Jet Reconstruction Efficiencies

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Calgo Meeting
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Samples

- **Data**:
  - EM1TRK skim
  - Single EM triggers
  - Run range: 20 April 2002 - 28 June 2004 (Runs 151,817 - 194,566)
  - Rejecting bad runs (CAL, SMT, CFT, Jet/Met, Lumi)
  - $323pb^{-1}$
  - No t42 applied
  - Processed with ATHENA (v01-05-02)

- **MC:**
  - Z/Gamma* > e^+e^-+X: 400k Pythia
  - Zj->eej: 150k Alp+Pythia
  - Zjj->eejj: 272k Alp+Pythia
  - Processed with ATHENA (v01-05-02)

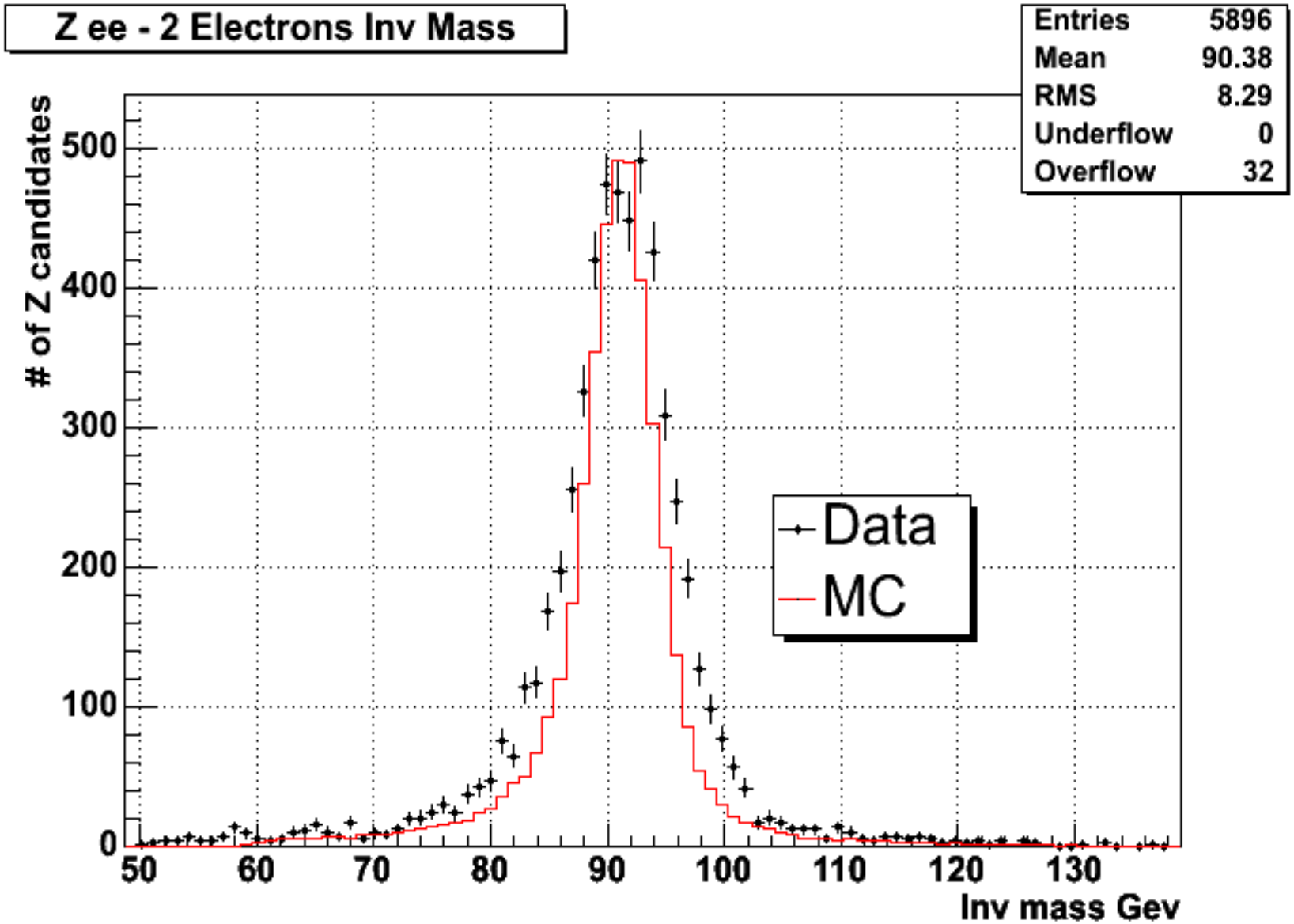
Selection Criteria

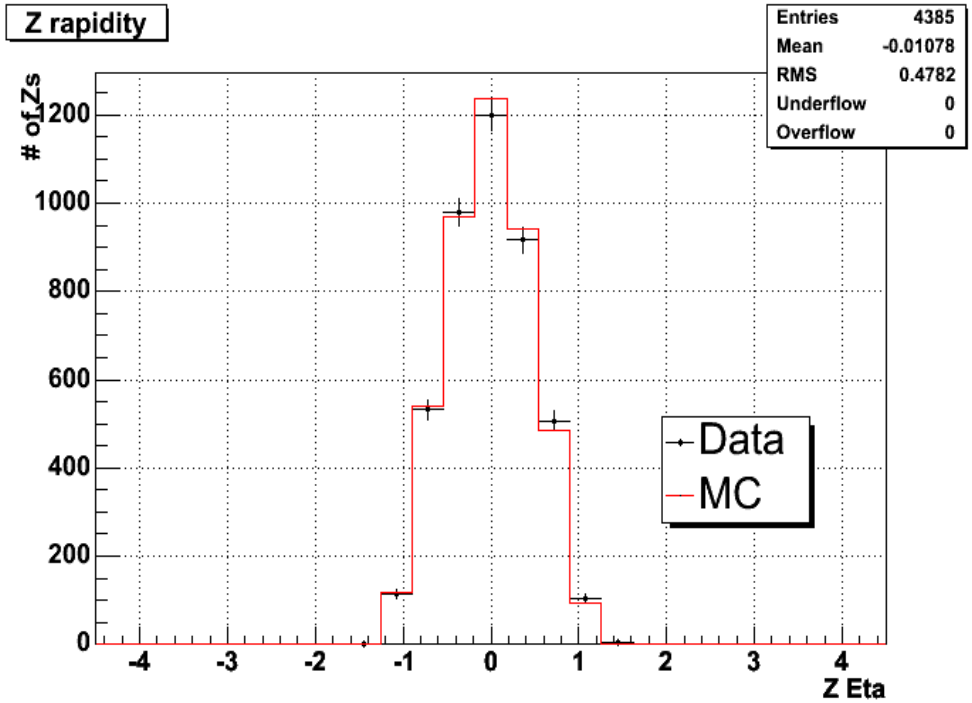
- Removing bad runs/LBNs & dupli events
- PVX cut: $|z|<60$cm
- Using unprescaled single EM triggers
- Electron selection:
  - $|ID|=10,11$
  - EMF>0.9
  - Iso<0.15
  - HMx(7)<12
  - p_T>25GeV
  - Including phi cracks
- Z selection:
  - 80 GeV < M_{ee} < 100 GeV
  - two trackmatched electrons with opposite signs
  - tracks have the same primary vertex
  - At least one electron needs to fire the trigger
- Jet selection:
  - 0.05 < EMF < 0.95
  - HotF < 10
  - N90>1
  - CHF<0.4
  - L1conf
  - JES corrected p_T>15GeV
  - | |<2.5
  - Removal of jets overlapping with electrons from Z within dR of 0.4

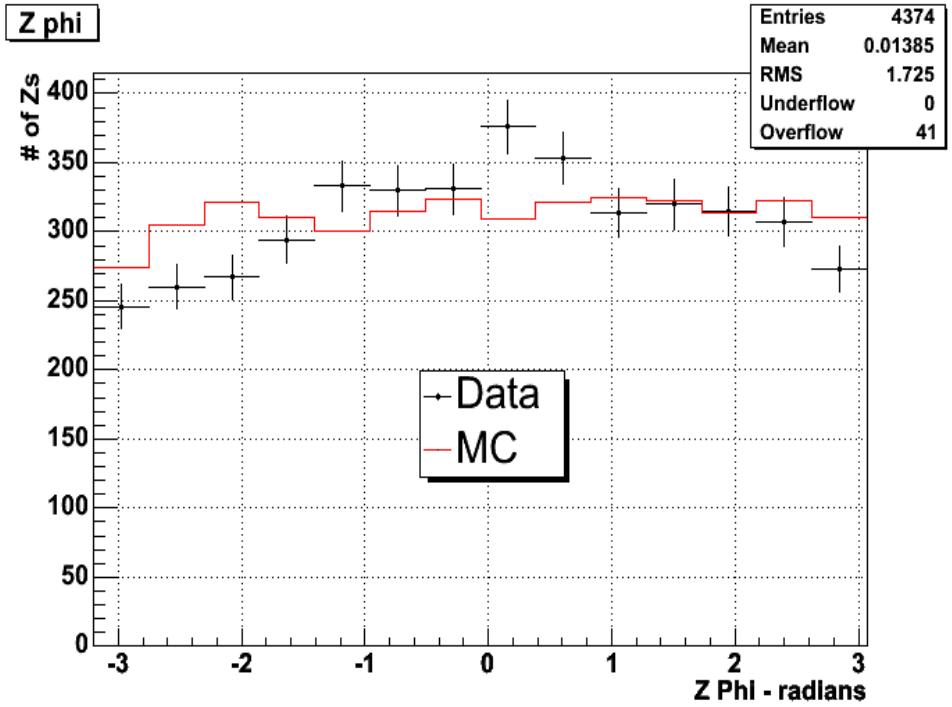
OUTLINE

electron distributions
jet distributions
jet eff. by Z pt
scale factor
straight MC eff
Straight Data Eff
Systematic Errors

