Plug/Crack Calorimeter E/p Tuning

Pedro A. Movilla Fernández (LBNL)

Simulation Group Meeting

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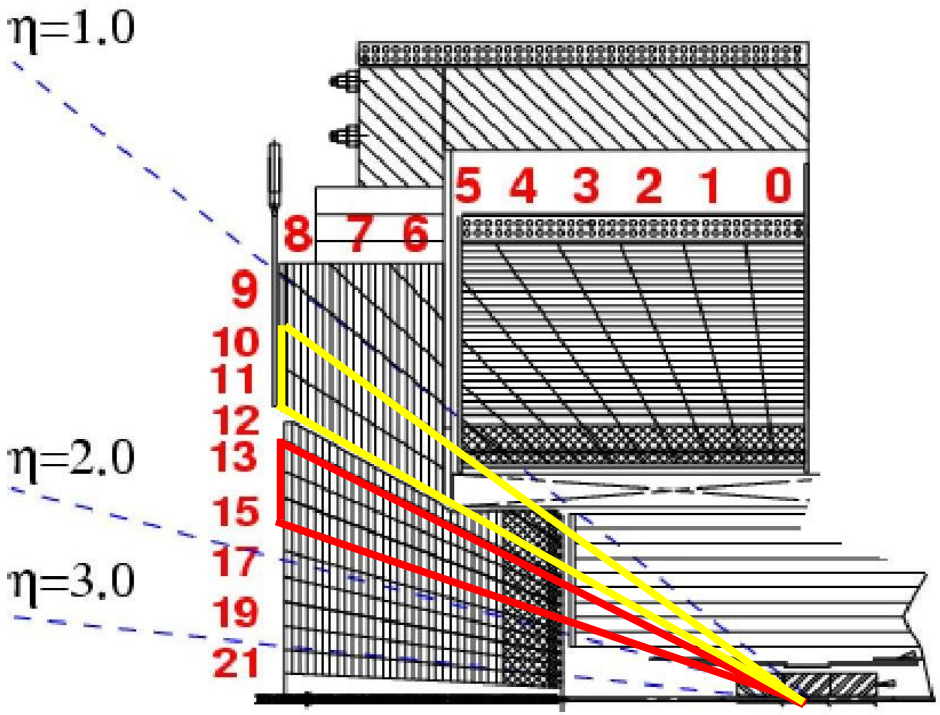
Introduction

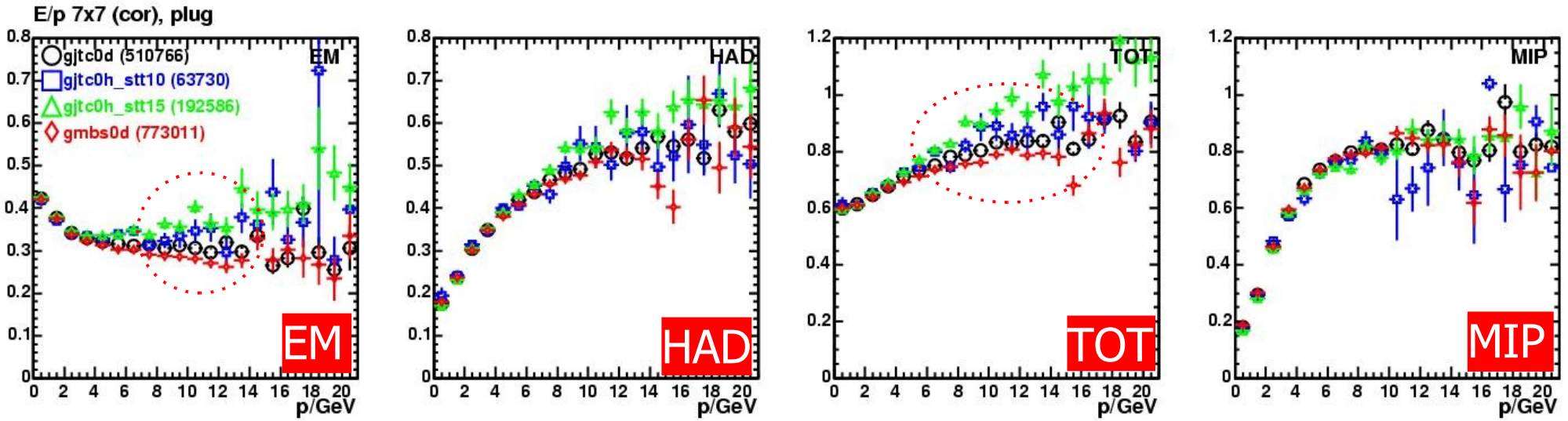
- After lateral profile tuning for the Plug simulation, the simulated E/p responses disagree due to leakage effects.
- This talk: First results of absolute E/p tuning iterations. (See my JER workshop talk of Aug-23 for details of event selection and signal definitions).



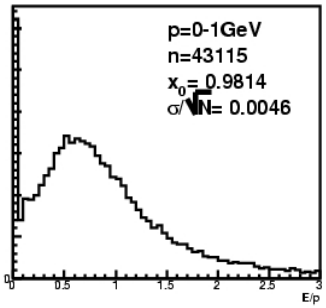
- "Crack"= target towers 10,11
- "Plug" = target towers 13-15
- Only IO tracks are used.

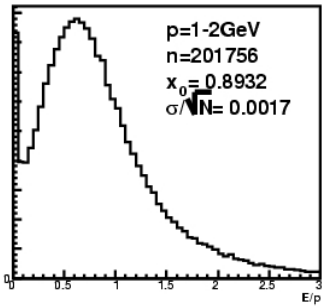
Data Samples

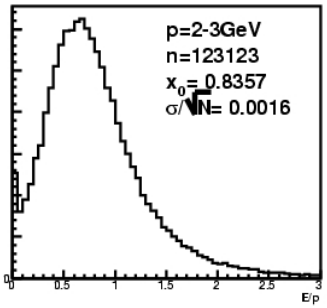
- Focus on 0d datasets: gmbs0d (21M events) & gjtc0d (16M events)
- ⟨E/p⟩ background correction is performed individually for each data set.
- Corrected distributions are combined using weighted means.
- For p>10 GeV/c, Gaussian means instead of simple means are used.
- Ignore 0h STT data sets because of possible electron contamination
  - Gaussian means are insensitive to this but are not good estimator of <E/p> at too low p because of the tails of E/p distributions.
  - Didn't optimize electron veto for the Plug.

