Status Report: Efficiency Correction

Krakow Meeting

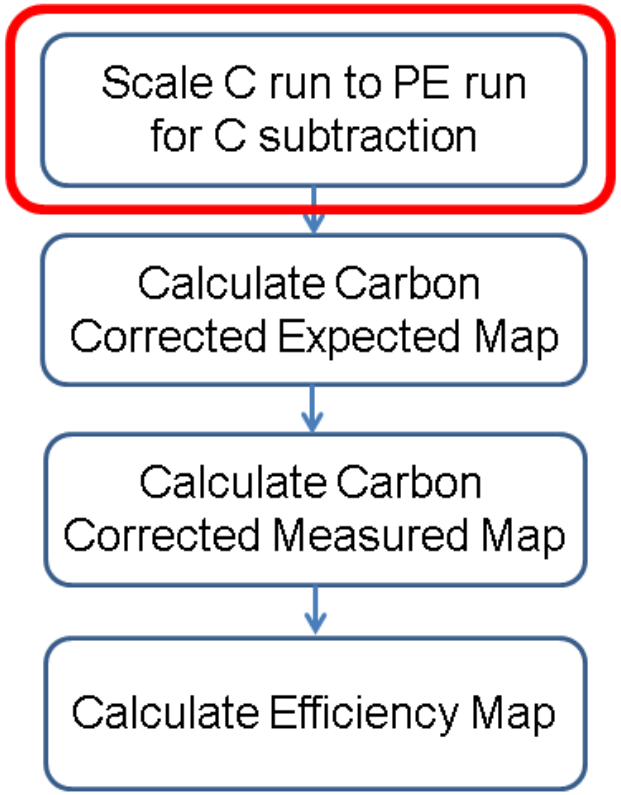
Steffen Maurus

January 8, 2016

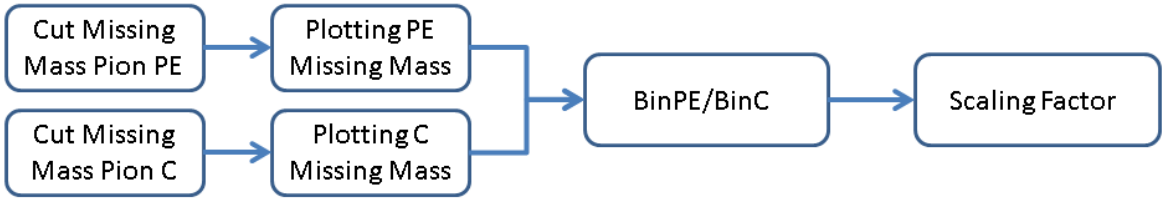
Excellence Cluster Universe

Procedure Proton

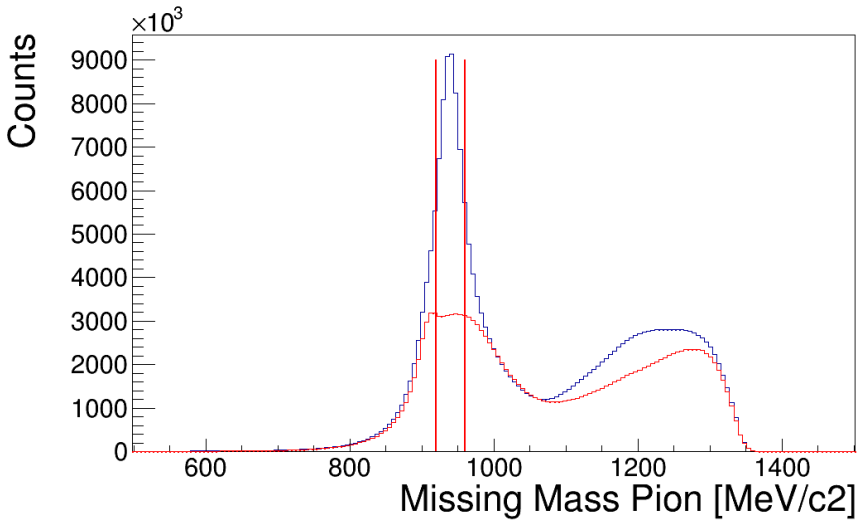
- goal: efficency map for protons and pions in Θ, Φ and momentum
- using elastic scattering of proton and pion and kinematic cuts
- e.g. efficency $\eta(\Theta, \Phi) = \frac{Measured(\Theta,\Phi)}{Expected(\Theta,\Phi)}$
- same procedure for pions
- first part: procedure shown for protons in 690 beam time
- second part: comparison to simulation