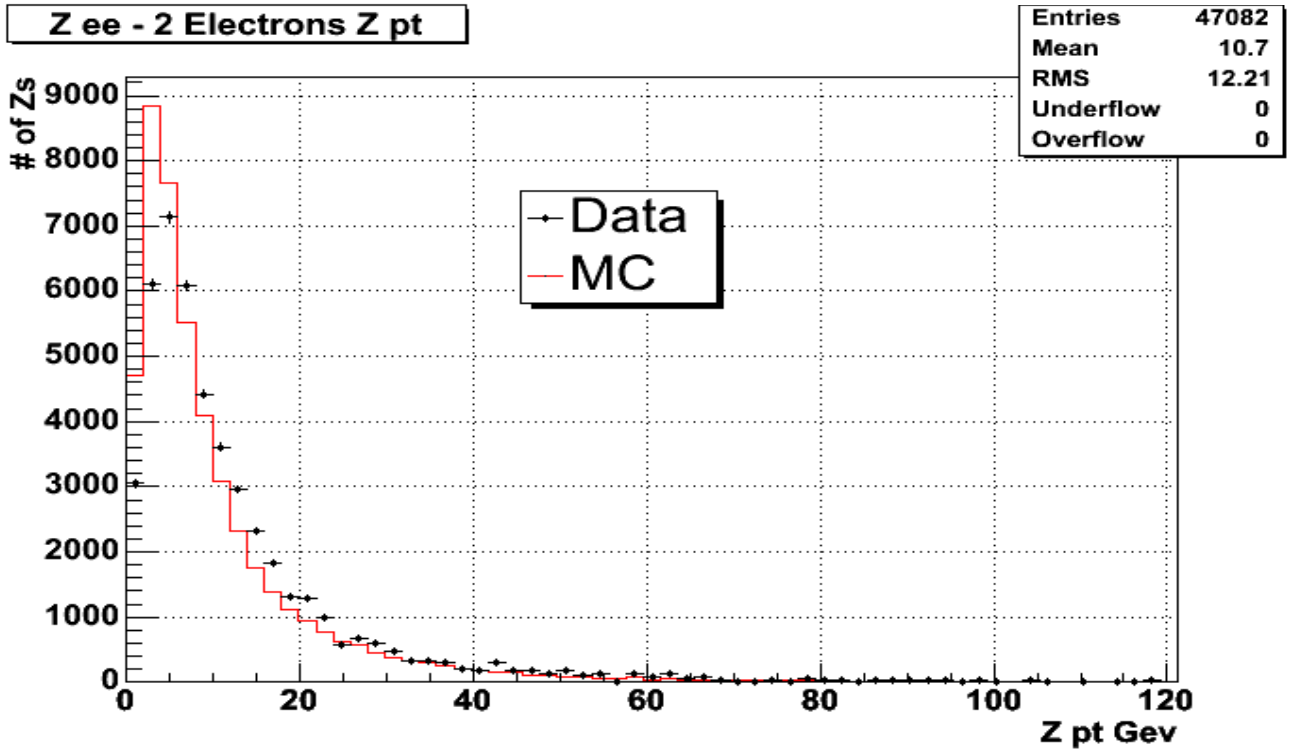
Z peak


Z ee - 2 Electrons Inv Mass
Entries 5896
Mean 90.38
RMS 8.29
Underflow 0
Overflow 32
# of Z candidates
0
100
200
300
400
500
50
60
70
80
90
100
110
120
130
Inv mass Gev
Data
MC

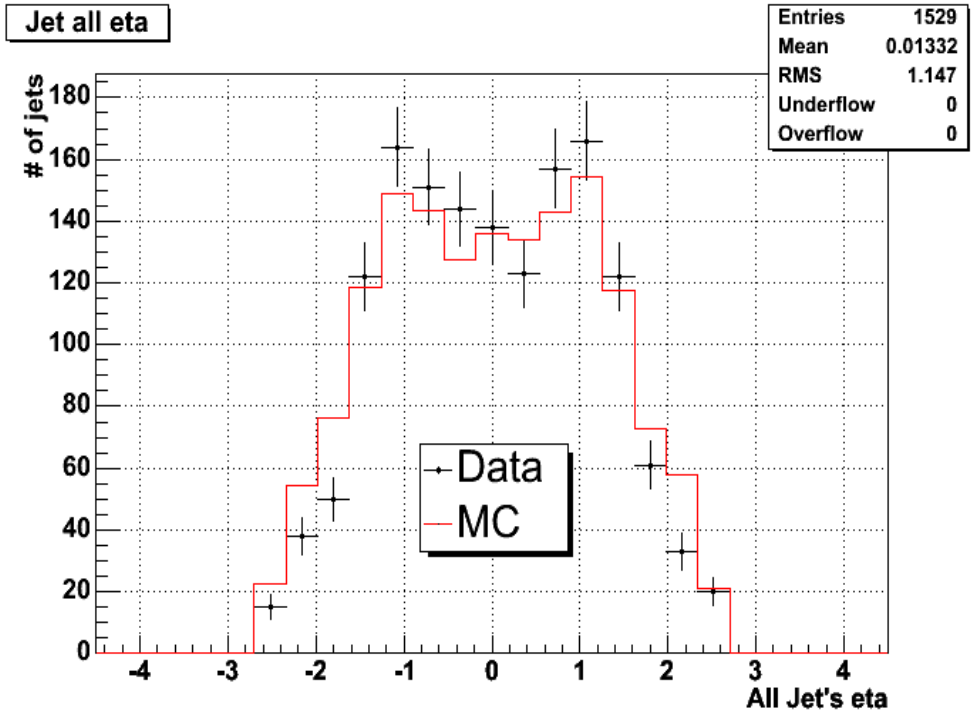

Z rapidity
Entries 4385
Mean -0.01078
RMS 0.4782
Underflow 0
Overflow 0
# of Zs
Data
MC
Z Eta

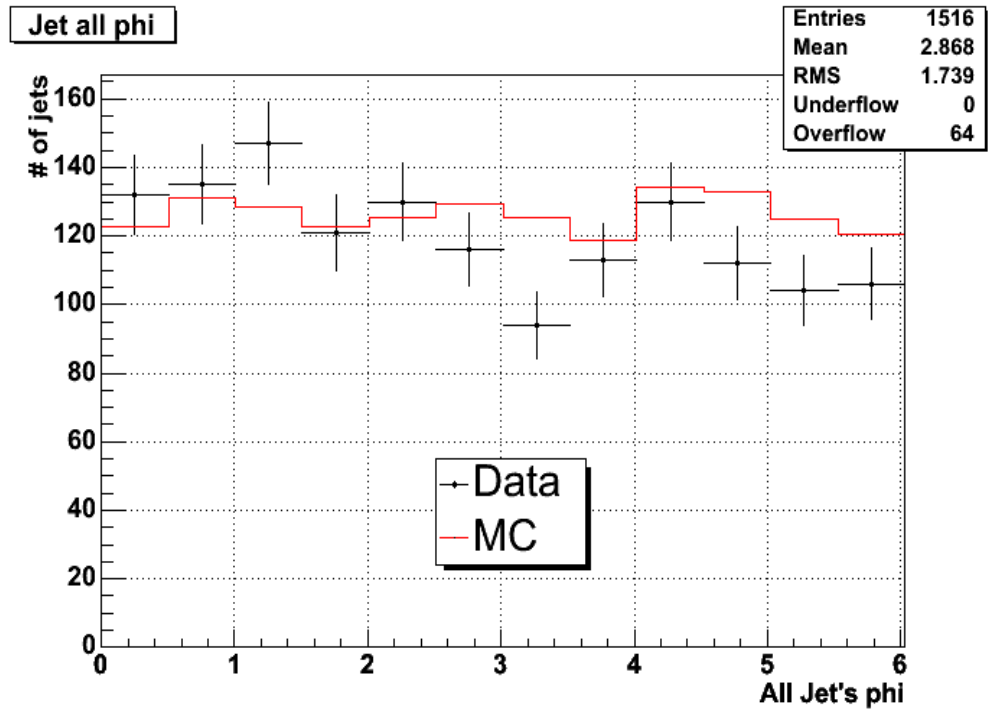

Z phi
Entries 4374
Mean 0.01385
RMS 1.725
Underflow 0
Overflow 41
# of Zs
Data
MC
Z Phi - radians

Z info

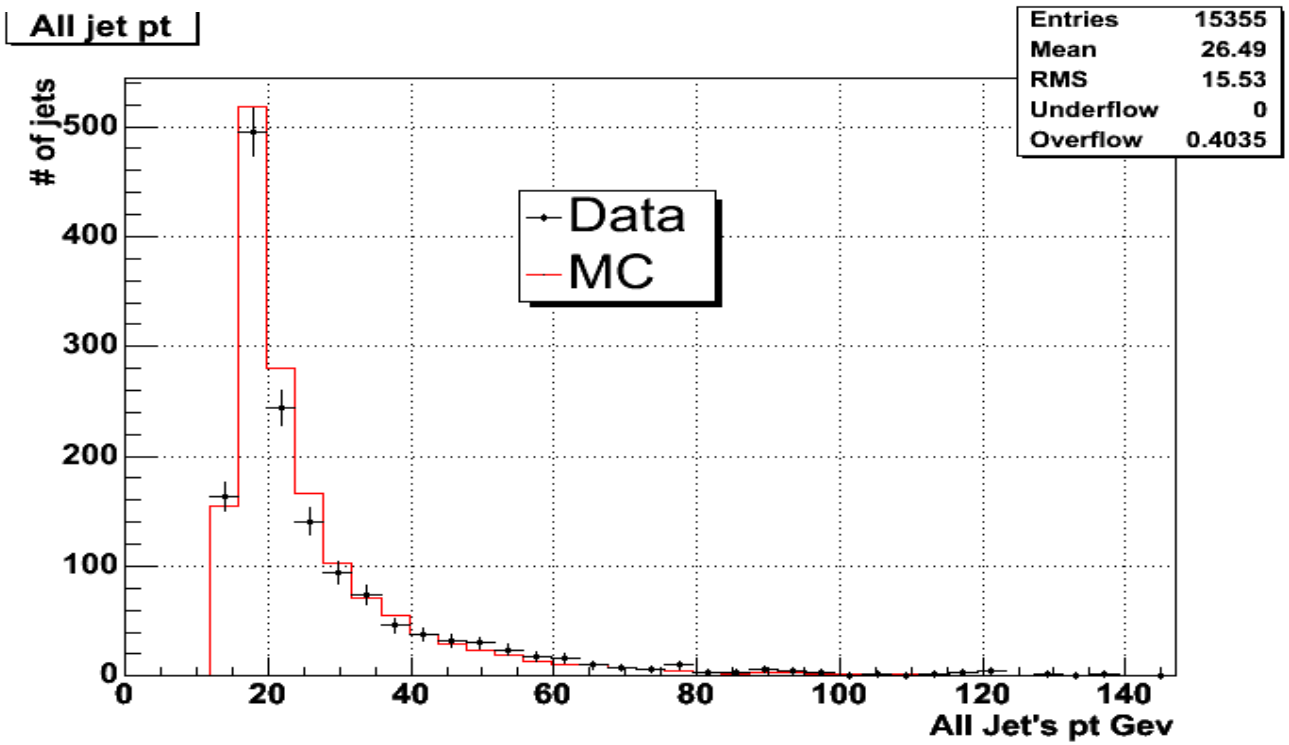

Z ee - 2 Electrons Z pt
Entries 47082
Mean 10.7
RMS 12.21
Underflow 0
Overflow 0
# of Zs
Data
MC
Z pt Gev