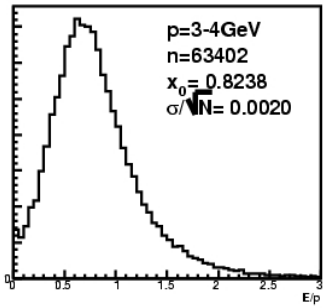


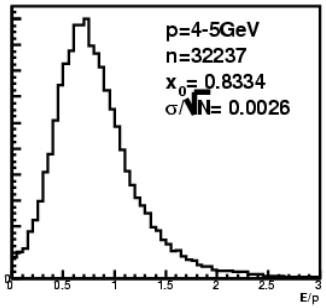
Plug TOT/p Distributions (gjtc0d)

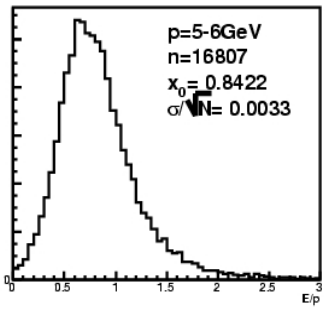


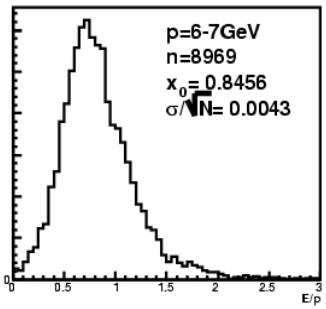


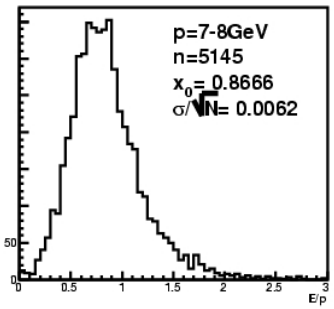


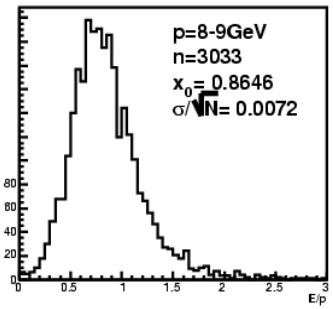


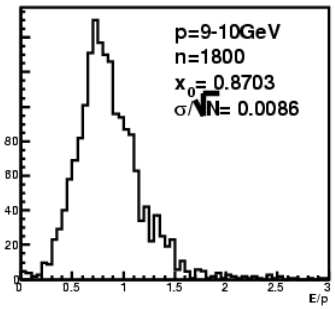


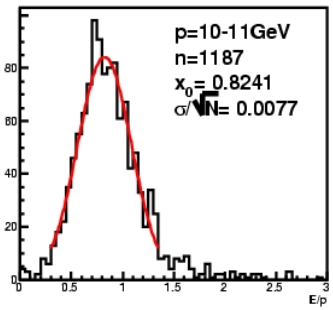


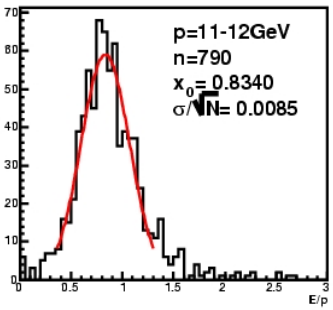


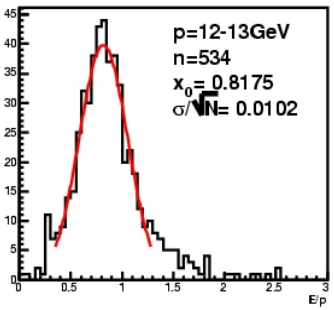


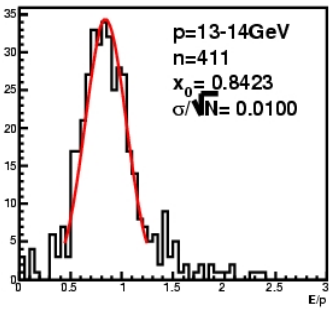


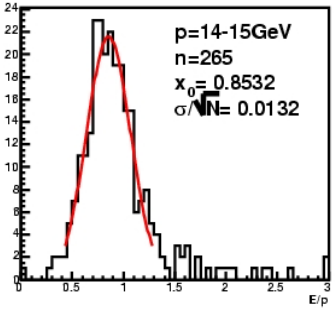


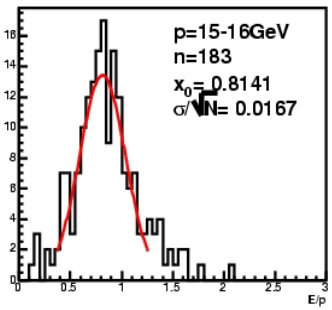


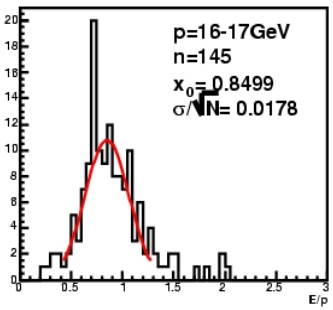


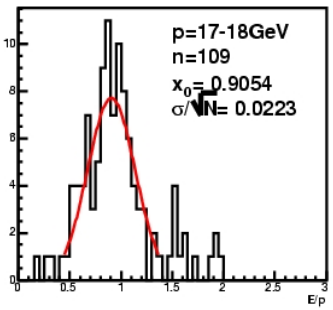


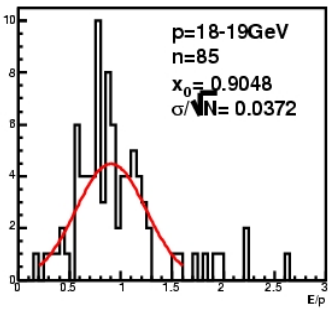


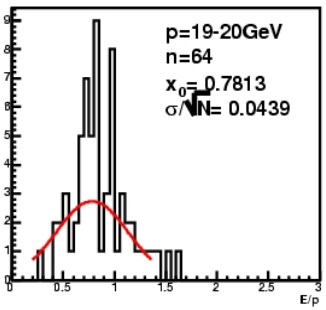




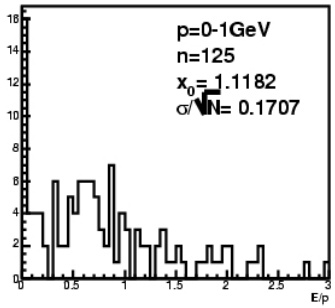


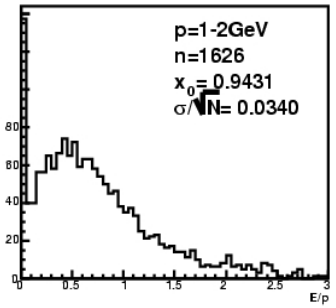


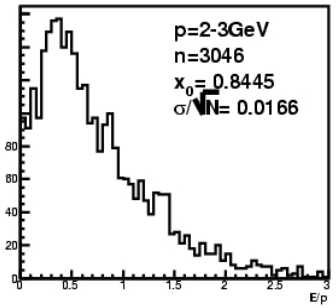


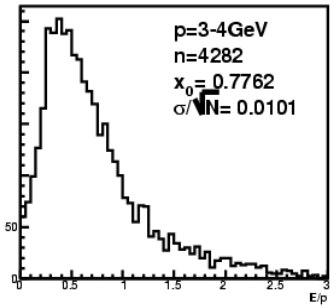


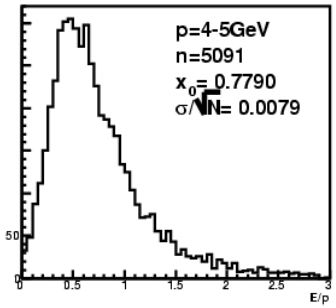
Plug TOT/p Distributions (FAKEEV)

