Flavor Dependence of Simulated Calorimeter Response

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Overview

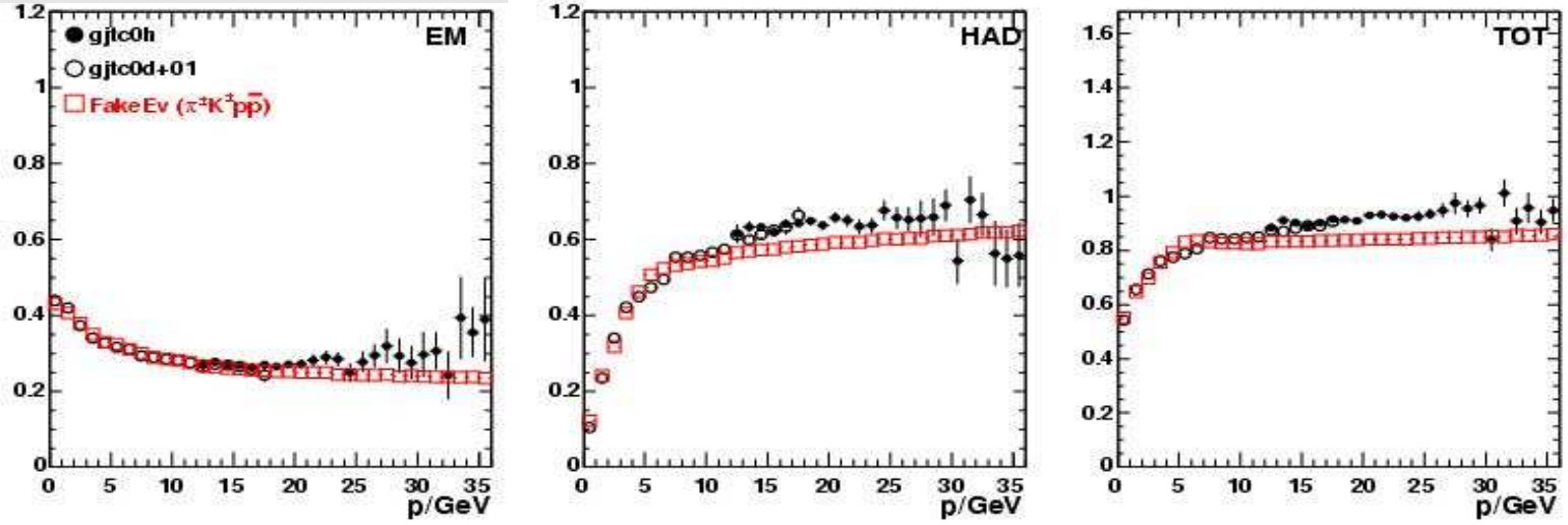
- Hadronic shower development depend on particle type
  - E.g. anti-protons tempt to start shower development earlier than protons
  - TOT response and EM/HAD ratio larger for anti-protons

- How crucial is the flavor composition for the Gflash tuning?
  - In FakeEv we are using a mixture of 60% $\pi^{\pm}$, 30% $K^{\pm}$,10% p,p
  - In the plug we are adding minbias events on top of FakeEv,
    ....at high p have approximately the same mixture as above

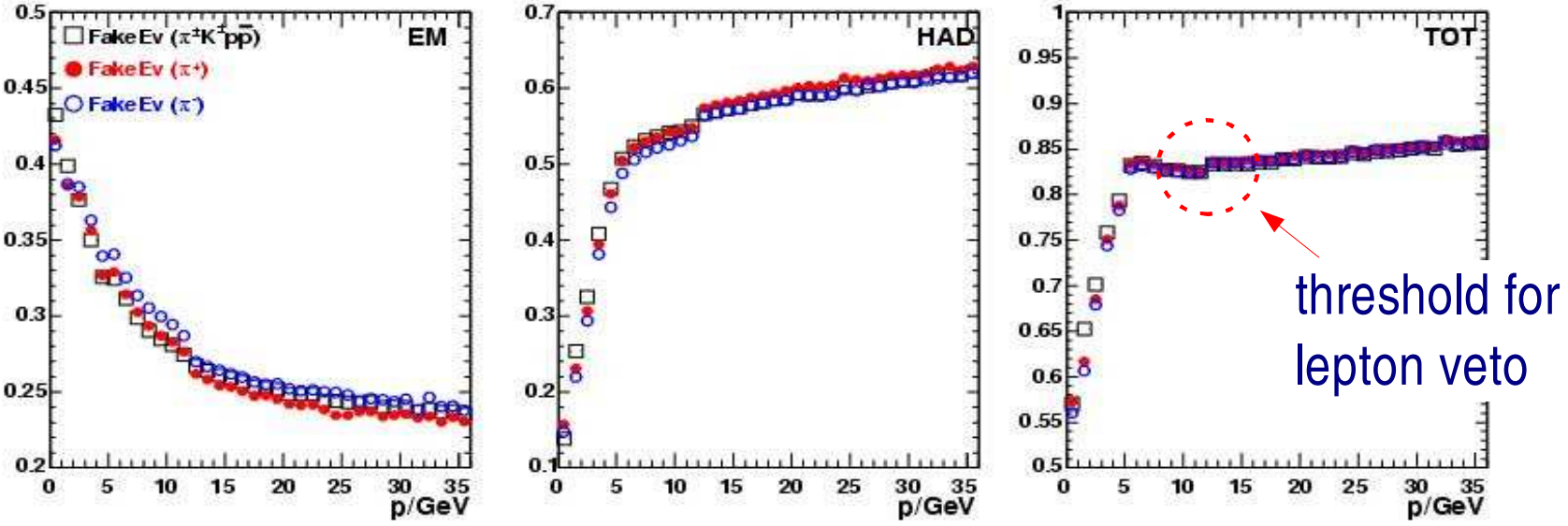
- This talk: check of E/p distributions, average absolute and lateral response in central part

E/p vs. p (central)

fakeev standard mix vs. data

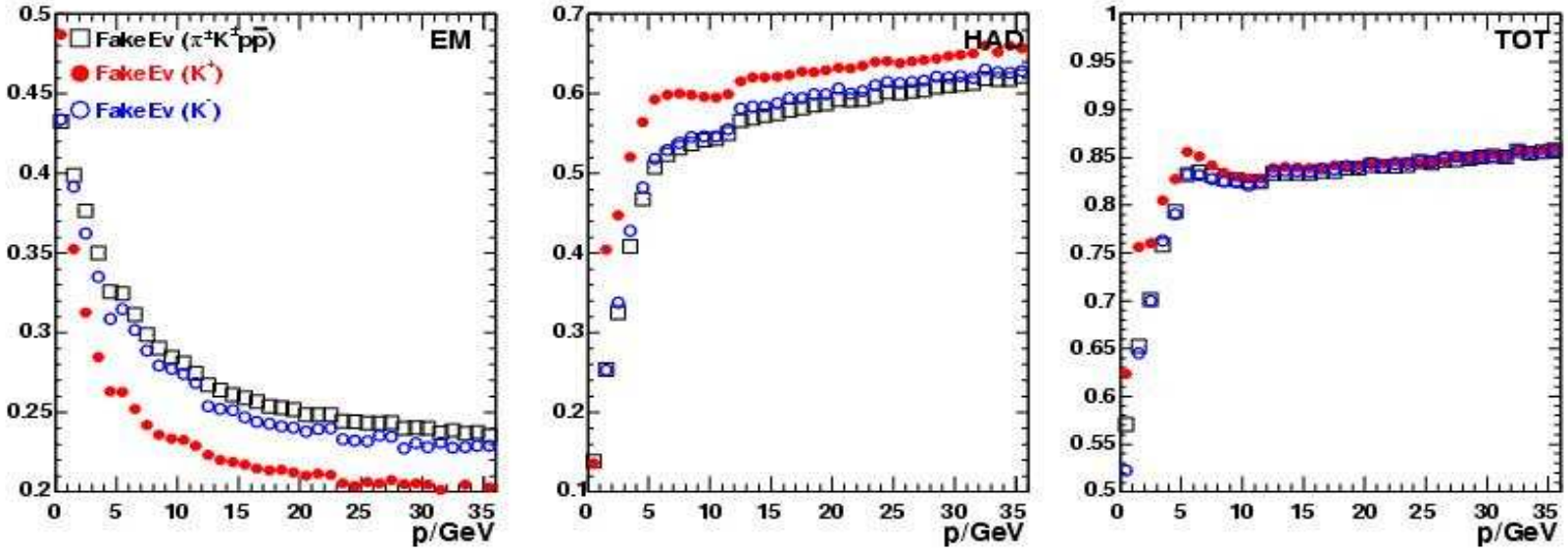


standard mix vs. π^+ /π^-

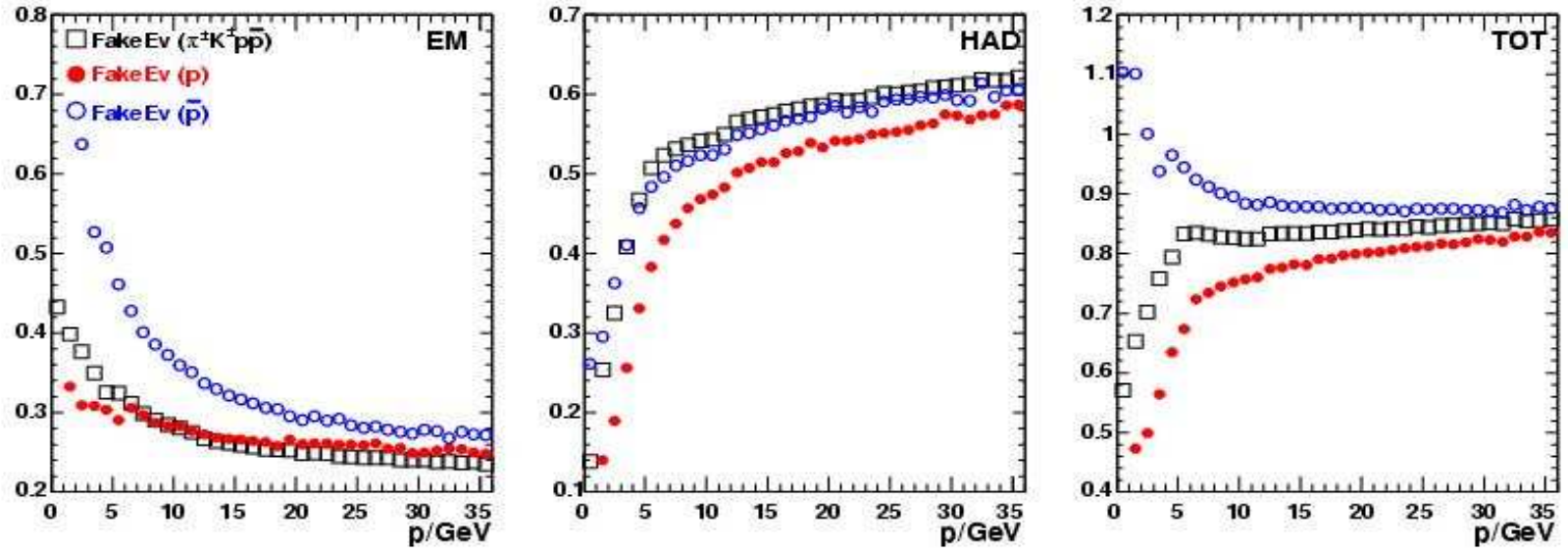


Mean E/p vs. p (central)