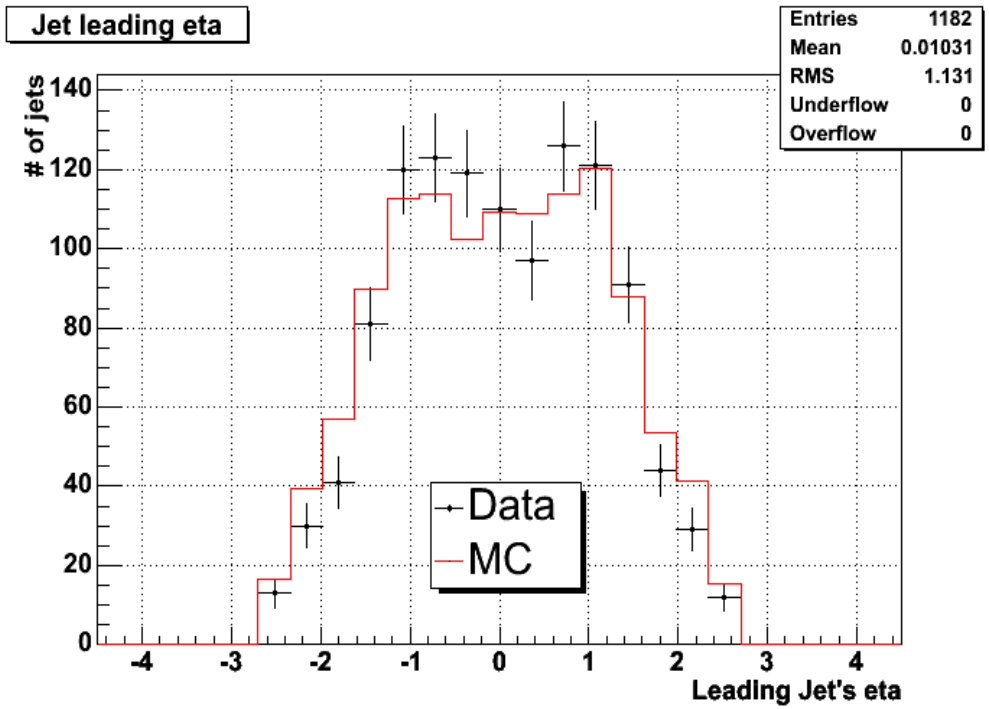
Jet Distributions

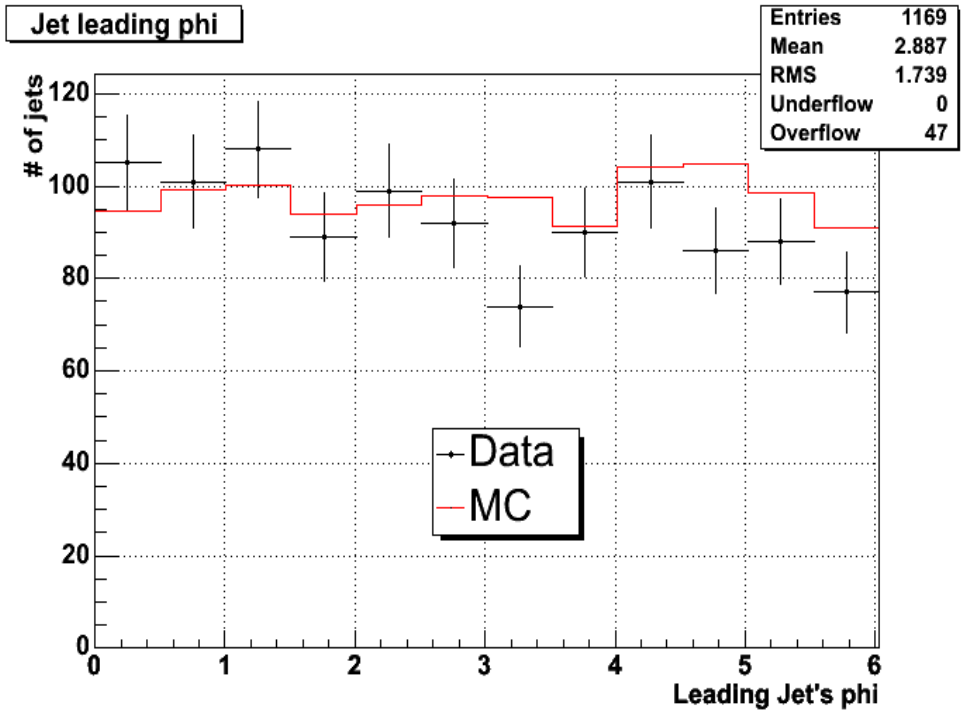

Jet all eta
Entries 1529
Mean 0.01332
RMS 1.147
Underflow 0
Overflow 0
# of jets
Data
MC
All Jet's eta


Jet all phi
Entries 1516
Mean 2.868
RMS 1.739
Underflow 0
Overflow 64
# of jets
Data
MC
All Jet's phi

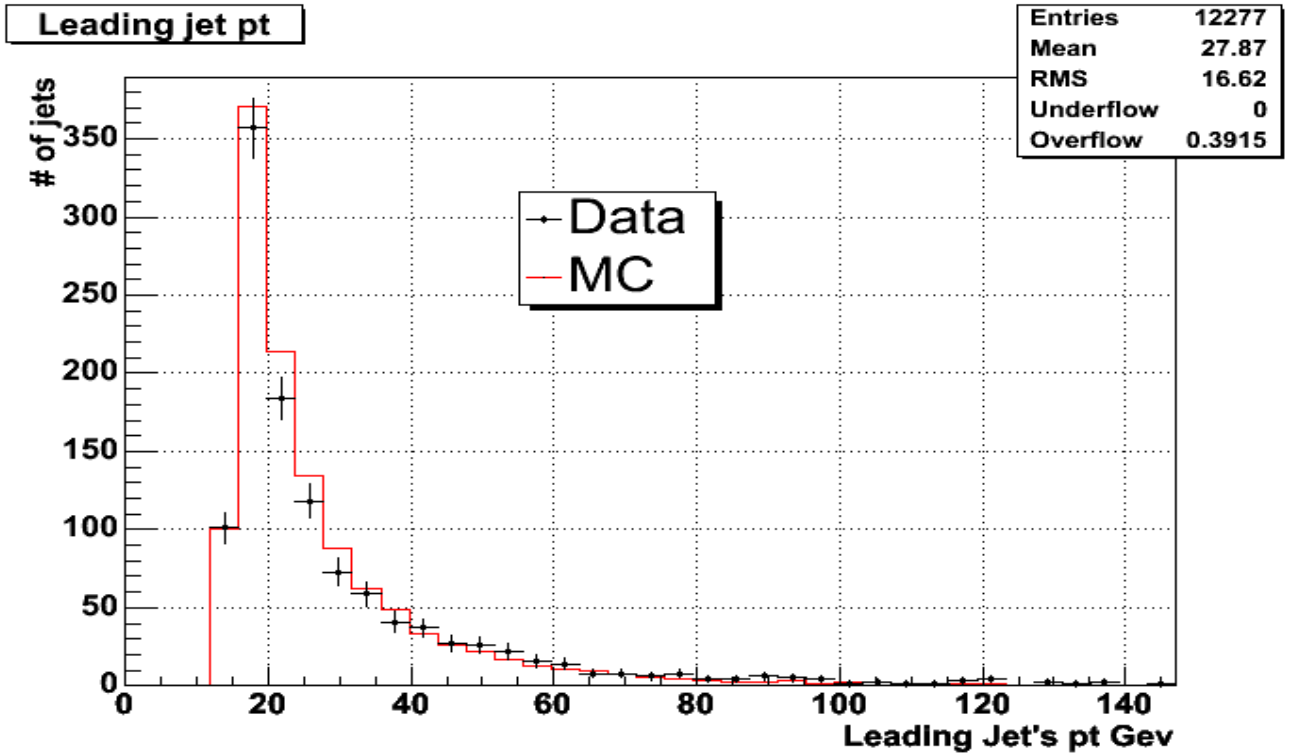
All jets


All jet pt
Entries 15355
Mean 26.49
RMS 15.53
Underflow 0
Overflow 0.4035
# of jets
Data
MC
All Jet's pt Gev