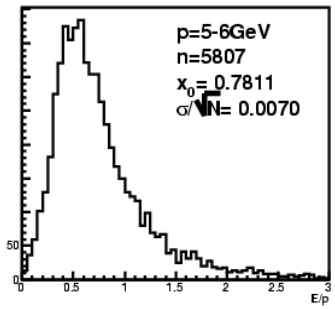


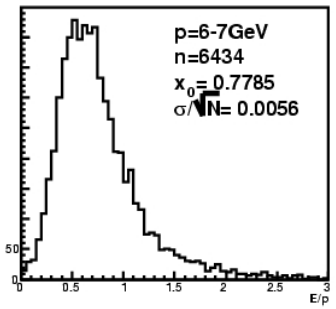


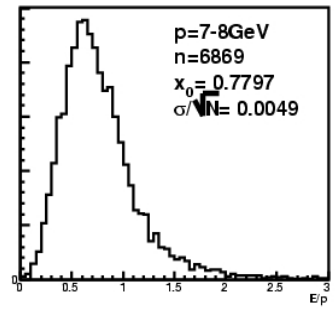


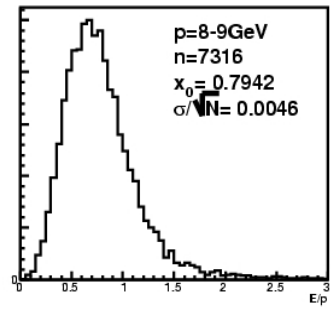


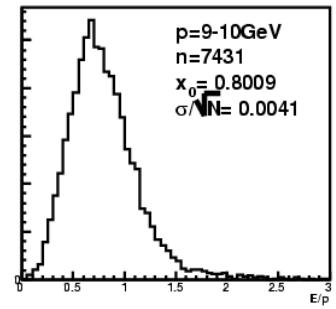


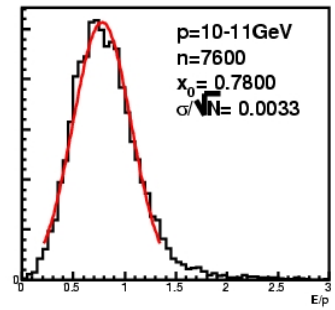


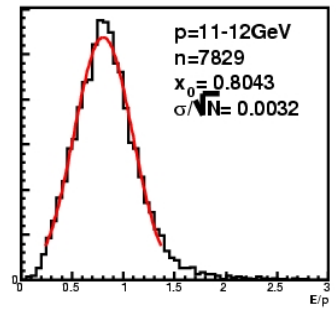


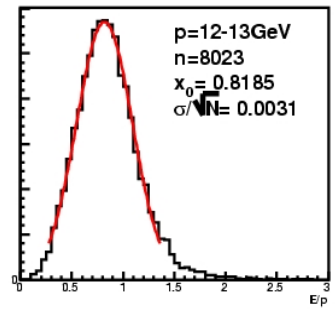


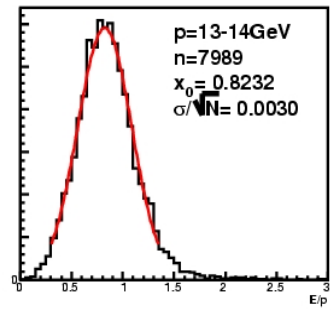


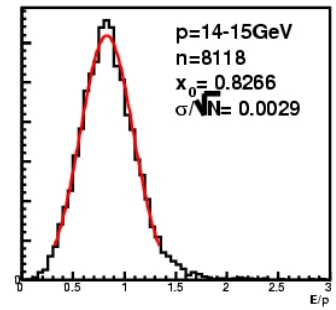


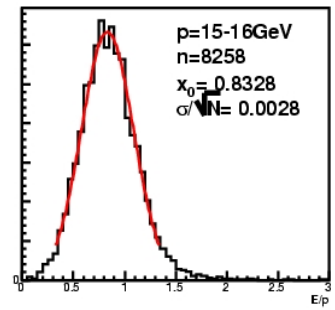


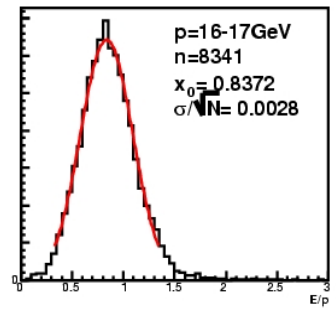


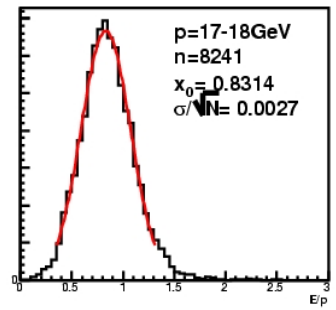


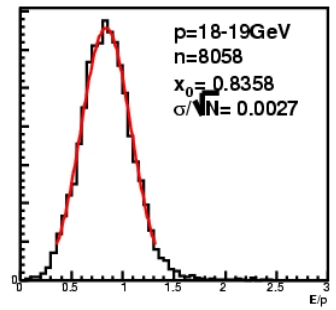


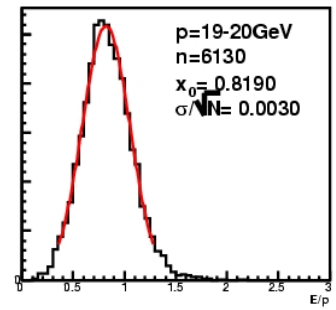




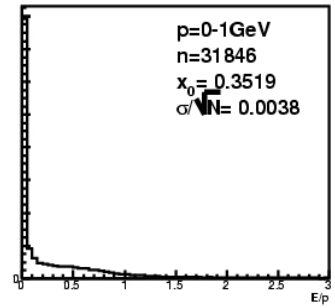


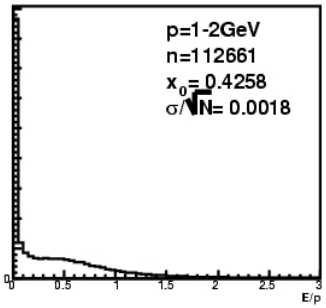


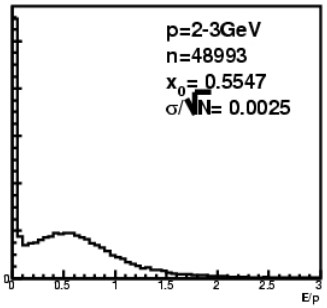


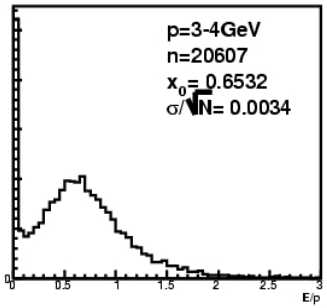


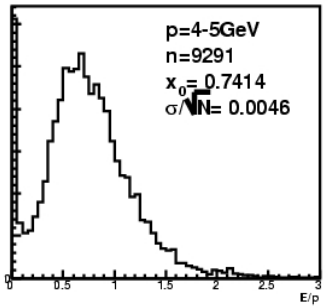
Plug MIP/p Distributions (gjtc0d)