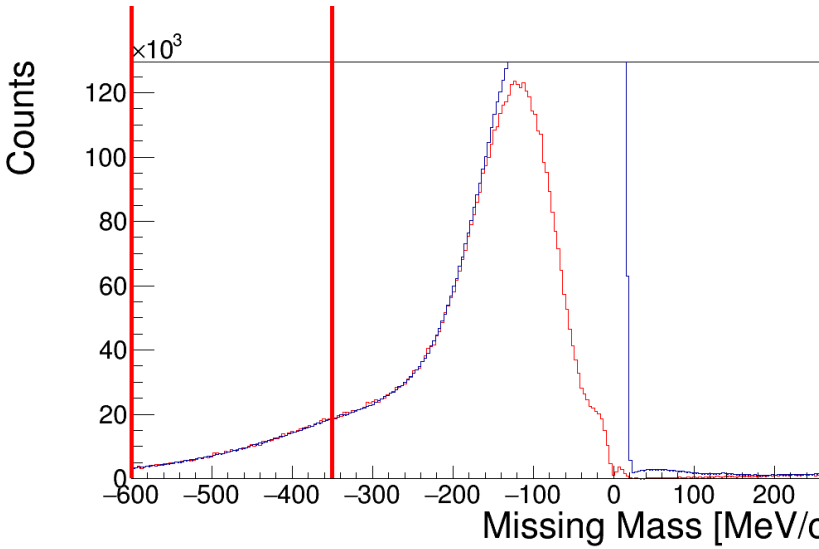


Procedure Proton - Scaling C to PE

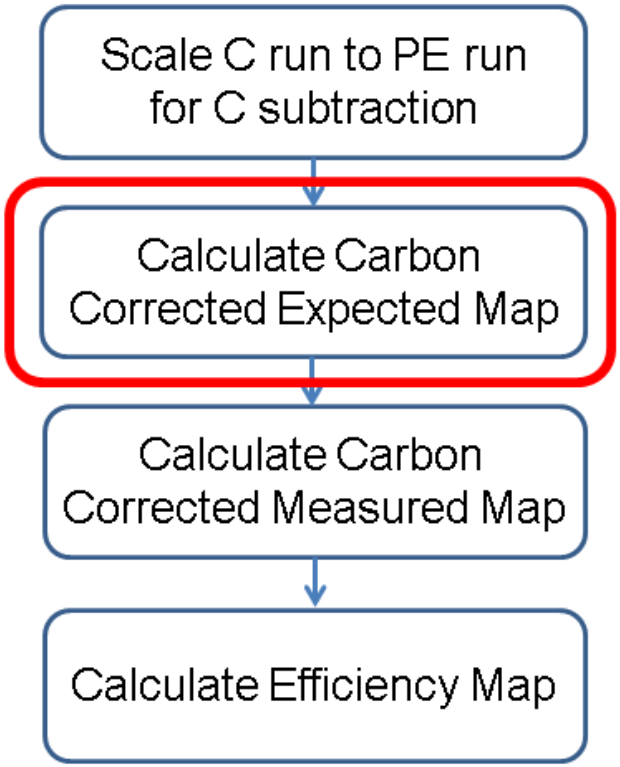


- integrate bin-content of PE and C (red intervall) and calculate scaling factor: $s = \frac{\sum BinContentPE(x)}{\sum BinContentC(x)}$
- scaling factor is dependent on missing-mass Cut:
  no cut: 9.4 ± 0.01 , proton cut: 9.74 ± 0.1 , pion cut: 9.98 ± 0.06
- plot: missing-mass C (already scaled) and PE with cut on proton mass (log(y) and lin(y))
- blue: PE, red: C





Procedure Proton - Carbon Corrected Expected Map



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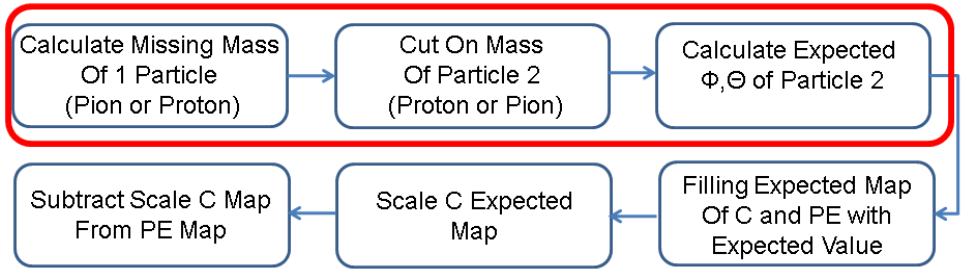
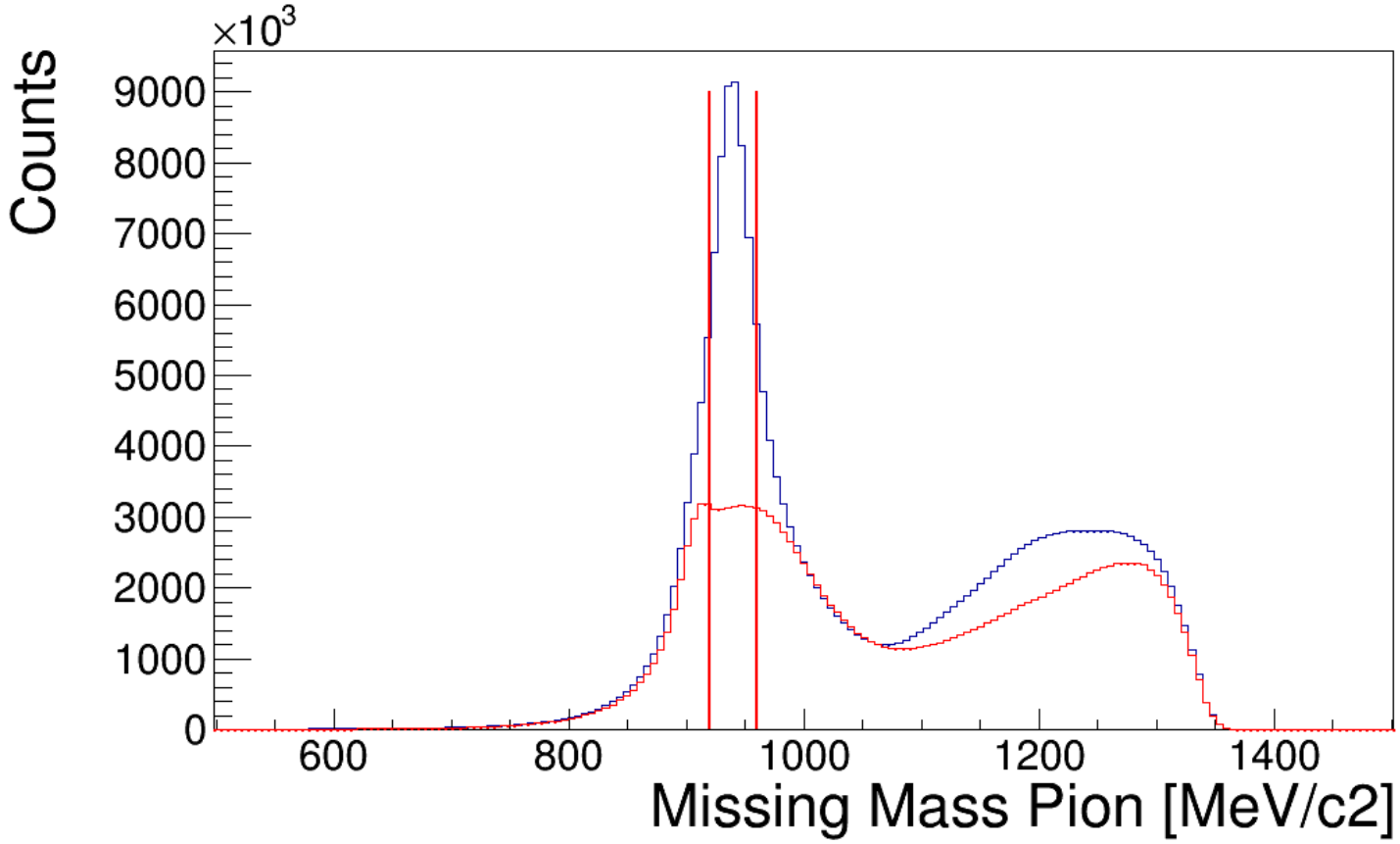


- cut: 1σ around nominal mass particle 2 (here proton)
- blue: PE, red: scaled C



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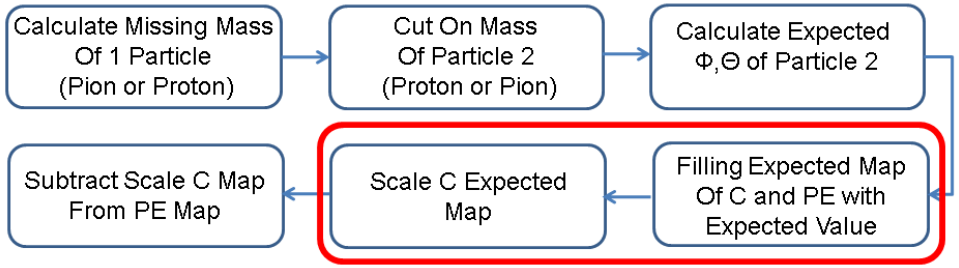

