# Pes simulation Improvements

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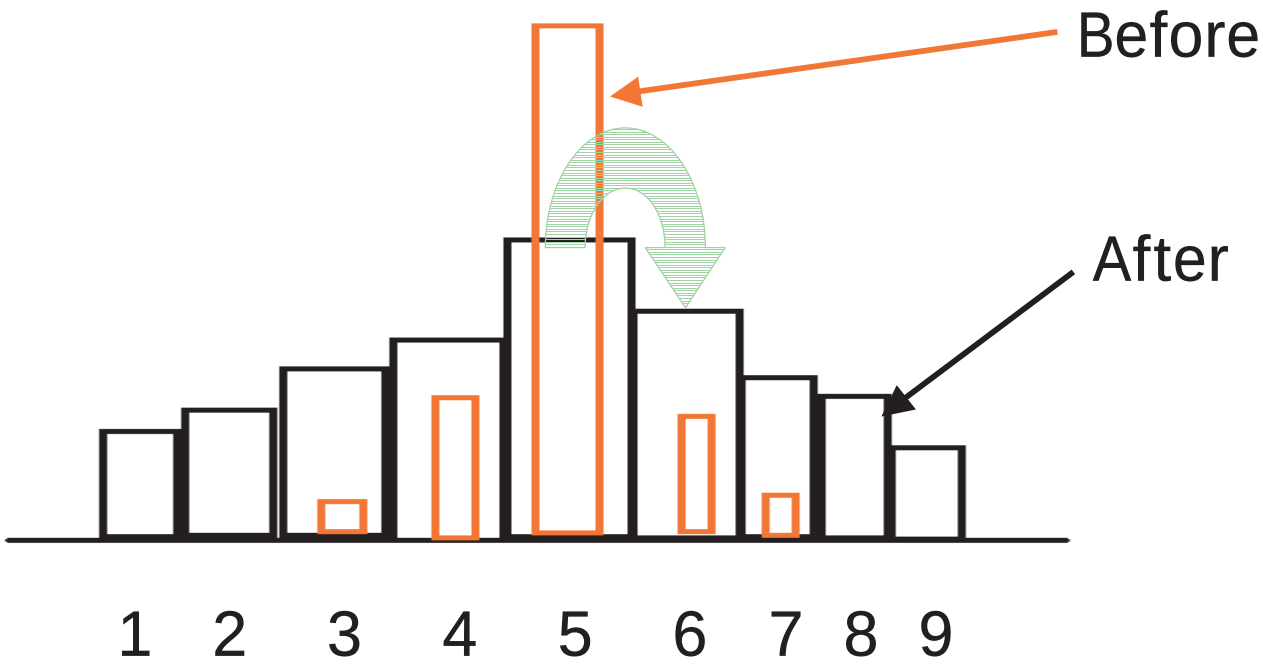
# Pes simulation

- Correct simulation for
  - Energy scale
  - Energy resolution
  - Shower shape
  - Cross talk
  - ...

# Adjust Shower Profile

- Redistribute energies inside cluster
- 9 strips in one Pes/Pes2d cluster

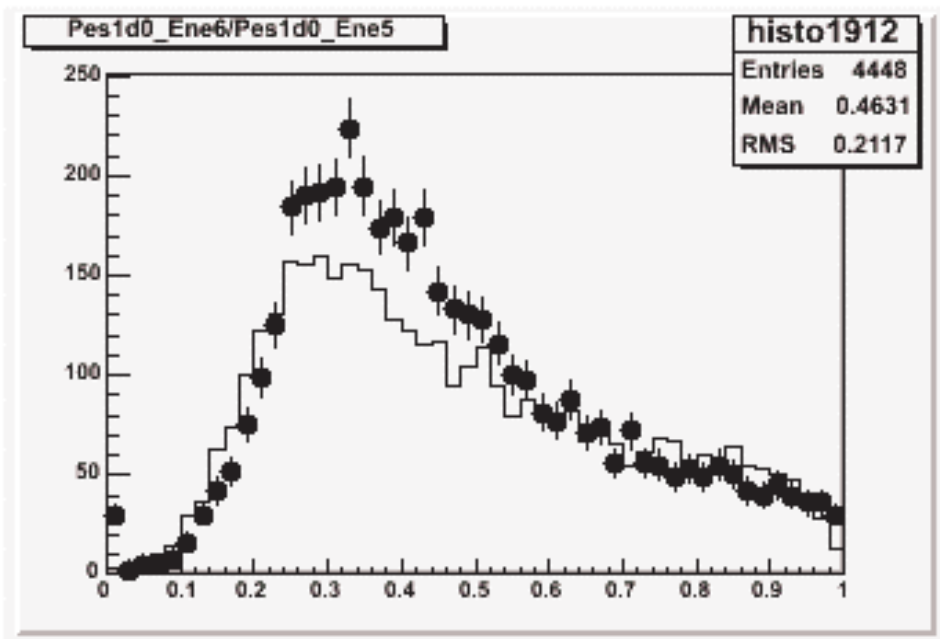


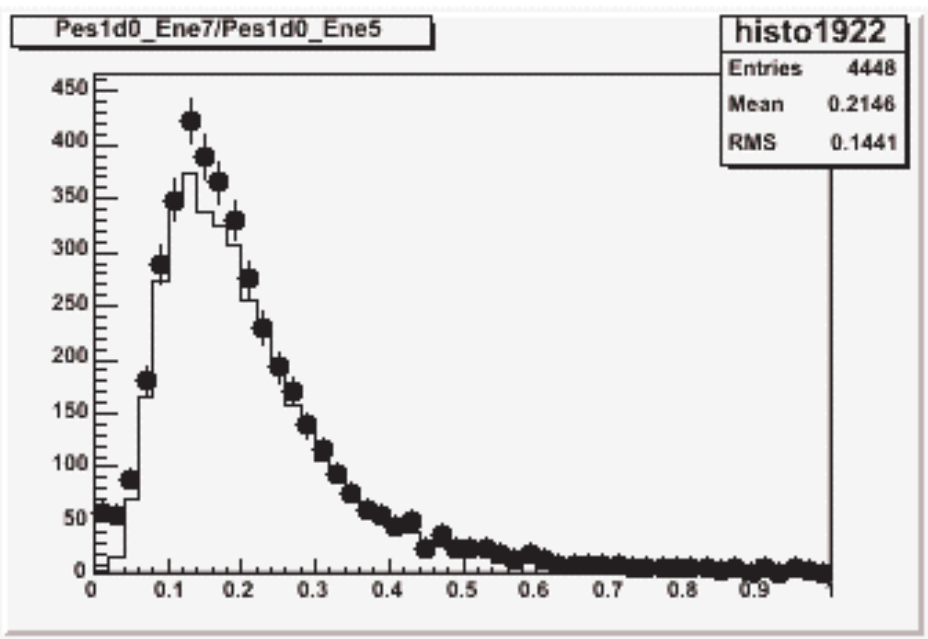
# Changes

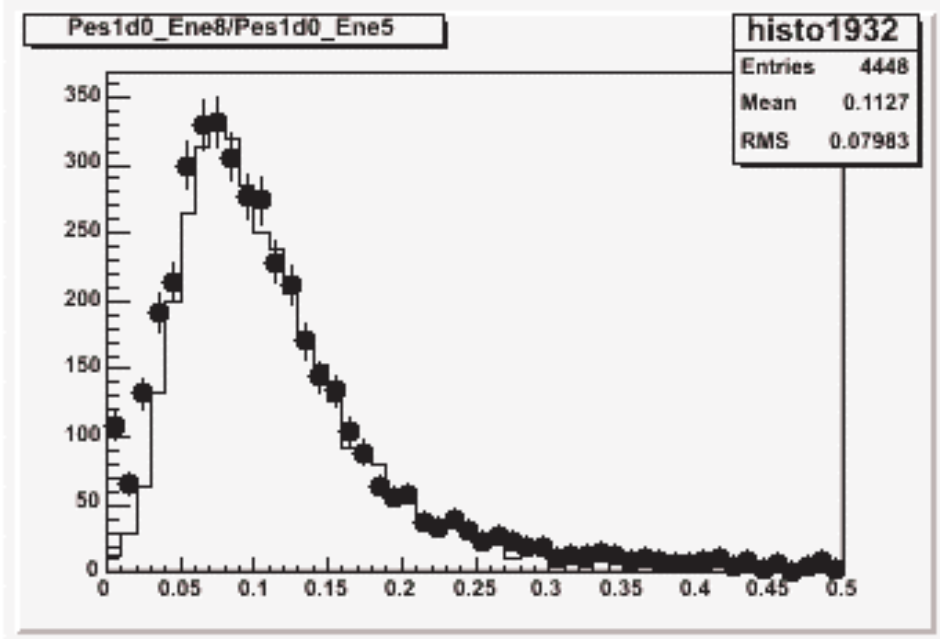
- Take cross talk into account.
- Changes for Shower shape implemented mainly in ShowerMax/PlugStripMaker
- TalkTo's implemented to change parameters on the fly.