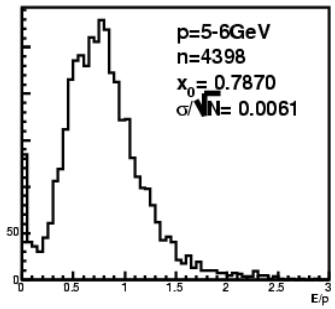


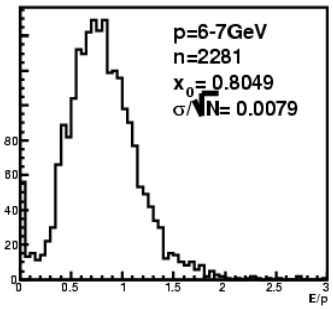


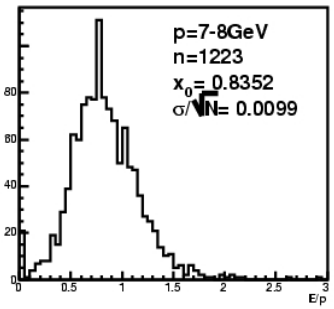


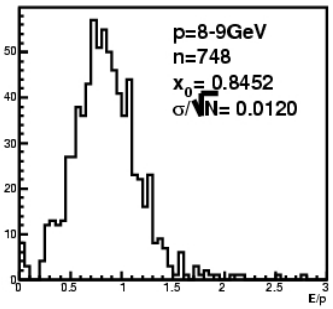


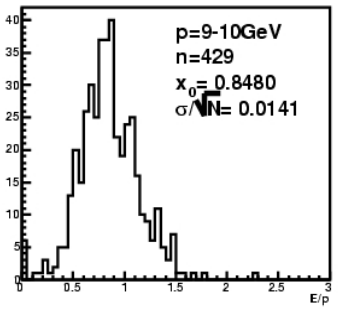


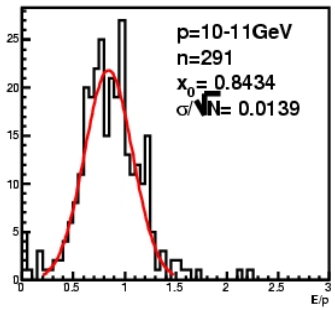


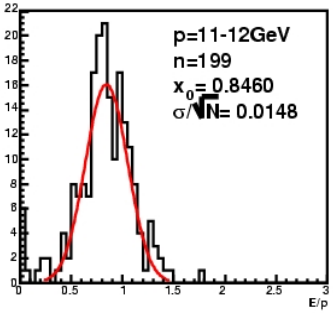


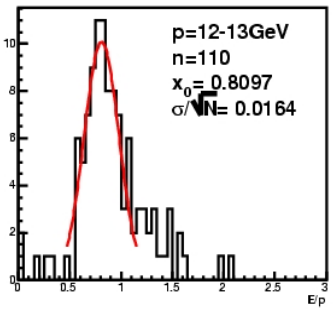


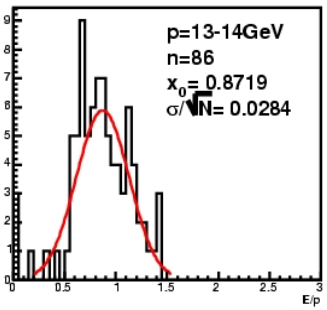