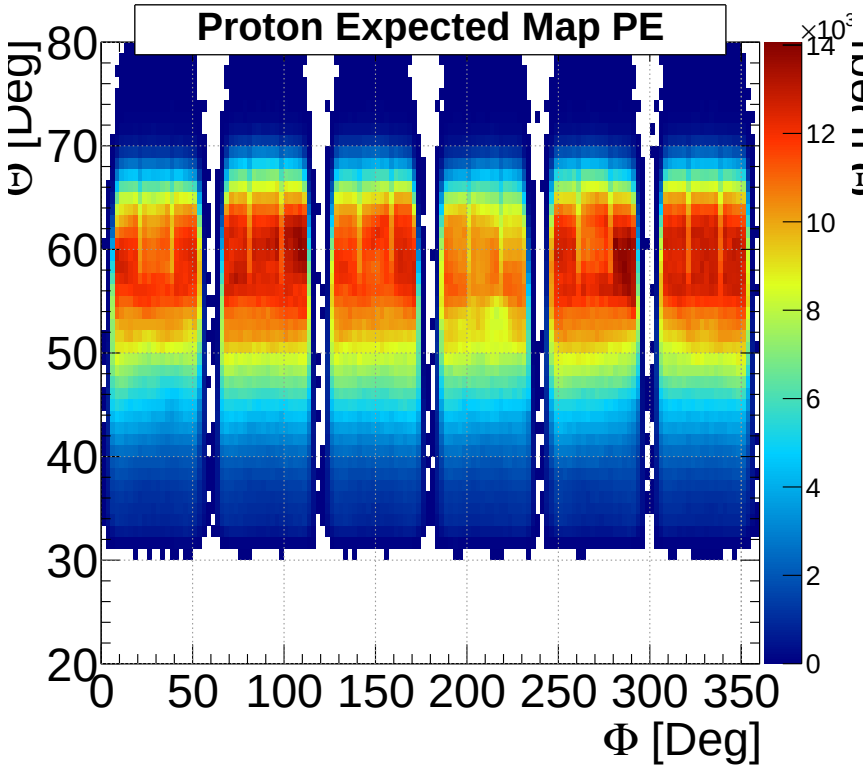

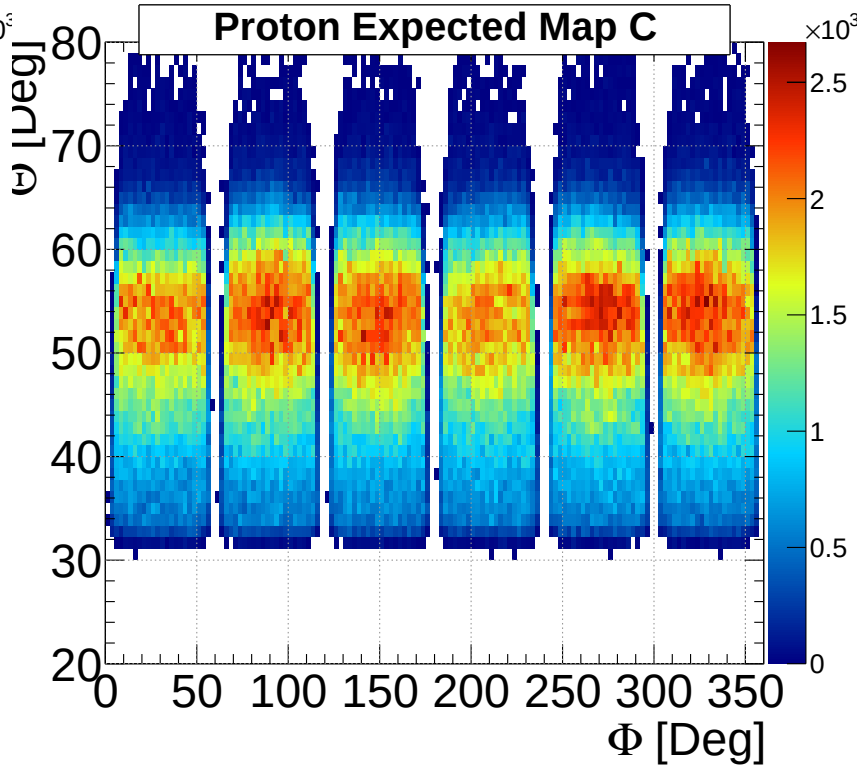

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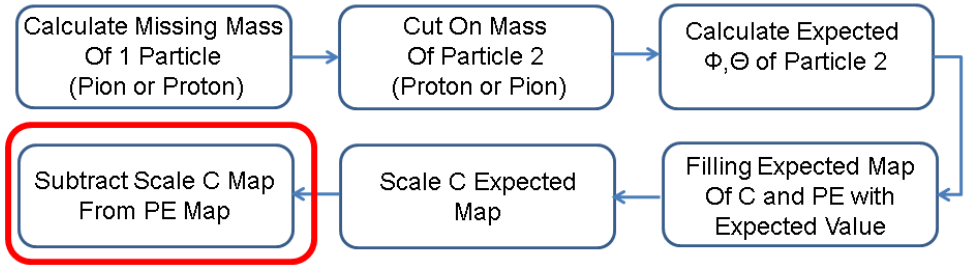
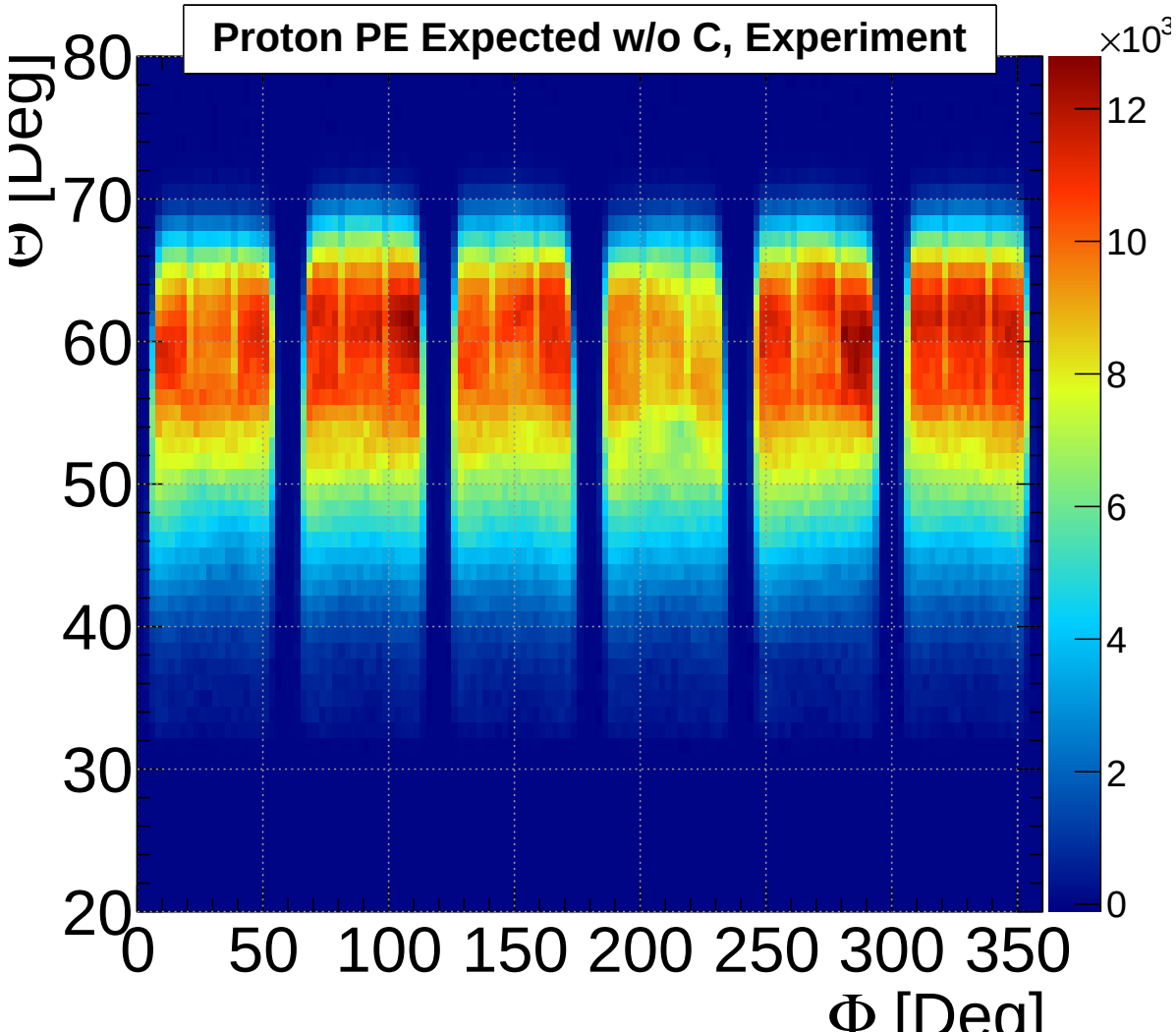