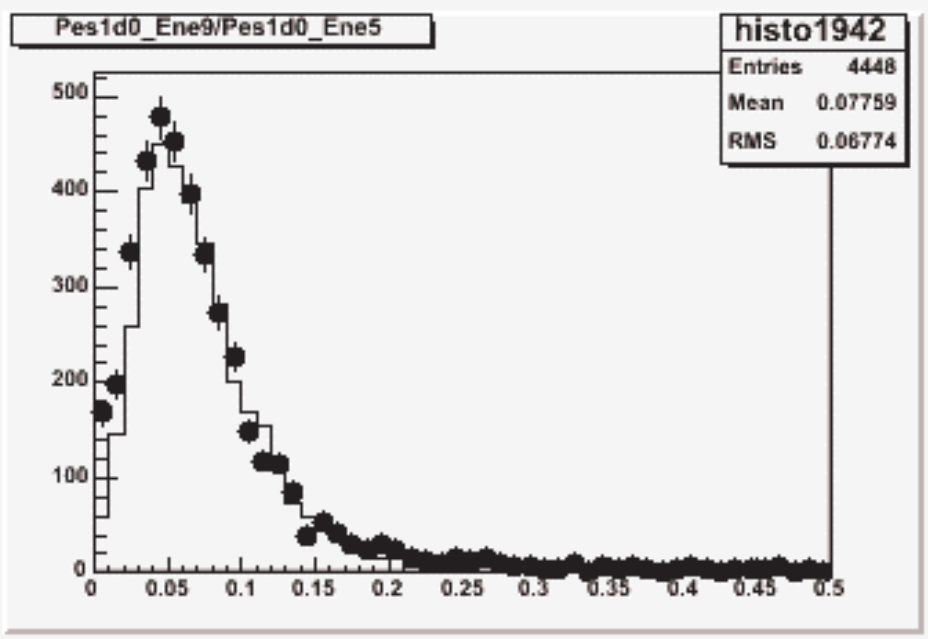
# Data sample

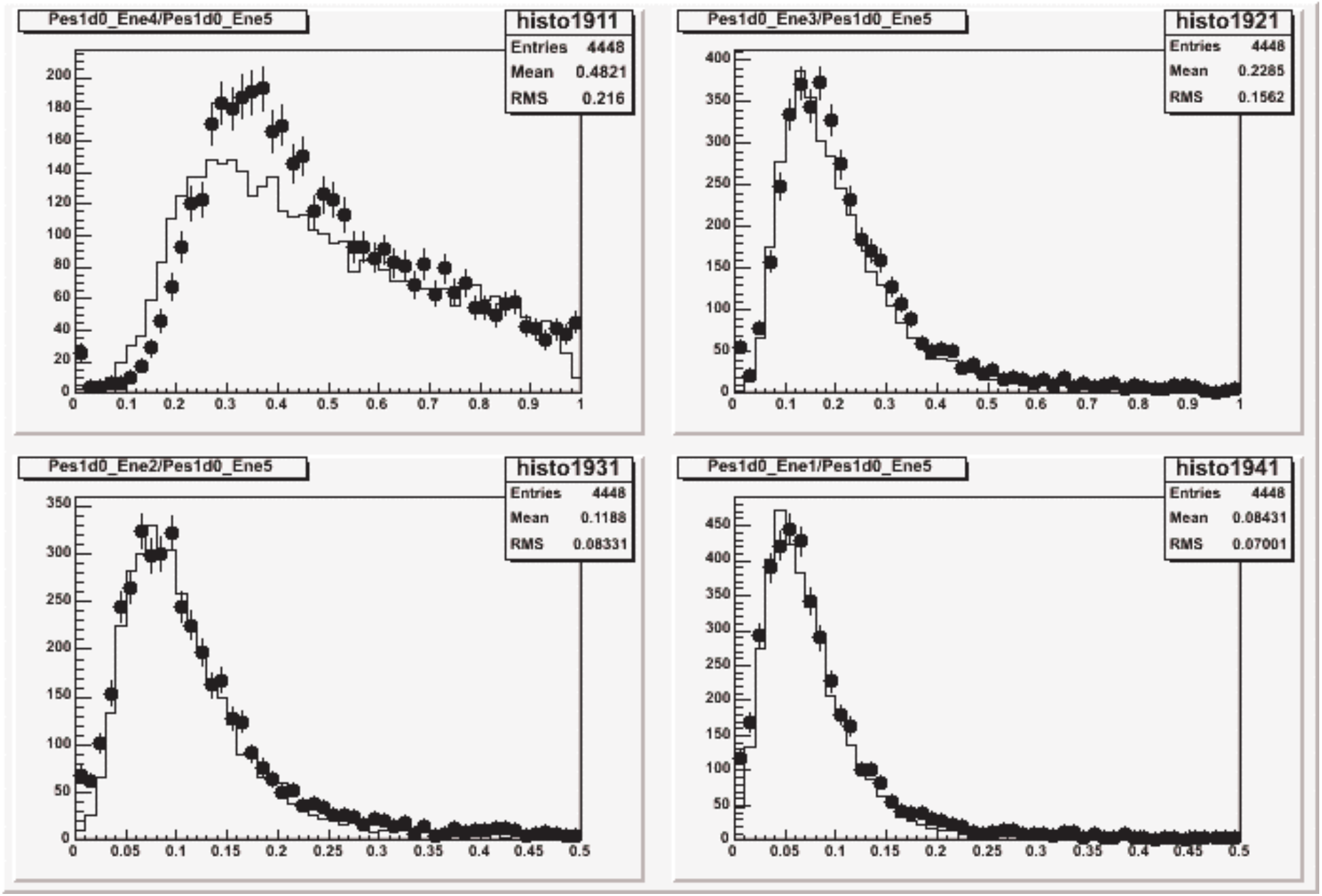
- Easy Wenu selection (no track selection). Higher statistics but also contamination of background.
- Use bpel0d data sample
- Used 5.3.3 for generating Wenu MCs.

