_eta2p5
Events / (1)
photon E GeV

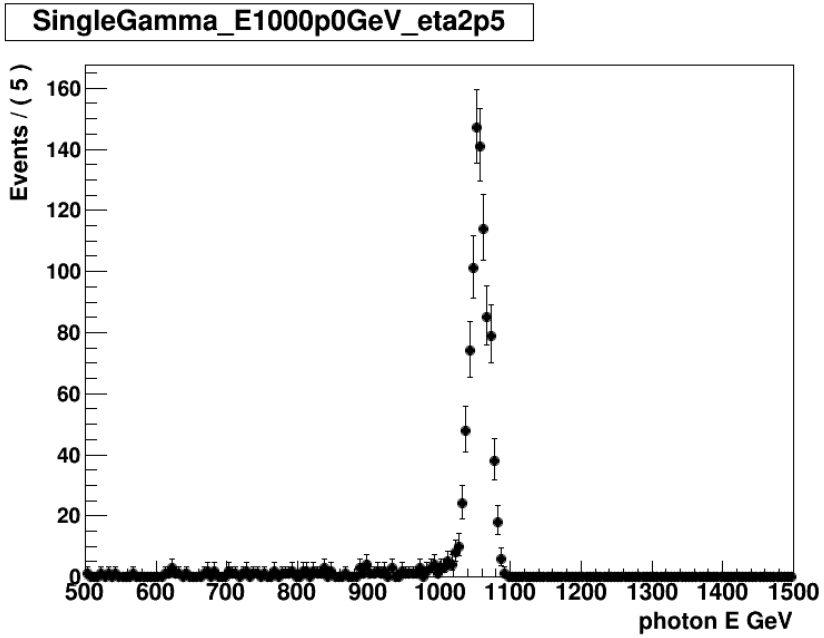

SingleGamma_E100p0GeV_eta2p5
meanDeltaE = 1.84 ± 0.14
sigmaDeltaE = 3.66 ± 0.11
Events / (1)
Δ E GeV

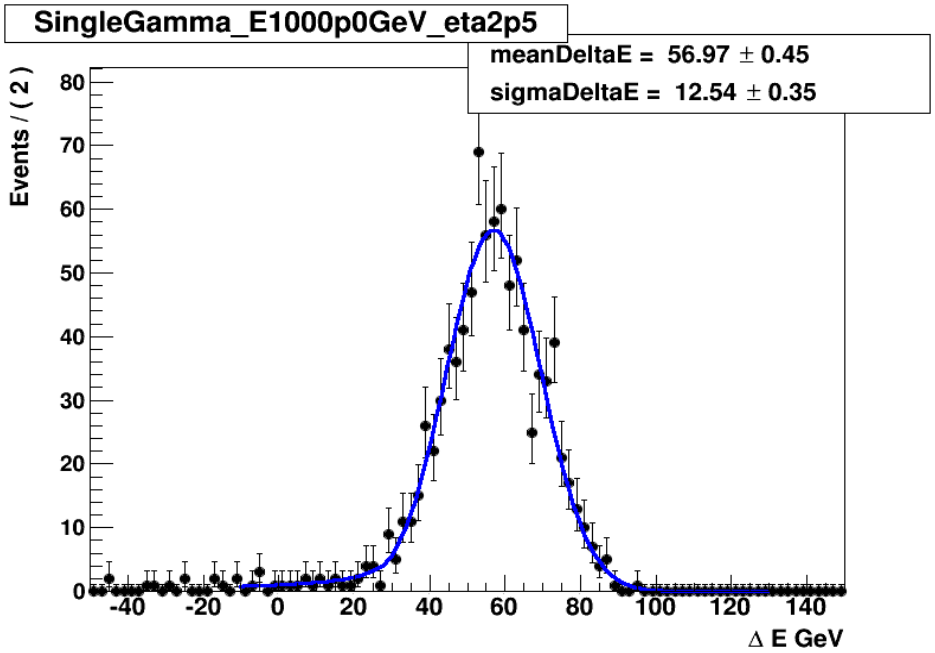

SingleGamma_E200p0GeV_eta2p5
Events / (2)
photon E GeV


SingleGamma_E200p0GeV_eta2p5
meanDeltaE = 6.72 ± 0.18
sigmaDeltaE = 5.04 ± 0.14
Events / (1)
Δ E GeV