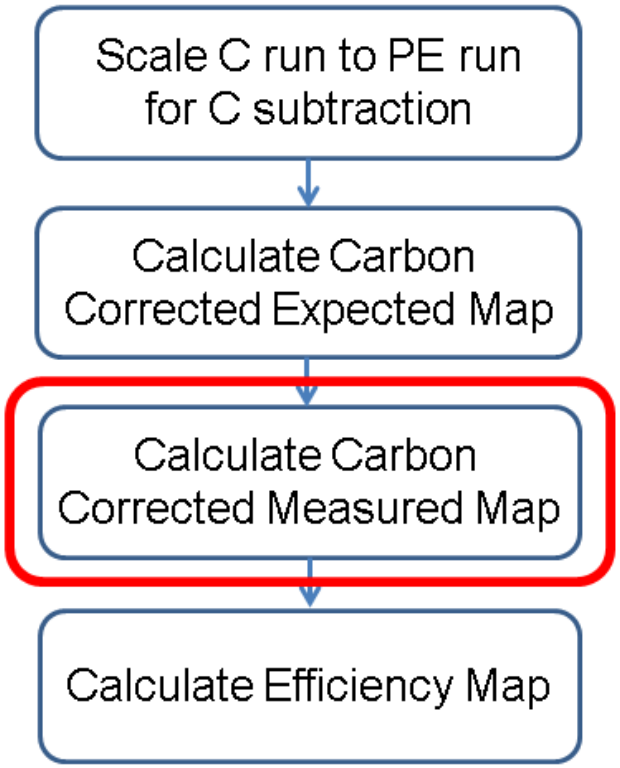




Procedure Proton - Carbon Corrected Measured Map



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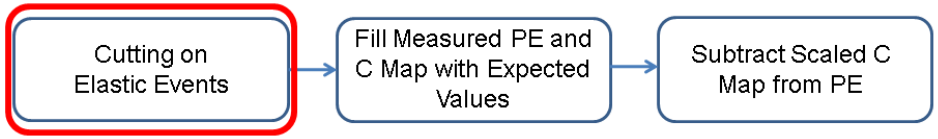
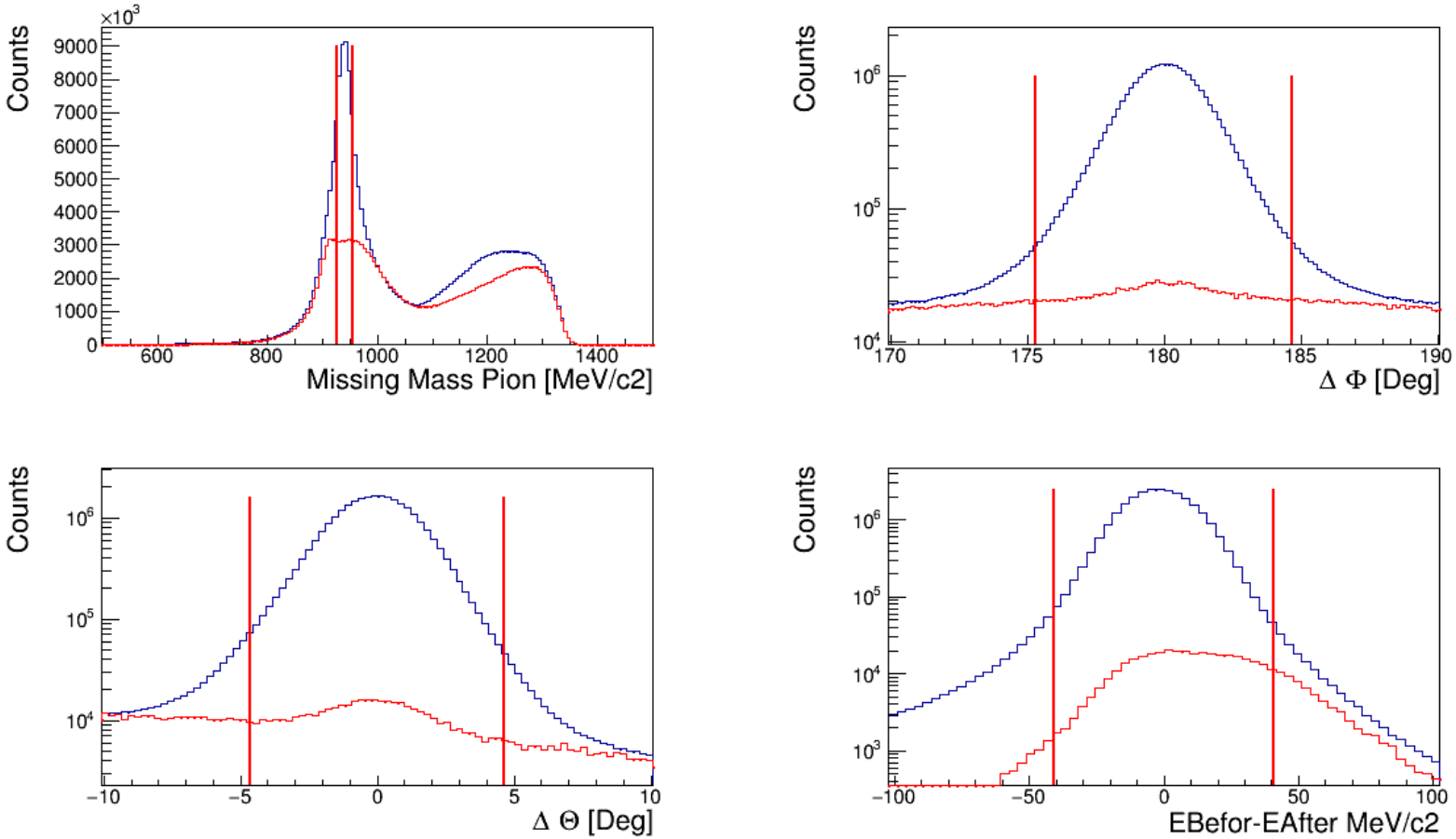