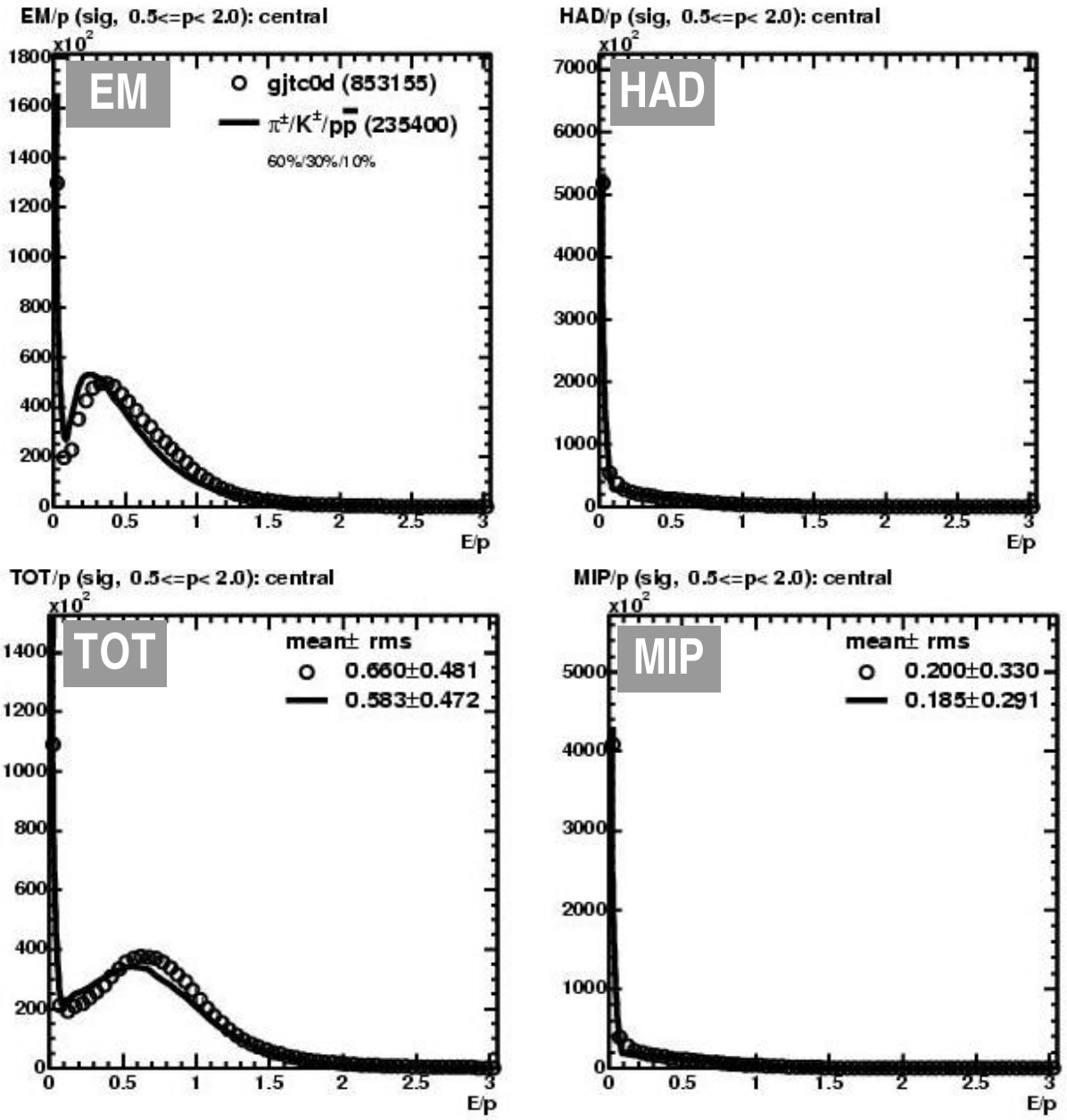
standard mix vs. K^+/K^-



standard mix vs. $p/\bar{p}$



E/p distribution (0.5-2.0 GeV/c, central)



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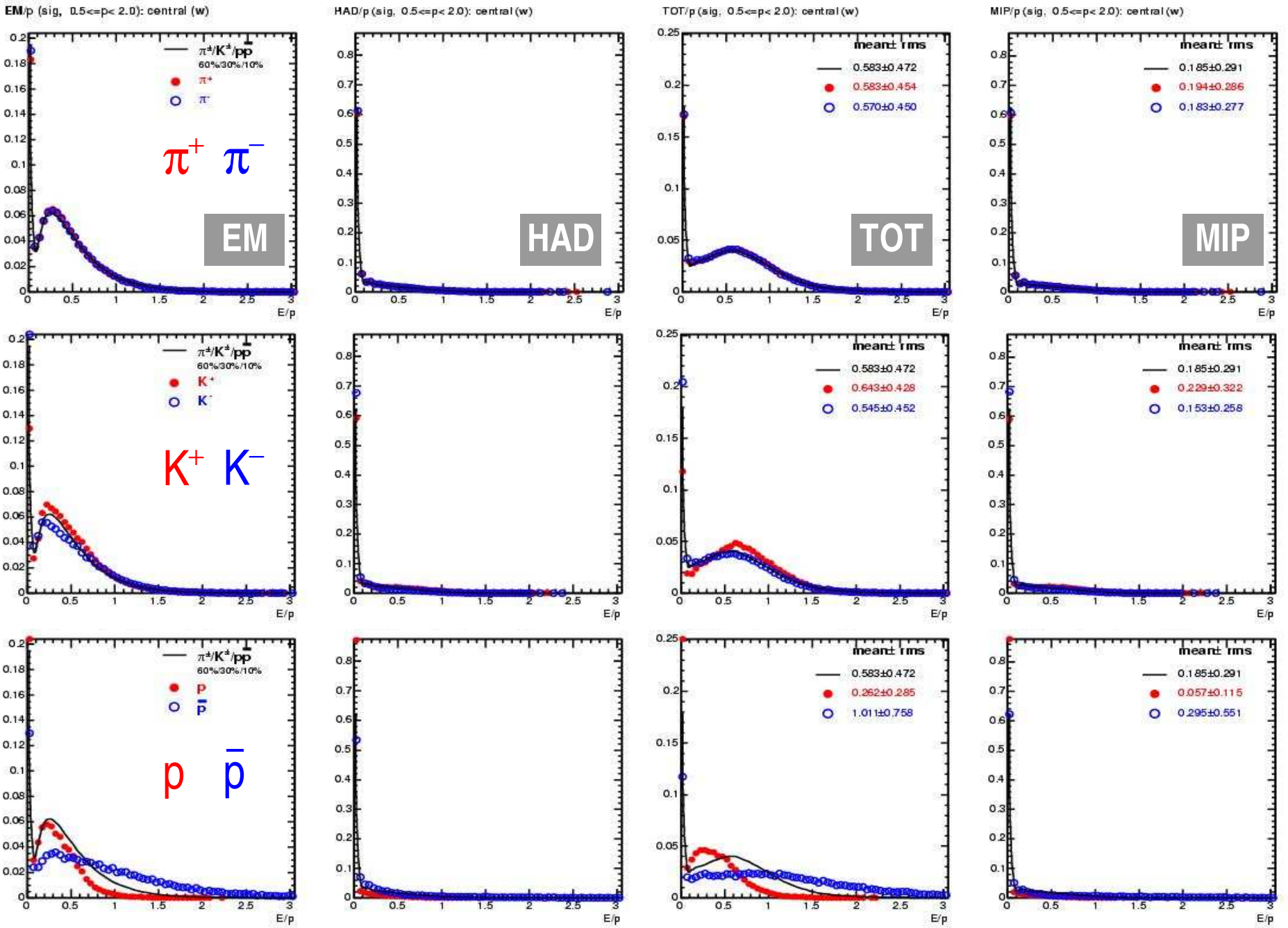
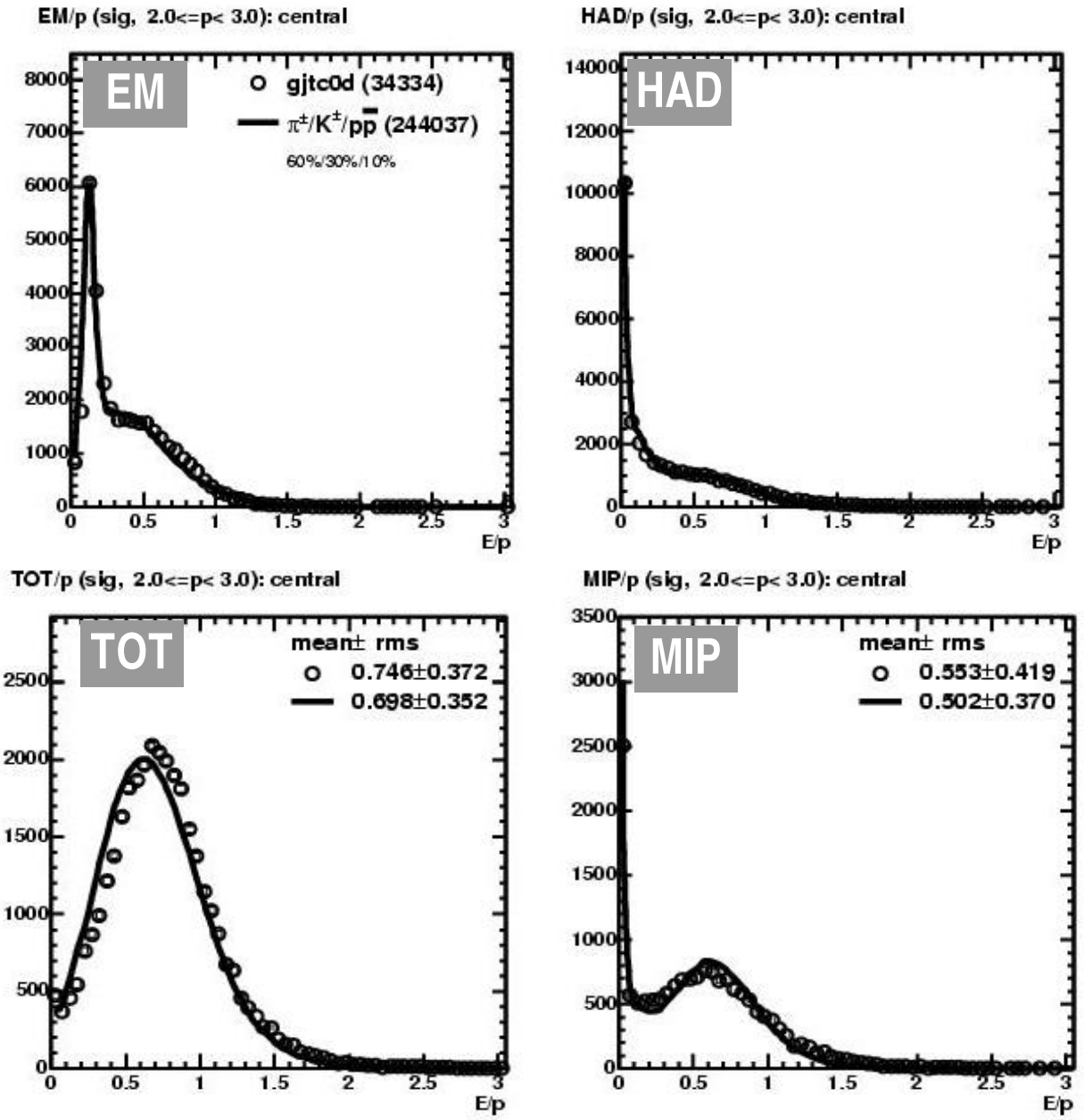
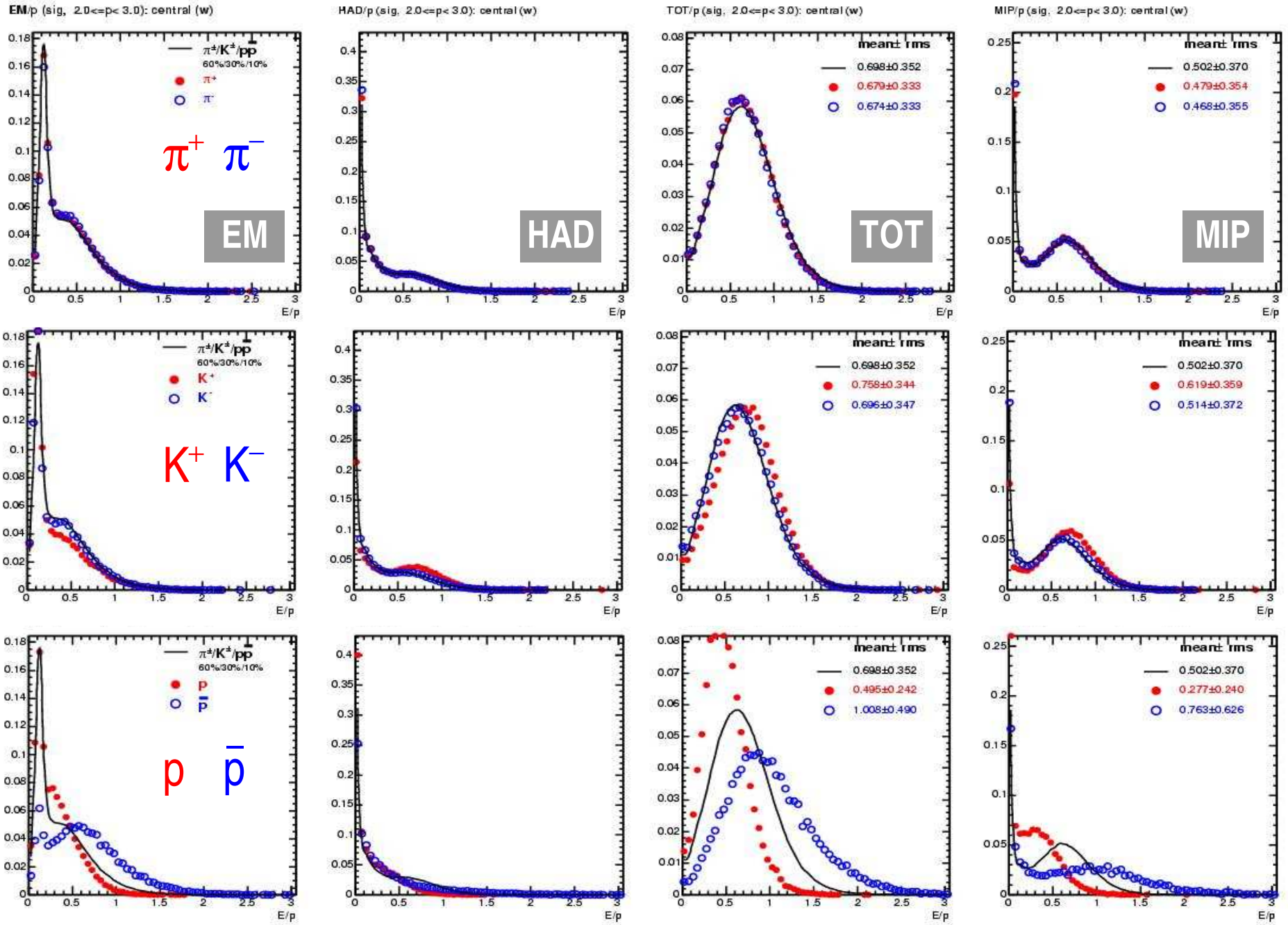


