MC Changes

- Bug in MC generation of Calorimeter hits
  - Detectors HCal & EMCal were being defined twice
    - once from the calorimeter summing routine `sum_cal` and once from the `analyze` routine in e907mc/
- This was causing:
  - double-counting of the energy deposit (all the time)
  - double-counting of the hits (most of the time)
- Fix: Turn off detector list in analyze.rcp (used to setup detectors for the `analyze_*` routines which are not required for generation anyway)
- This affects all the calorimeter hits in the MC data that were generated in Jan
- Other changes: noticed that the "scale factor" for packing dedx hits for chambers and bckov was set to 1e11: too high for a 32-bit number; have changed it to 1e9

Details….

Buggy

```
====== Event: 1
MC Hit HCAL/HCAL EDep=1.04615 EAdr=1
MC Hit HCAL/HCAL EDep=0.115422 EAdr=3
MC Hit HCAL/HCAL EDep=1.04615 EAdr=1
MC Hit HCAL/HCAL EDep=0.115422 EAdr=3
```

```
====== Event: 24
MC Hit HCAL/HCAL EDep=0.634806 EAdr=1
MC Hit HCAL/HCAL EDep=0.480294 EAdr=3
MC Hit HCAL/HCAL EDep=0.516428 EAdr=4
MC Hit HCAL/HCAL EDep=0.289749 EAdr=6
MC Hit HCAL/HCAL EDep=0.0908778 EAdr=8
```

```
====== Event: 30
MC Hit HCAL/HCAL EDep=0.330015 EAdr=1
MC Hit HCAL/HCAL EDep=0.0350184 EAdr=3
MC Hit HCAL/HCAL EDep=1.2371 EAdr=2
MC Hit HCAL/HCAL EDep=0.445208 EAdr=4
MC Hit HCAL/HCAL EDep=0.0869889 EAdr=6
```

```
====== Event: 33
MC Hit HCAL/HCAL EDep=0.676163 EAdr=1
MC Hit HCAL/HCAL EDep=1.13815 EAdr=3
MC Hit HCAL/HCAL EDep=0.193162 EAdr=5
MC Hit HCAL/HCAL EDep=0.270217 EAdr=7
MC Hit HCAL/HCAL EDep=0.113144 EAdr=4
MC Hit HCAL/HCAL EDep=0.676163 EAdr=1
MC Hit HCAL/HCAL EDep=0.270217 EAdr=3
MC Hit HCAL/HCAL EDep=0.113144 EAdr=4
```