- looping over all candidates and selecting candidate $Min(Abs(180 - Abs(\Phi_{pion} - \Phi_k)))$ and using only this one
- cut: 1σ around nominal mass particle 2 (here proton)
- cut: 3σ for $\Delta\Phi$, $\Delta\Theta$ and ΔE (blue: PE, red: C)



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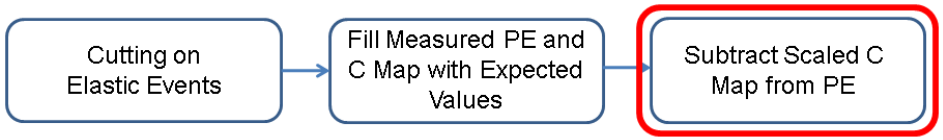
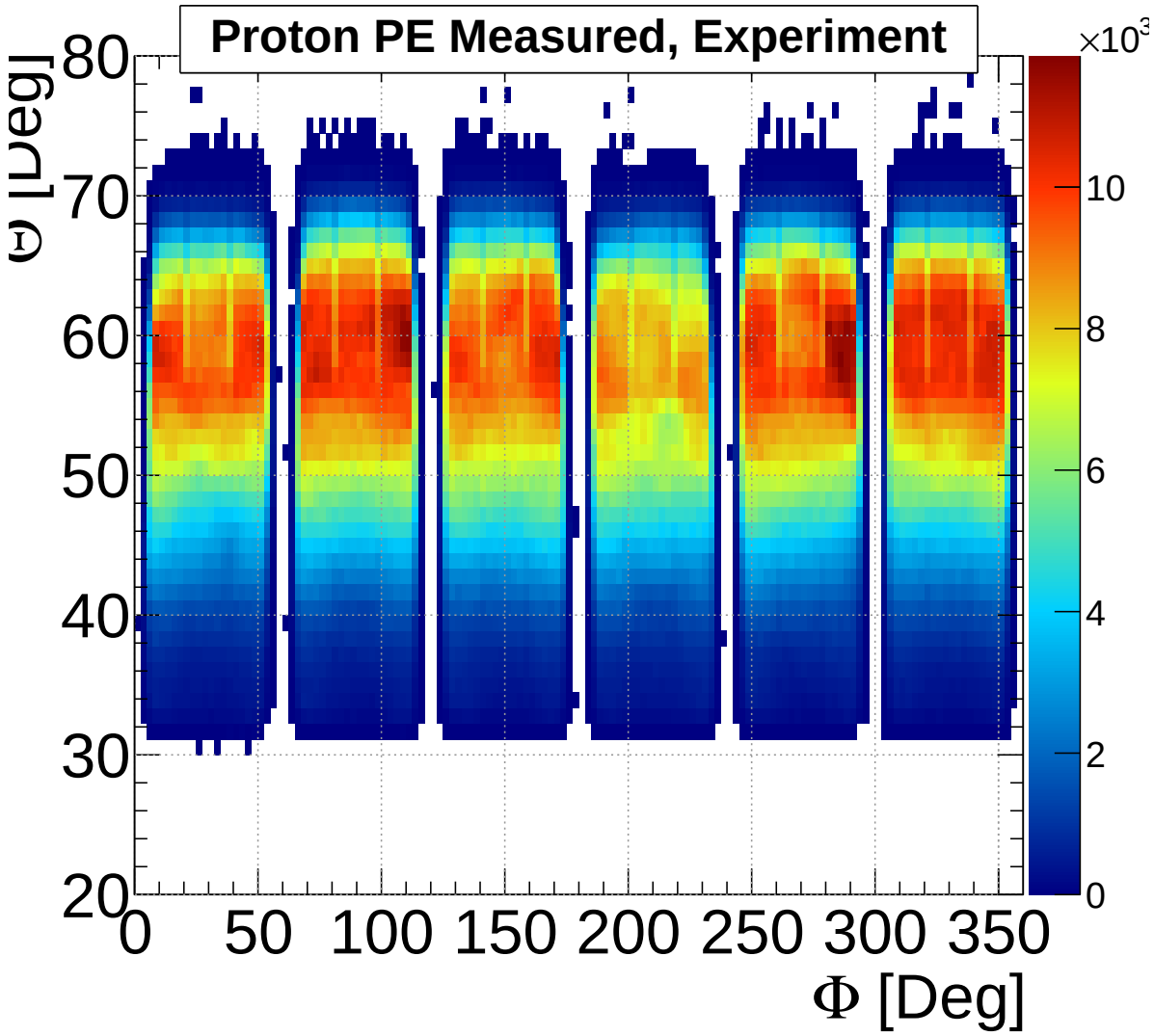
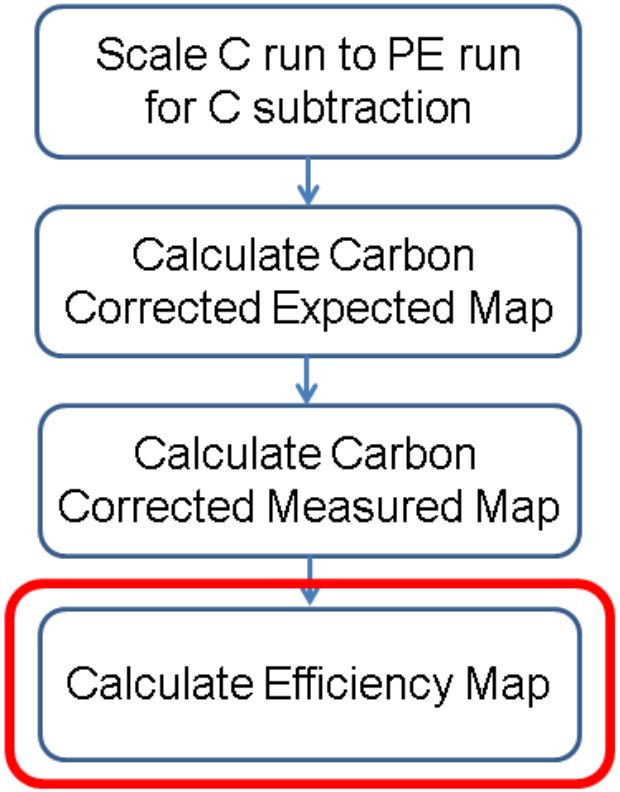