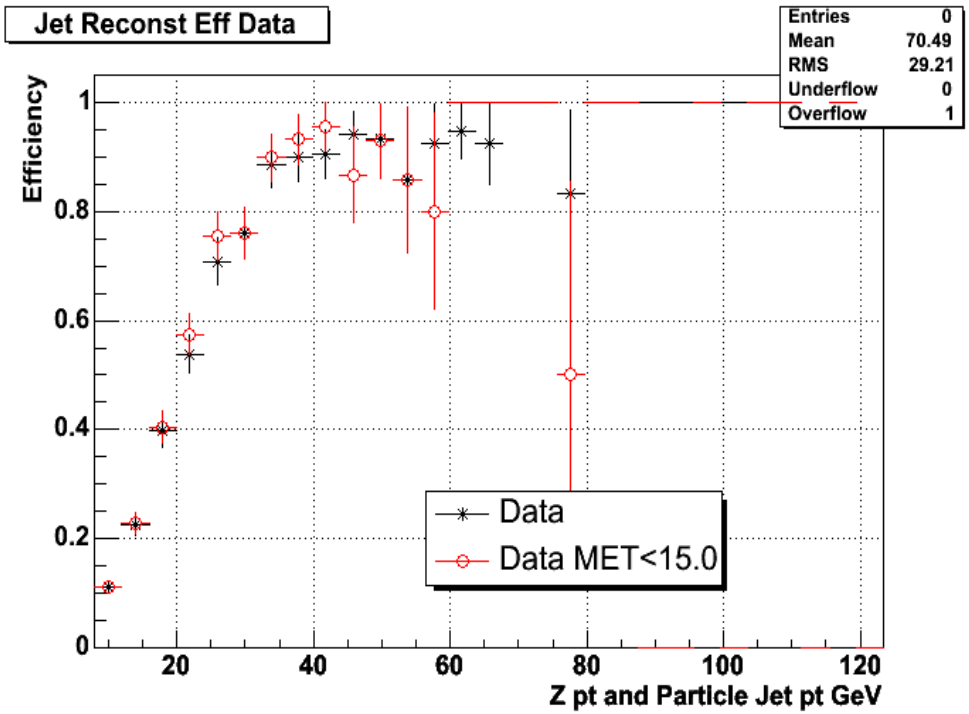


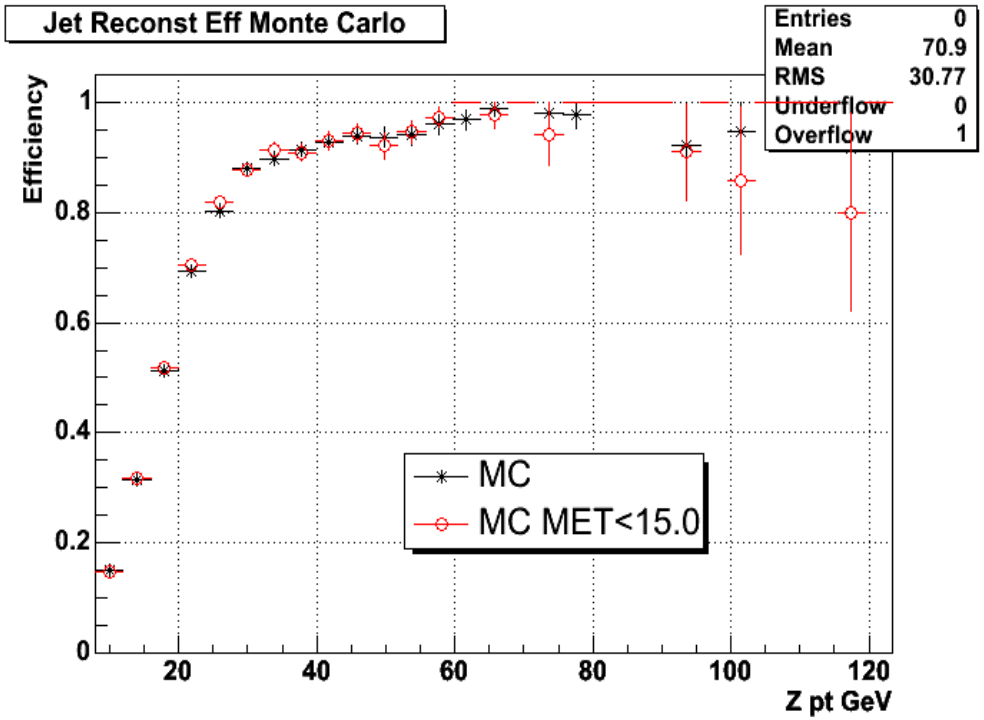


Leading jets

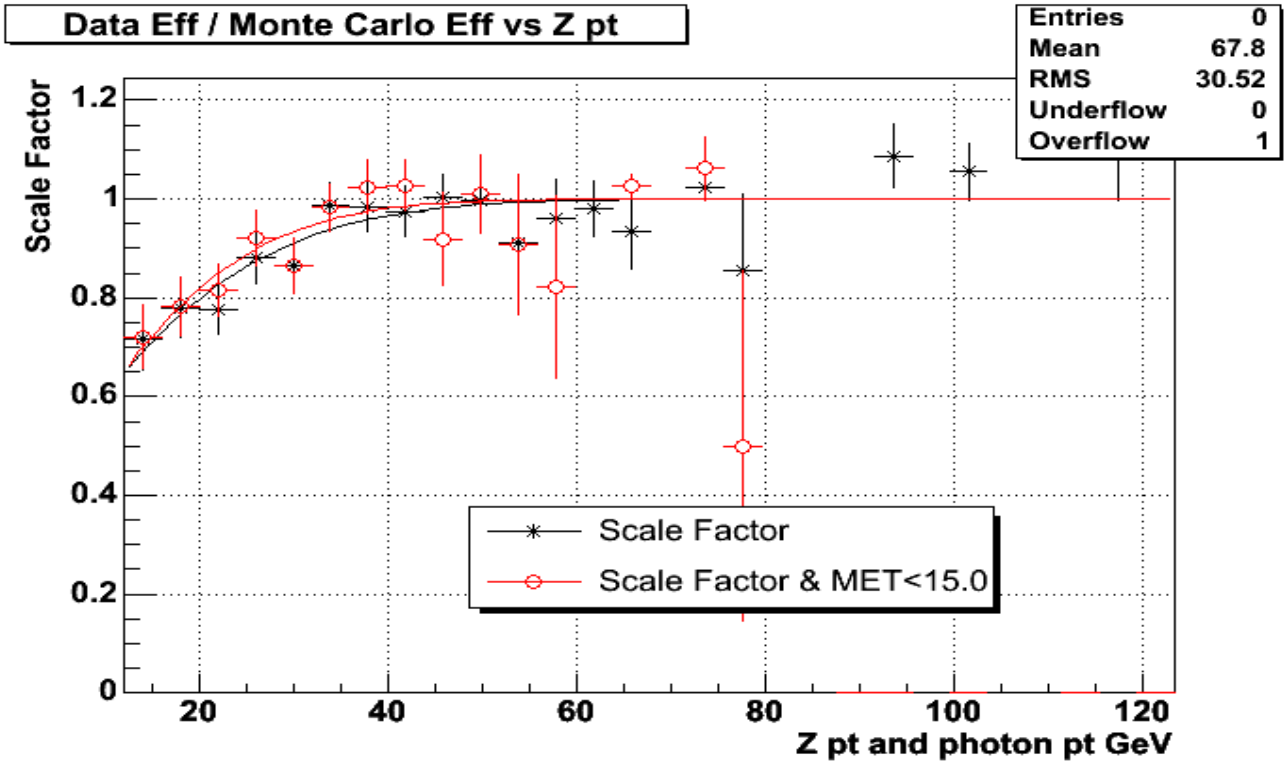


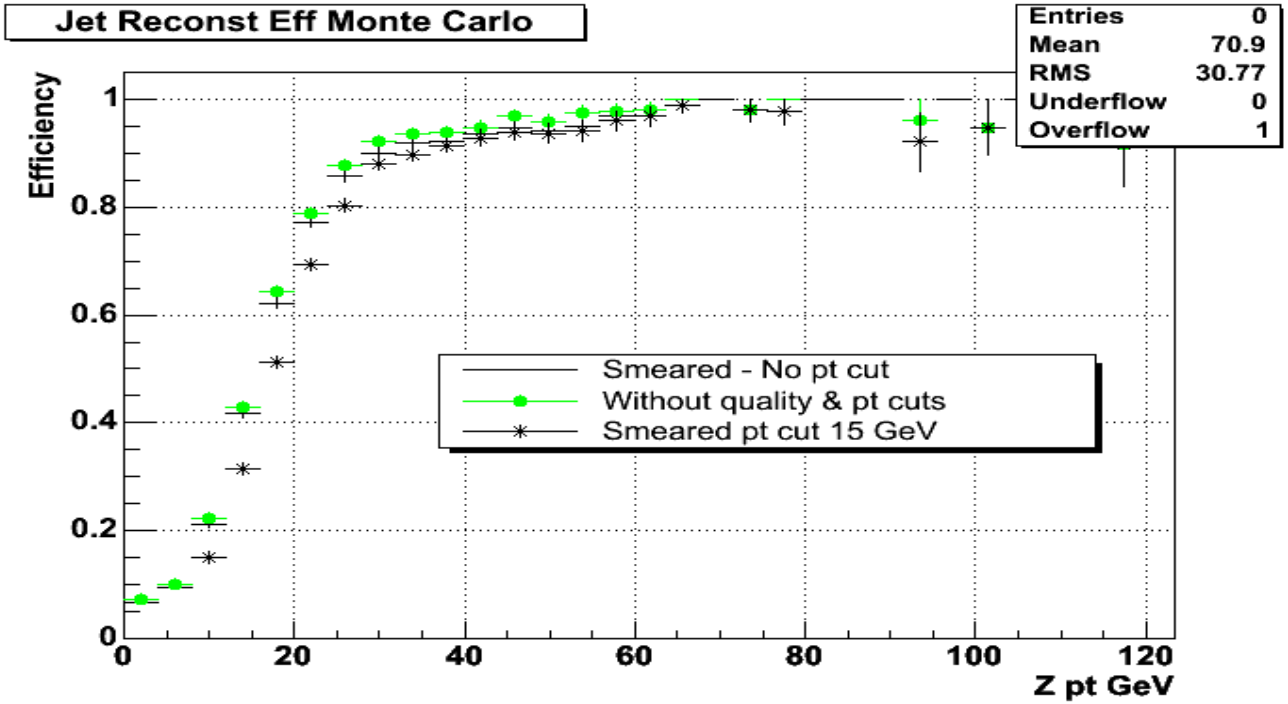
Efficiencies

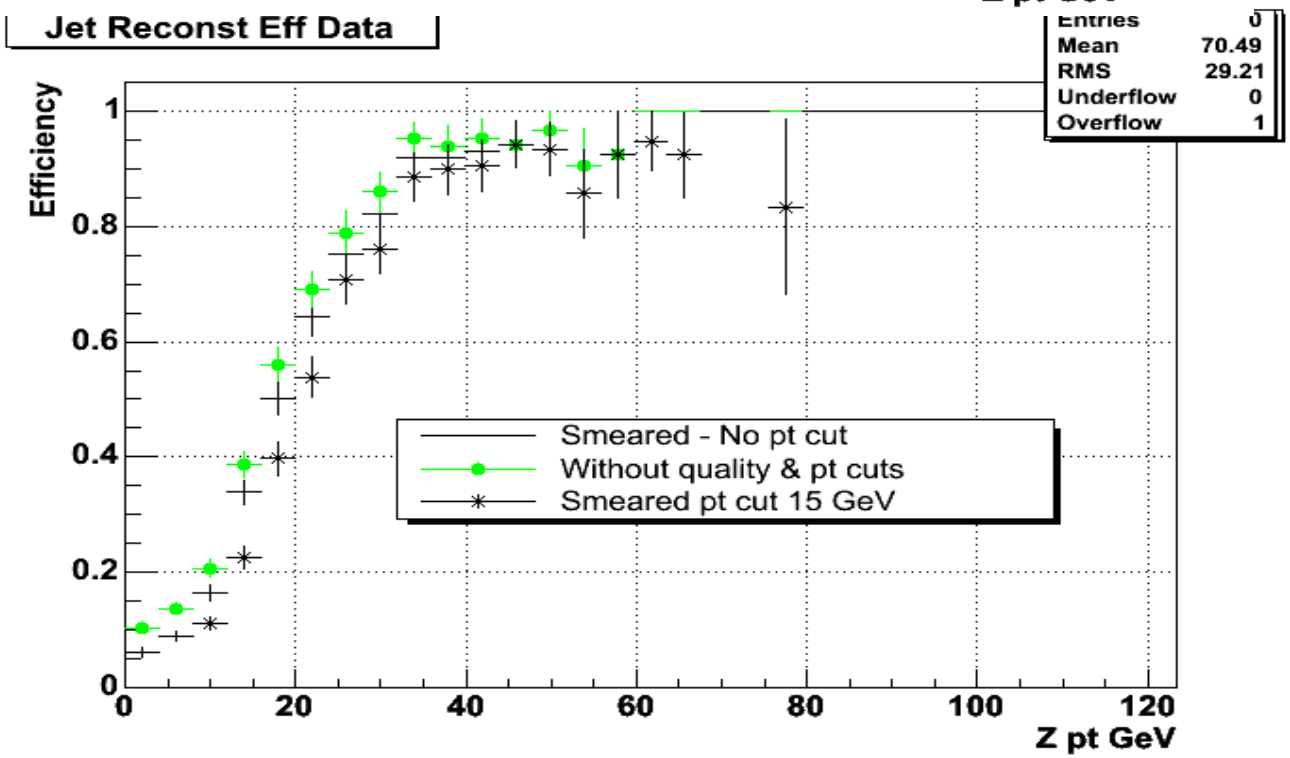

Jet Reconst Eff Data
Entries 0
Mean 70.49
RMS 29.21
Underflow 0
Overflow 1
Efficiency
Data
Data MET<15.0
Z pt and Particle Jet pt GeV

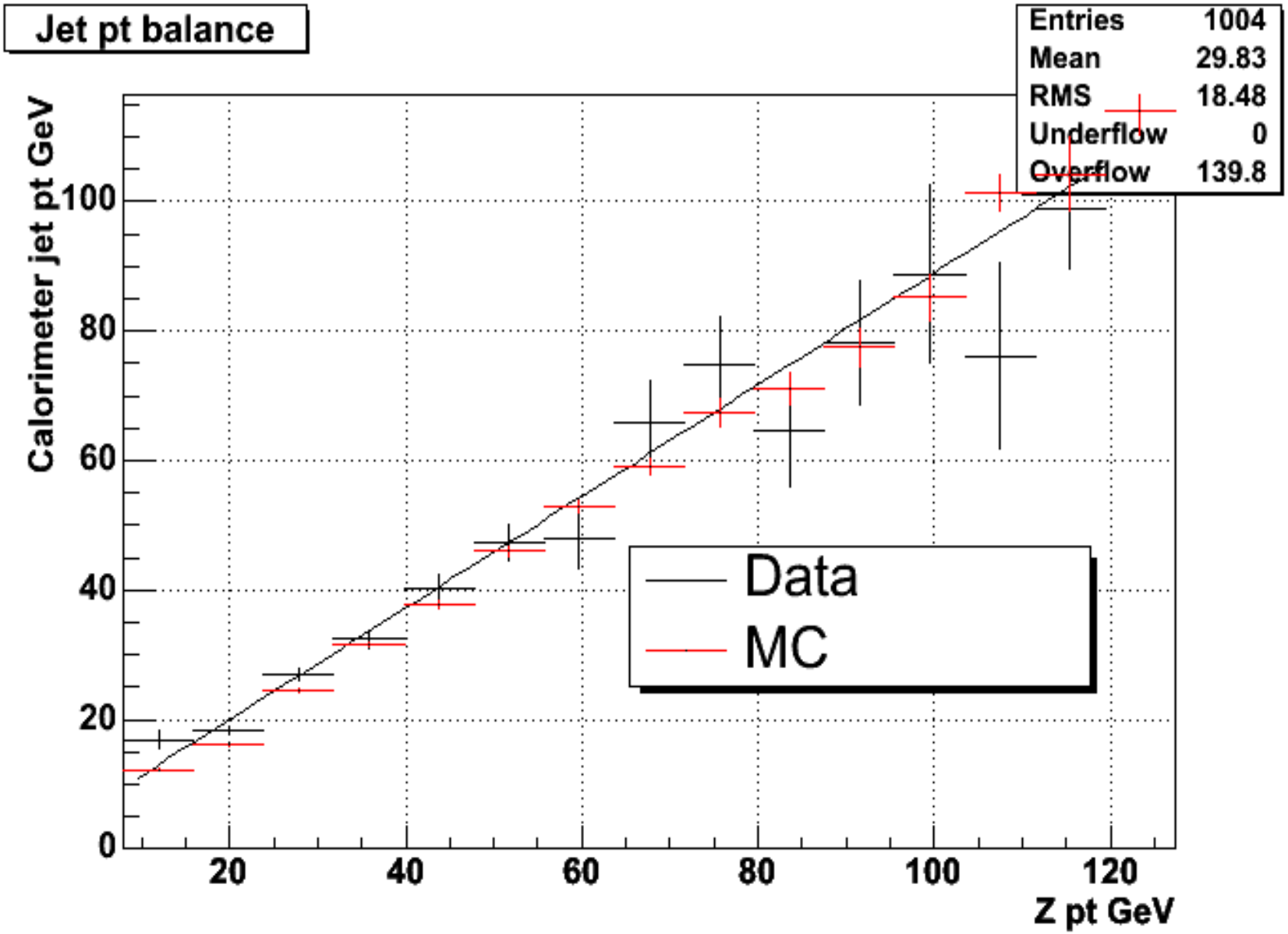

Jet Reconst Eff Monte Carlo
Entries 0
Mean 70.9