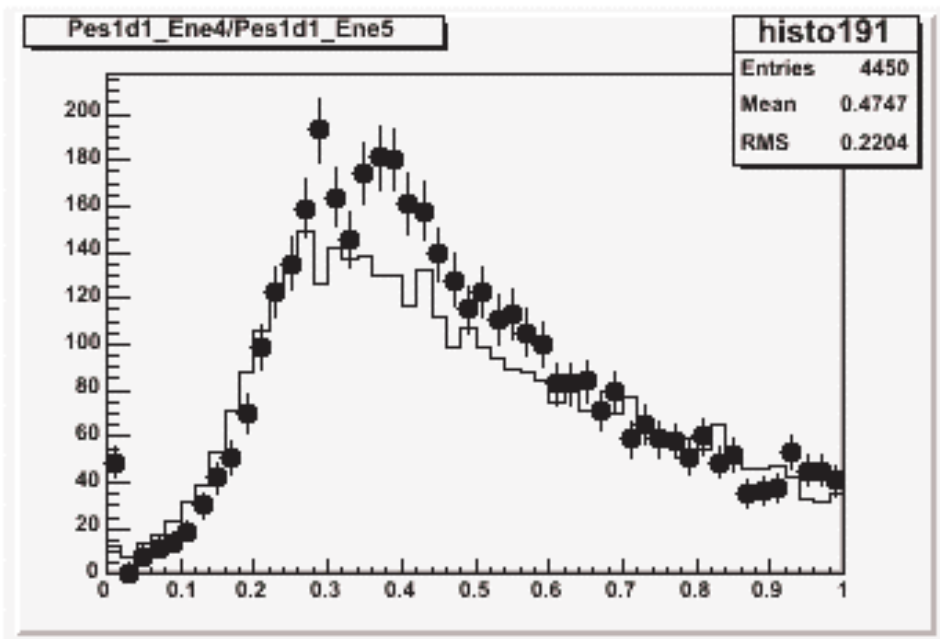

Pes1d0_Ene6/Pes1d0_Ene5
histo1912
Entries 4448
Mean 0.4631
RMS 0.2117

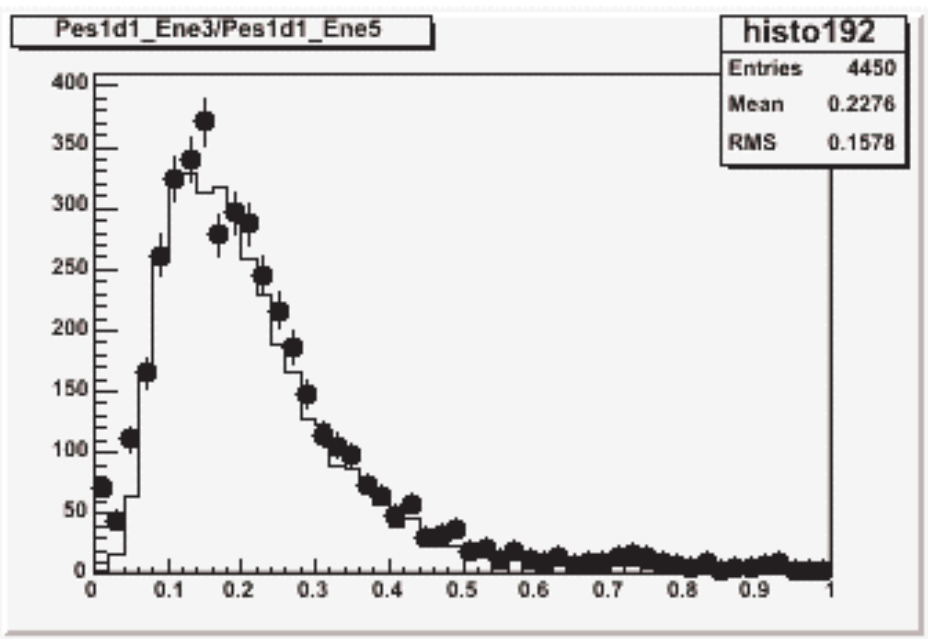

Pes1d0_Ene7/Pes1d0_Ene5
histo1922
Entries 4448
Mean 0.2146
RMS 0.1441

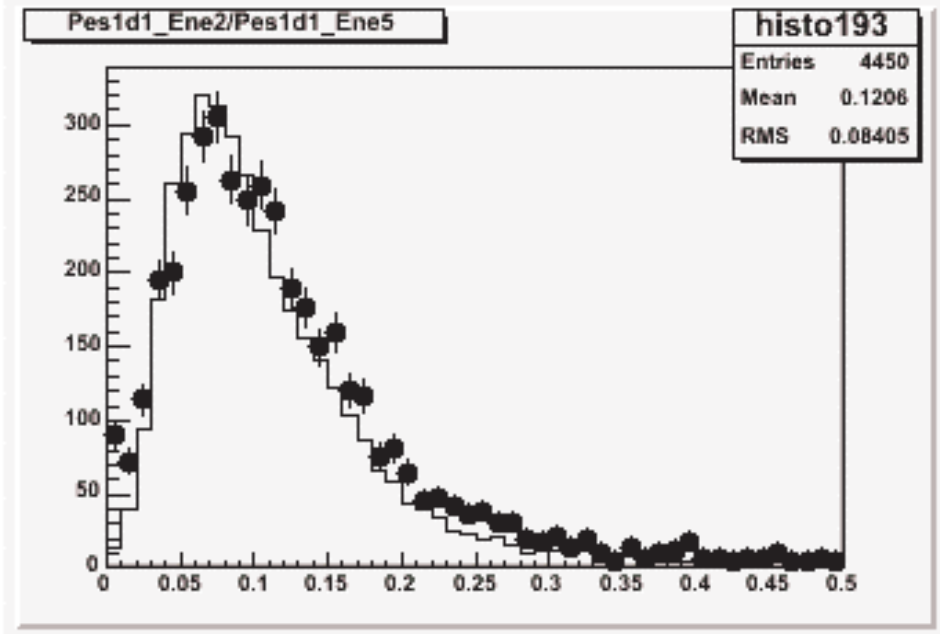

Pes1d0_Ene8/Pes1d0_Ene5
histo1932
Entries 4448
Mean 0.1127
RMS 0.07983

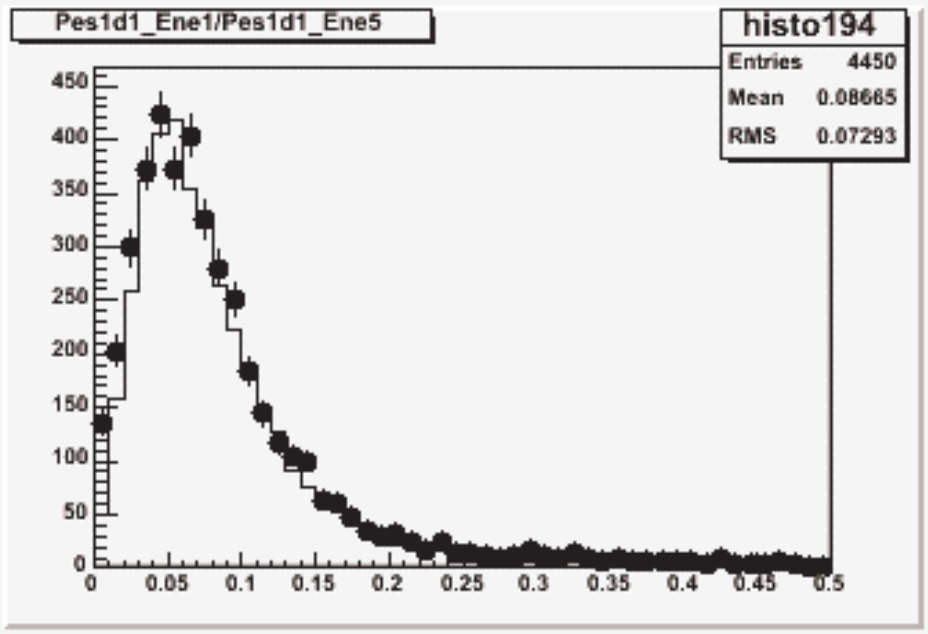

Pes1d0_Ene9/Pes1d0_Ene5
histo1942
Entries 4448
Mean 0.07759
RMS 0.06774

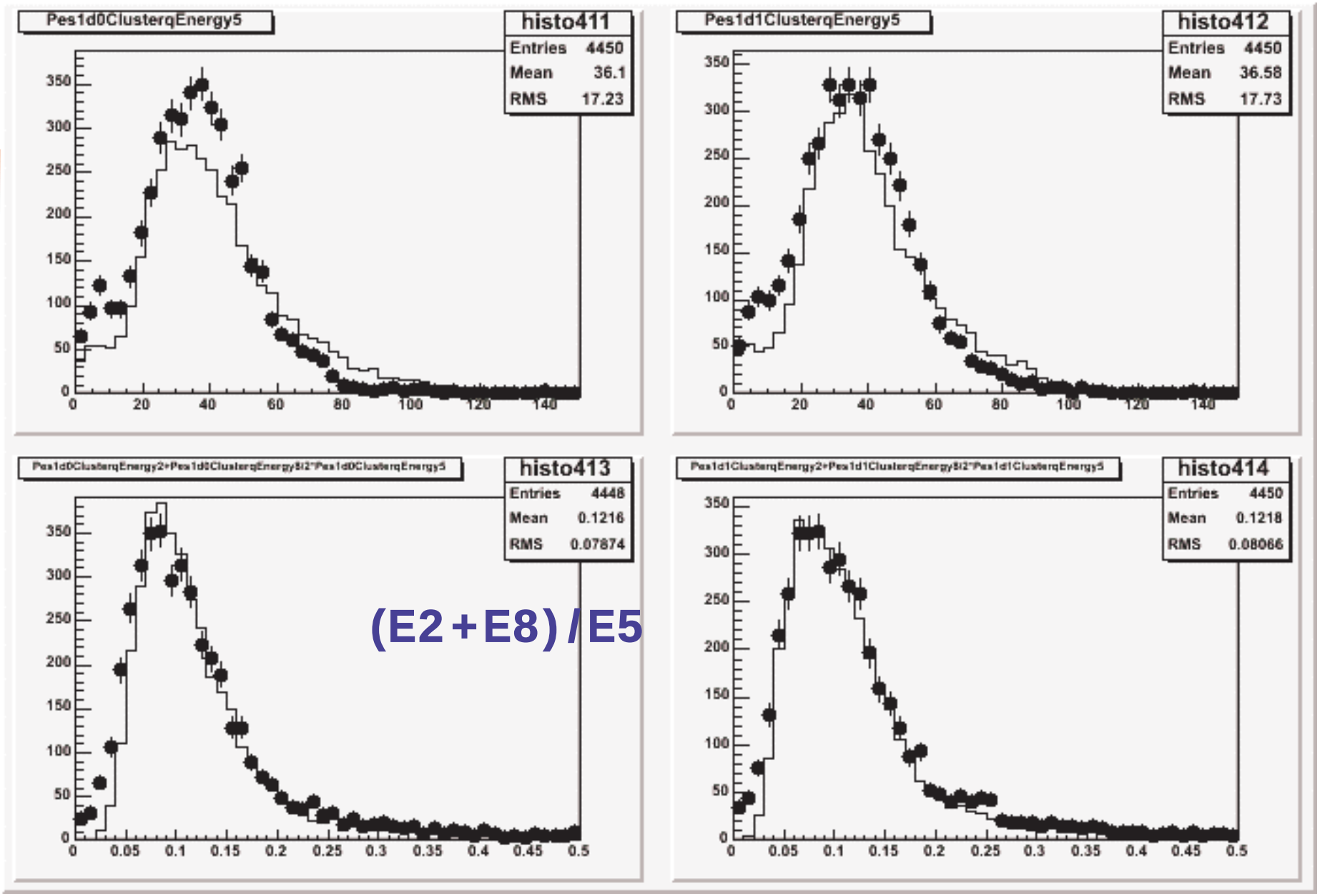

Pes1d0_Ene4/Pes1d0_Ene5
histo1911
Entries 4448
Mean 0.4821
RMS 0.216
Pes1d0_Ene3/Pes1d0_Ene5
histo1921
Entries 4448
Mean 0.2285
RMS 0.1562
Pes1d0_Ene2/Pes1d0_Ene5
histo1931
Entries 4448
Mean 0.1188
RMS 0.08331
Pes1d0_Ene1/Pes1d0_Ene5
histo1941
Entries 4448
Mean 0.08431
RMS 0.07001