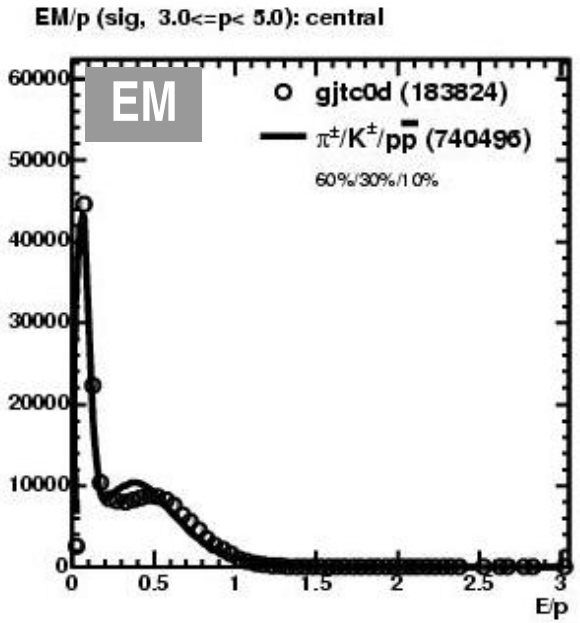
E/p distribution (2-3 GeV/c, central)

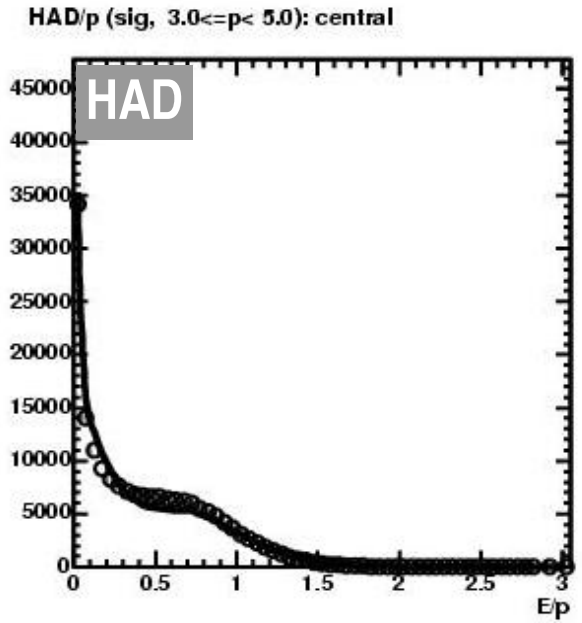


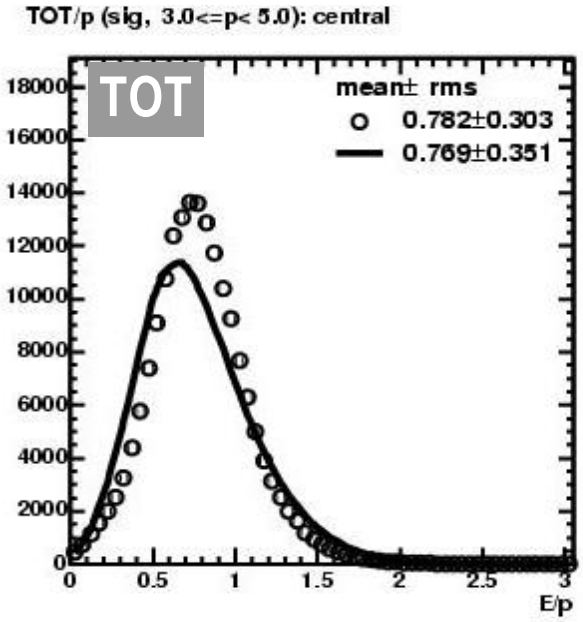
E/p distribution (2-3 GeV/c, central)

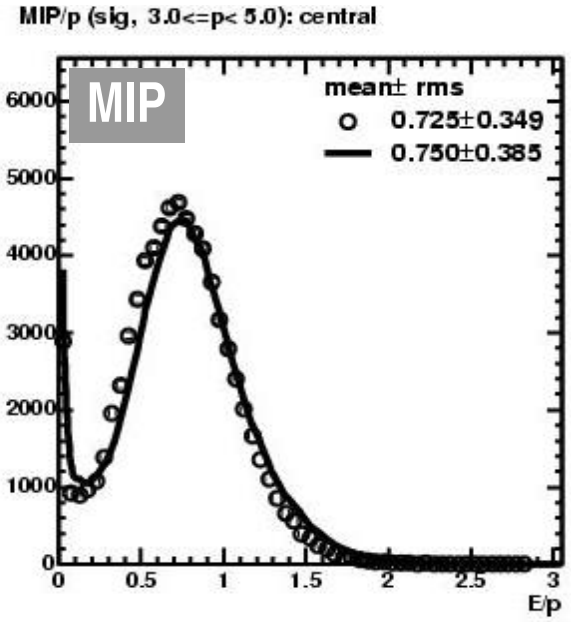


E/p distribution (3-5 GeV/c, central)