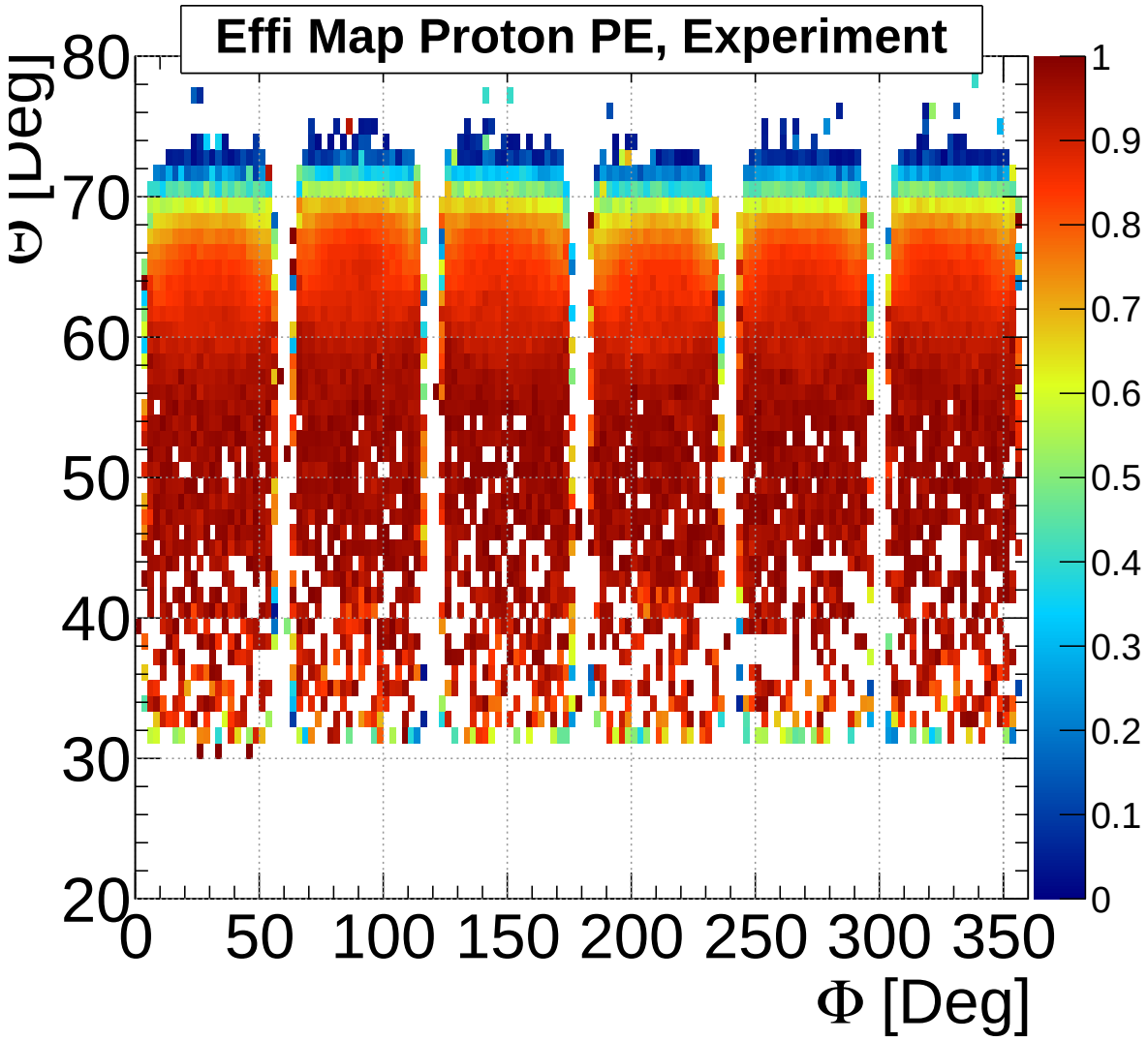


Procedure Proton - Efficency



Procedure Proton - Calculated Efficiency Map

- using carbon correcte PE maps an calculate $\eta(\Theta, \Phi) = \frac{Measured(\Theta,\Phi)}{Expected(\Theta,\Phi)}$
- setting values below 0 and above 1.0 to 0

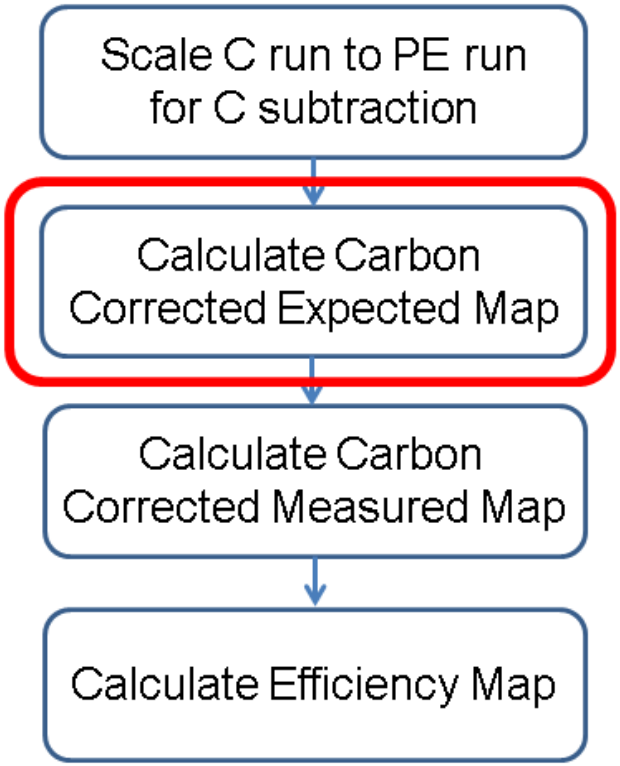


Simulation of ES

Using simulation as comparison:

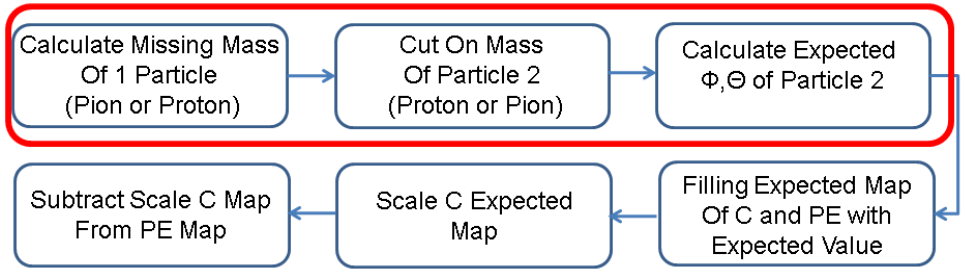
1. Pluto event generator:
   - ES for π^- on proton at 690 MeV/c
   - use SAID database for angular distribution
   - vertex distribution (TODO: picture?)
   - no carbon background
2. perform full chain (TODO: more infos):
   event $\rightarrow$ geant $\rightarrow$ dst $\rightarrow$ same analysis as exp
3. compare results