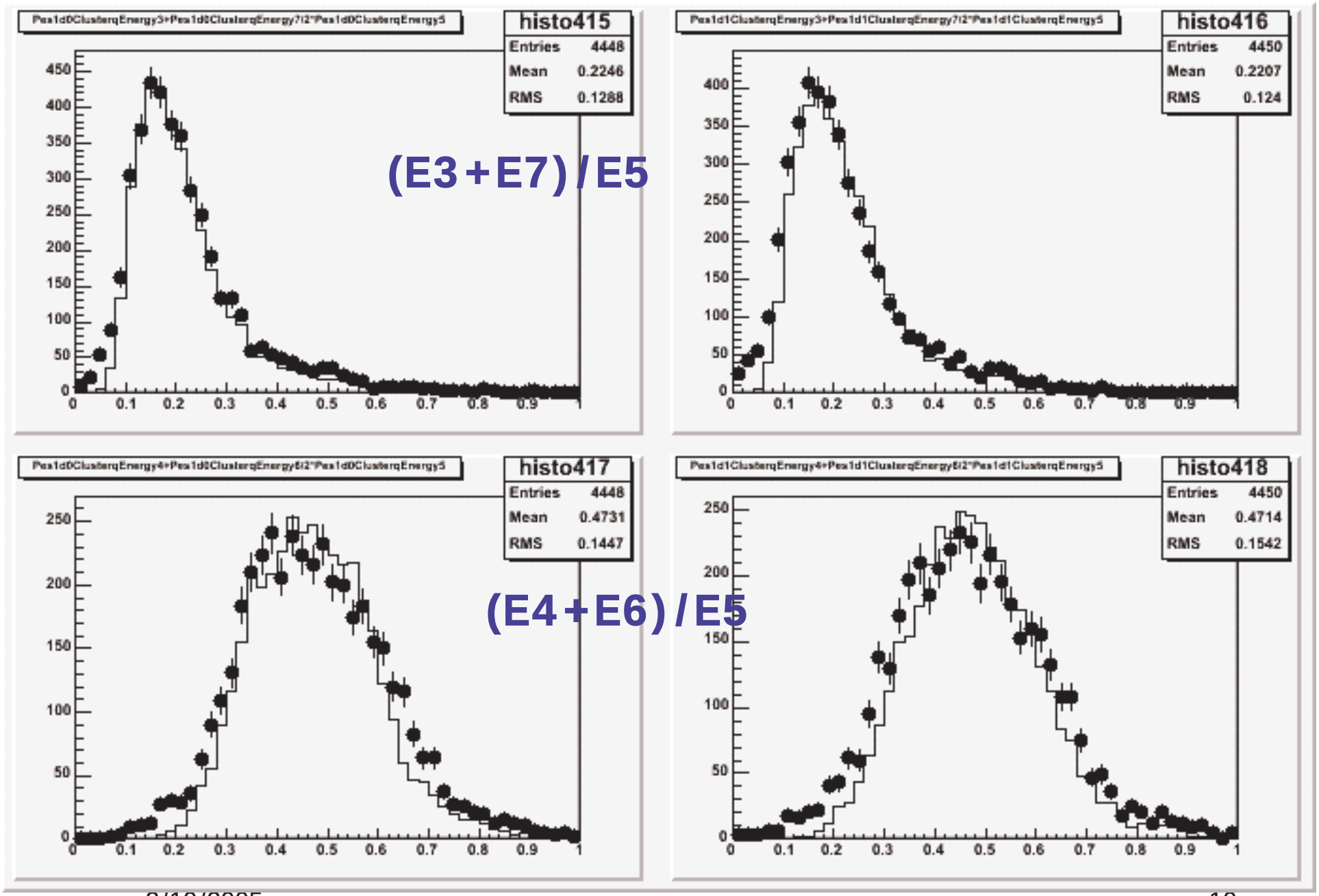

Pes1d1_Ene4/Pes1d1_Ene5
histo191
Entries 4450
Mean 0.4747
RMS 0.2204

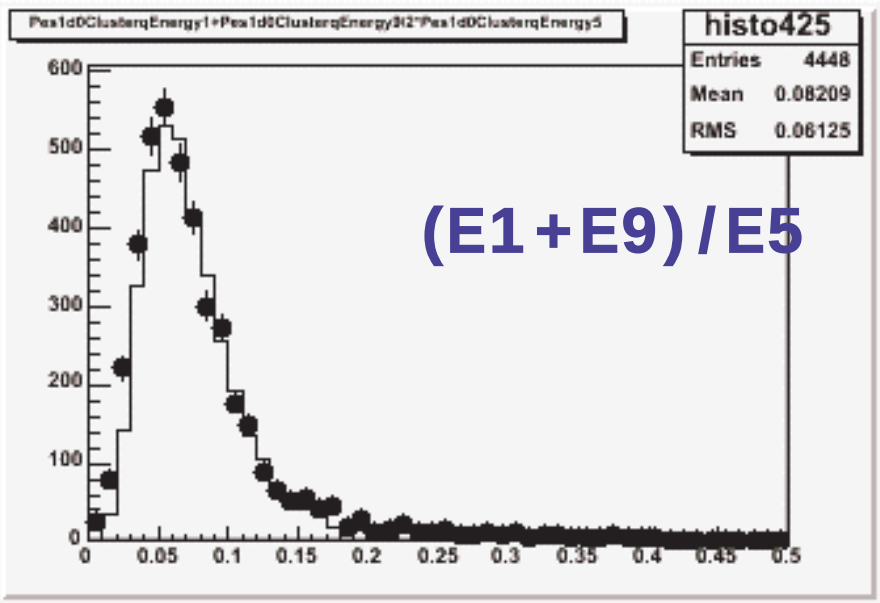

Pes1d1_Ene3/Pes1d1_Ene5
histo192
Entries 4450
Mean 0.2276
RMS 0.1578

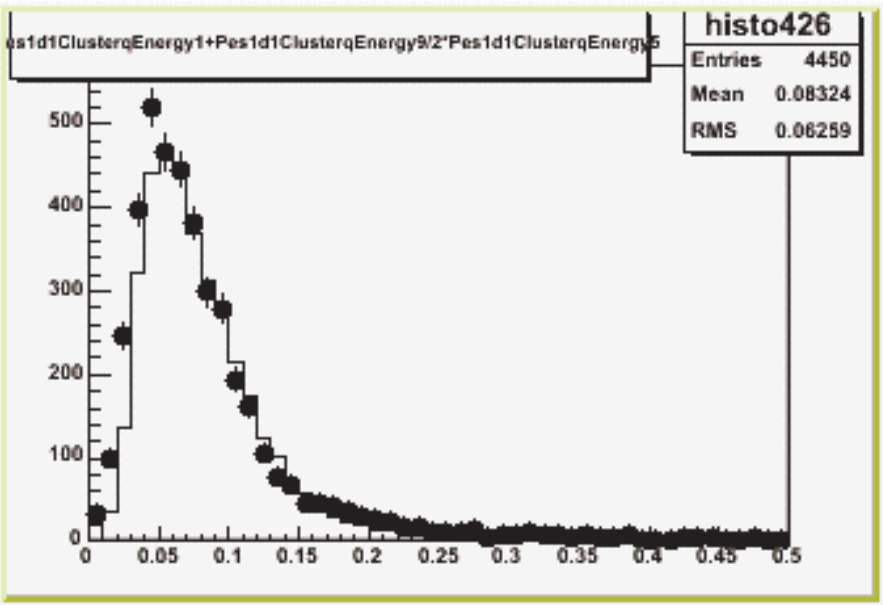

Pes1d1_Ene2/Pes1d1_Ene5
histo193
Entries 4450
Mean 0.1206
RMS 0.08405

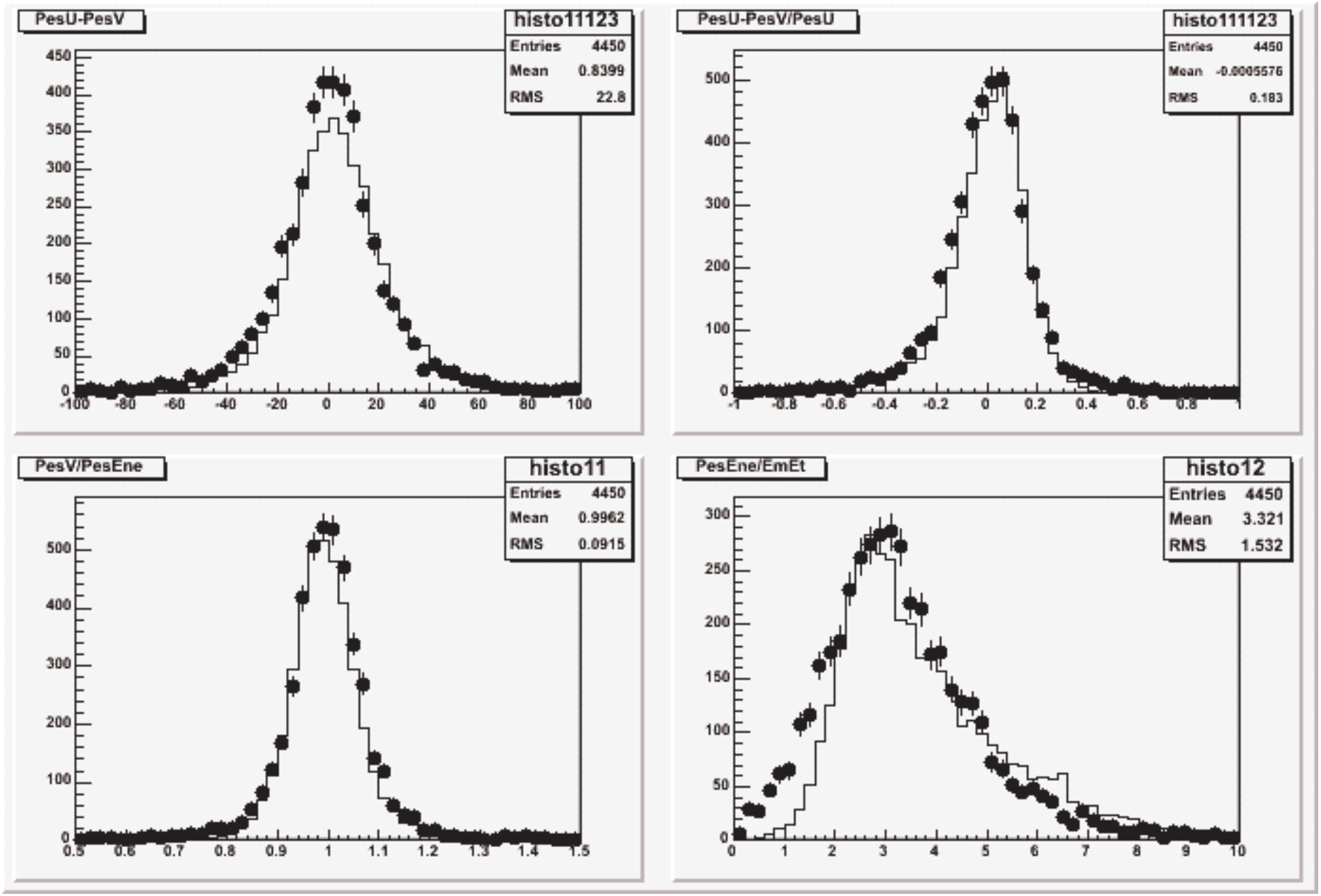

Pes1d1_Ene1/Pes1d1_Ene5
histo194
Entries 4450
Mean 0.08665
RMS 0.07293

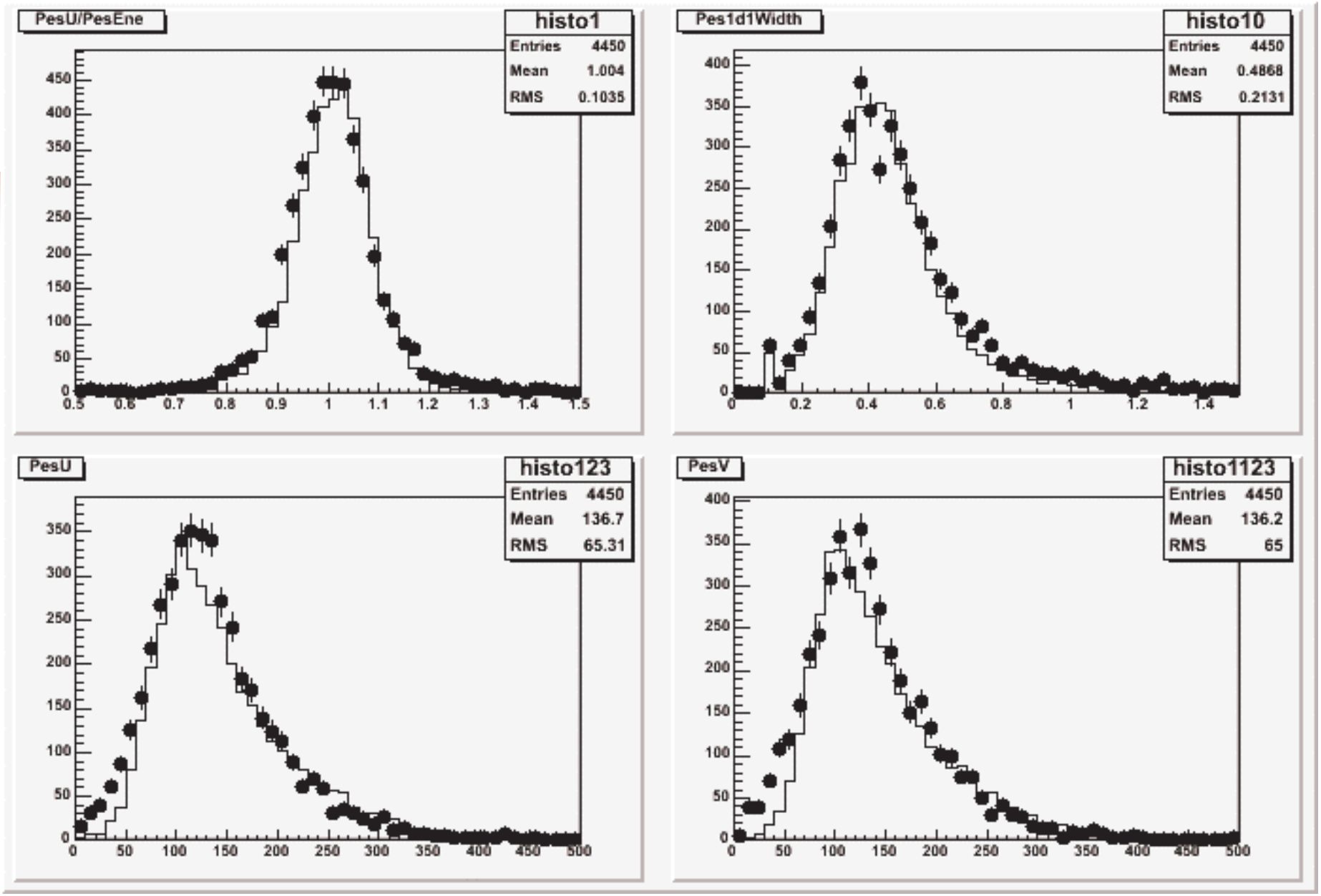

Pes1d0ClusterqEnergy5
histo411
Entries 4450
Mean 36.1
RMS 17.23
Pes1d1ClusterqEnergy5
histo412
Entries 4450
Mean 36.58
RMS 17.73
Pes1d0ClusterqEnergy2+Pes1d0ClusterqEnergy8/2*Pes1d0ClusterqEnergy5
histo413
Entries 4448
Mean 0.1216
RMS 0.07874
(E2+E8)/E5
Pes1d1ClusterqEnergy2+Pes1d1ClusterqEnergy8/2*Pes1d1ClusterqEnergy5
histo414
Entries 4450
Mean 0.1218
RMS 0.08066