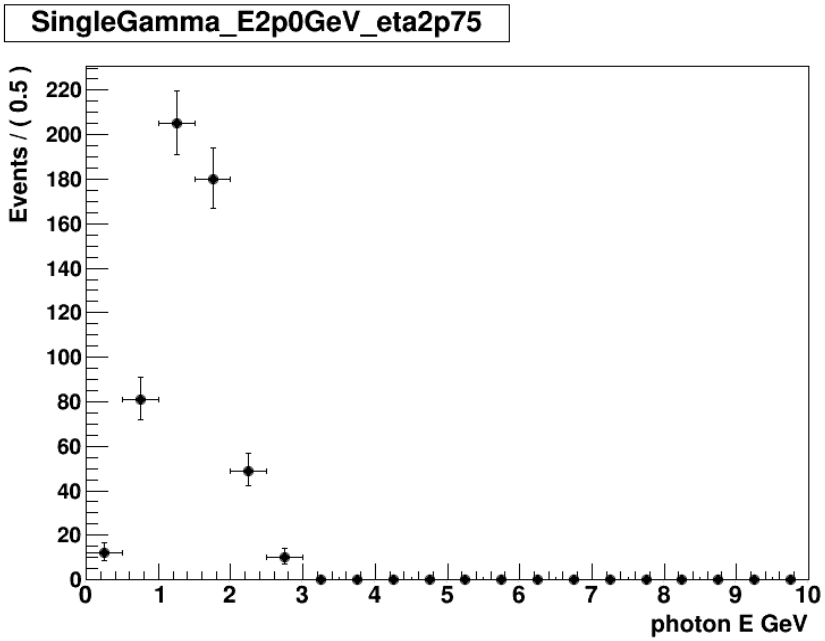

SingleGamma_E500p0GeV_eta2p5
Events / (5)
photon E GeV

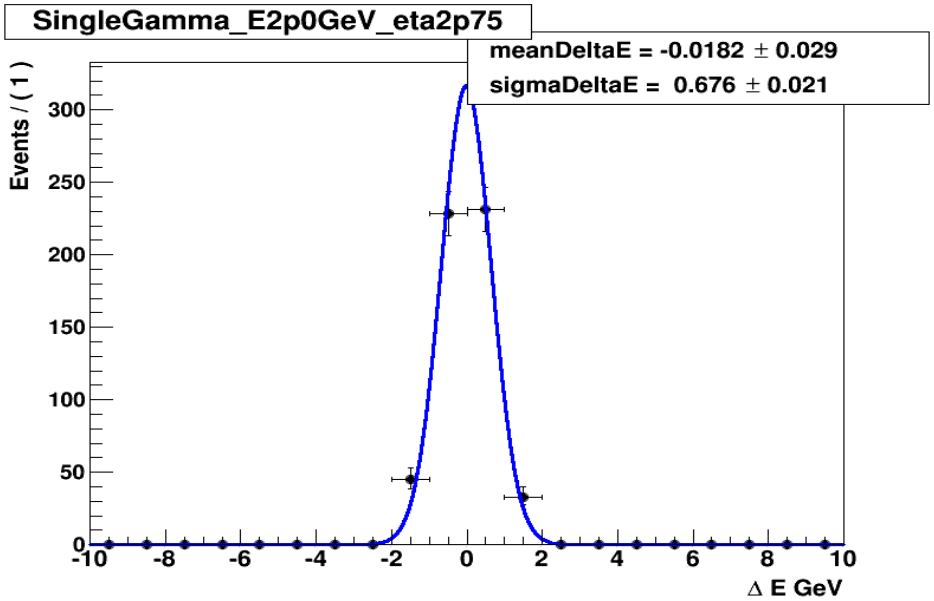

SingleGamma_E500p0GeV_eta2p5
meanDeltaE = 25.29 ± 0.29
sigmaDeltaE = 8.24 ± 0.22
Events / (1)
Δ E GeV