Compare Proton - Expected Map

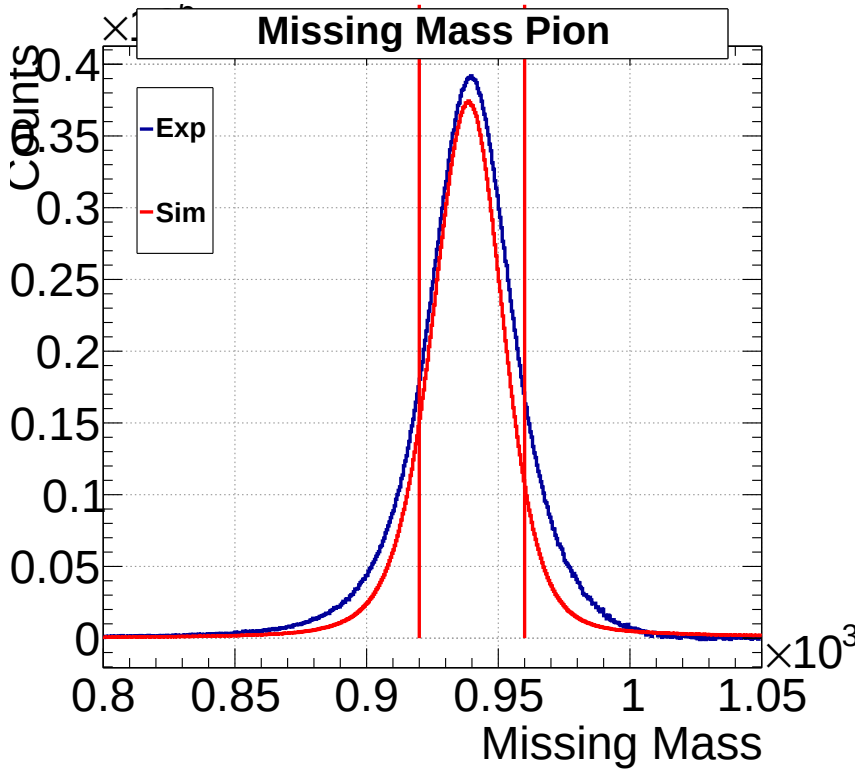


No scaling in the case of the simulation → part can be skipped

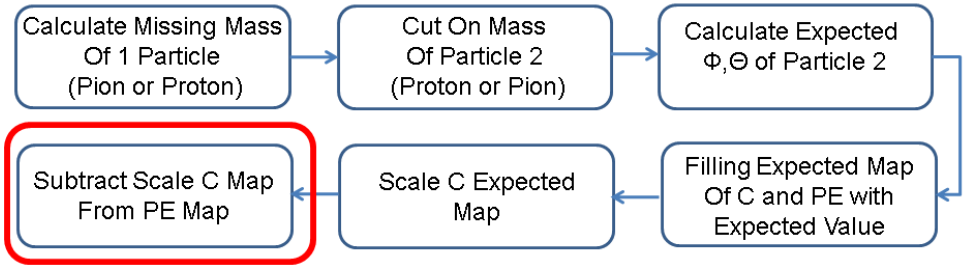
Compare Proton - Expected Map



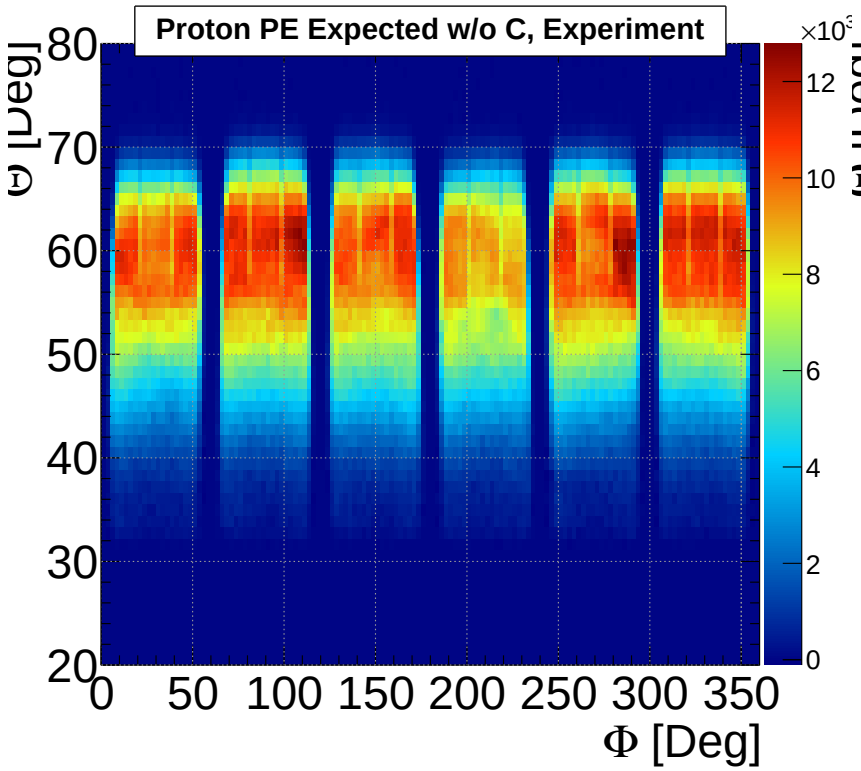
- cut: 1σ around nominal mass particle 2 (here proton)
- exp: carbon subtracted (also for all subsequent plots)