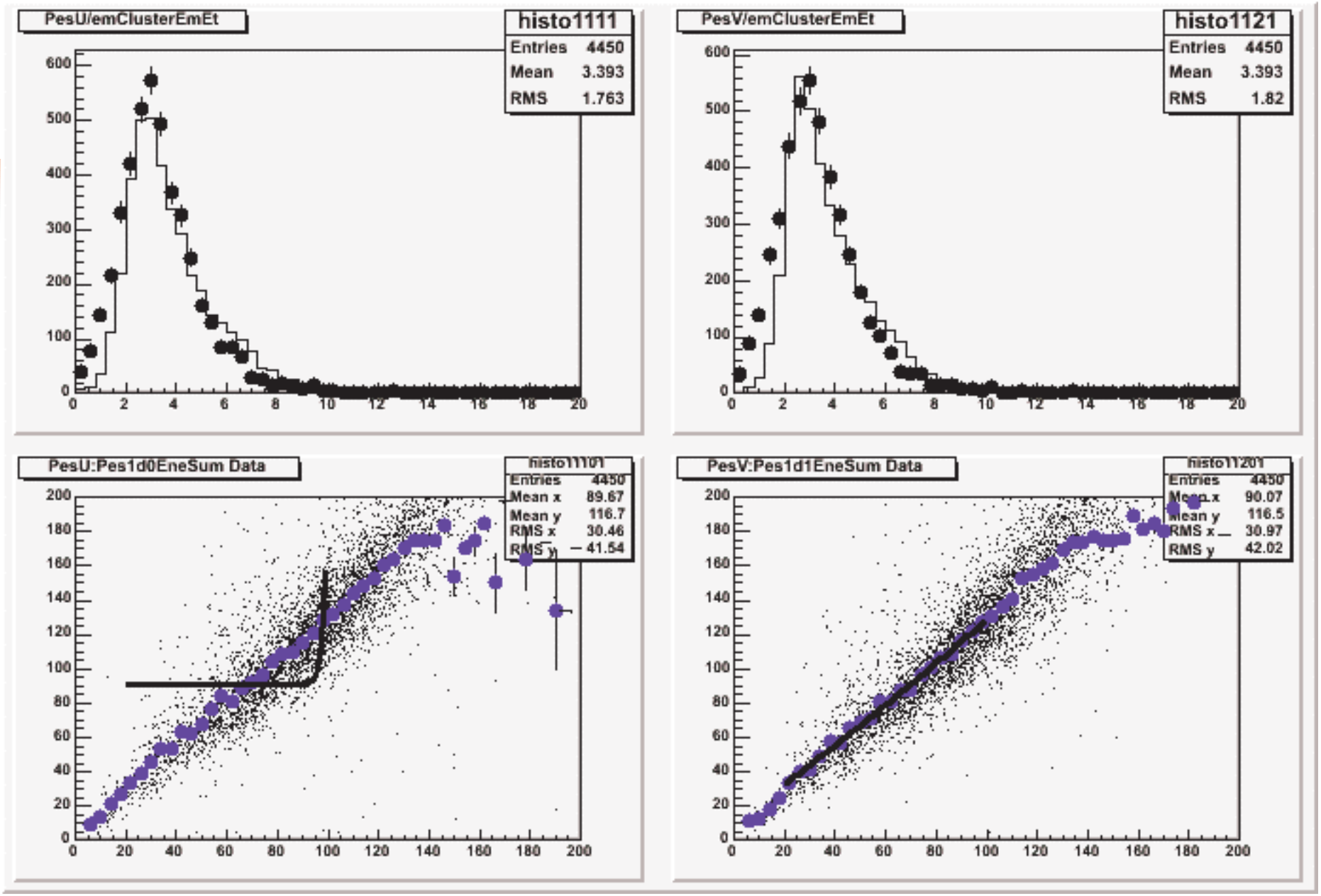

Pea1d0ClusterqEnergy3+Pea1d0ClusterqEnergy7/2*Pea1d0ClusterqEnergy5
histo415
Entries 4448
Mean 0.2246
RMS 0.1288
(E3+E7)/E5
Pea1d1ClusterqEnergy3+Pea1d1ClusterqEnergy7/2*Pea1d1ClusterqEnergy5
histo416
Entries 4450
Mean 0.2207
RMS 0.124
Pea1d0ClusterqEnergy4+Pea1d0ClusterqEnergy6/2*Pea1d0ClusterqEnergy5
histo417
Entries 4448
Mean 0.4731
RMS 0.1447
(E4+E6)/E5
Pea1d1ClusterqEnergy4+Pea1d1ClusterqEnergy6/2*Pea1d1ClusterqEnergy5
histo418
Entries 4450
Mean 0.4714
RMS 0.1542

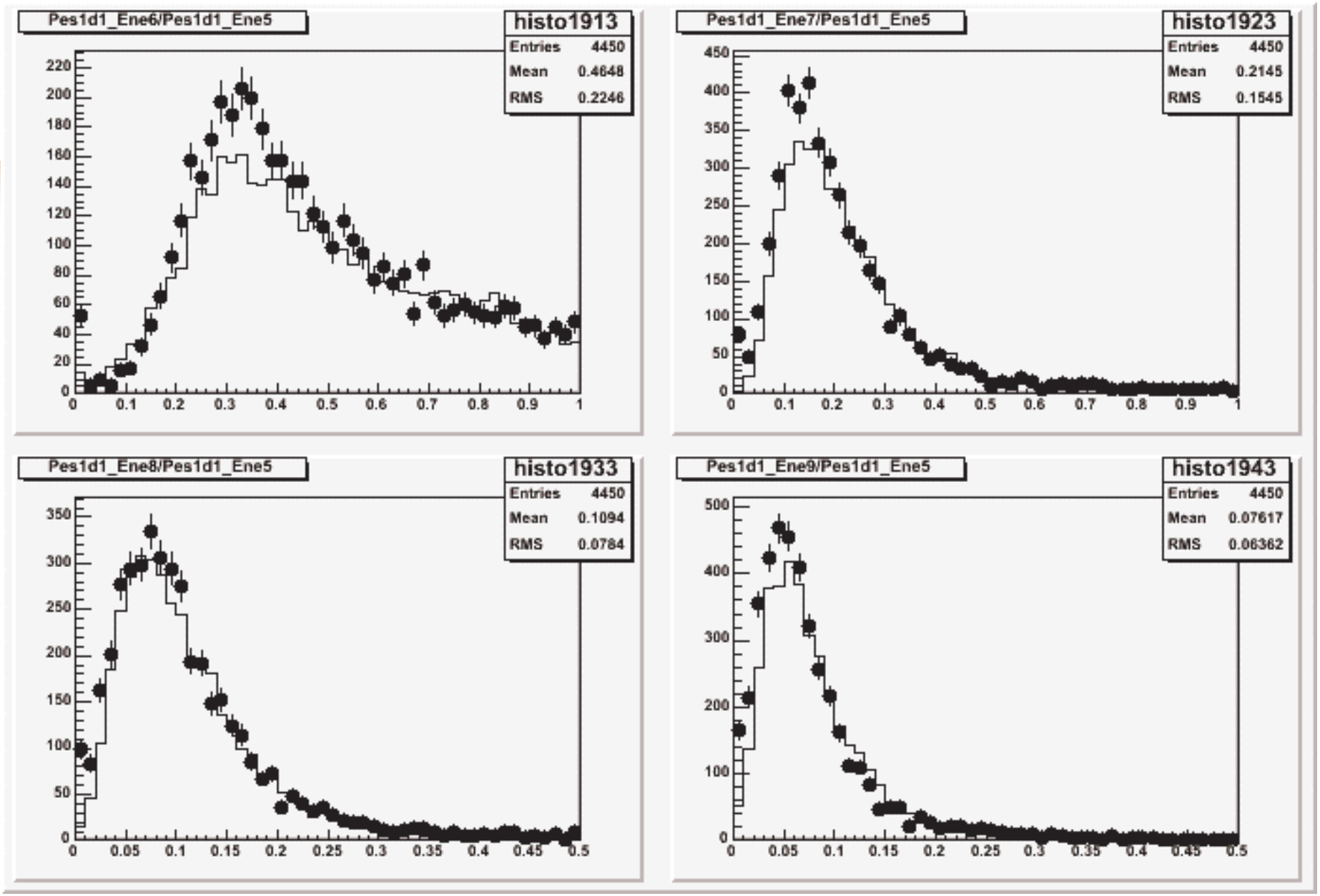

Pes1d0ClusterqEnergy1+Pes1d0ClusterqEnergy9/2*Pes1d0ClusterqEnergy5
histo425
Entries 4448
Mean 0.08209
RMS 0.06125
(E1+E9)/E5

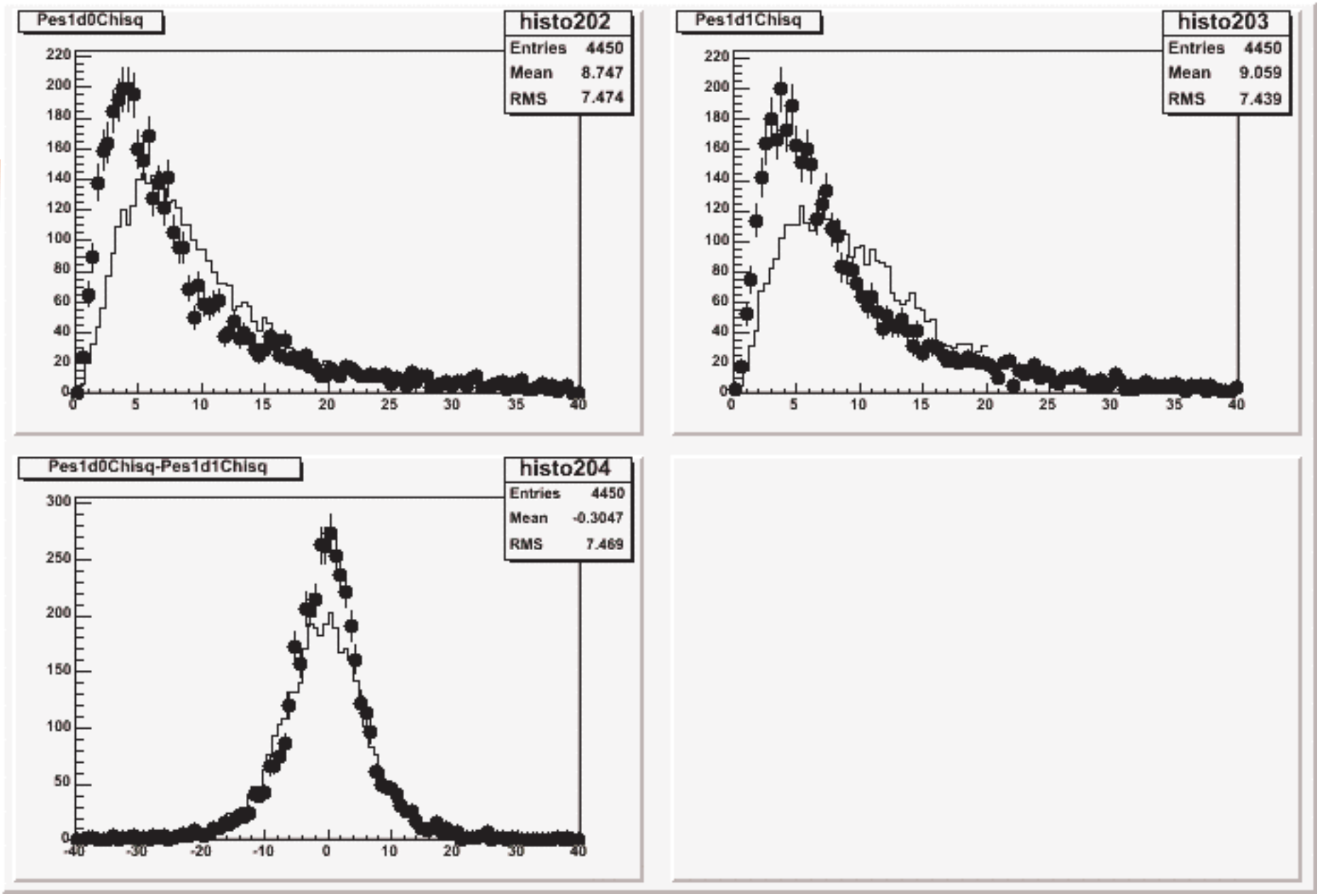

es1d1ClusterqEnergy1+Pes1d1ClusterqEnergy9/2*Pes1d1ClusterqEnergy5
histo426
Entries 4450
Mean 0.08324
RMS 0.06259