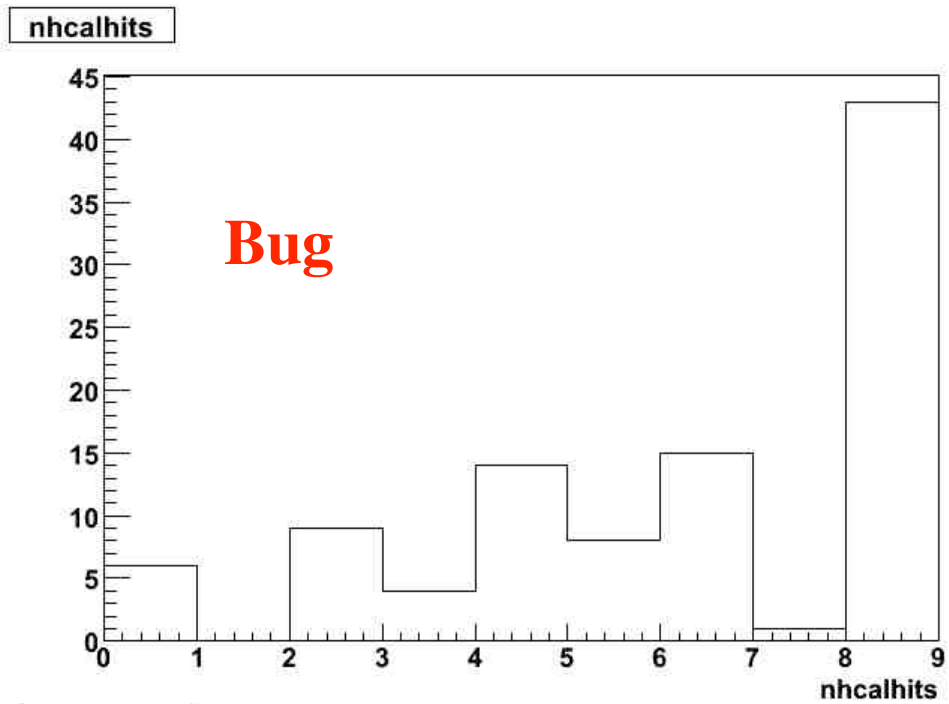
Fixed

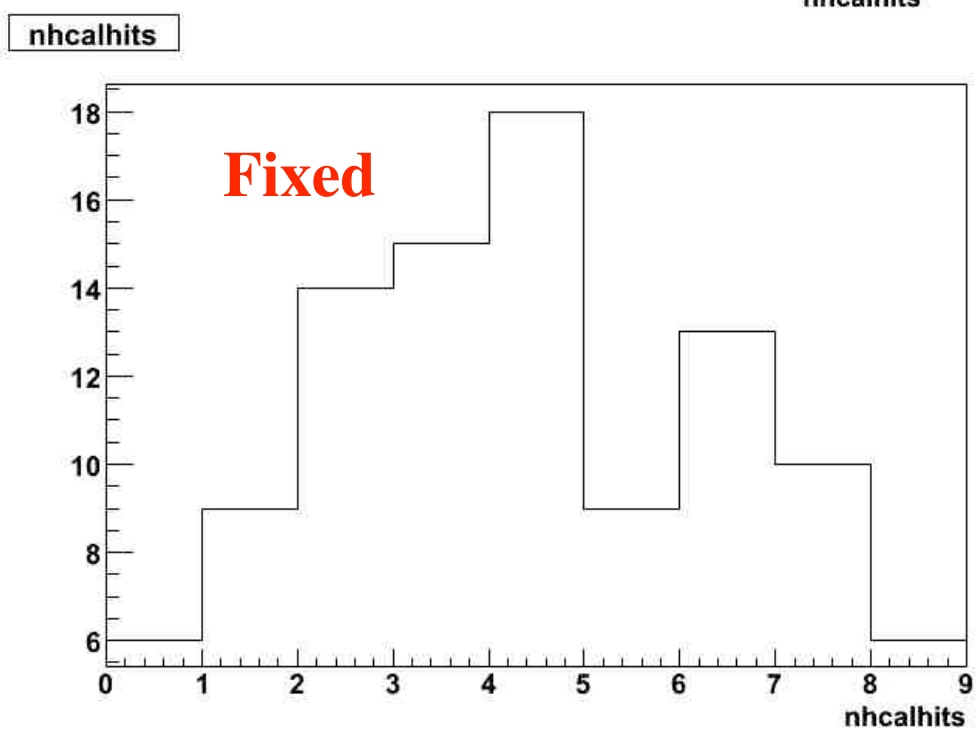
```
====== Event: 1
MC Hit HCAL/HCAL EDep=0.523075 EAdr=1
MC Hit HCAL/HCAL EDep=0.0577112 EAdr=3
```