RMS 30.77
Underflow 0
Overflow 1
Efficiency
MC
MC MET<15.0
Z pt GeV

Z pt method


Data Eff / Monte Carlo Eff vs Z pt
Entries 0
Mean 67.8
RMS 30.52
Underflow 0
Overflow 1
Scale Factor
Scale Factor
Scale Factor & MET<15.0
Z pt and photon pt GeV

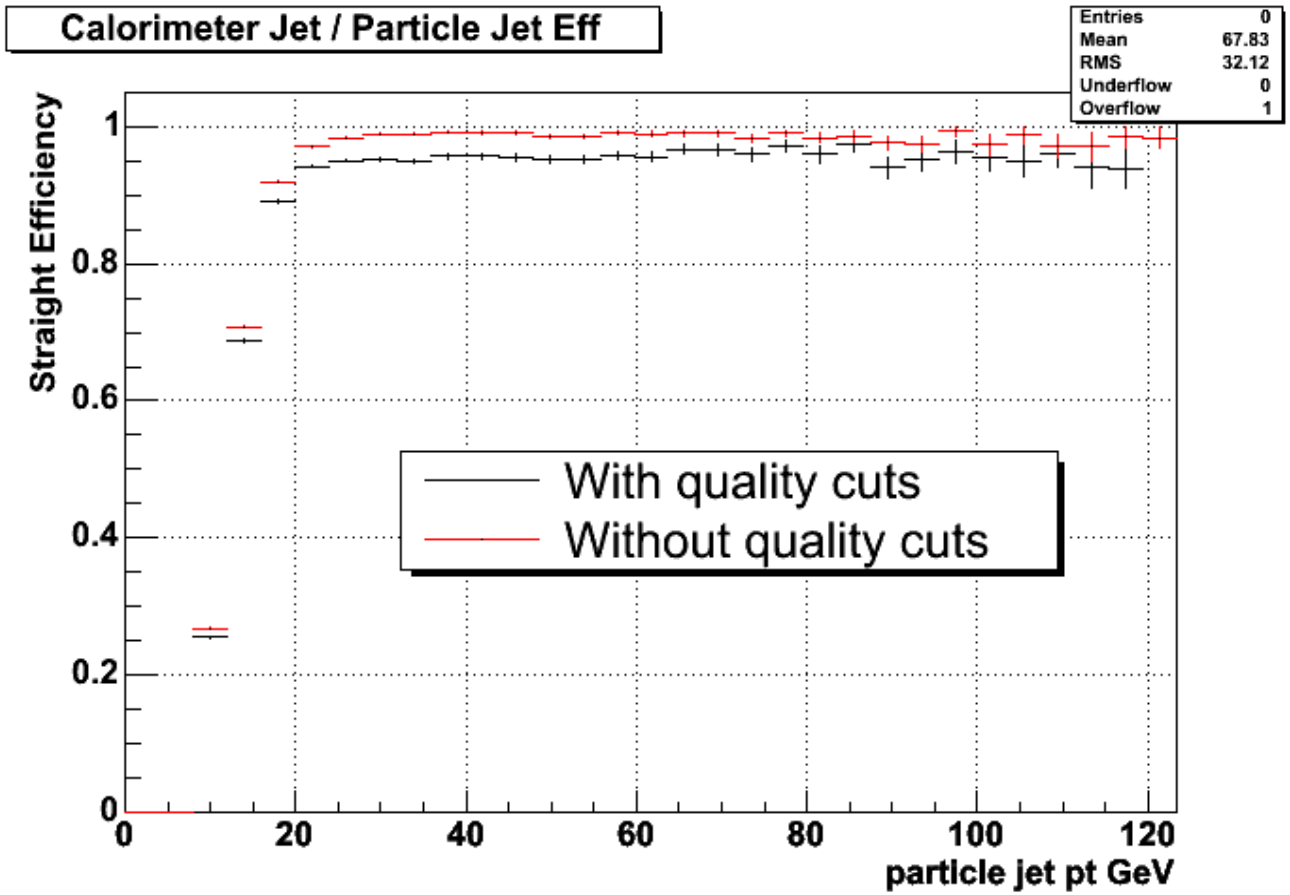

Jet Reconst Eff Monte Carlo
Entries 0
Mean 70.9
RMS 30.77
Underflow 0
Overflow 1
Efficiency
Z pt GeV
Smeared - No pt cut
Without quality & pt cuts
Smeared pt cut 15 GeV