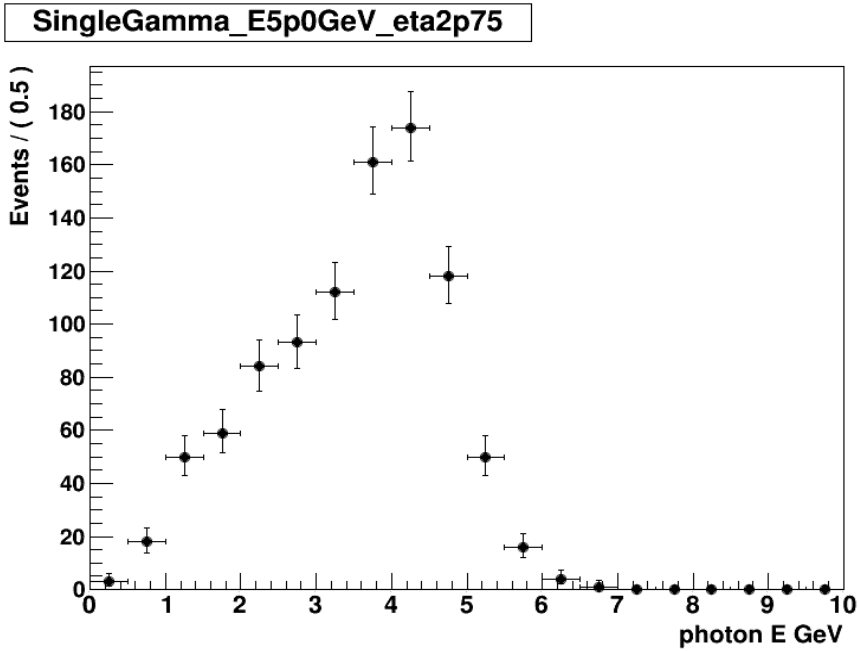

SingleGamma_E1000p0GeV_eta2p5
Events / (5)
photon E GeV

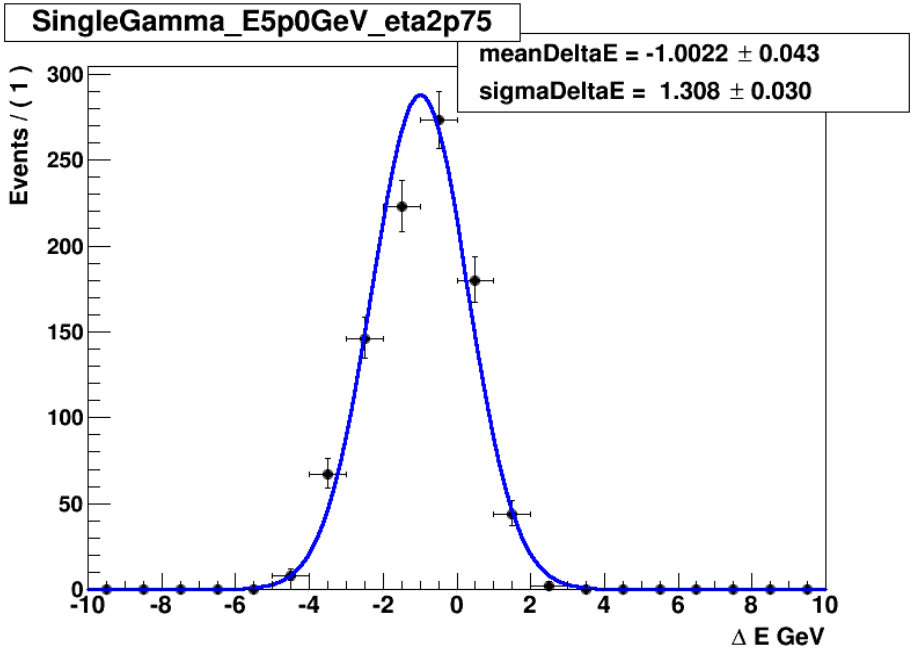

SingleGamma_E1000p0GeV_eta2p5
meanDeltaE = 56.97 ± 0.45
sigmaDeltaE = 12.54 ± 0.35
Events / (2)
Δ E GeV