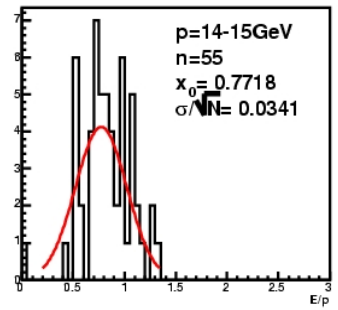


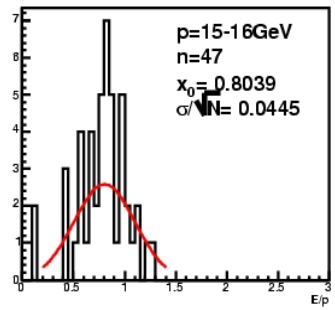


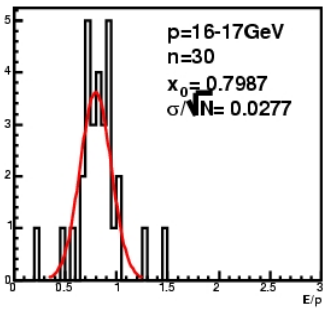


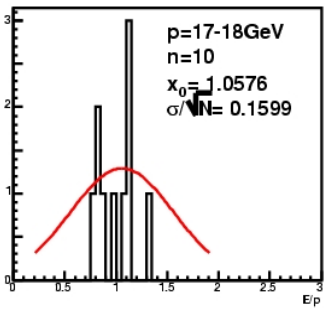


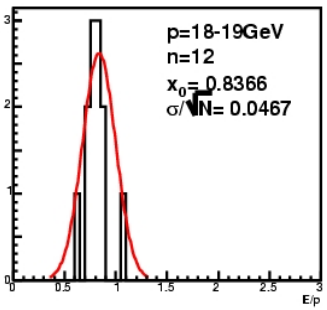


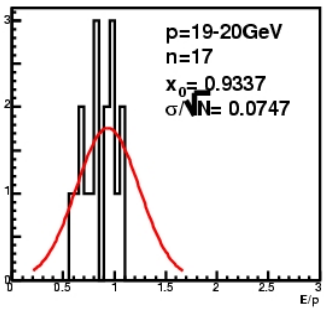




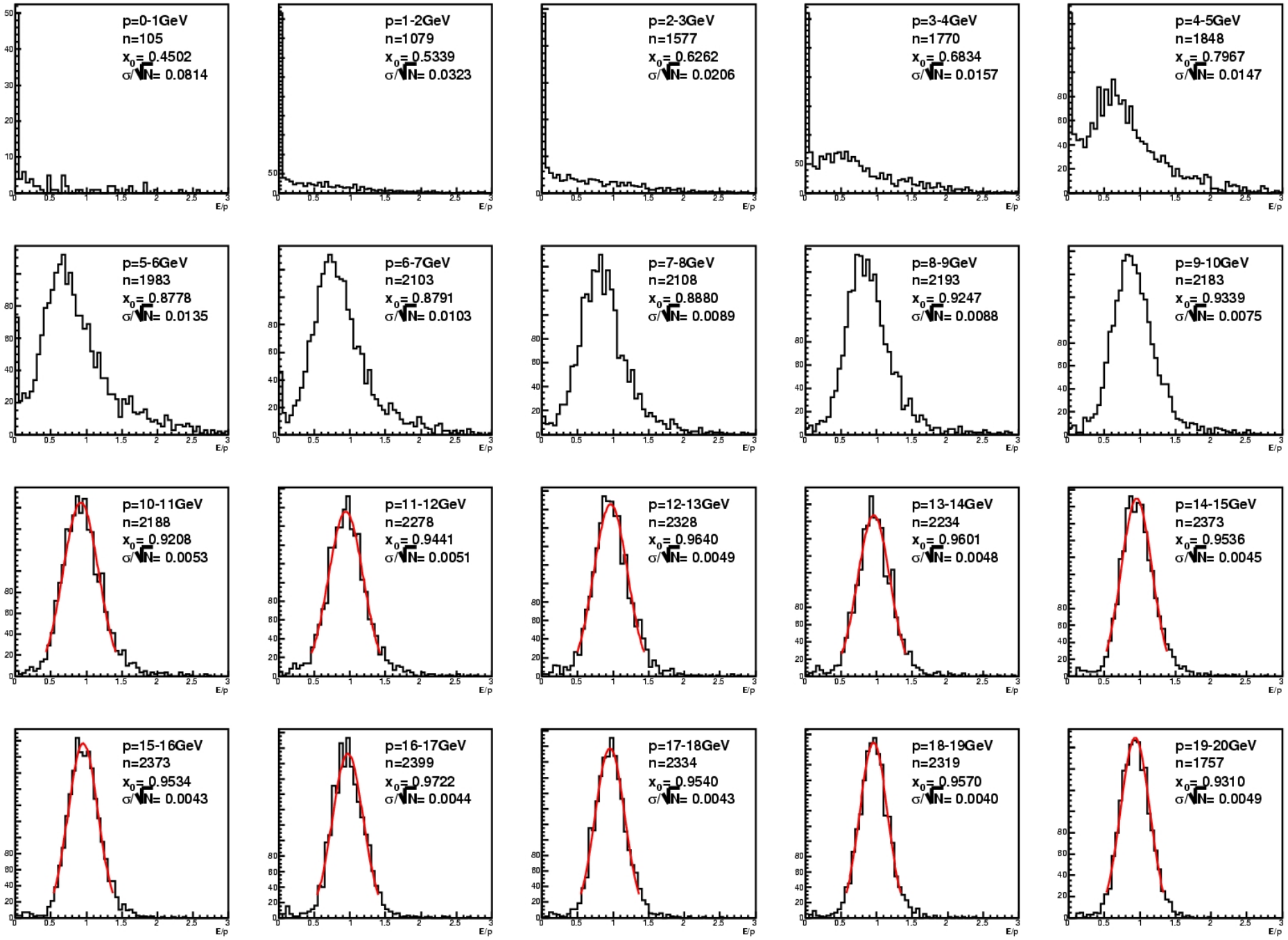








Plug MIP/p Distributions (FAKEEV)