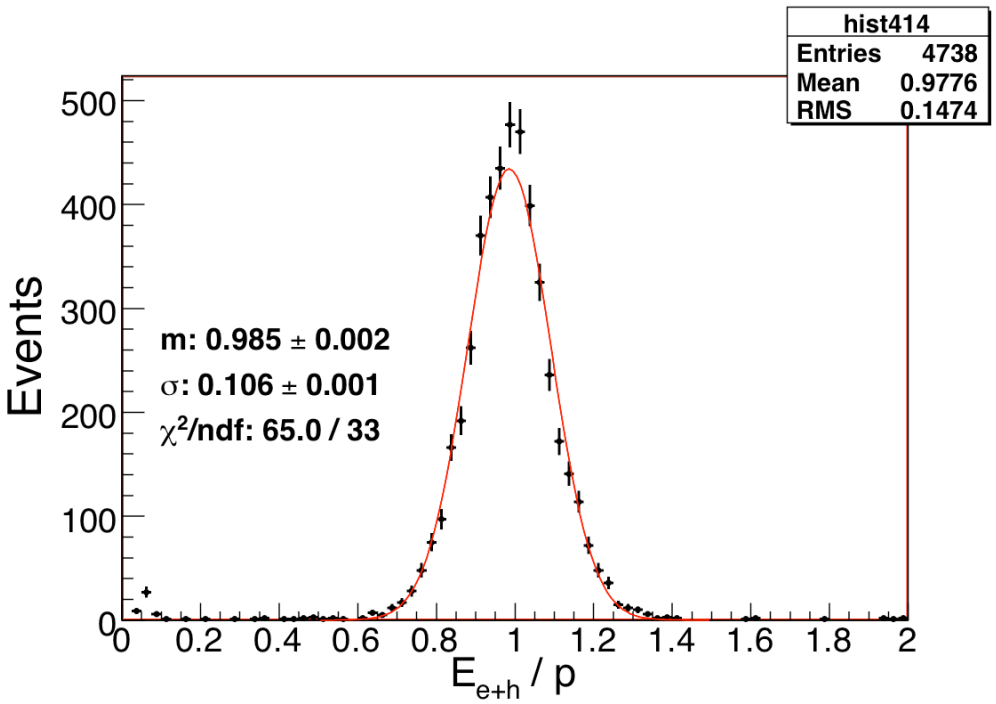
```
====== Event: 24
MC Hit HCAL/HCAL EDep=0.317403 EAdr=1
MC Hit HCAL/HCAL EDep=0.0416724 EAdr=3
MC Hit HCAL/HCAL EDep=0.240147 EAdr=2
MC Hit HCAL/HCAL EDep=0.258214 EAdr=4
MC Hit HCAL/HCAL EDep=0.144874 EAdr=6
MC Hit HCAL/HCAL EDep=0.0454389 EAdr=8
```

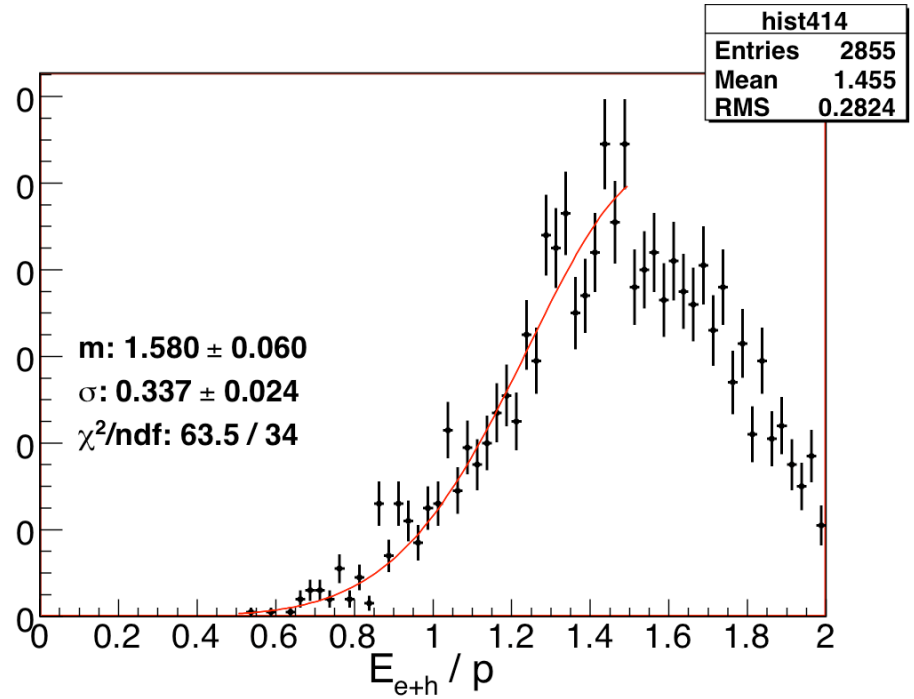
```
====== Event: 30
MC Hit HCAL/HCAL EDep=0.165008 EAdr=1
MC Hit HCAL/HCAL EDep=0.0175092 EAdr=3
MC Hit HCAL/HCAL EDep=0.618553 EAdr=2
MC Hit HCAL/HCAL EDep=0.222604 EAdr=4
MC Hit HCAL/HCAL EDep=0.0434944 EAdr=6
```