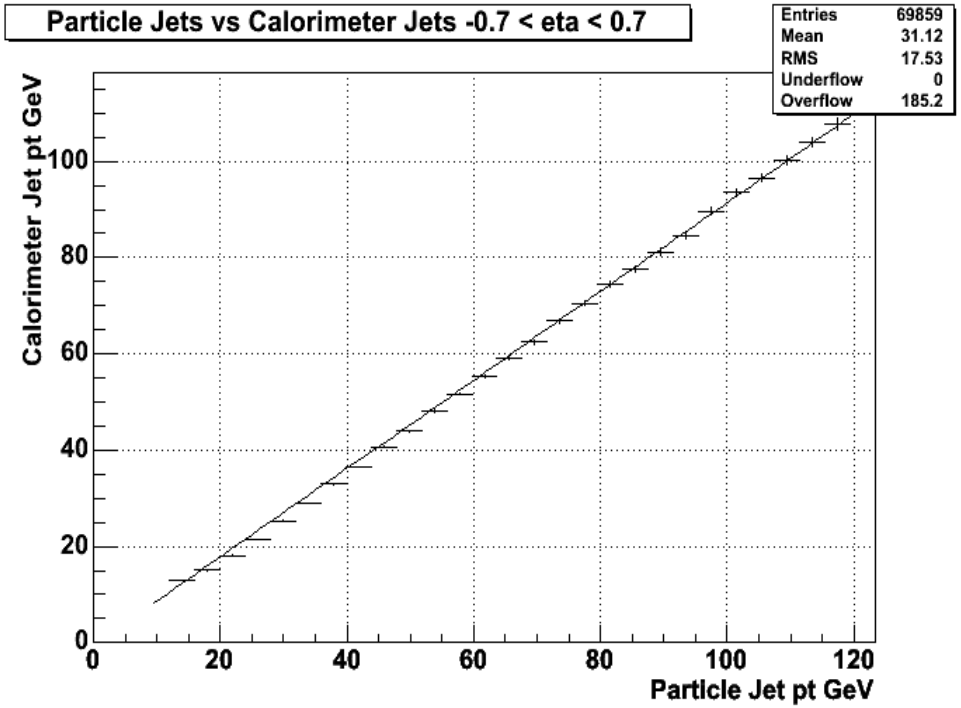

Jet Reconst Eff Data
Entries 0
Mean 70.49
RMS 29.21
Underflow 0
Overflow 1
Efficiency
Z pt GeV
Smeared - No pt cut
Without quality & pt cuts
Smeared pt cut 15 GeV

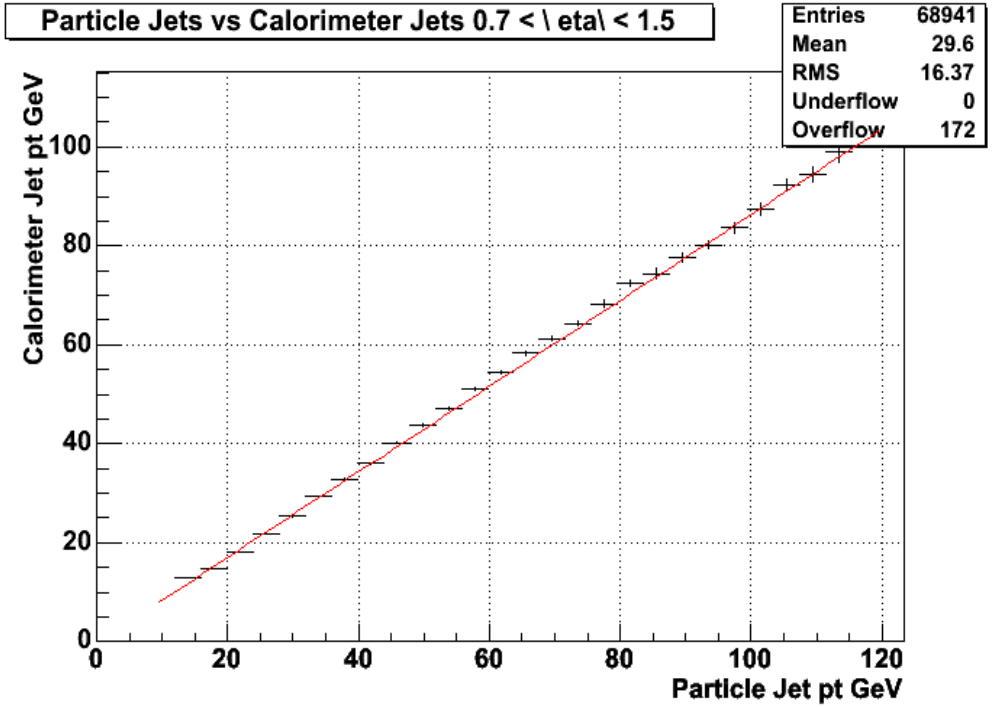


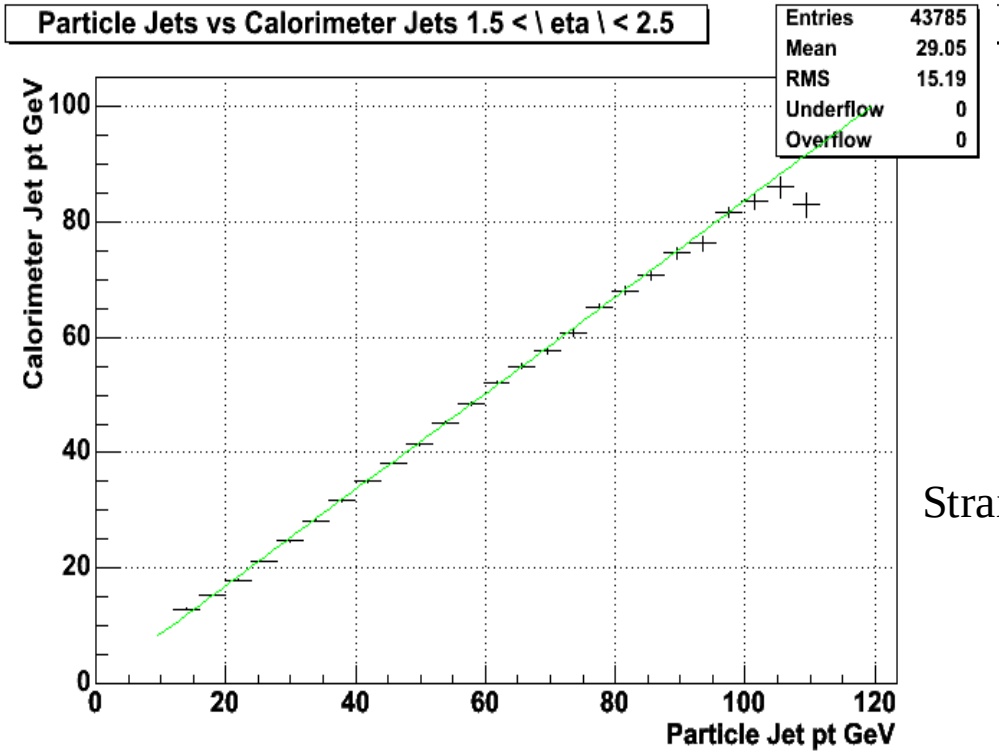
Cal jet vs Z pt

Monte Carlo

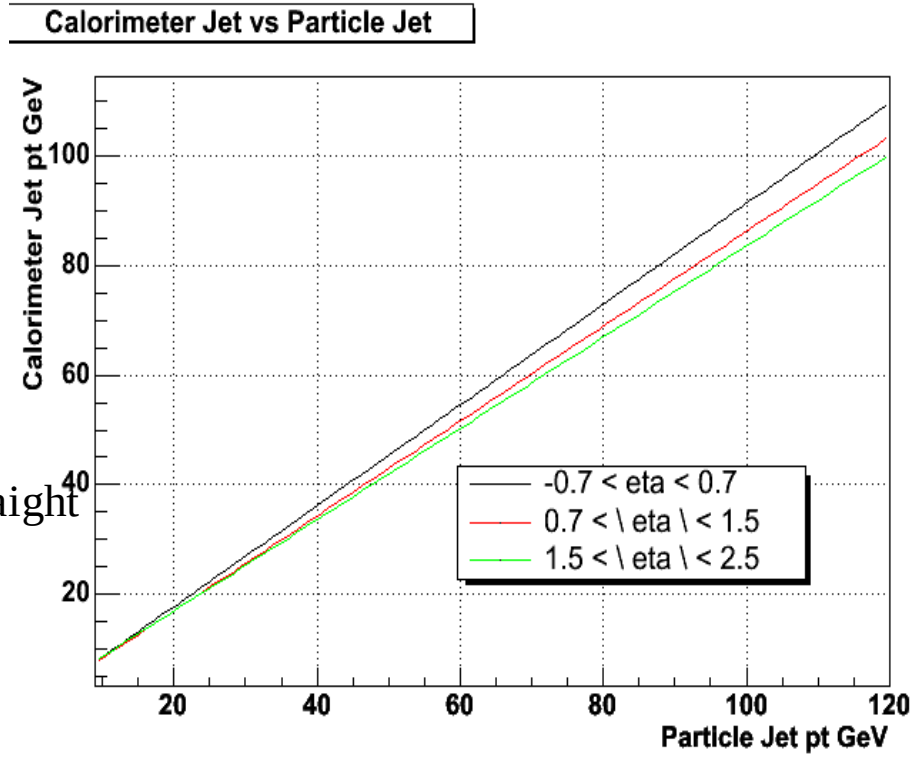

Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 67.83
RMS 32.12
Underflow 0
Overflow 1
Straight Efficiency
1
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
particle jet pt GeV
With quality cuts
Without quality cuts

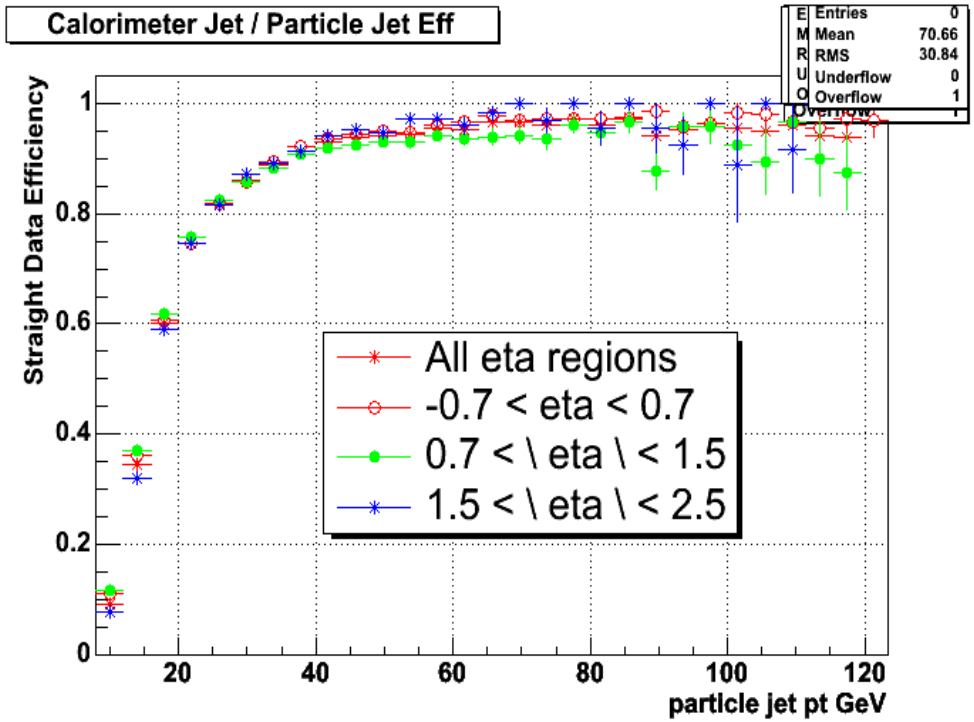

Particle Jets vs Calorimeter Jets -0.7 < eta < 0.7
Entries 69859
Mean 31.12
RMS 17.53
Underflow 0
Overflow 185.2
Calorimeter Jet pt GeV
Particle Jet pt GeV