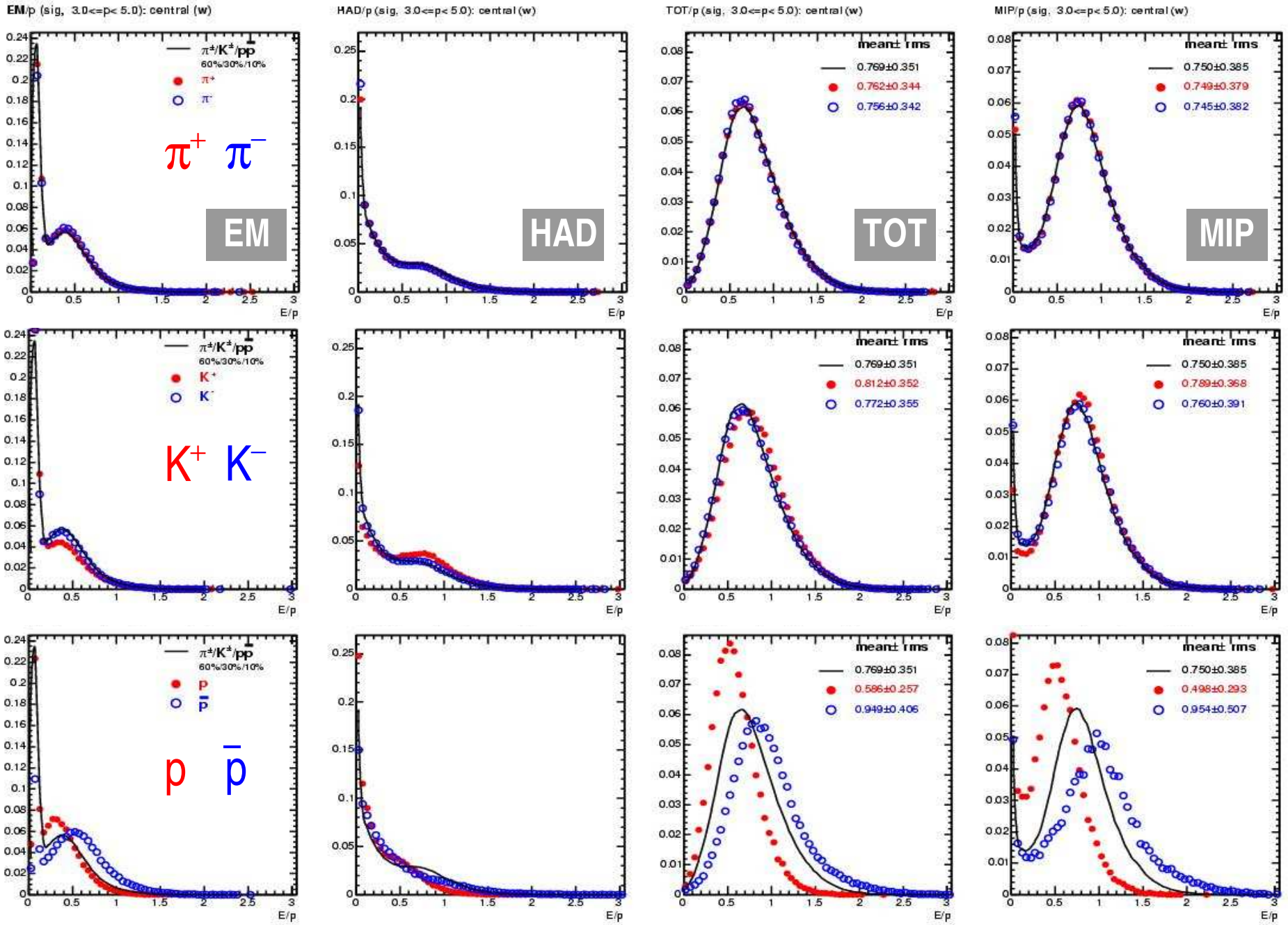




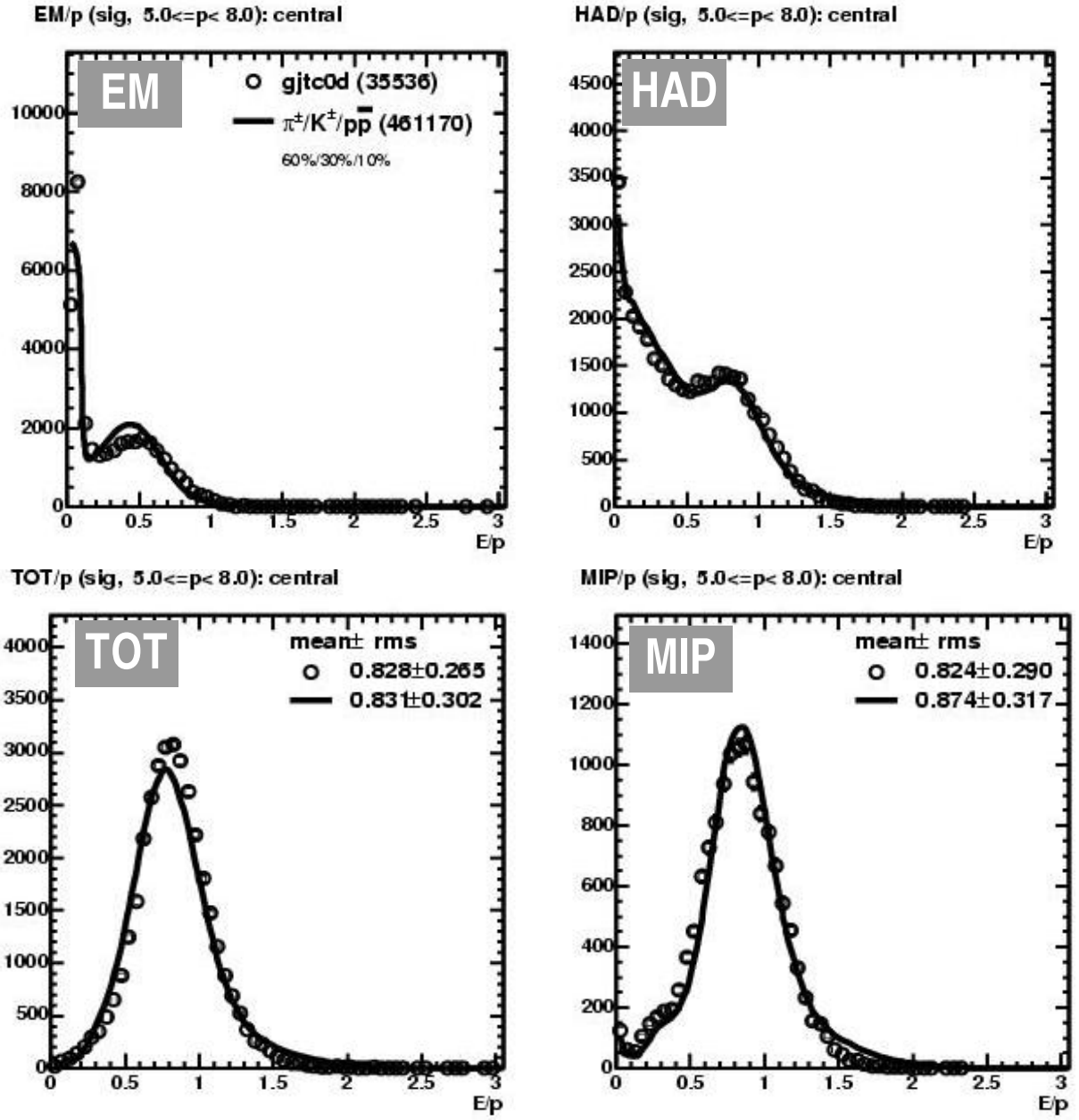




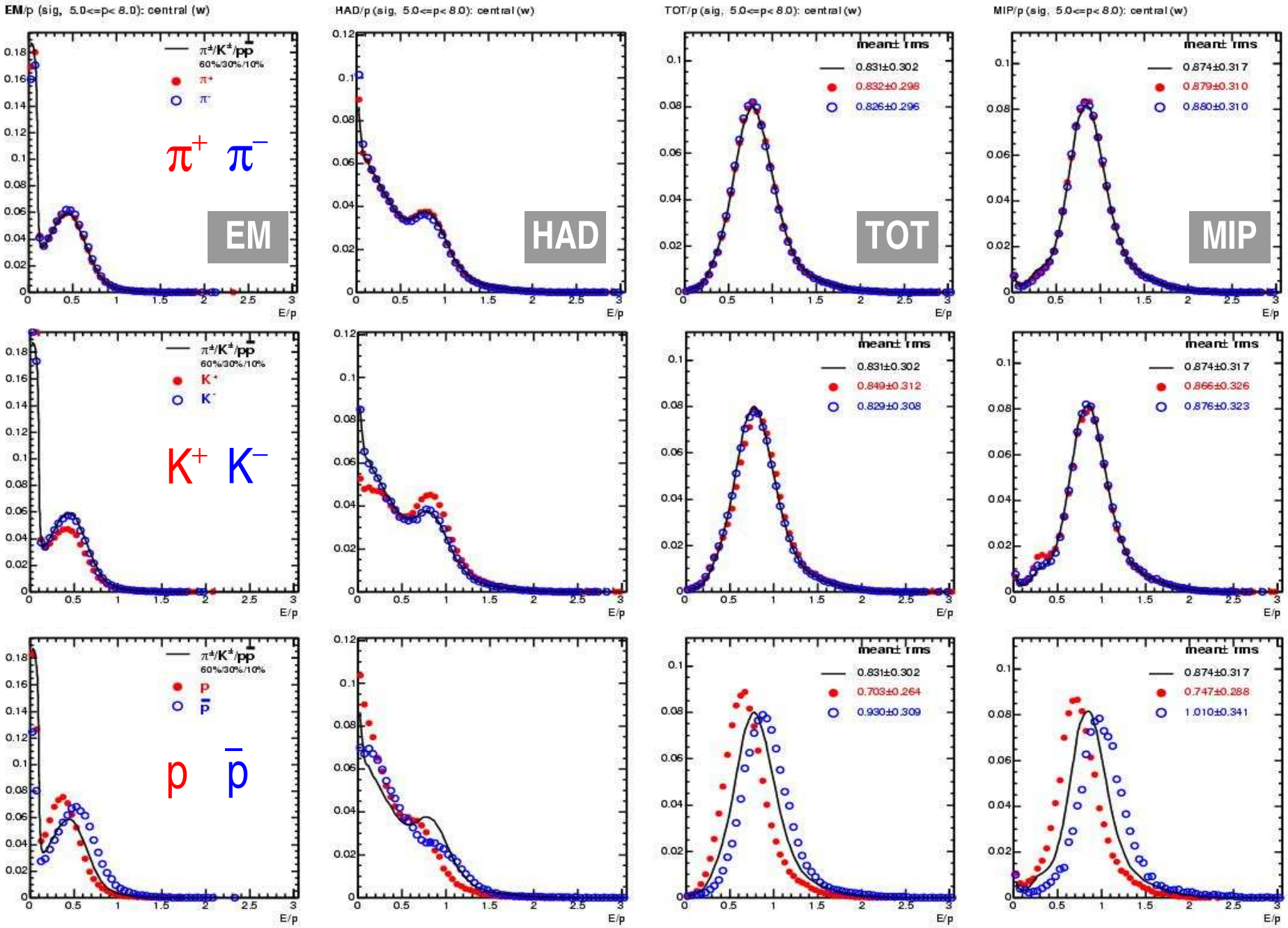
E/p distribution (3-5 GeV/c, central)



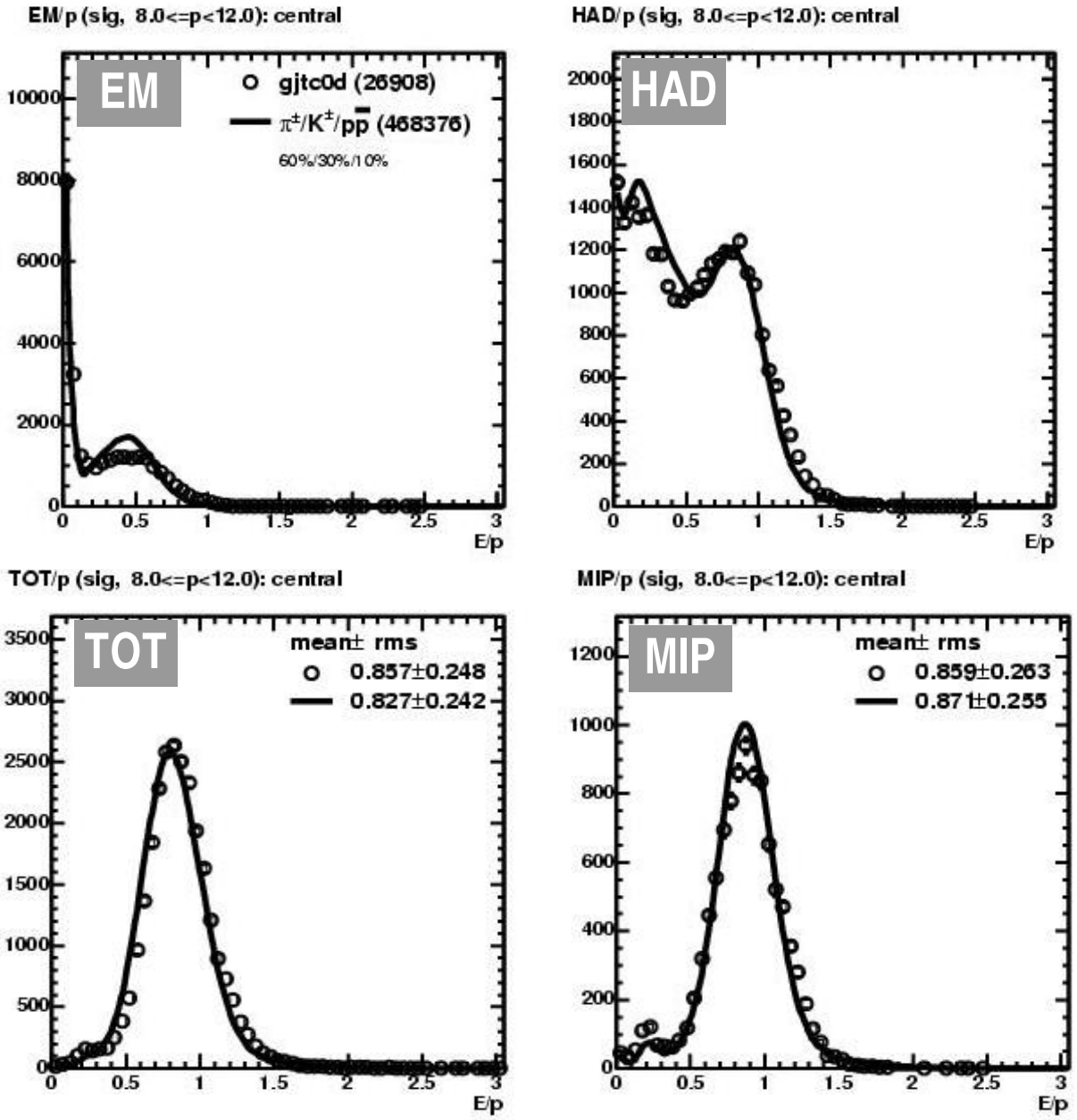
E/p distribution (5-8 GeV/c, central)