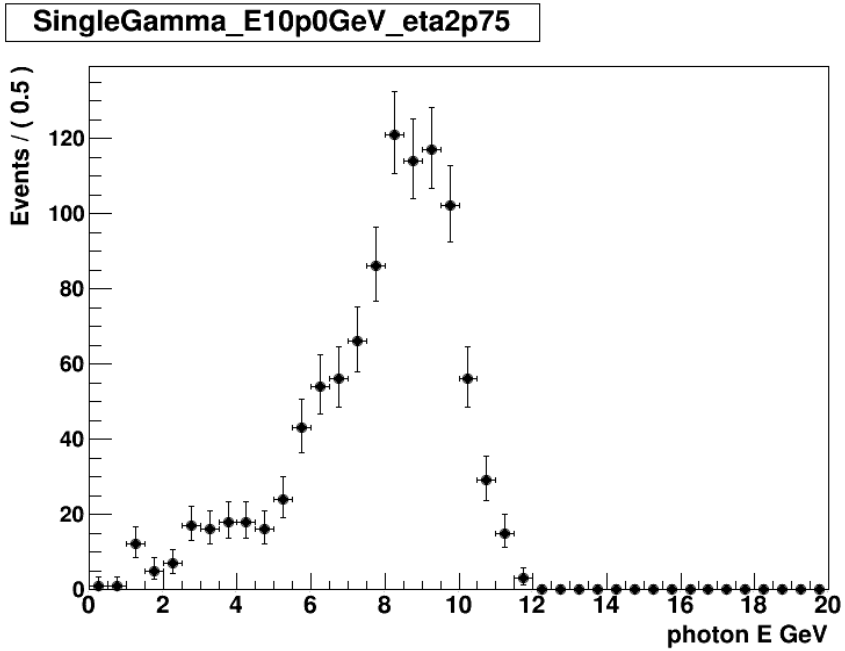
Eta = 2.75

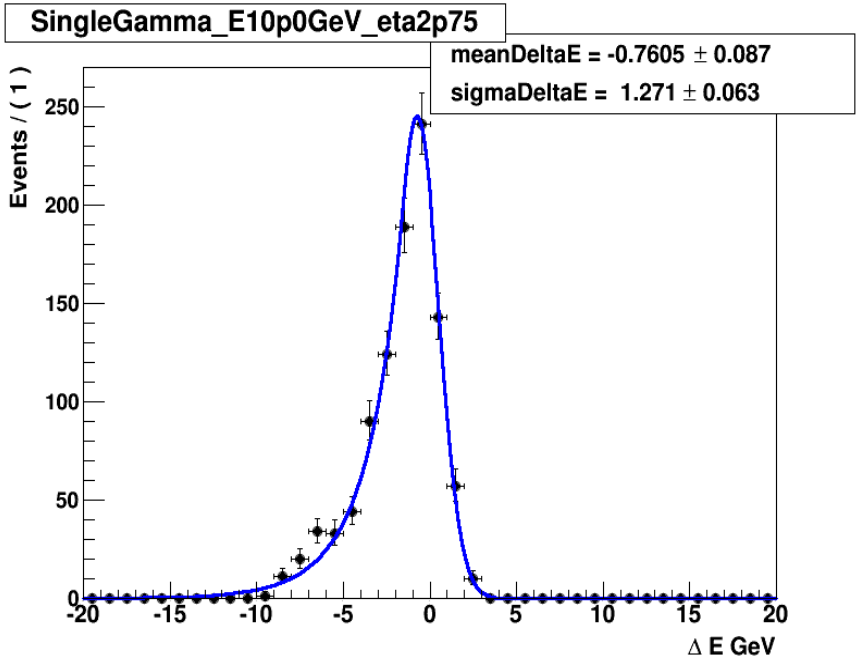

SingleGamma_E2p0GeV_eta2p75
Events / (0.5)
photon E GeV

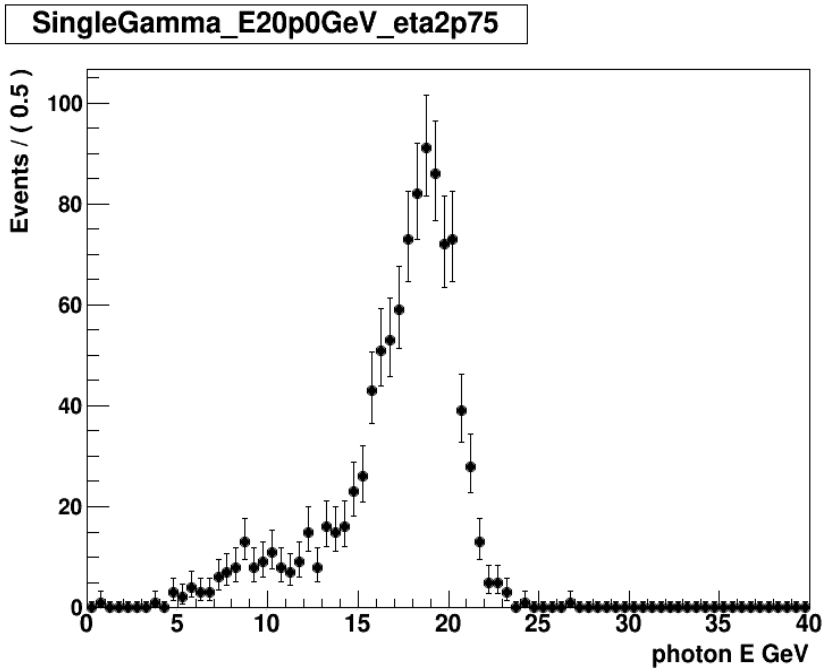

SingleGamma_E2p0GeV_eta2p75
meanDeltaE = -0.0182 ± 0.029
sigmaDeltaE = 0.676 ± 0.021
Events / (1)
Δ E GeV