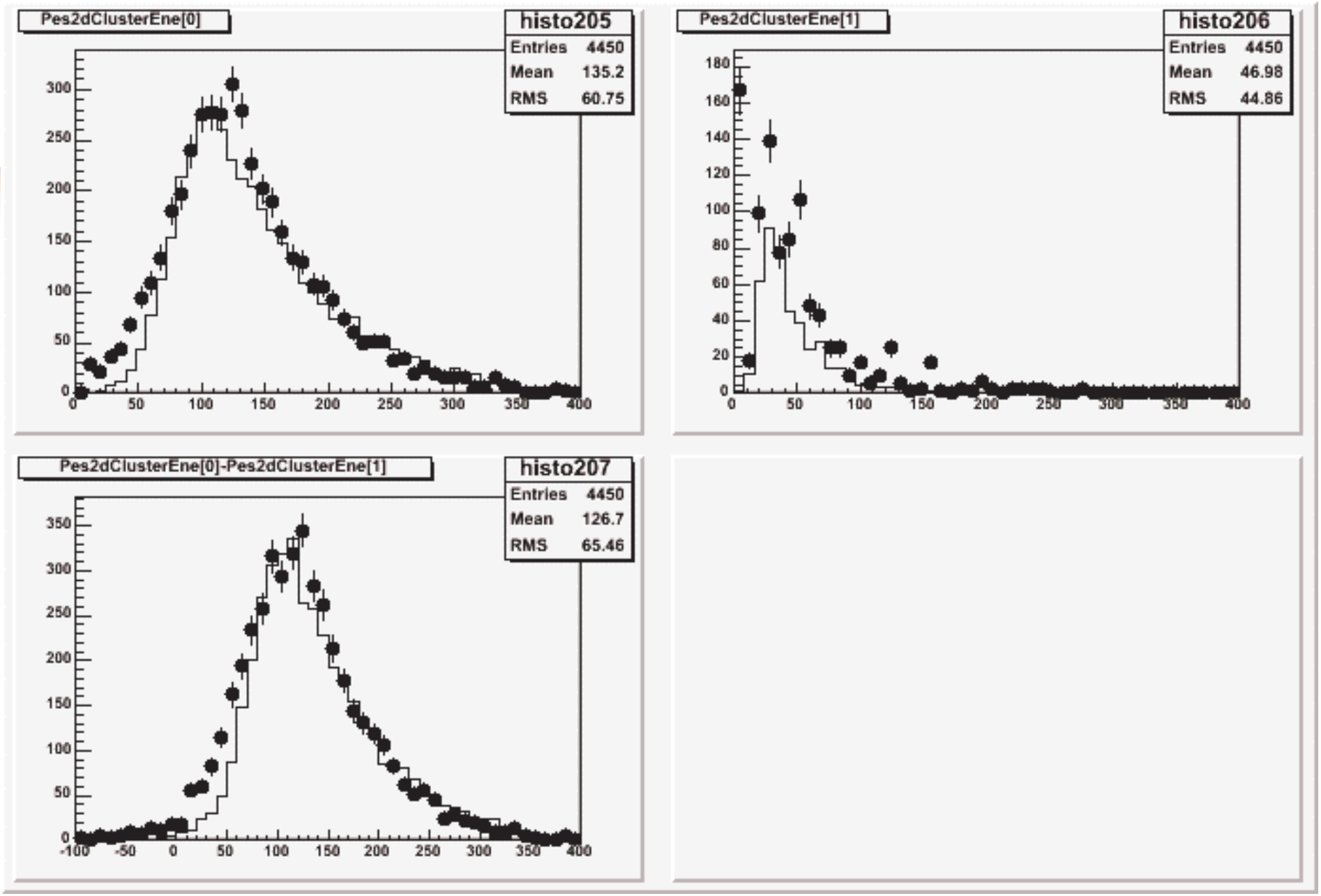

PesU-PesV
histo11123
Entries 4450
Mean 0.8399
RMS 22.8
PesU-PesV/PesU
histo111123
Entries 4450
Mean -0.0005576
RMS 0.183
PesV/PesEne
histo11
Entries 4450
Mean 0.9962
RMS 0.0915
PesEne/EmEt
histo12
Entries 4450
Mean 3.321
RMS 1.532

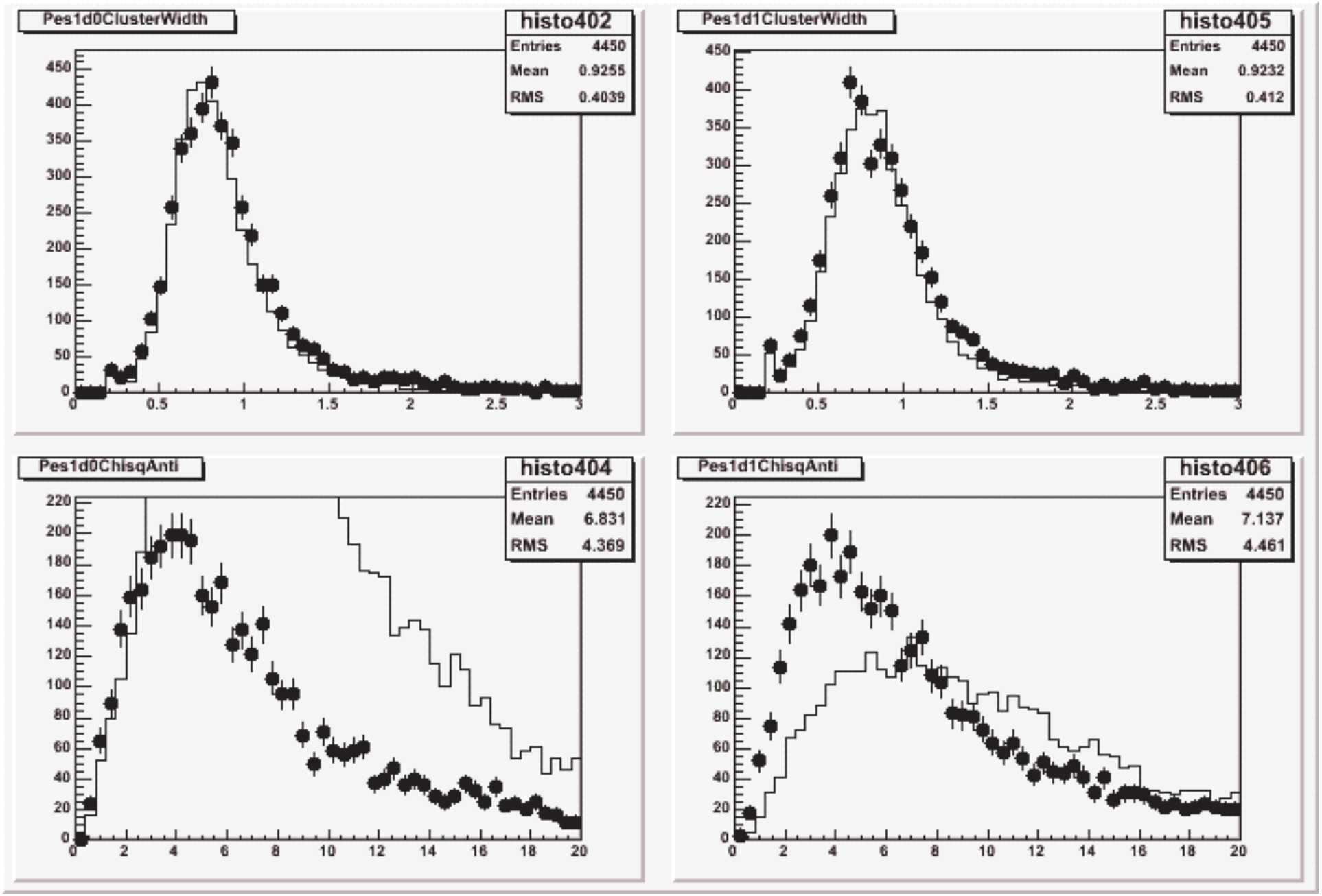

PesU/PesEne
histo1
Entries 4450
Mean 1.004
RMS 0.1035
Pes1d1Width
histo10
Entries 4450
Mean 0.4868
RMS 0.2131
PesU
histo123
Entries 4450
Mean 136.7
RMS 65.31
PesV
histo1123
Entries 4450
Mean 136.2
RMS 65