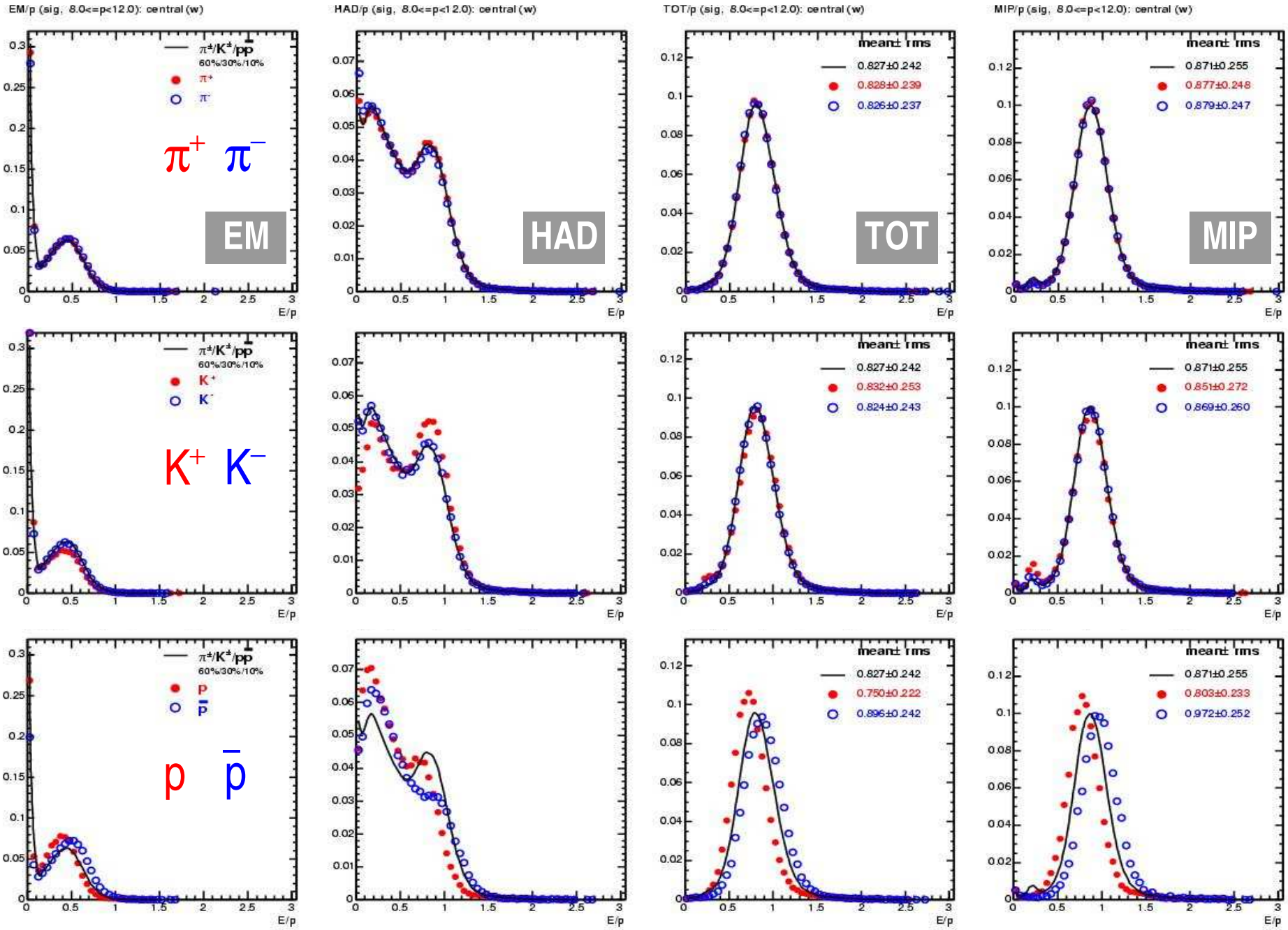
E/p distribution (5-8 GeV/c, central)



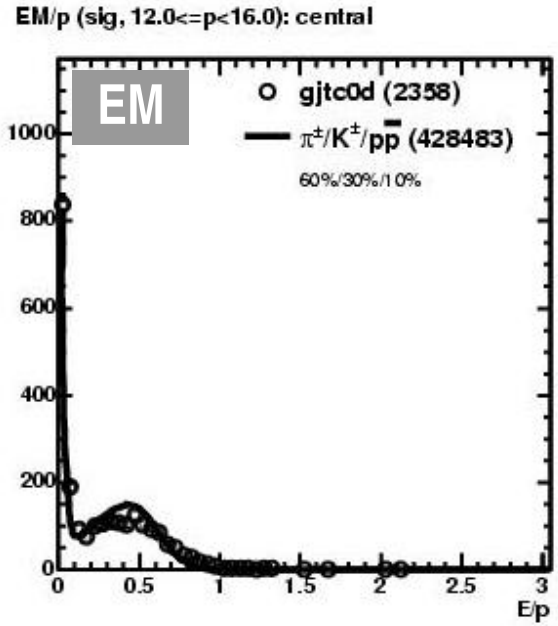
E/p distribution (8-12 GeV/c, central)

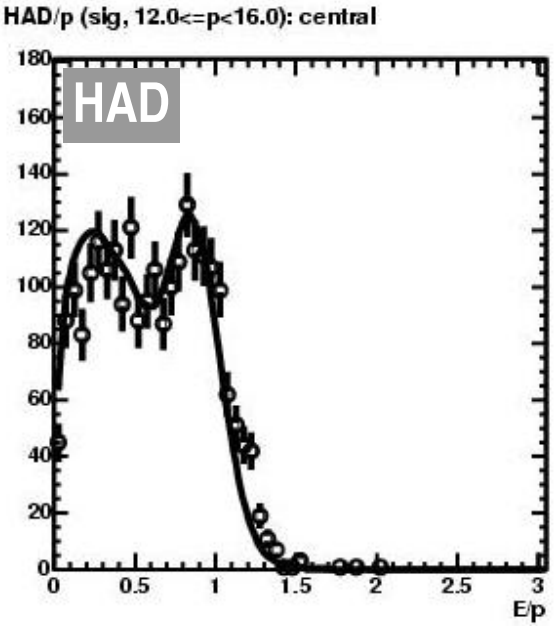


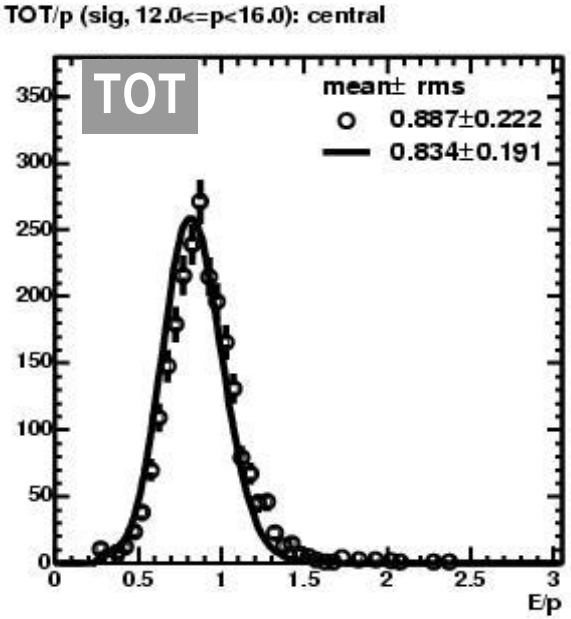
E/p distribution (8-12 GeV/c, central)

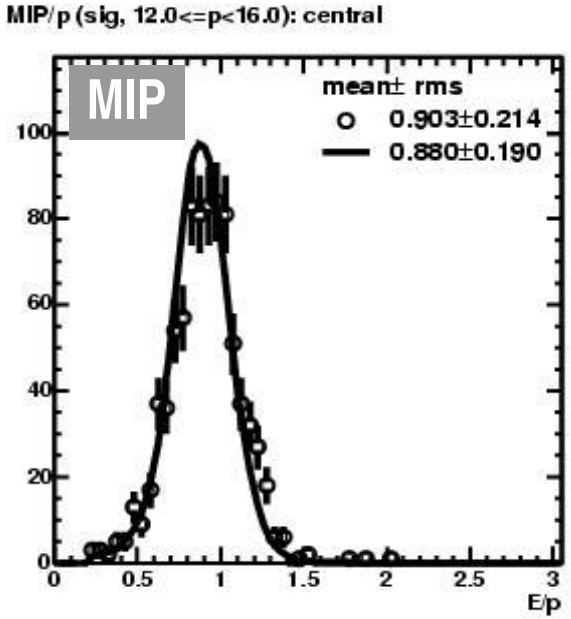


E/p distribution (12-16 GeV/c, central)