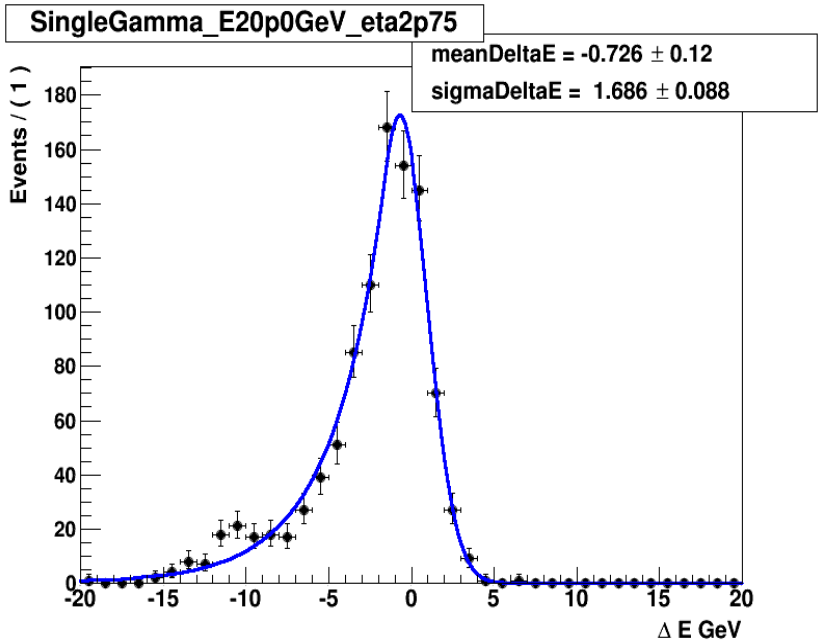

SingleGamma_E5p0GeV_eta2p75
Events / (0.5)
photon E GeV

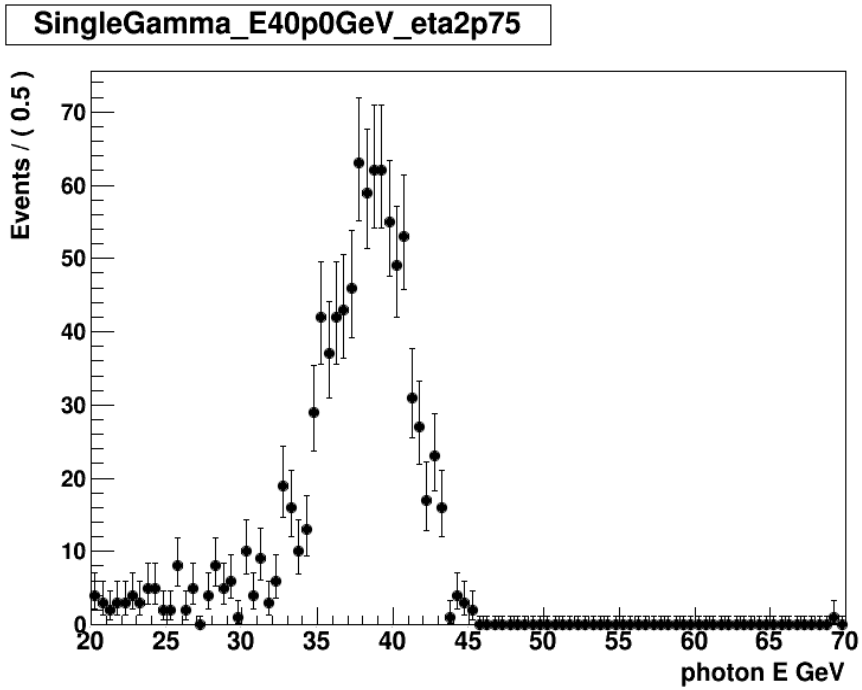

SingleGamma_E5p0GeV_eta2p75
meanDeltaE = -1.0022 ± 0.043
sigmaDeltaE = 1.308 ± 0.030
Events / (1)
Δ E GeV

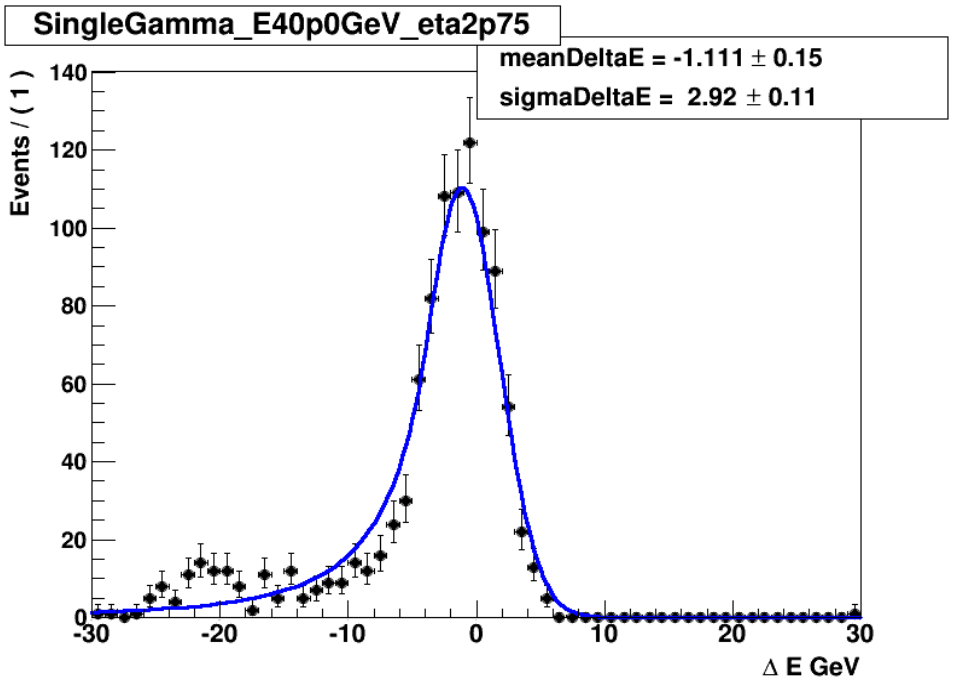

SingleGamma_E10p0GeV_eta2p75
Events / (0.5)
photon E GeV

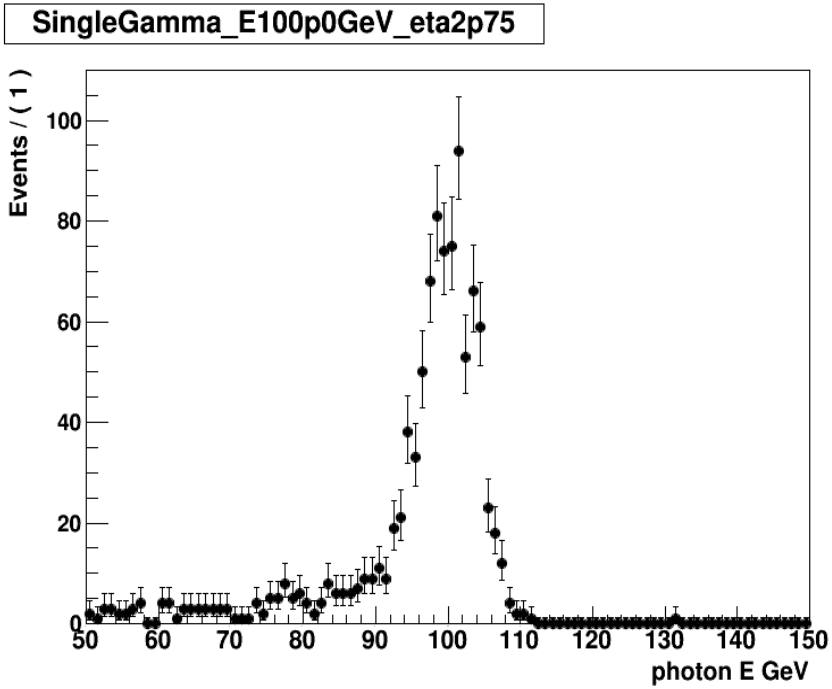

SingleGamma_E10p0GeV_eta2p75
meanDeltaE = -0.7605 ± 0.087
sigmaDeltaE = 1.271 ± 0.063
Events / (1)
Δ E GeV