Tuning Iterations

- Gen-5/6

GflashSim/gfinha.F:

```
FEDP = 0.7366+0.1699*TANH(0.6569*(XLNE-2.0826))
```

GflashSim/gfshow.F:

```
PBYMIP(1) = 2.30-0.48*TANH(7.45*(XLNP-1.74))
PBYMIP(2) = 3.01+0.19*TANH(5.04*(XLNP-1.32))
```

- P0

```
FEDP = 0.7366+0.1699*TANH(0.6569*(XLNE-2.0826))
PBYMIP(1) = 1.82
PBYMIP(2) = 3.20
```

- P1

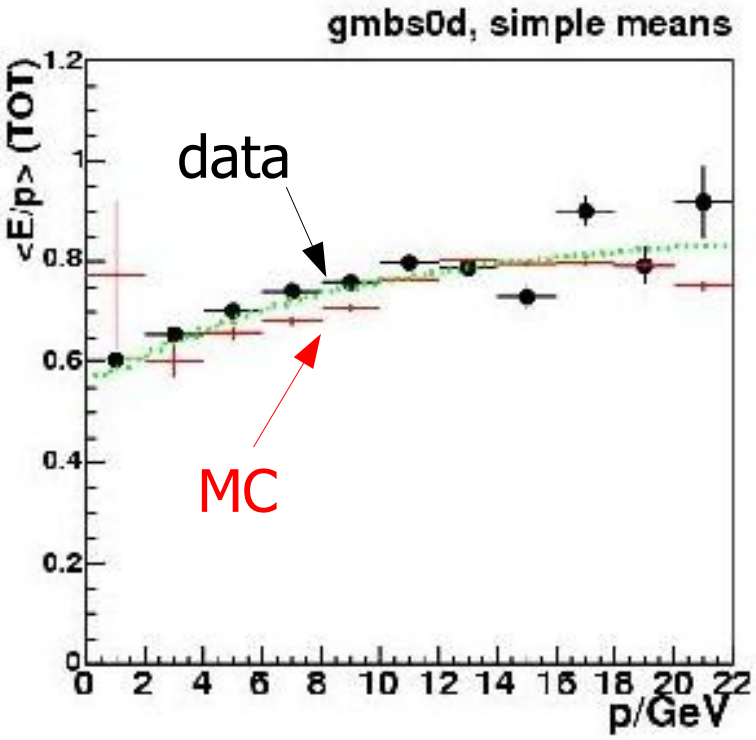
```
FEDP = 0.7209+0.1854*TANH(0.5668*(XLNE-1.6769))
PBYMIP(1) = 1.82
PBYMIP(2) = 3.20
```

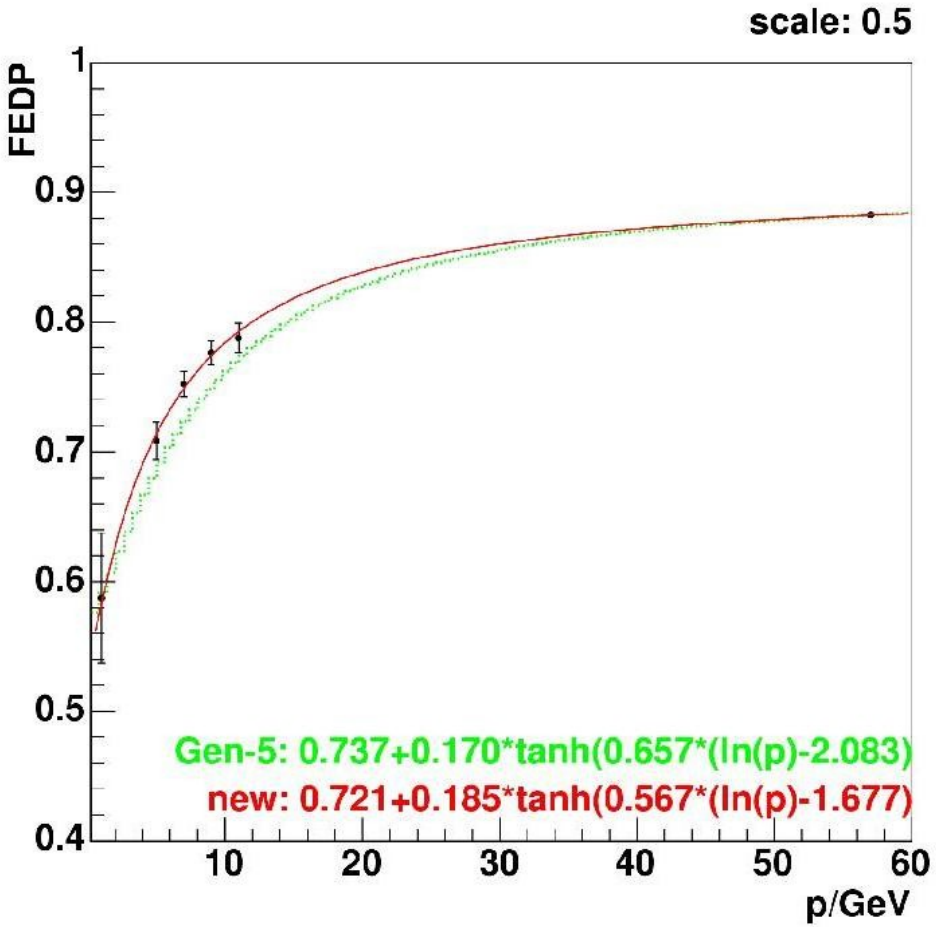
- P2

```
FEDP = 0.5677+0.3278*TANH(0.5504*(XLNE-0.5058))
PBYMIP(1) = 1.82
PBYMIP(2) = 3.20
```