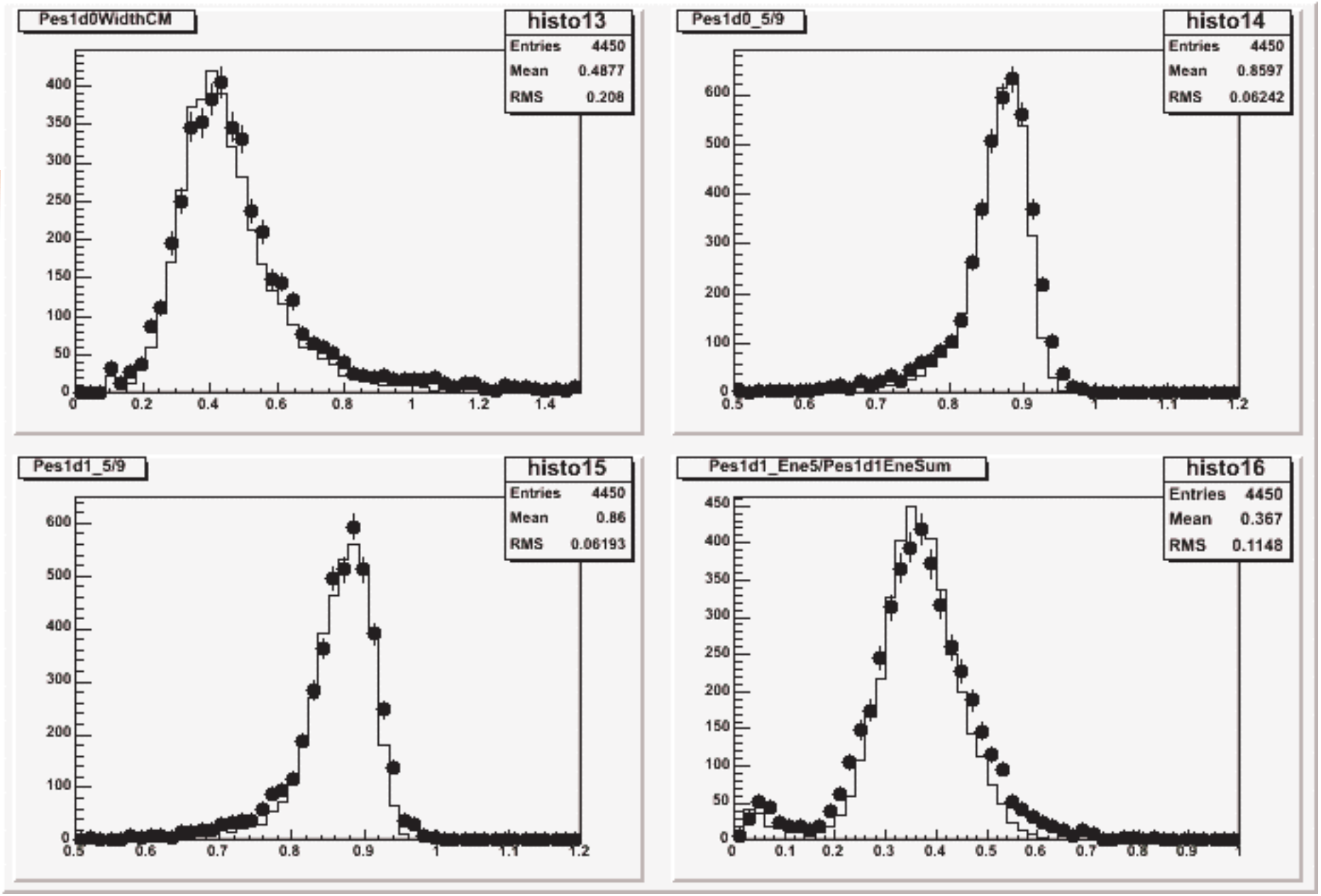

PesU/emClusterEmEt
histo1111
Entries 4450
Mean 3.393
RMS 1.763
PesV/emClusterEmEt
histo1121
Entries 4450
Mean 3.393
RMS 1.82
PesU:Pes1d0EneSum Data
histo11101
Entries 4450
Mean x 89.67
Mean y 116.7
RMS x 30.46
RMS y 41.54
PesV:Pes1d1EneSum Data
histo11201
Entries 4450
Mean x 90.07
Mean y 116.5
RMS x 30.97
RMS y 42.02

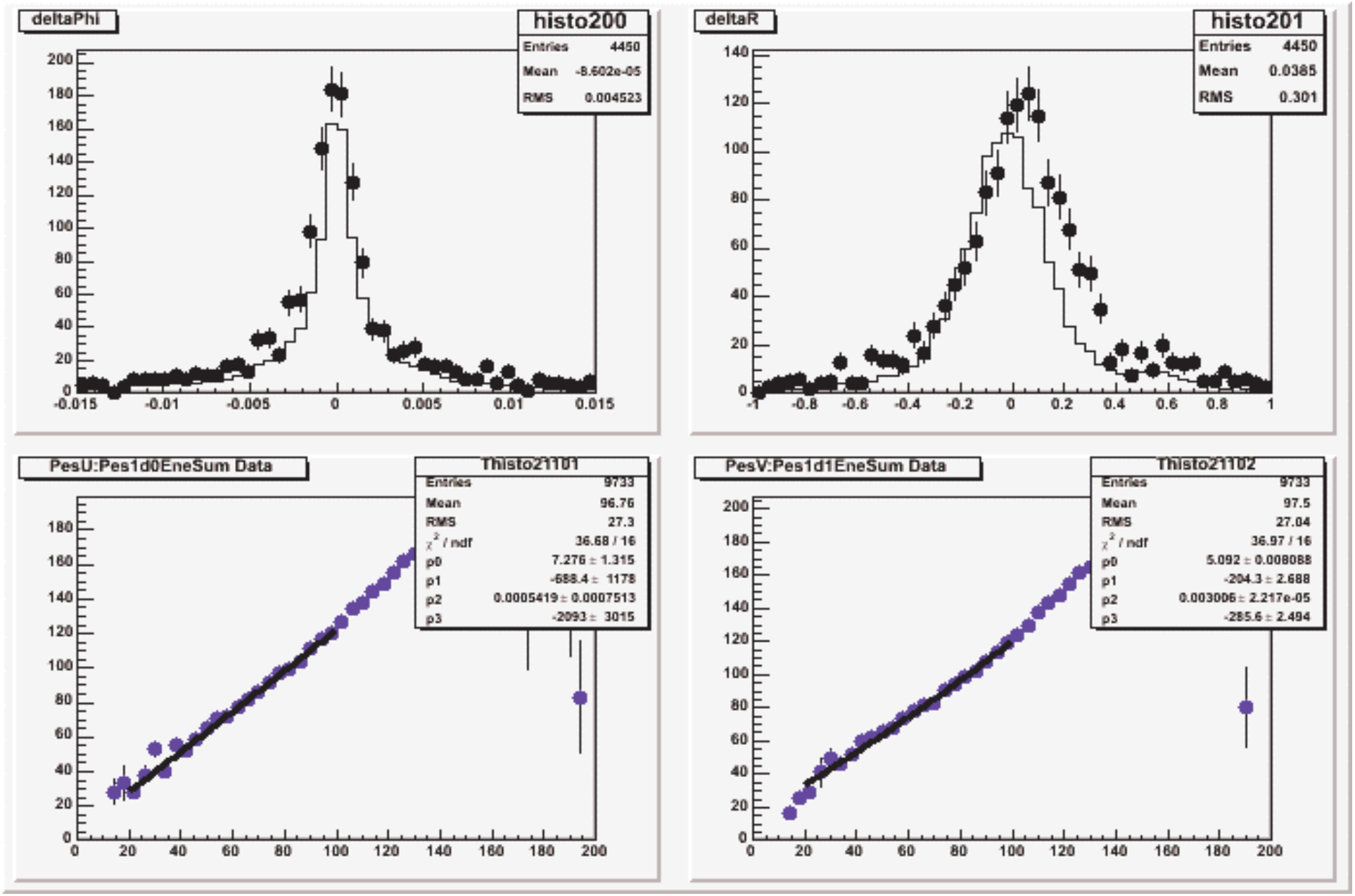

Pes1d1_Ene6/Pes1d1_Ene5
histo1913
Entries 4450
Mean 0.4648
RMS 0.2246
Pes1d1_Ene7/Pes1d1_Ene5
histo1923
Entries 4450
Mean 0.2145
RMS 0.1545
Pes1d1_Ene8/Pes1d1_Ene5
histo1933
Entries 4450
Mean 0.1094
RMS 0.0784
Pes1d1_Ene9/Pes1d1_Ene5
histo1943
Entries 4450
Mean 0.07617
RMS 0.06362

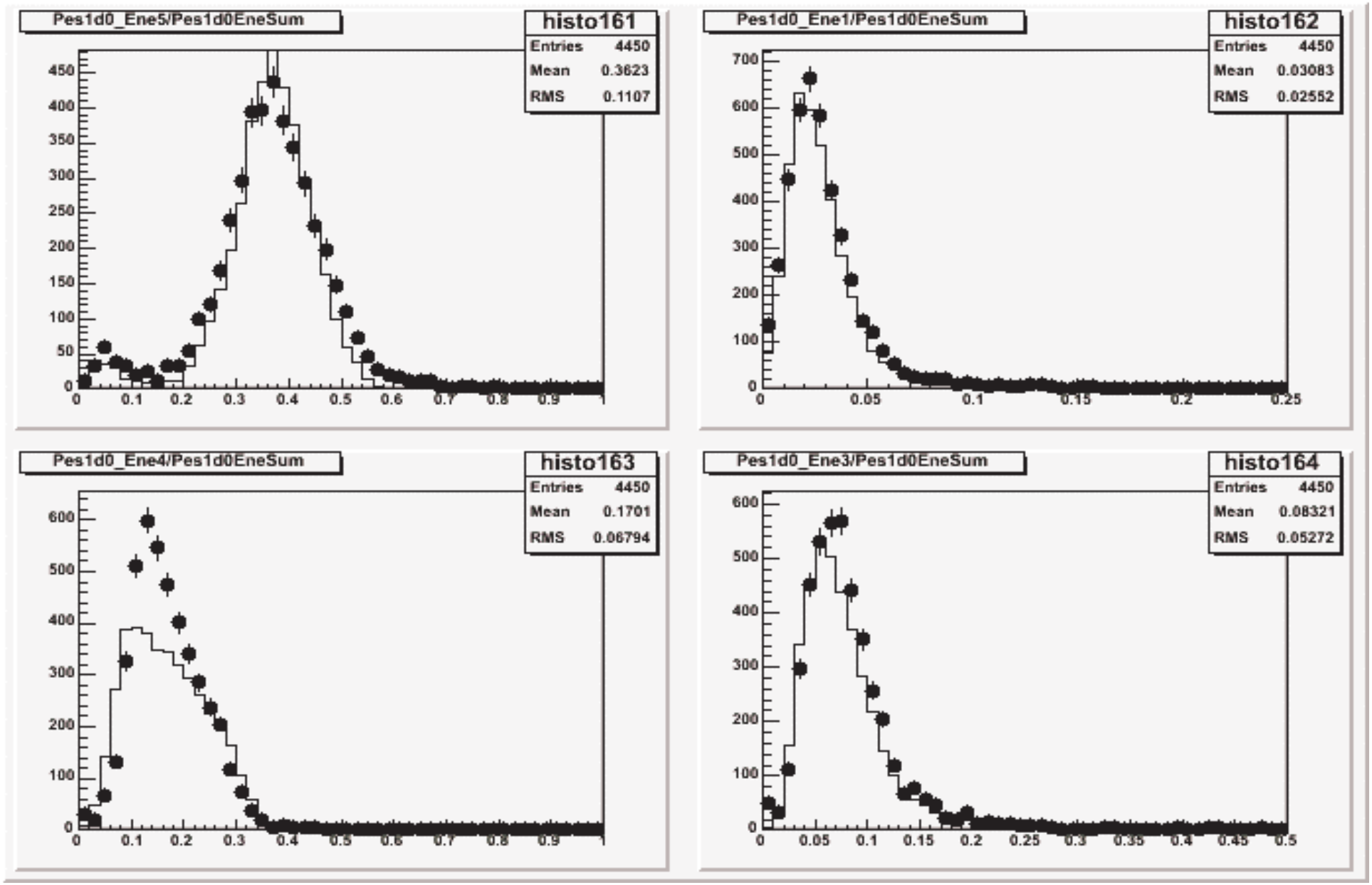

Pes1d0Chisq
histo202
Entries 4450
Mean 8.747
RMS 7.474
Pes1d1Chisq
histo203
Entries 4450
Mean 9.059
RMS 7.439
Pes1d0Chisq-Pes1d1Chisq
histo204
Entries 4450
Mean -0.3047
RMS 7.469