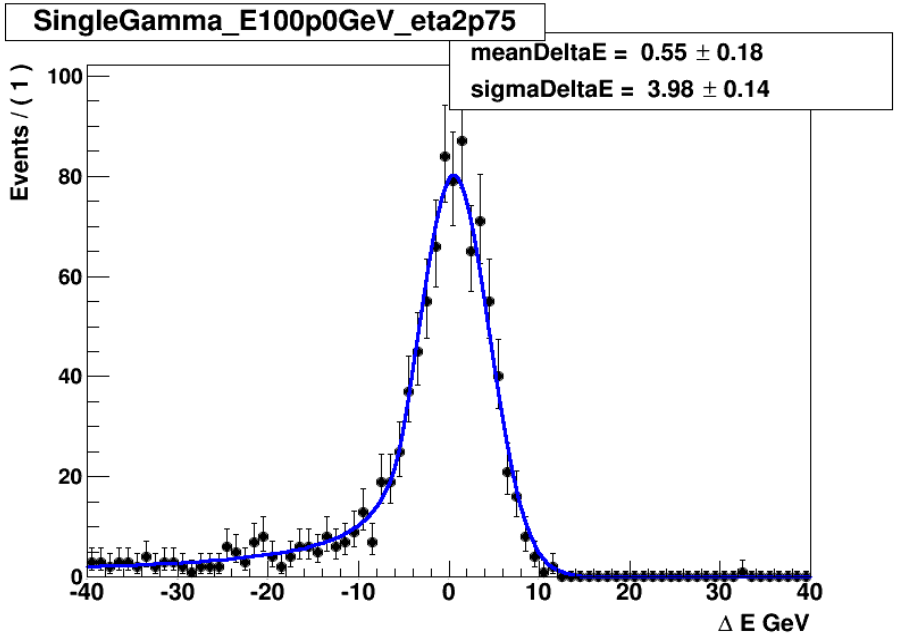

SingleGamma_E20p0GeV_eta2p75
Events / (0.5)
photon E GeV

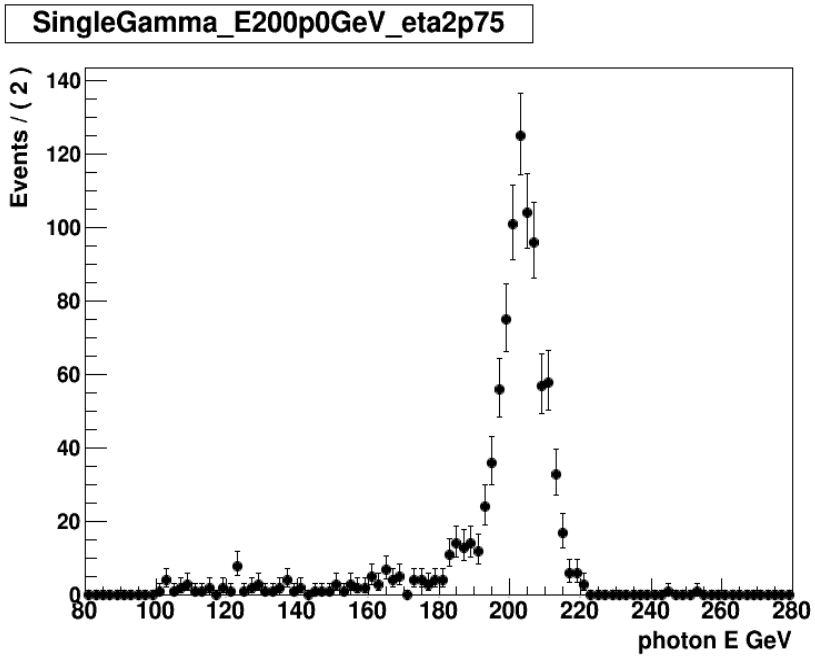

SingleGamma_E20p0GeV_eta2p75
meanDeltaE = -0.726 ± 0.12
sigmaDeltaE = 1.686 ± 0.088
Events / (1)
Δ E GeV