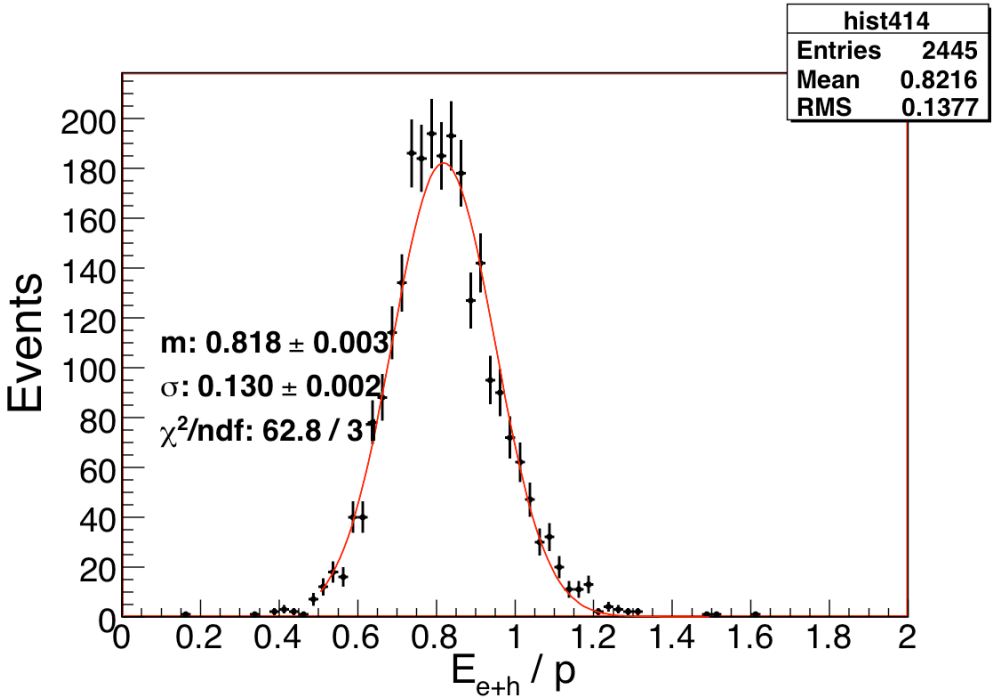
```
====== Event: 33
MC Hit HCAL/HCAL EDep=0.338081 EAdr=1
MC Hit HCAL/HCAL EDep=0.569076 EAdr=3
MC Hit HCAL/HCAL EDep=0.0965811 EAdr=5
MC Hit HCAL/HCAL EDep=0.135108 EAdr=7
MC Hit HCAL/HCAL EDep=0.0565722 EAdr=4
```


nhcalhits
Bug
45
40
35
30
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
nhcalhits