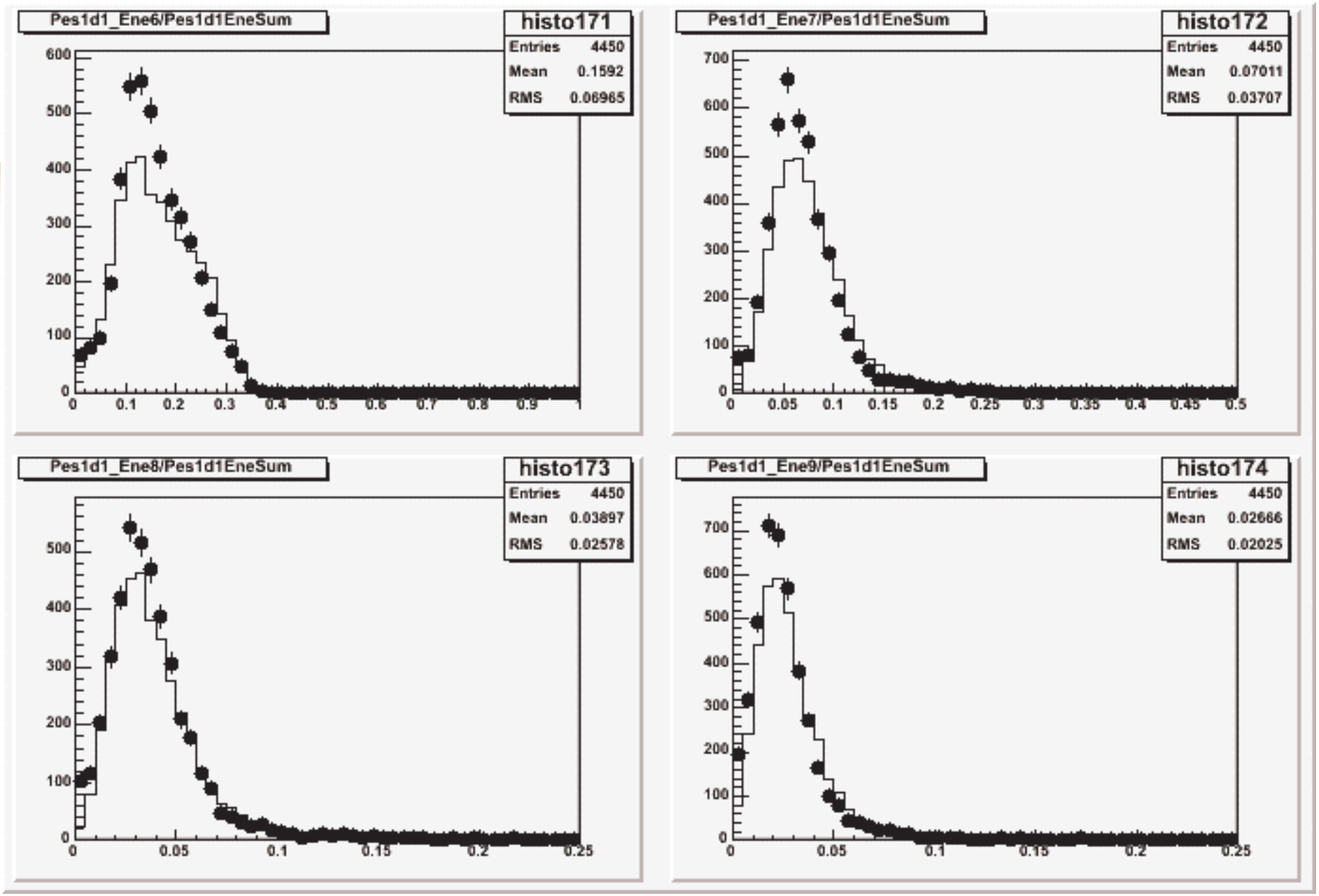

Pes2dClusterEne[0]
histo205
Entries 4450
Mean 135.2
RMS 60.75
Pes2dClusterEne[1]
histo206
Entries 4450
Mean 46.98
RMS 44.86
Pes2dClusterEne[0]-Pes2dClusterEne[1]
histo207
Entries 4450
Mean 126.7
RMS 65.46

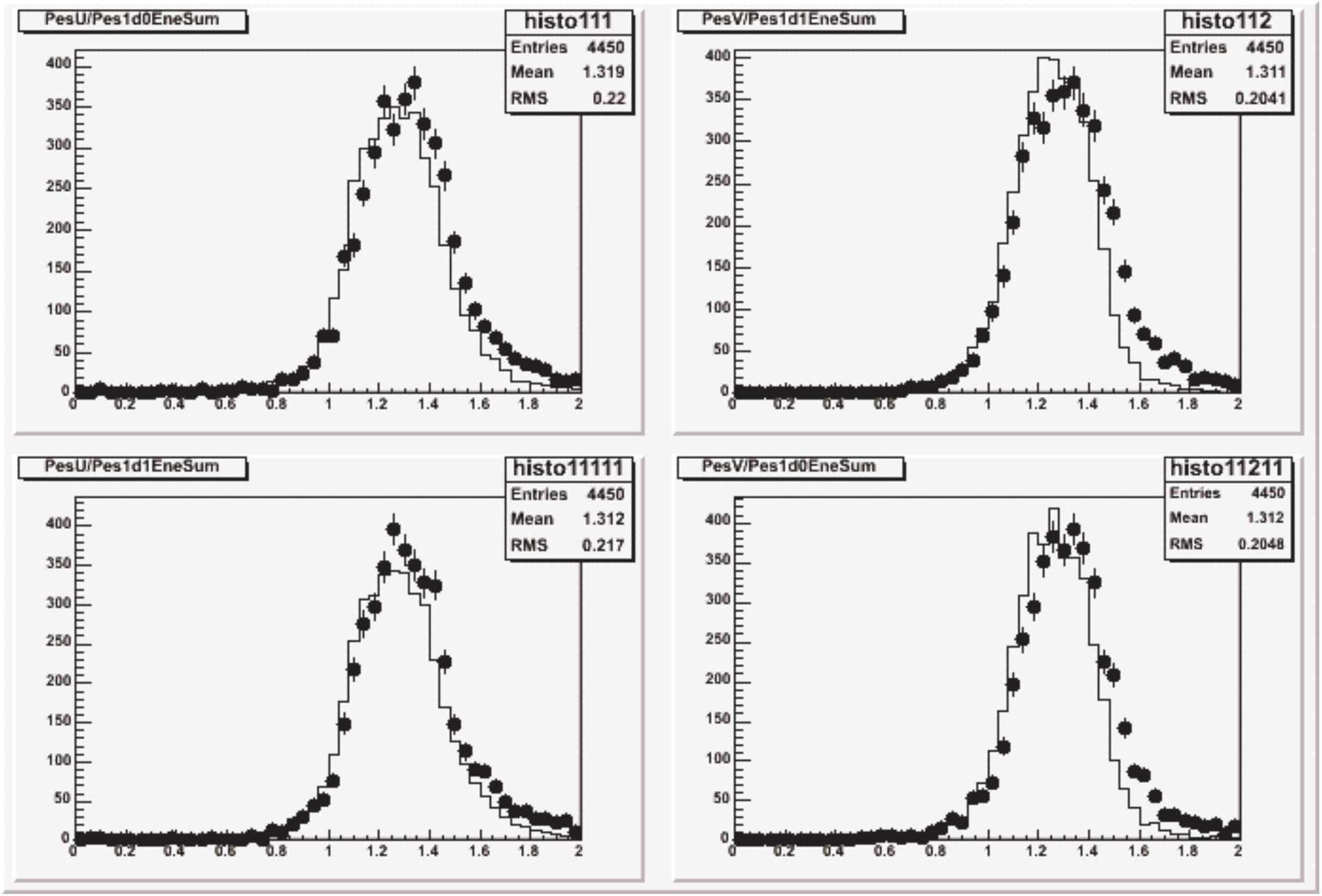

Pes1d0ClusterWidth
histo402
Entries 4450
Mean 0.9255
RMS 0.4039
Pes1d1ClusterWidth
histo405
Entries 4450
Mean 0.9232
RMS 0.412
Pes1d0ChisqAnti
histo404
Entries 4450
Mean 6.831
RMS 4.369
Pes1d1ChisqAnti
histo406
Entries 4450
Mean 7.137
RMS 4.461


Pes1d0WidthCM
histo13
Entries 4450
Mean 0.4877
RMS 0.208
Pes1d0_5/9
histo14
Entries 4450
Mean 0.8597
RMS 0.06242
Pes1d1_5/9
histo15
Entries 4450
Mean 0.86
RMS 0.06193
Pes1d1_Ene5/Pes1d1EneSum
histo16
Entries 4450
Mean 0.367
RMS 0.1148


deltaPhi
histo200
Entries 4450
Mean -8.602e-05
RMS 0.004523
deltaR
histo201
Entries 4450
Mean 0.0385
RMS 0.301
PesU:Pes1d0EneSum Data
Thisto21101
Entries 9733
Mean 96.76
RMS 27.3
χ² / ndf 36.68 / 16
p0 7.276 ± 1.315
p1 -688.4 ± 1178
p2 0.0005419 ± 0.0007513
p3 -2093 ± 3015
PesV:Pes1d1EneSum Data
Thisto21102
Entries 9733
Mean 97.5
RMS 27.04
χ² / ndf 36.97 / 16
p0 5.092 ± 0.008088
p1 -204.3 ± 2.688
p2 0.003006 ± 2.217e-05
p3 -285.6 ± 2.494


Pes1d0_Ene5/Pes1d0EneSum
histo161
Entries 4450
Mean 0.3623
RMS 0.1107
Pes1d0_Ene1/Pes1d0EneSum
histo162
Entries 4450
Mean 0.03083
RMS 0.02552
Pes1d0_Ene4/Pes1d0EneSum
histo163
Entries 4450
Mean 0.1701
RMS 0.06794
Pes1d0_Ene3/Pes1d0EneSum
histo164
Entries 4450
Mean 0.08321
RMS 0.05272


Pes1d1_Ene6/Pes1d1EneSum
histo171
Entries 4450
Mean 0.1592
RMS 0.06965
Pes1d1_Ene7/Pes1d1EneSum
histo172
Entries 4450
Mean 0.07011
RMS 0.03707
Pes1d1_Ene8/Pes1d1EneSum
histo173
Entries 4450
Mean 0.03897
RMS 0.02578
Pes1d1_Ene9/Pes1d1EneSum
histo174
Entries 4450
Mean 0.02666
RMS 0.02025


PesU/Pes1d0EneSum
histo111
Entries 4450
Mean 1.319
RMS 0.22
PesV/Pes1d1EneSum
histo112
Entries 4450
Mean 1.311
RMS 0.2041
PesU/Pes1d1EneSum
histo11111
Entries 4450
Mean 1.312
RMS 0.217
PesV/Pes1d0EneSum
histo11211
Entries 4450
Mean 1.312
RMS 0.2048

# Summary

- Good agreement
- Code submitted to CVS
- Tests undergo
- Working on Shower shape fitting.