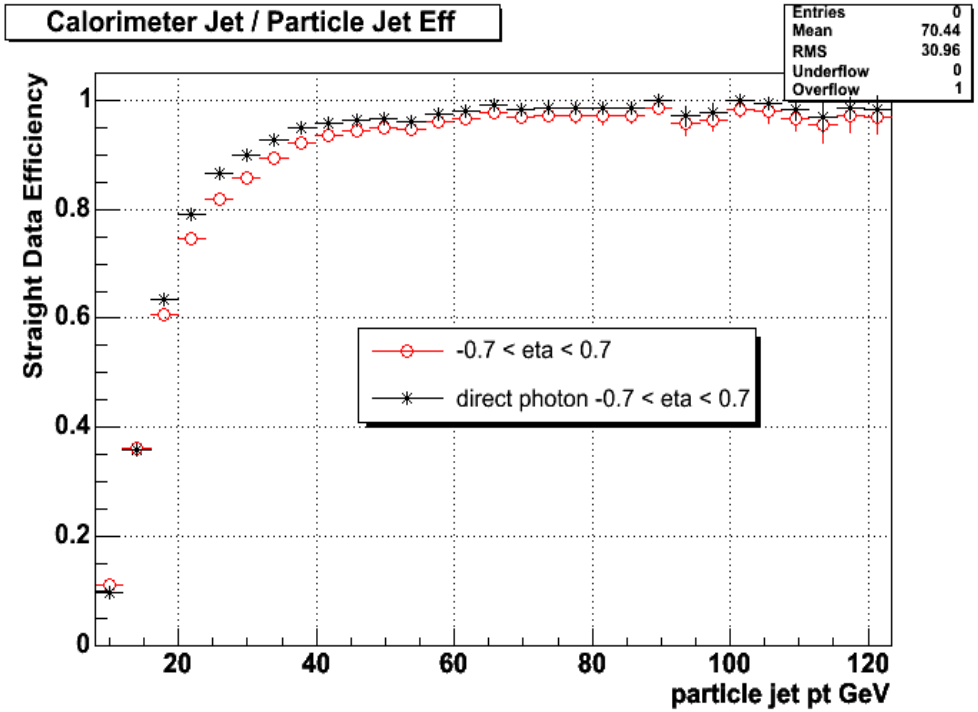

Particle Jets vs Calorimeter Jets 0.7 < \ eta\ < 1.5
Entries 68941
Mean 29.6
RMS 16.37
Underflow 0
Overflow 172
Calorimeter Jet pt GeV
Particle Jet pt GeV

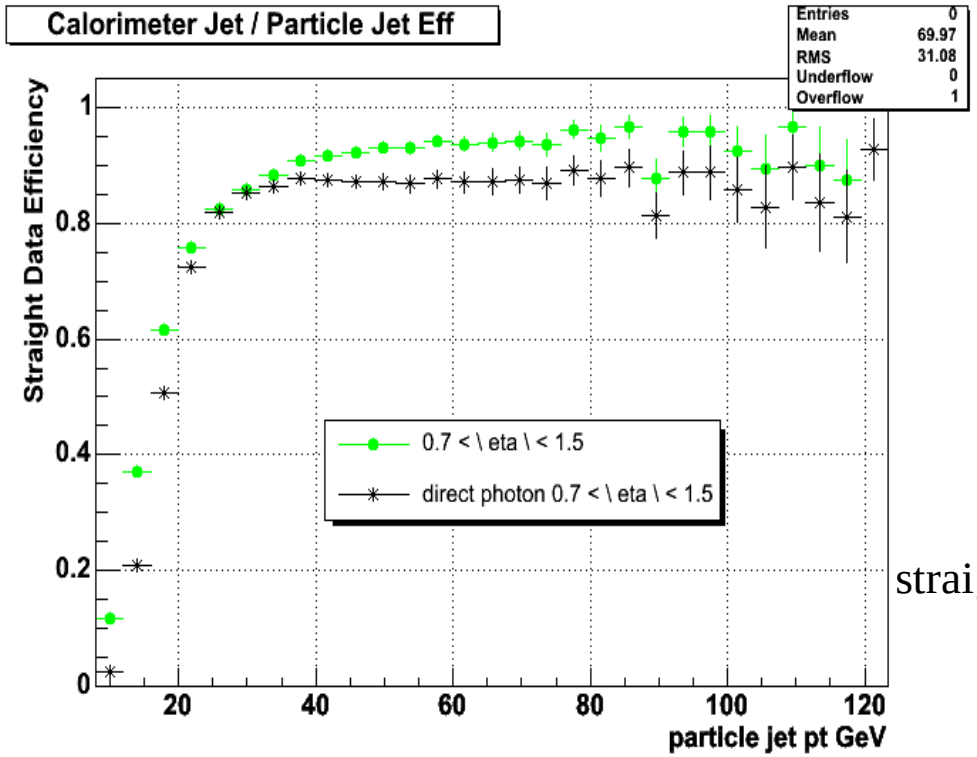

Particle Jets vs Calorimeter Jets 1.5 < \ eta \ < 2.5
Entries 43785
Mean 29.05
RMS 15.19
Underflow 0
Overflow 0
Calorimeter Jet pt GeV
Particle Jet pt GeV

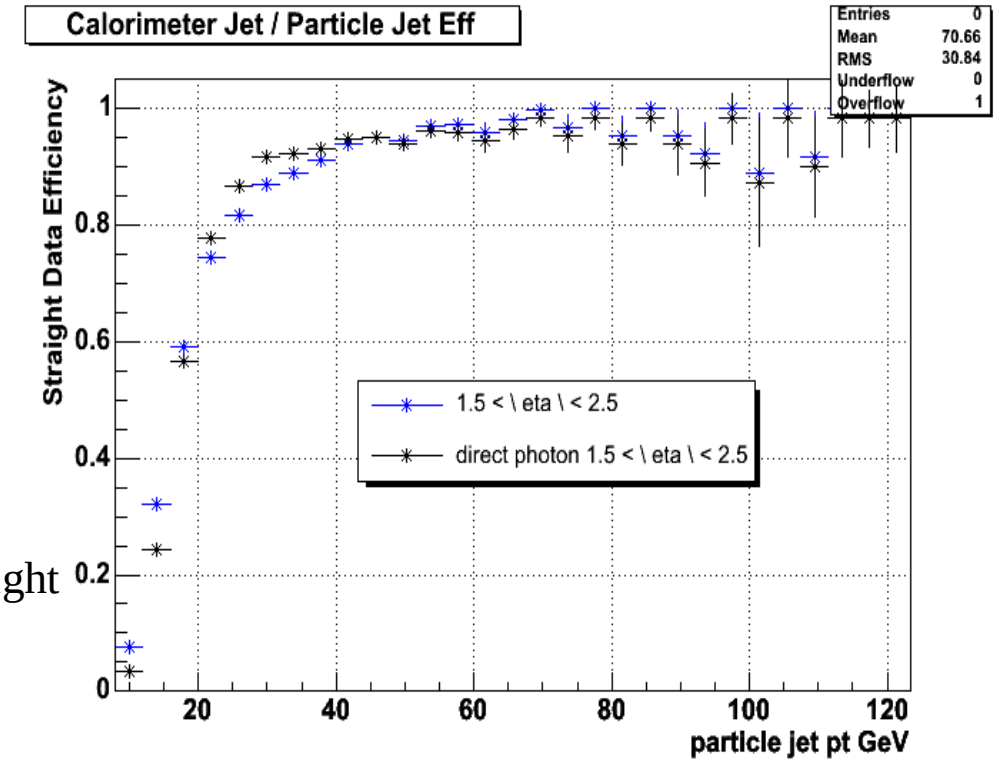
Straight


Calorimeter Jet vs Particle Jet
-0.7 < eta < 0.7
0.7 < \ eta \ < 1.5
1.5 < \ eta \ < 2.5
Calorimeter Jet pt GeV
Particle Jet pt GeV