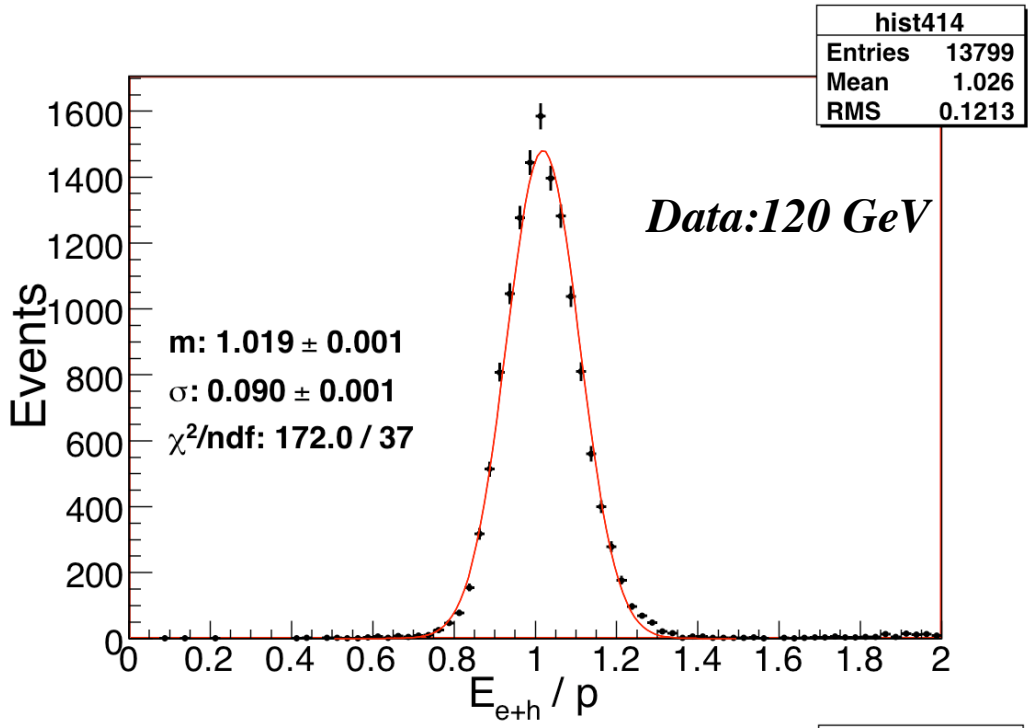

nhcalhits
Fixed
18
16
14
12
10
8
6
0
1
2
3
4
5
6
7
8
9
nhcalhits

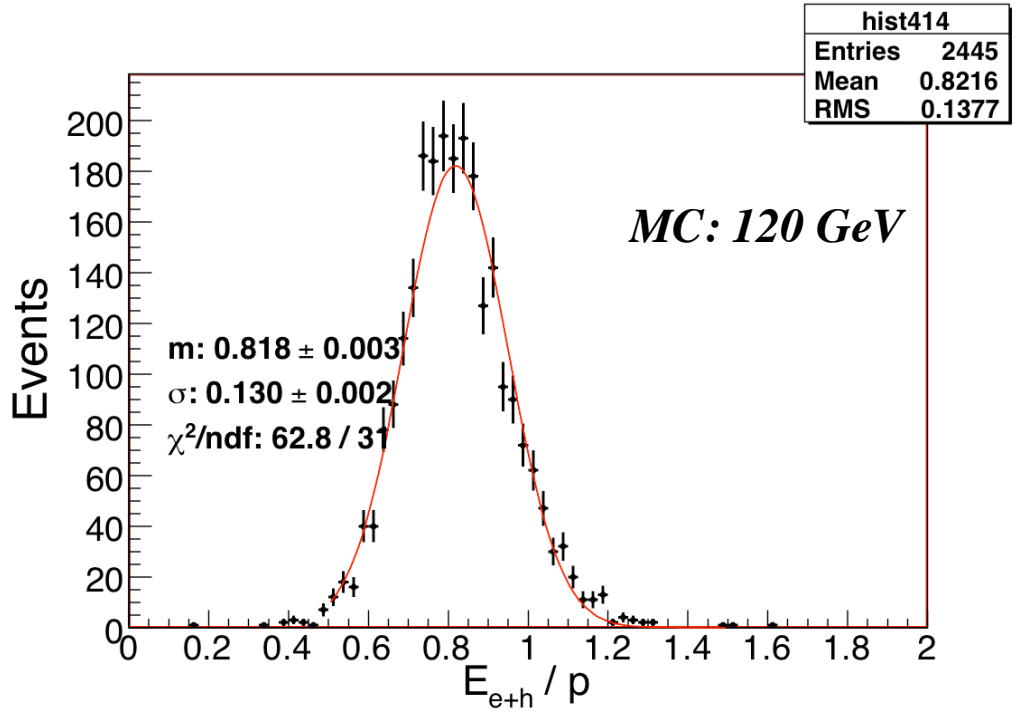






Top Left: Data 58 GeV
Top Right: MC 58 GeV: Bug
Bottom Left: MC 58 GeV: Fixed


hist414
Entries 13799
Mean 1.026
RMS 0.1213
Data:120 GeV
m: 1.019 ± 0.001
σ: 0.090 ± 0.001
χ²/ndf: 172.0 / 37
Events
E_e+h / p


hist414
Entries 2445
Mean 0.8216
RMS 0.1377
MC: 120 GeV
m: 0.818 ± 0.003
σ: 0.130 ± 0.002
χ²/ndf: 62.8 / 31
Events
E_e+h / p

Summary

- Bug in Calo MC generation has been fixed
- Tagged Release R08.04.02 to test the generator. Generated a few runs on the grid for testing.
- Currently looking at the generated and reconstructed output to make sure. So far, things look OK.
- Once I verify, will re-generate MC data.