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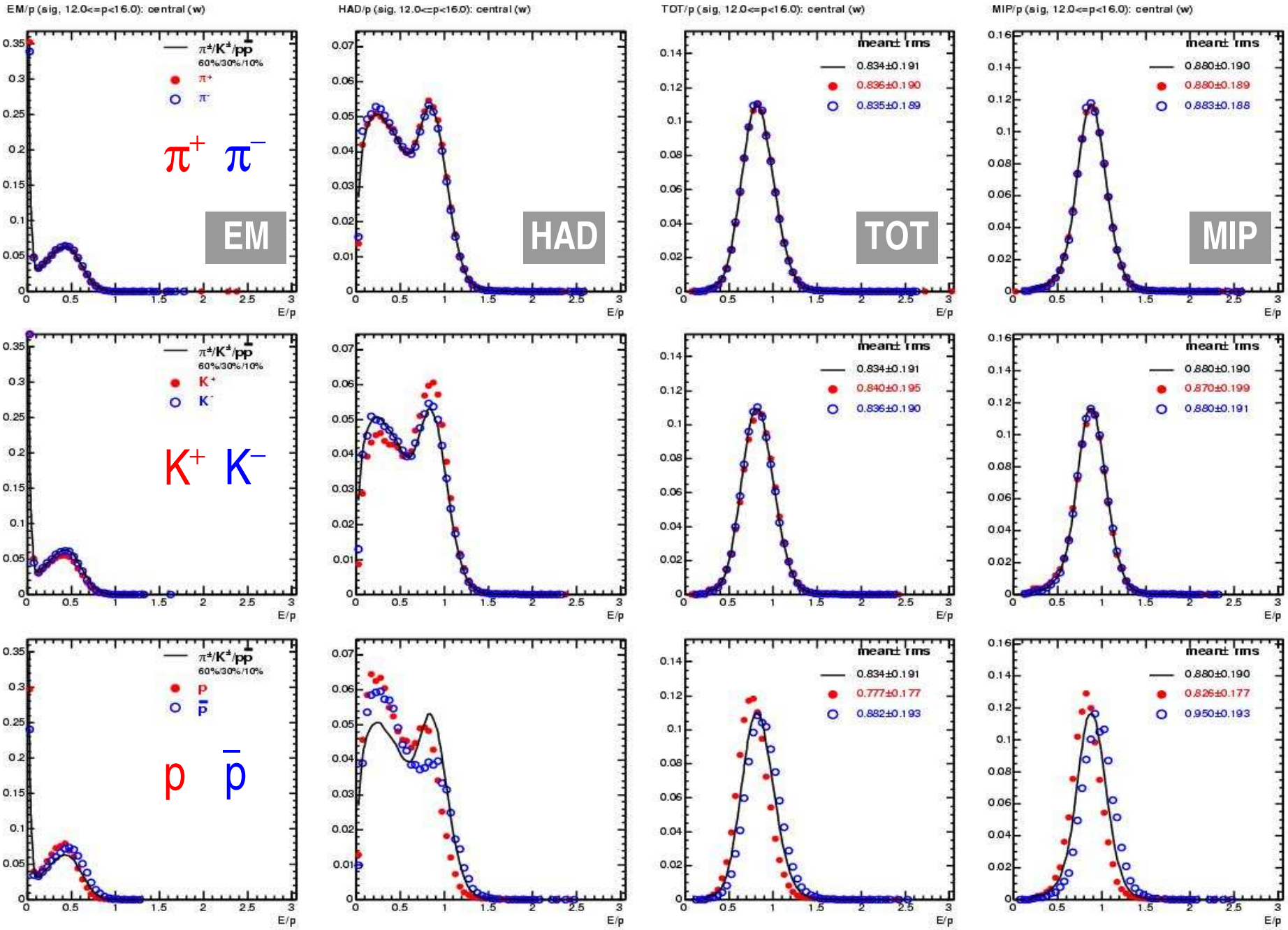
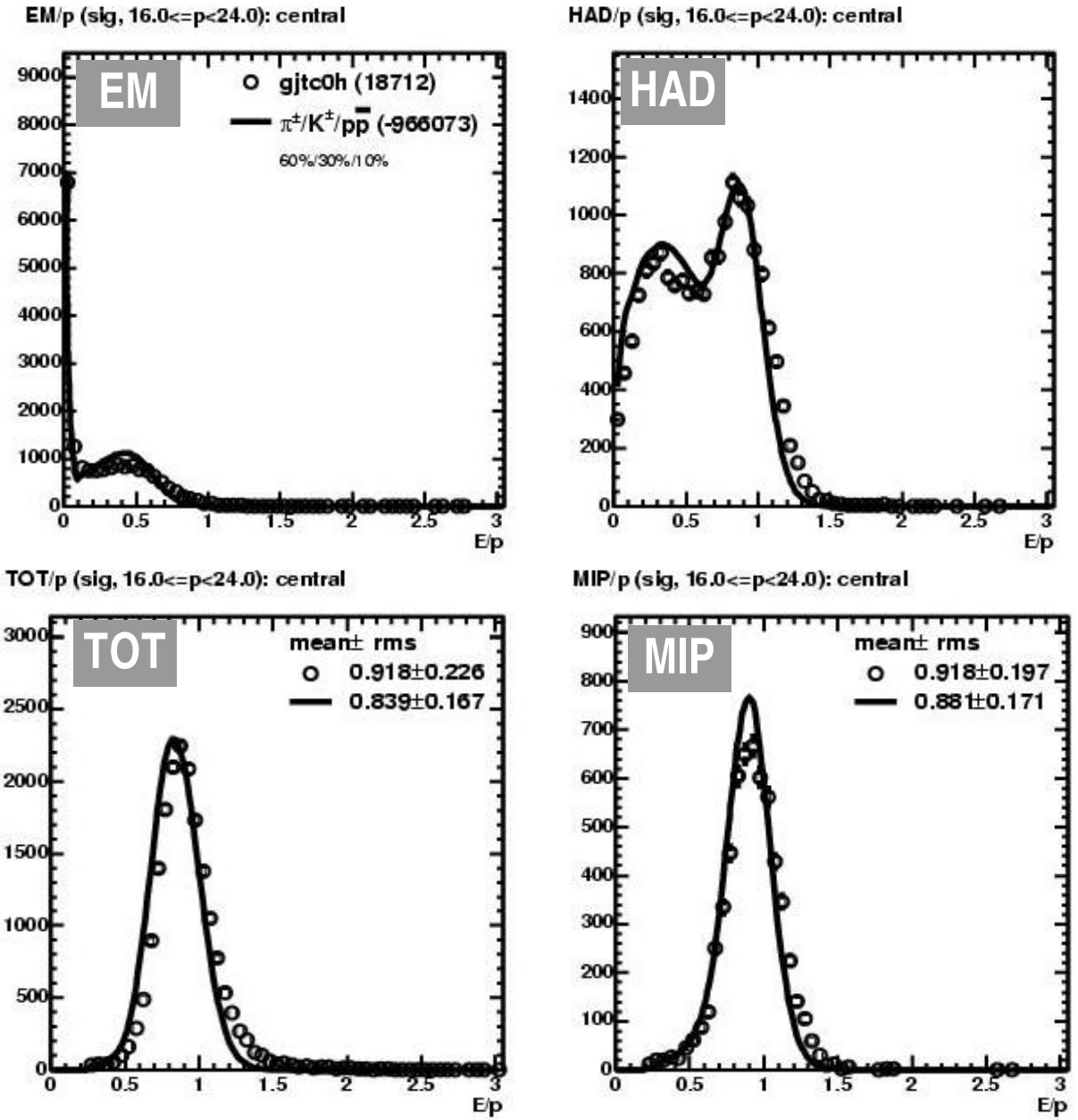


E/p distribution (16-24 GeV/c, central)



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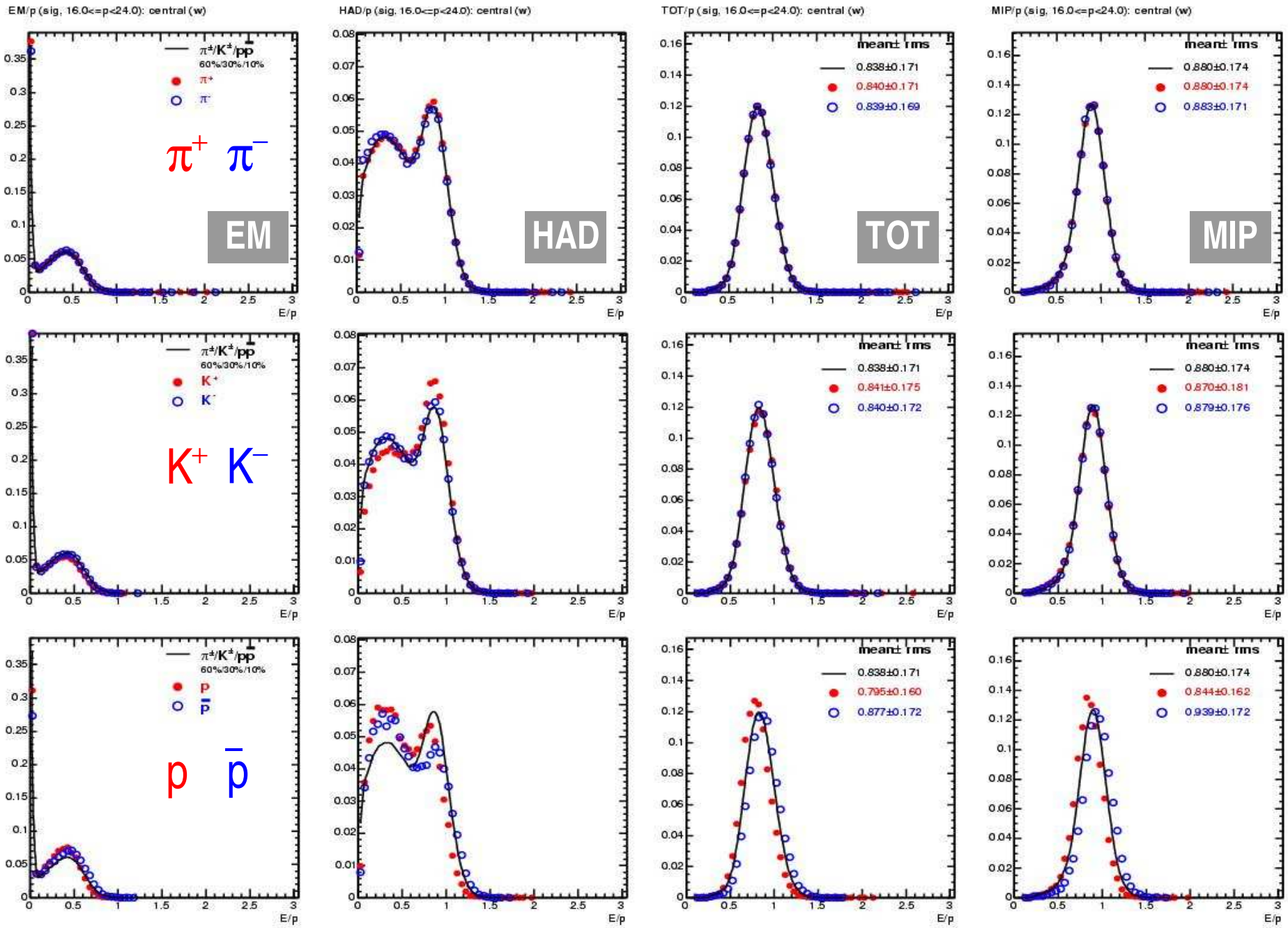
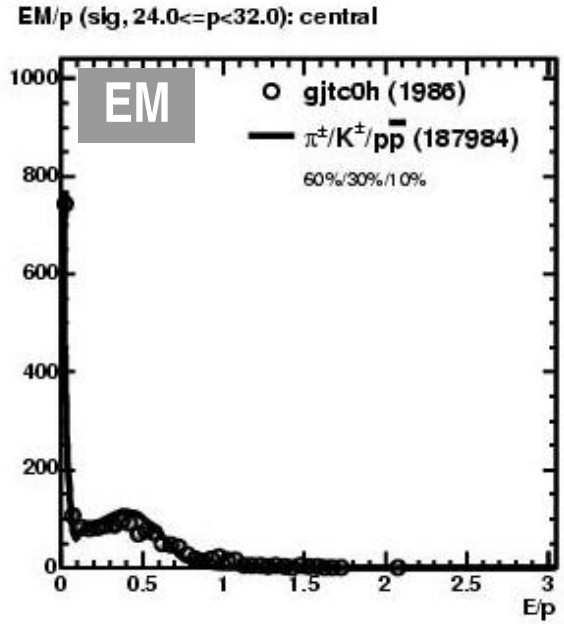
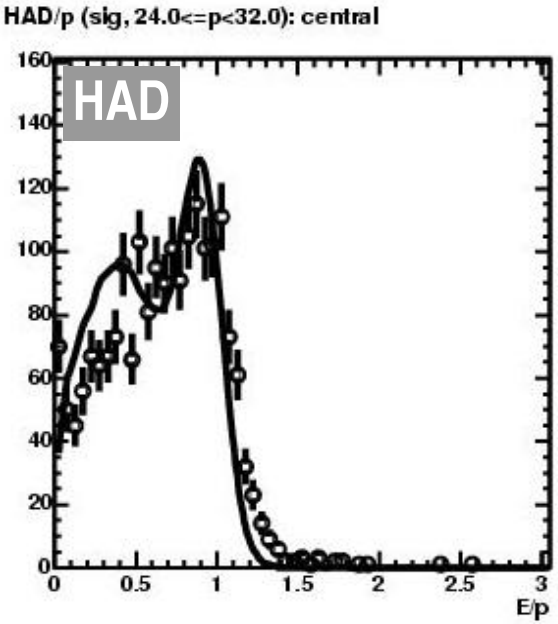
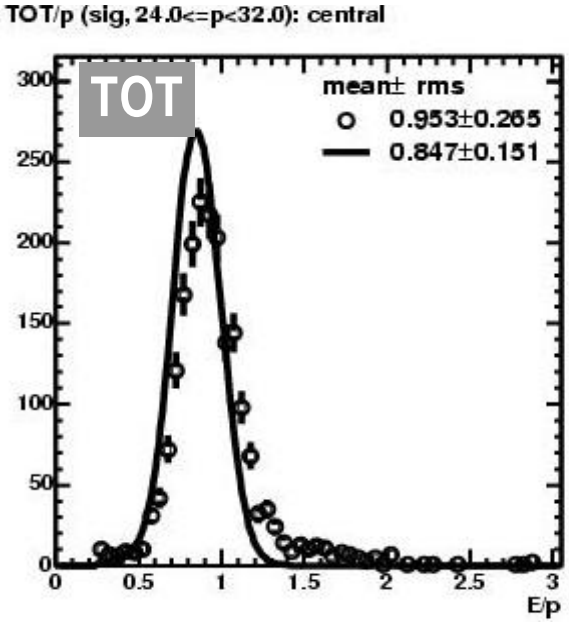
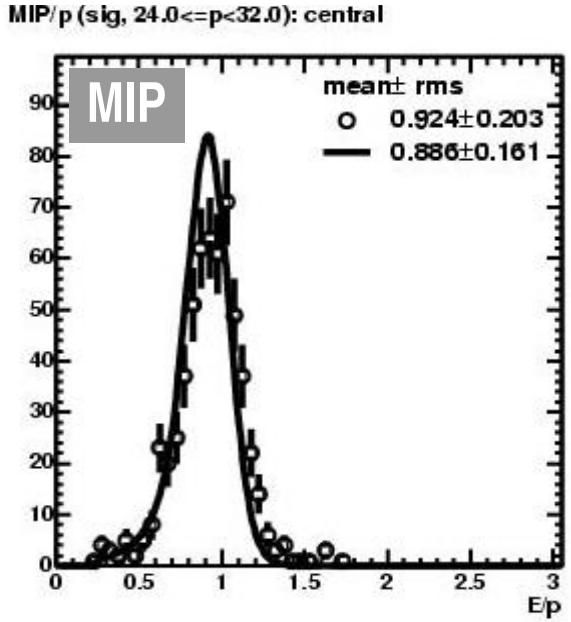