- We are switching back to constant relative sampling fractions (H1 default)

FEDP Optimization

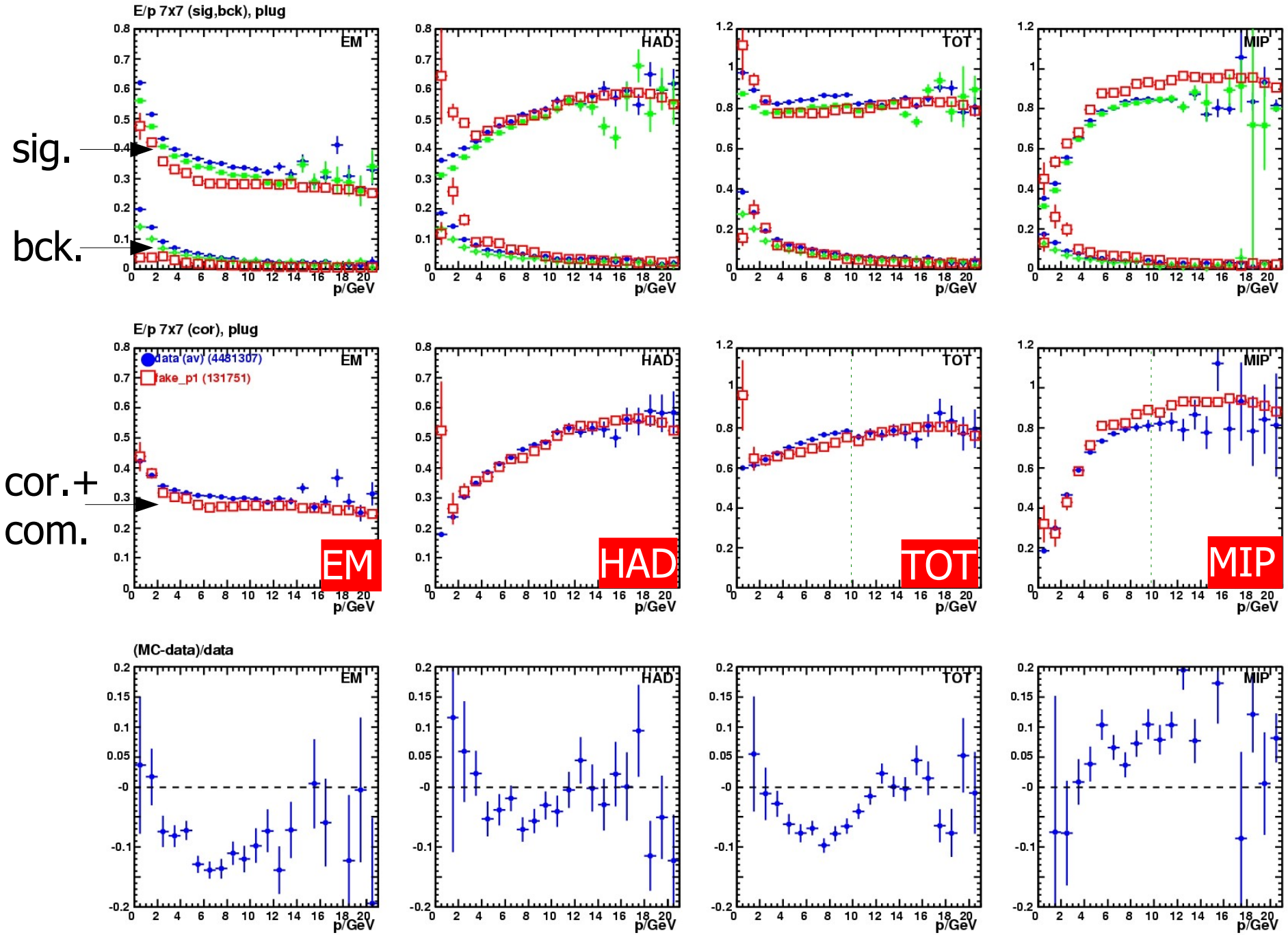




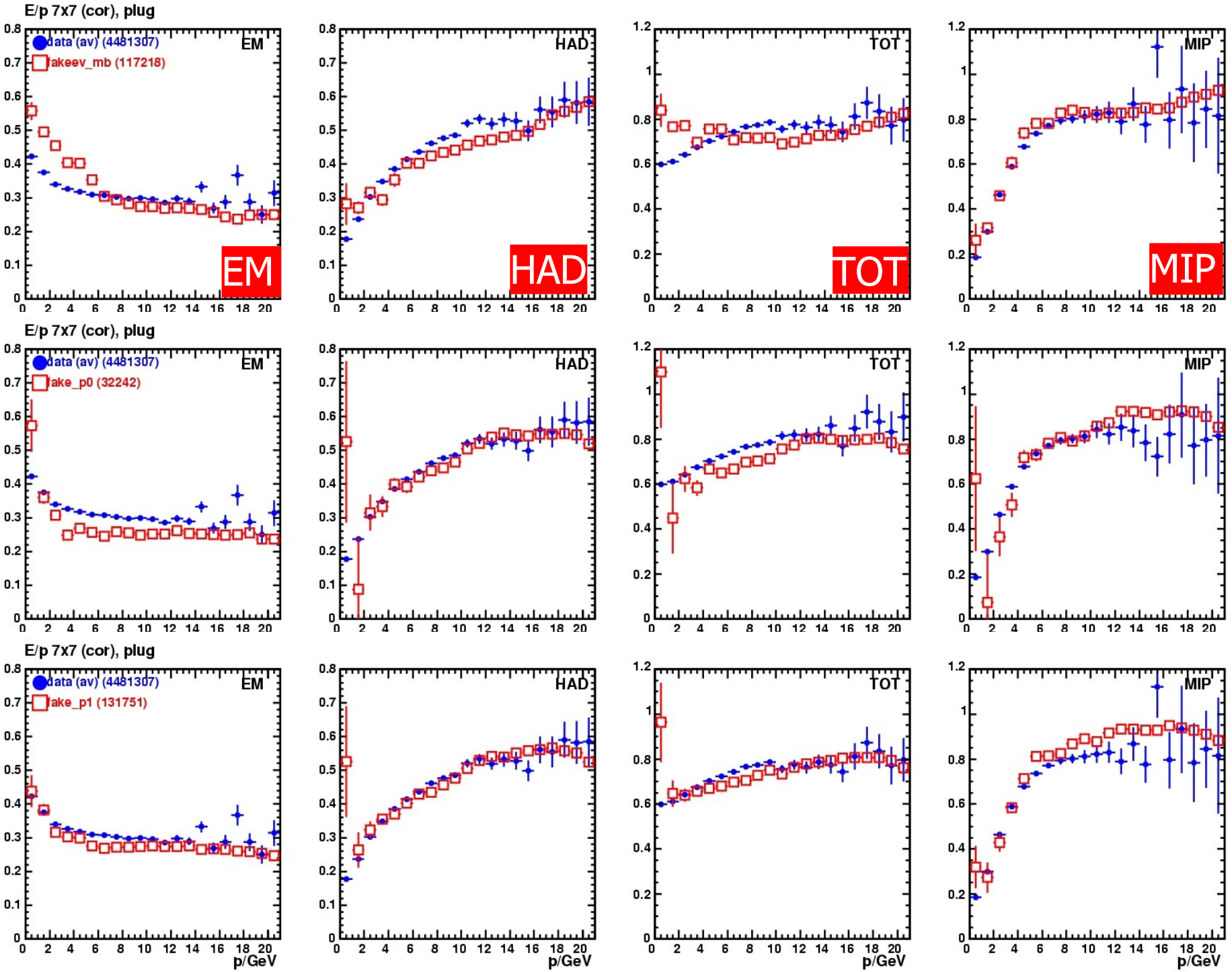
Method:

- Constrain FEDP to test beam data at 57 GeV.
- FEDP(i+1)=FEDP(i)* [1+(DAT-MC(i))/MC(i)*scale]
- Want to keep relative sampling fractions energy independent.

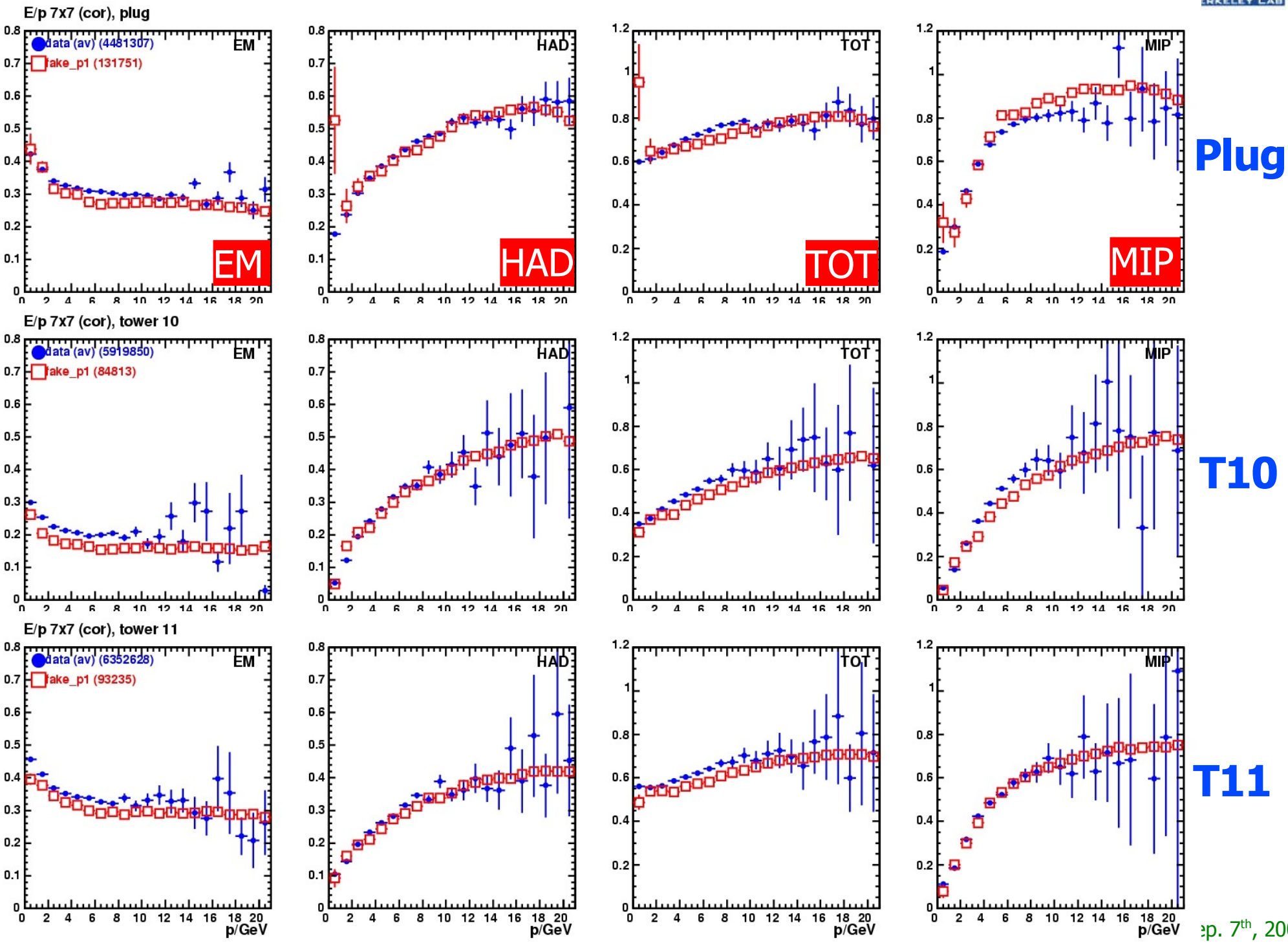
Plug Tuning Result (P1)



Changes w.r.t Gen-5/6



Plug vs. Crack (P1)



Conclusions

- First iterations already improved much the picture in the Plug and Crack.
- Need a couple of iterations to get nicer results.
- Have "acceptable" tuning hopefully by end of next week.