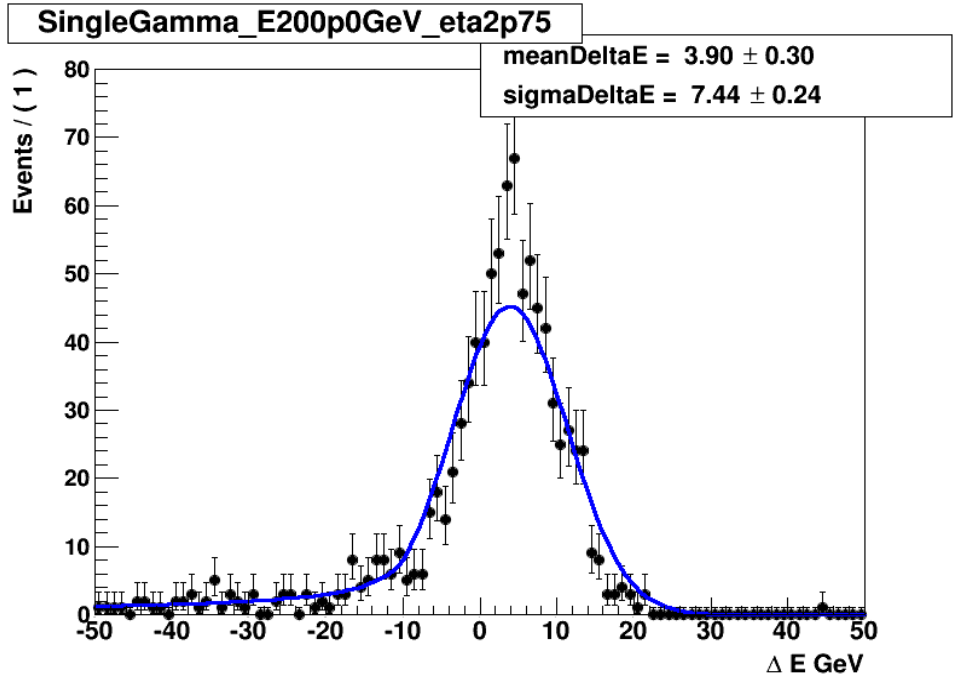

SingleGamma_E40p0GeV_eta2p75
Events / (0.5)
photon E GeV

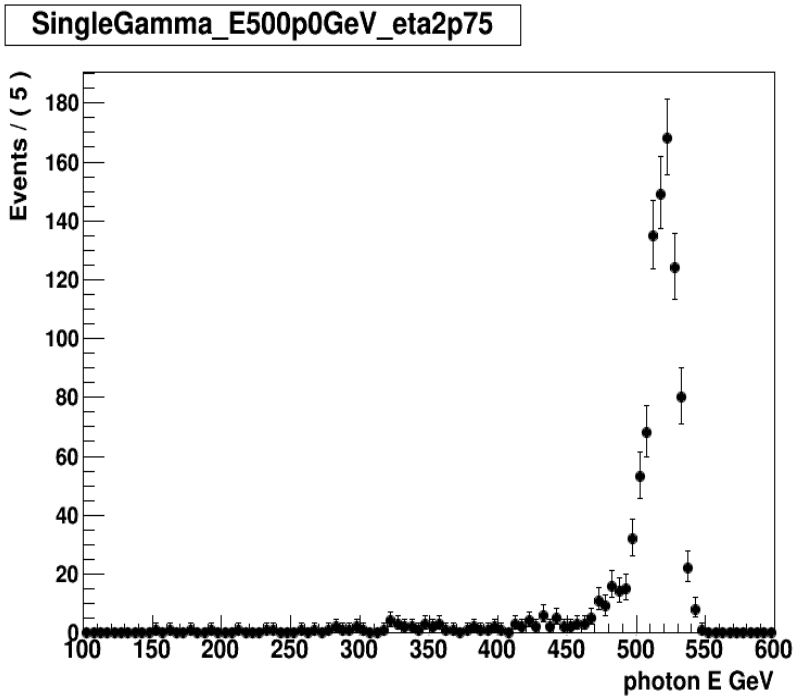

SingleGamma_E40p0GeV_eta2p75
meanDeltaE = -1.111 ± 0.15
sigmaDeltaE = 2.92 ± 0.11
Events / (1)
Δ E GeV