E/p distribution (24-32 GeV/c, central)









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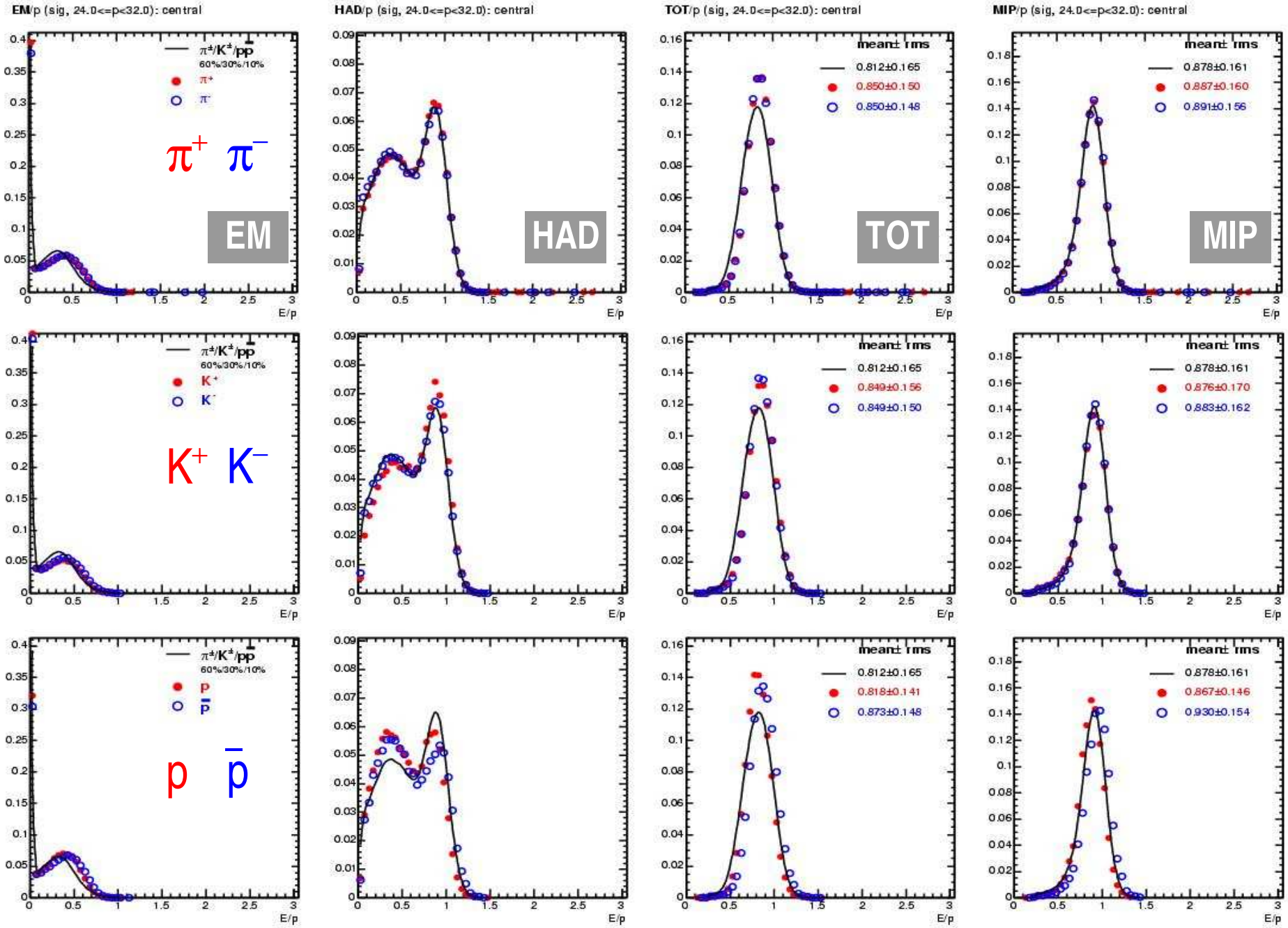
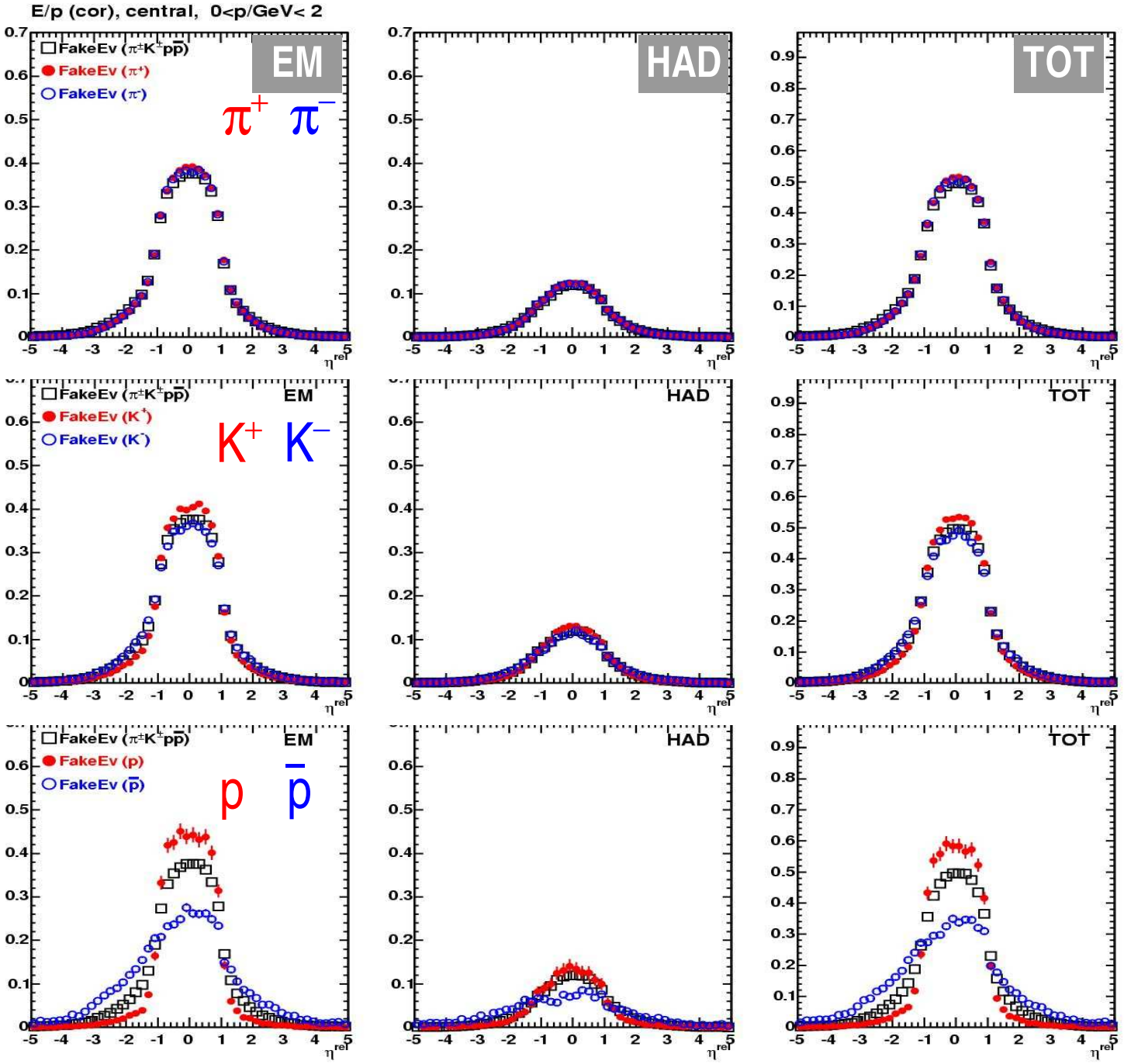
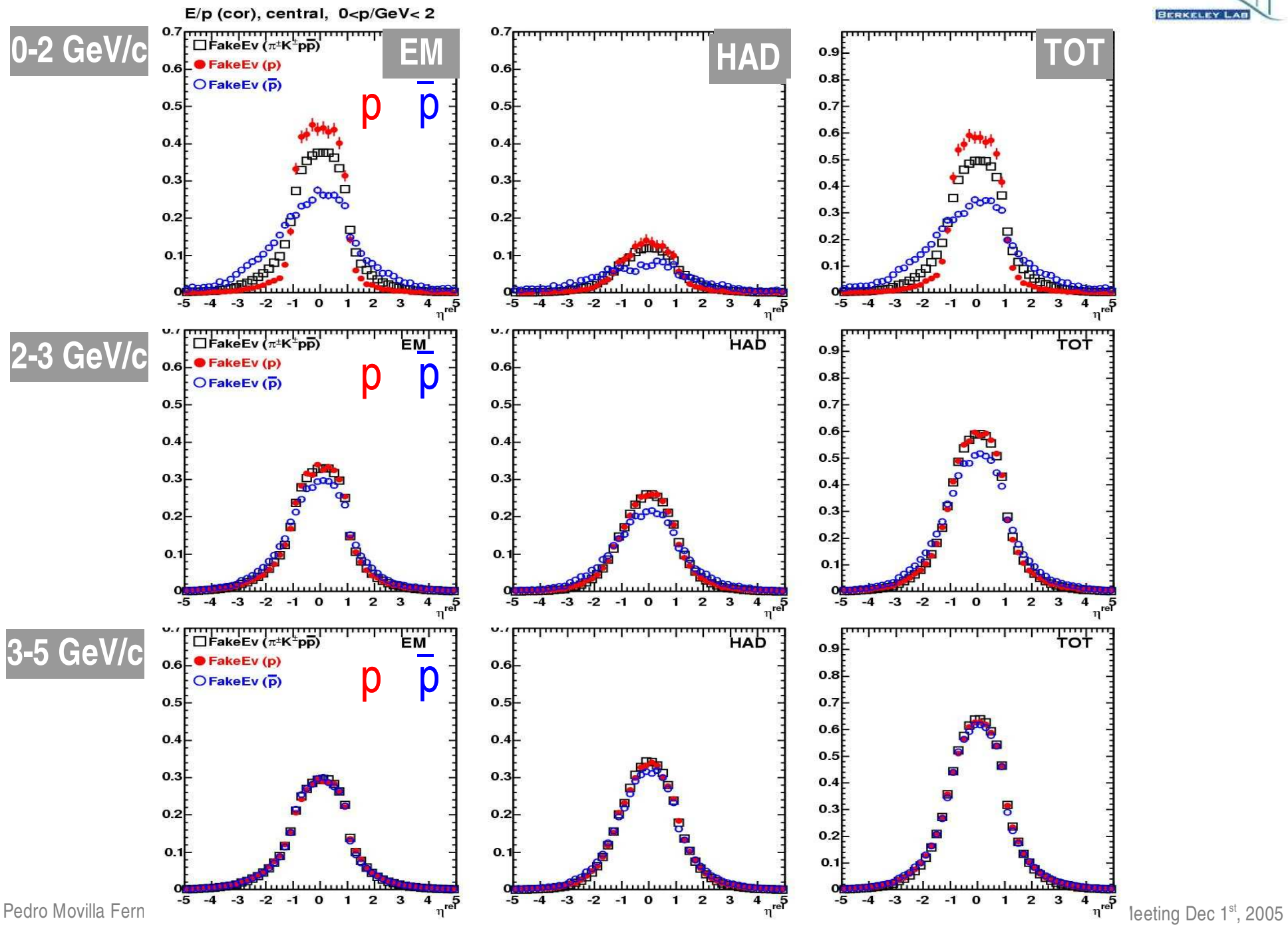