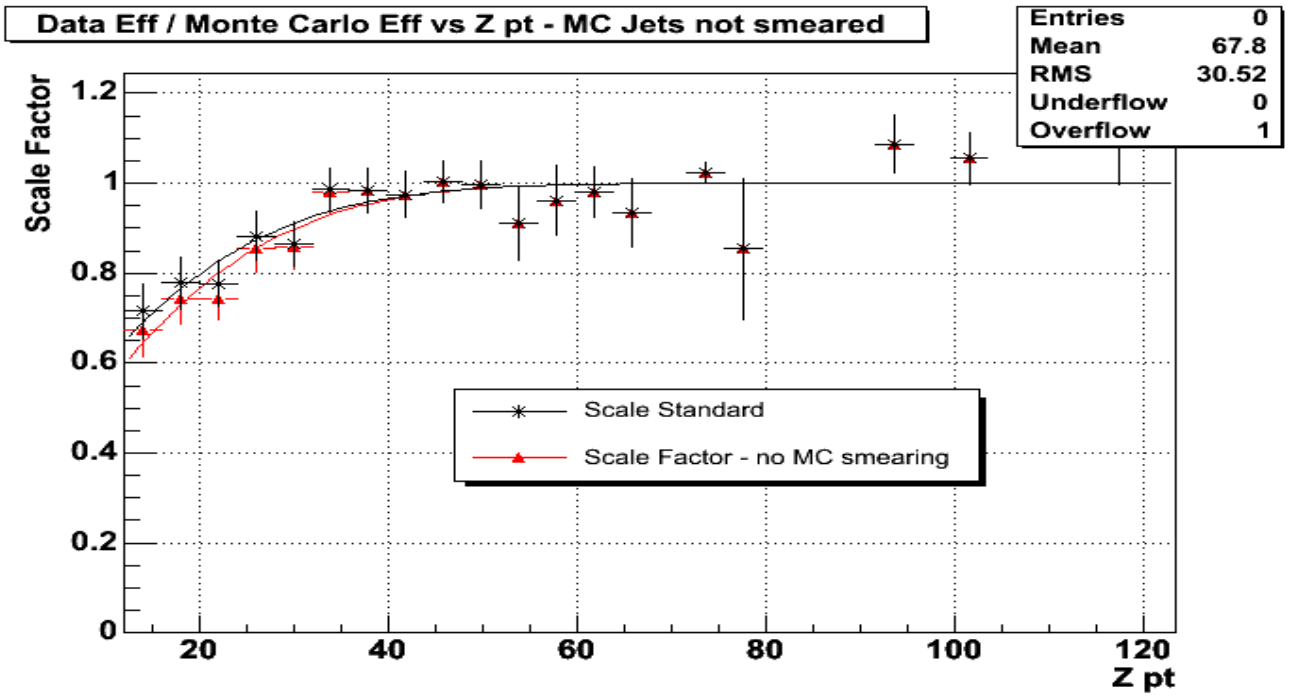

Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 70.66
RMS 30.84
Underflow 0
Overflow 1
Straight Data Efficiency
particle jet pt GeV
All eta regions
-0.7 < eta < 0.7
0.7 < \ eta \ < 1.5
1.5 < \ eta \ < 2.5


Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 70.44
RMS 30.96
Underflow 0
Overflow 1
Straight Data Efficiency
particle jet pt GeV
-0.7 < eta < 0.7
direct photon -0.7 < eta < 0.7

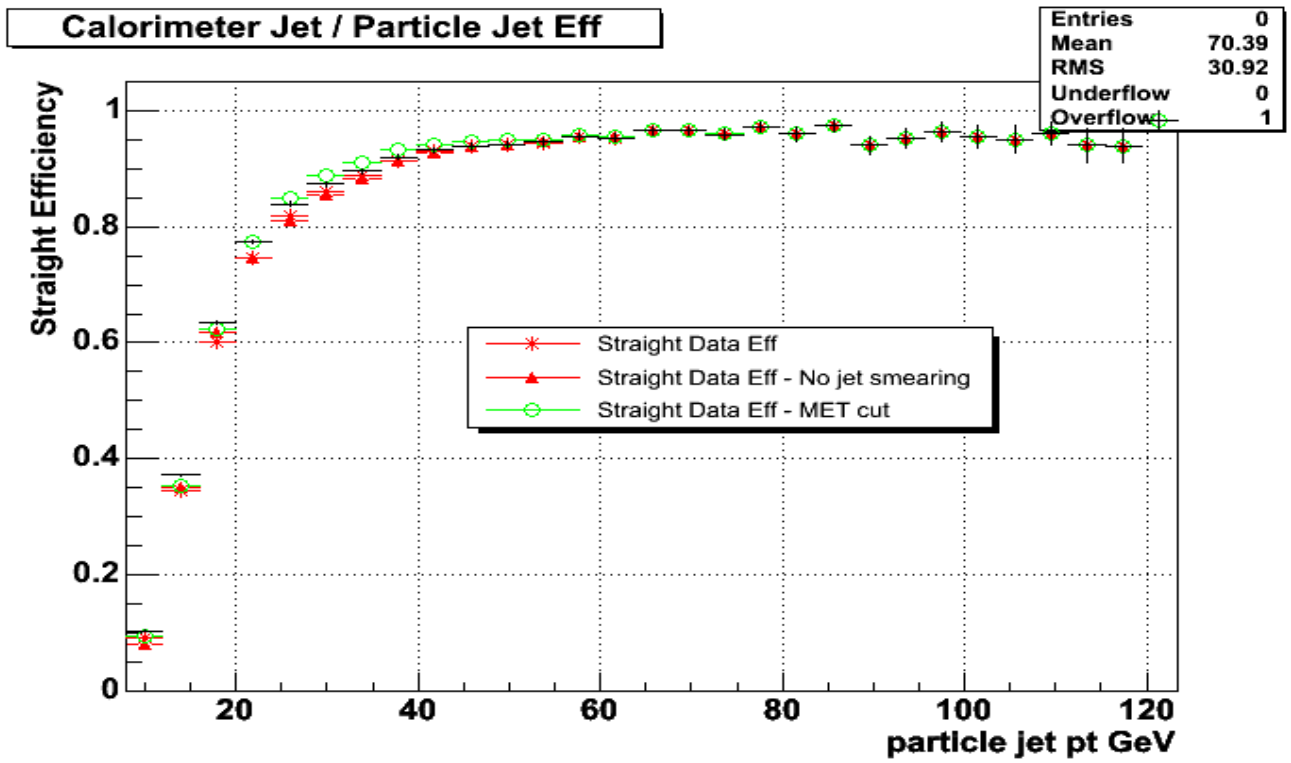

Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 69.97
RMS 31.08
Underflow 0
Overflow 1
Straight Data Efficiency
particle jet pt GeV
0.7 < \ eta \ < 1.5
direct photon 0.7 < \ eta \ < 1.5

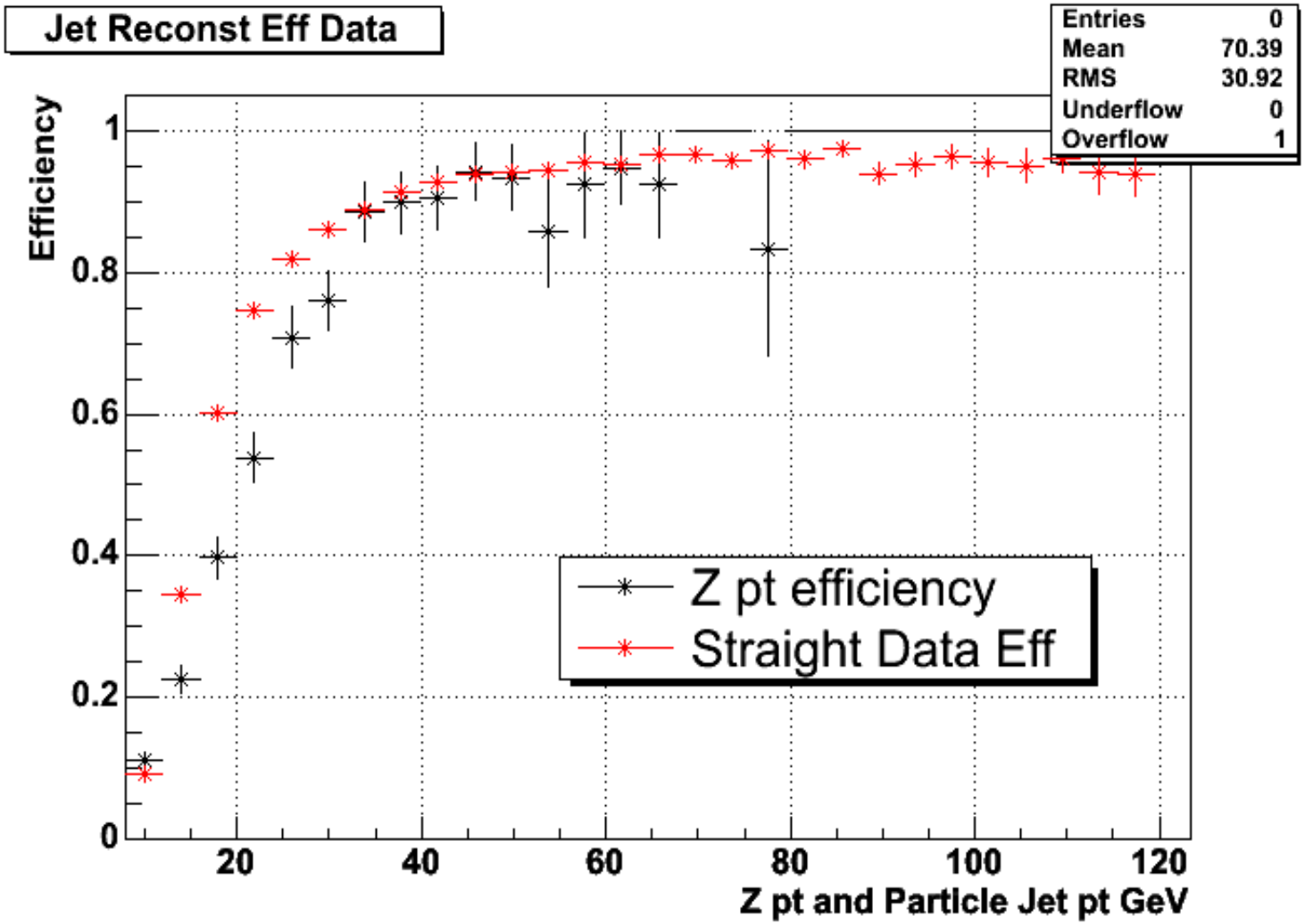

Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 70.66
RMS 30.84
Underflow 0
Overflow 1
Straight Data Efficiency
particle jet pt GeV
1.5 < \ eta \ < 2.5
direct photon 1.5 < \ eta \ < 2.5

straight


Data Eff / Monte Carlo Eff vs Z pt - MC Jets not smeared
Entries 0
Mean 67.8
RMS 30.52
Underflow 0
Overflow 1
Scale Factor
Z pt
Scale Standard
Scale Factor - no MC smearing

Straight


Calorimeter Jet / Particle Jet Eff
Entries 0
Mean 70.39
RMS 30.92
Underflow 0
Overflow 1
Straight Efficiency
particle jet pt GeV
Straight Data Eff
Straight Data Eff - No jet smearing
Straight Data Eff - MET cut



Z pt method and Straight method

Missing Jets – removed quality cuts and Z pt > 50 GeV

3 Events

2 – EM-Jet Removal
1- detEta > 2.5

Missing Jets – removed quality cuts and Z pt ~ 20 GeV

Reviewed 10 events with d0scan

4 JCCA & JKCA
2 JKCA
1 EM-Jet Removal
1 Met 17.13
1 Extra L2 jet Et=6.5 Met 15.5
1 Extra L2 Em obj Et=1.25 Met 8.39 – small jet cluster

Conclusion

extract out an error for the straight efficiencies
write the note