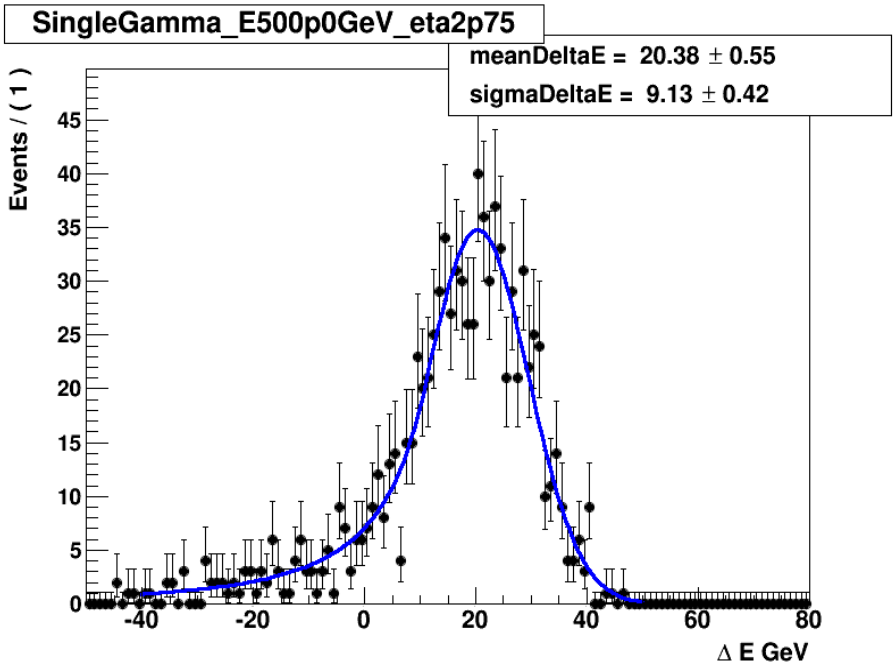

SingleGamma_E100p0GeV_eta2p75
Events / (1)
photon E GeV

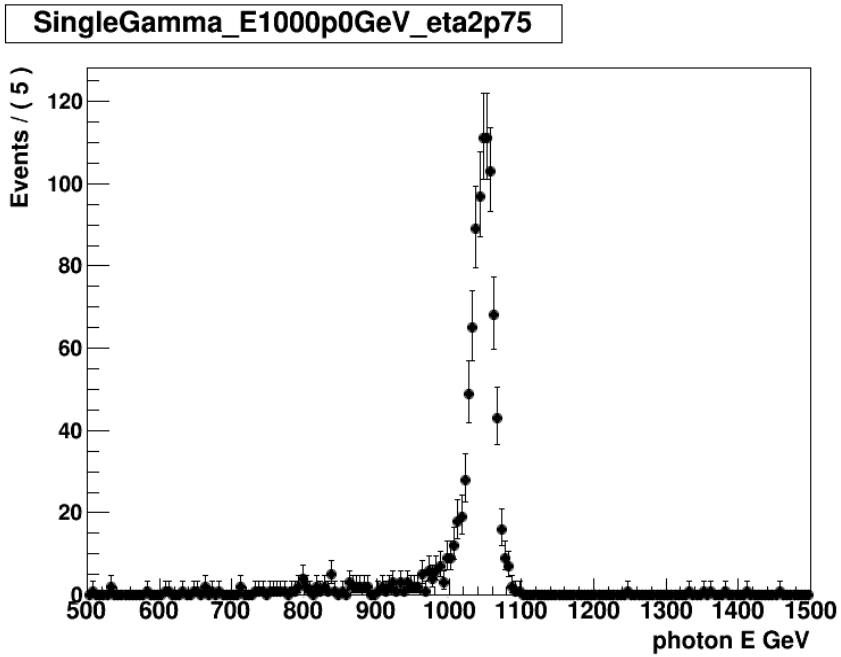

SingleGamma_E100p0GeV_eta2p75
meanDeltaE = 0.55 ± 0.18
sigmaDeltaE = 3.98 ± 0.14
Events / (1)
Δ E GeV

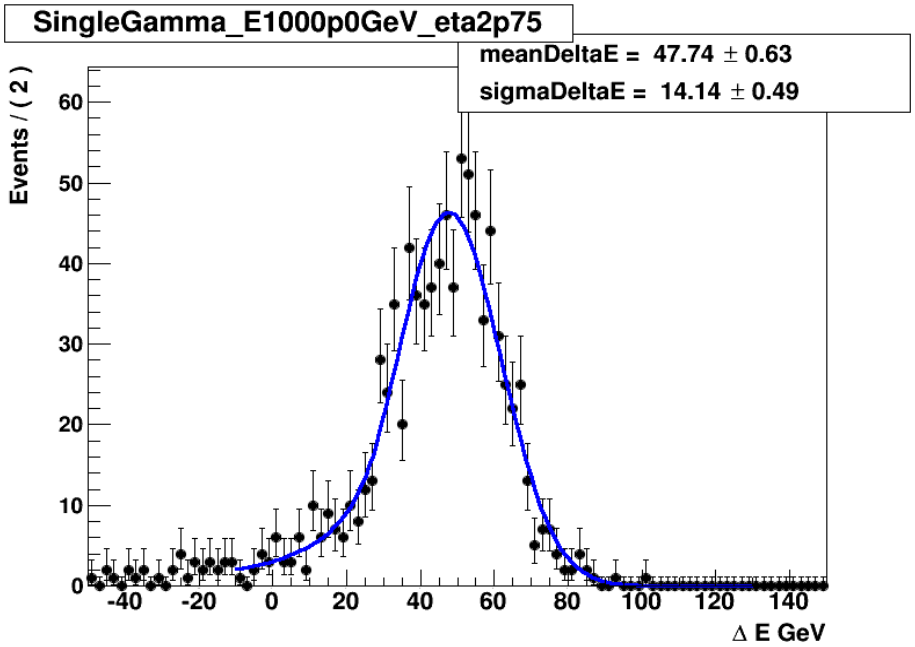

SingleGamma_E200p0GeV_eta2p75
Events / (2)
photon E GeV


SingleGamma_E200p0GeV_eta2p75
meanDeltaE = 3.90 ± 0.30
sigmaDeltaE = 7.44 ± 0.24
Events / (1)
Δ E GeV


SingleGamma_E500p0GeV_eta2p75
Events / (5)
photon E GeV


SingleGamma_E500p0GeV_eta2p75
meanDeltaE = 20.38 ± 0.55
sigmaDeltaE = 9.13 ± 0.42
Events / (1)
Δ E GeV


SingleGamma_E1000p0GeV_eta2p75
Events / (5)
photon E GeV


SingleGamma_E1000p0GeV_eta2p75
meanDeltaE = 47.74 ± 0.63
sigmaDeltaE = 14.14 ± 0.49
Events / (2)
Δ E GeV