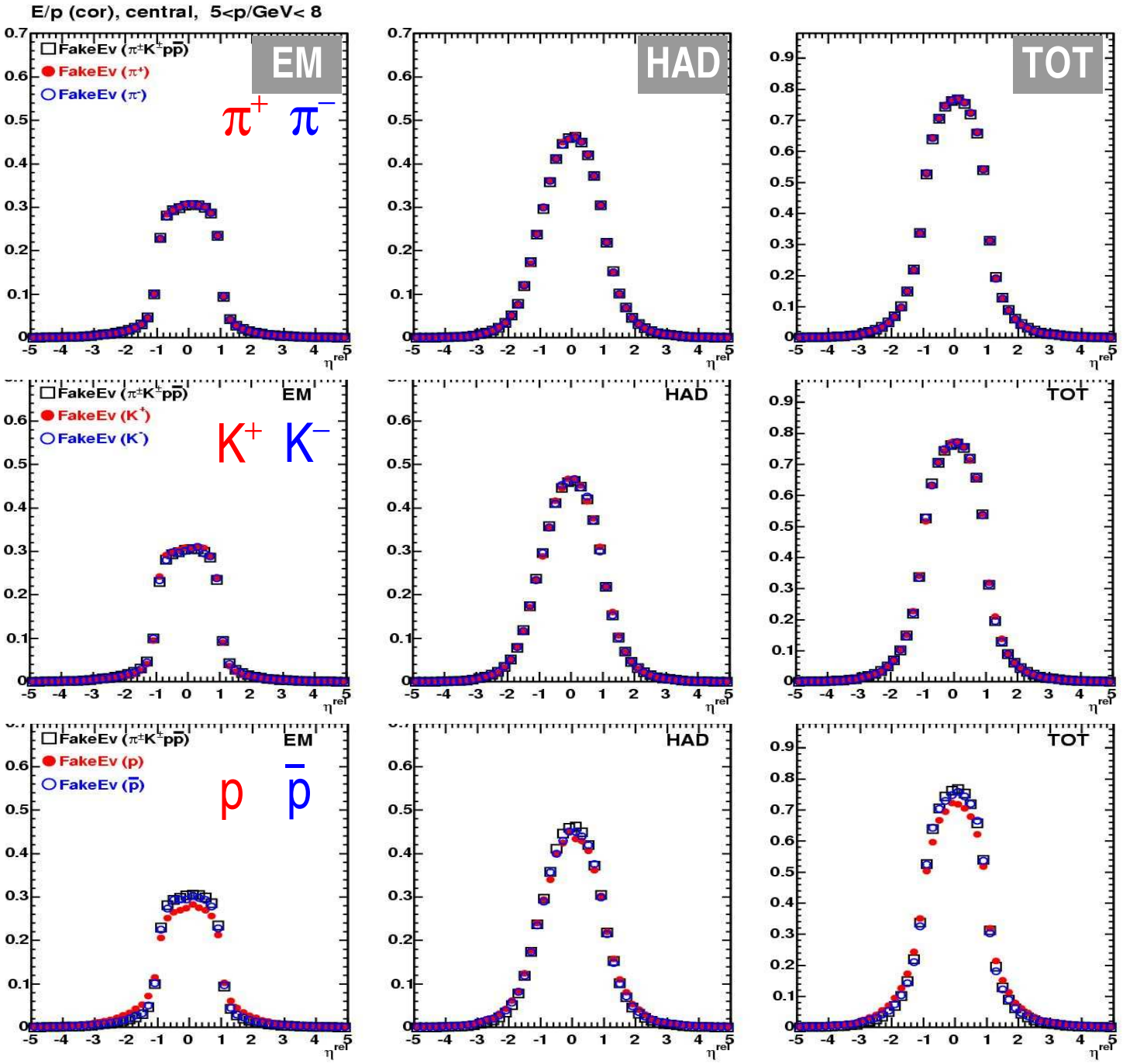
Normalized lateral profiles (0.5-2.0 GeV/c, central)



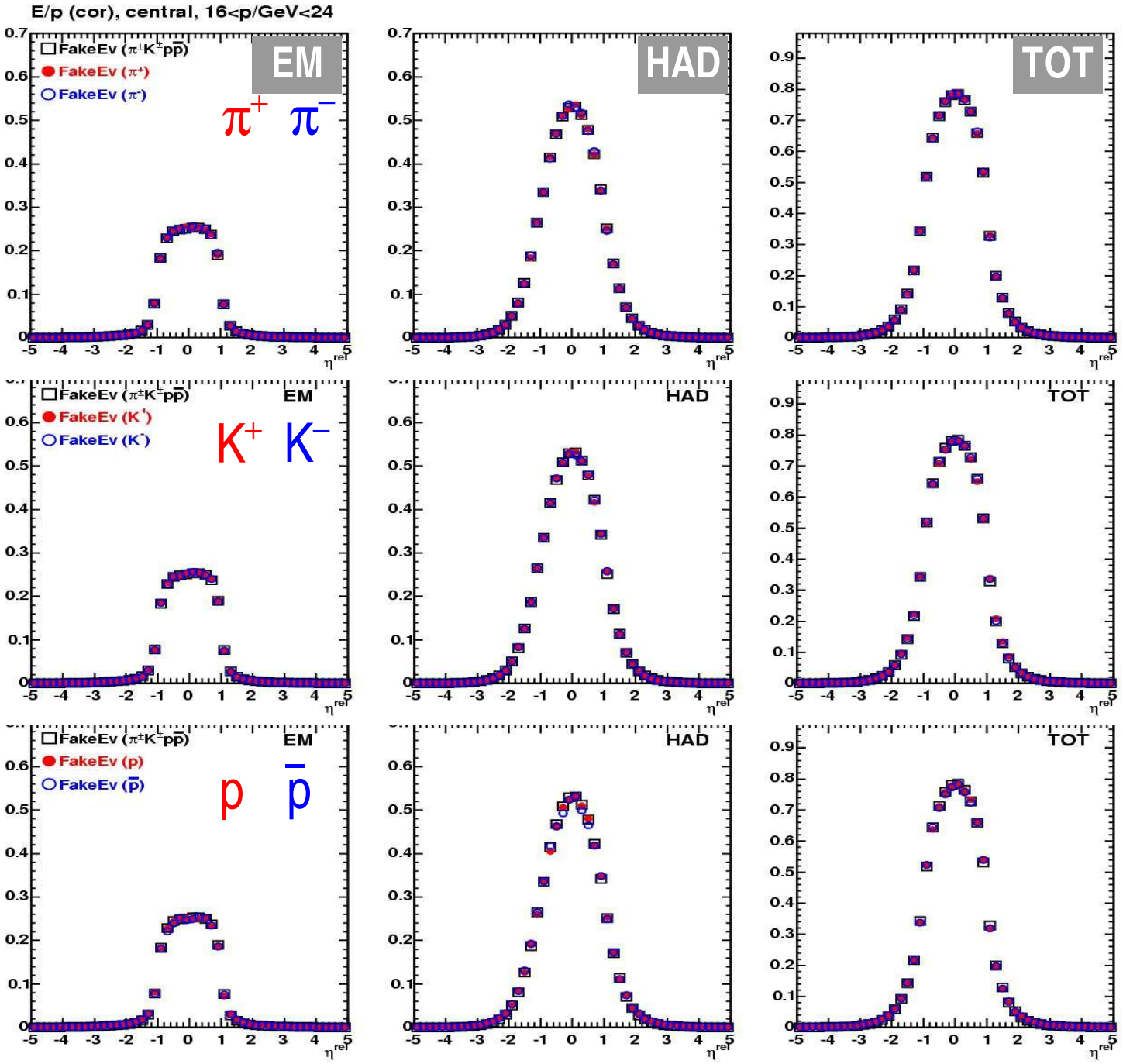
Normalized lateral profiles for protons (central)



Normalized lateral profile (5-8 GeV/c, central)



Normalized lateral profile (16-24 GeV/c, central)



Conclusion

- Gflash hadronic showers depend on particle type according to various expectations:
  - presence of $\bar{u}$, $\bar{d}$ in calorimeter material
  - large dependence on particle type at low p
  - responses (average + shapes) become similar at high p

- For the TOT response, at not too low p, the standard mixture appear as an average between particle/anti-particle response of a given flavor
  $\rightarrow$ no big systematics expected for tuning of FEDP

- For EM/HAD response, flavor composition is much more crucial
  $\rightarrow$ relevant for tuning of relative sampling fractions

- Normalized lateral profiles not very sensitive to particle type (some effect for protons/anti-protons at p<3GeV/c)