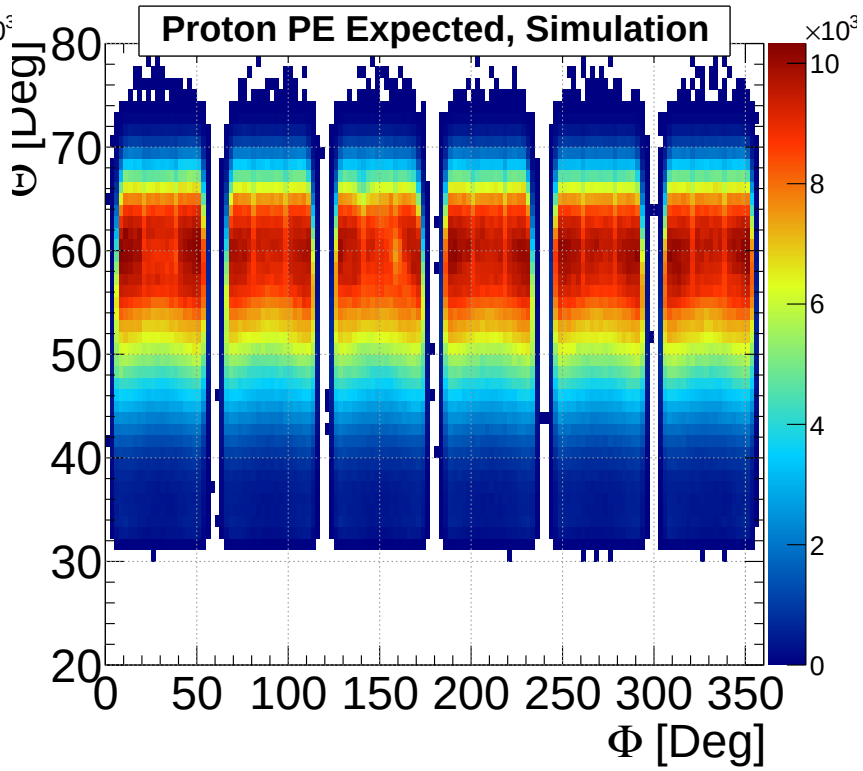


Compare Proton Expected Map

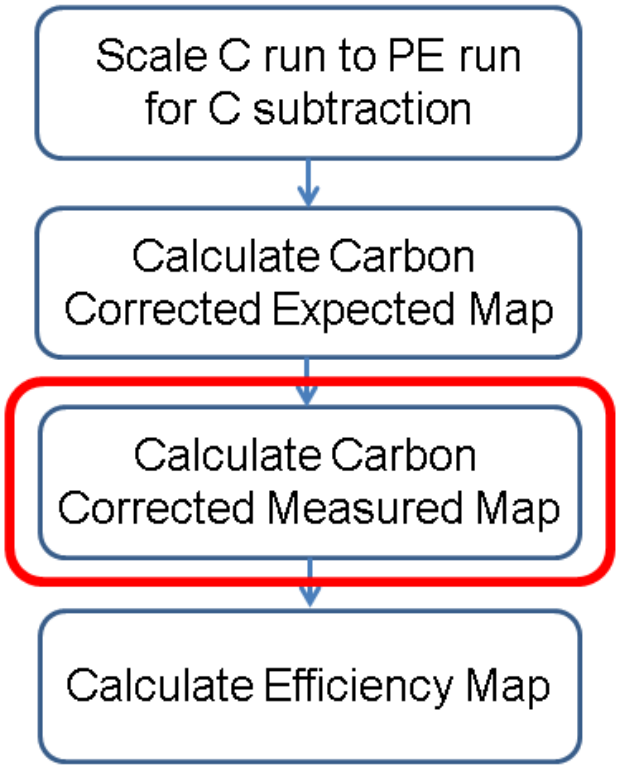


- exp map carbon corrected





Compare Proton - Measured Map



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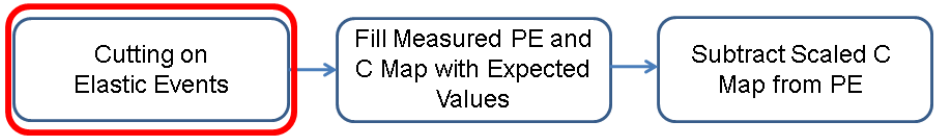

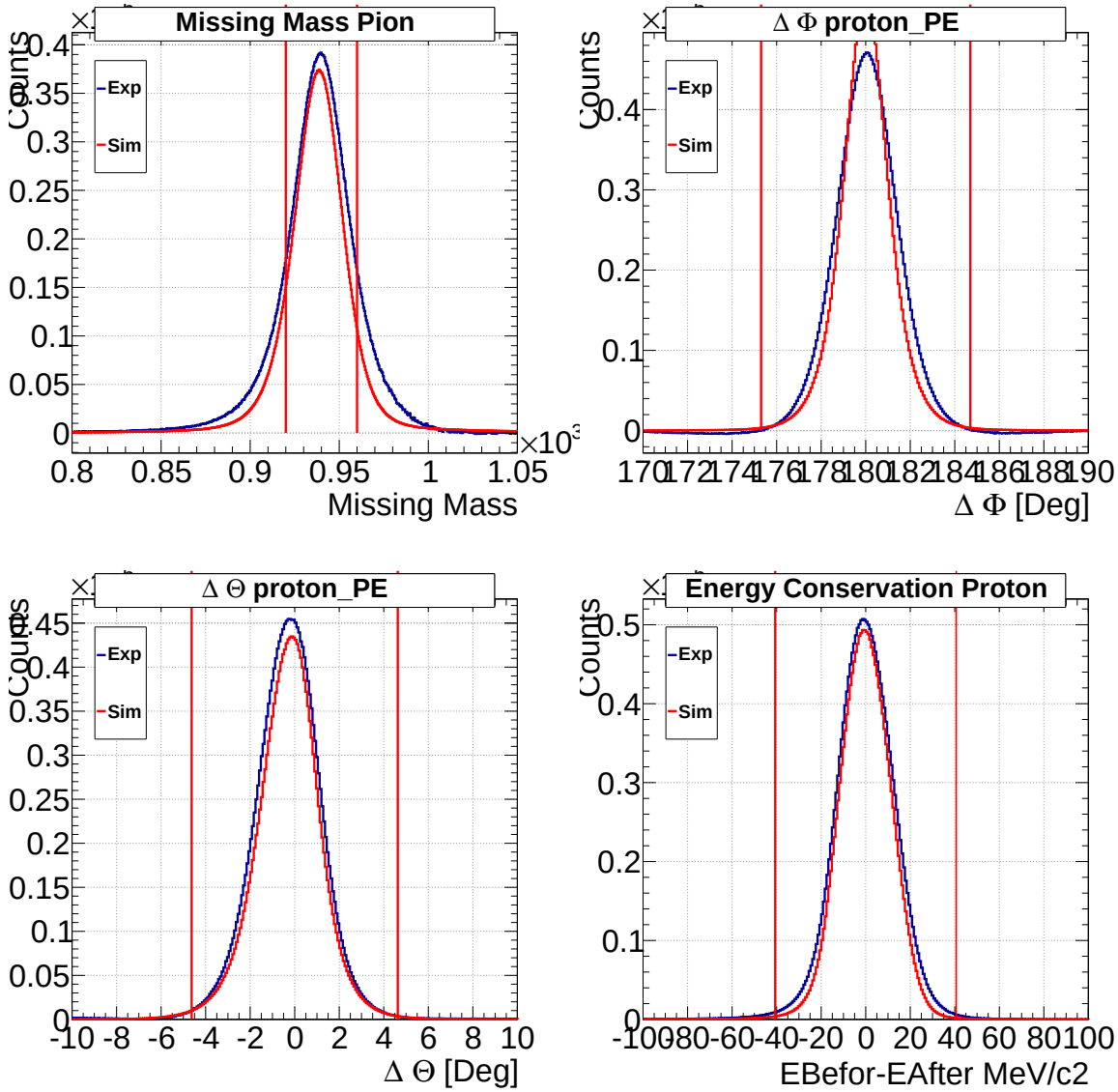

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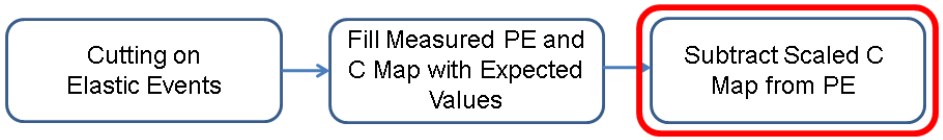
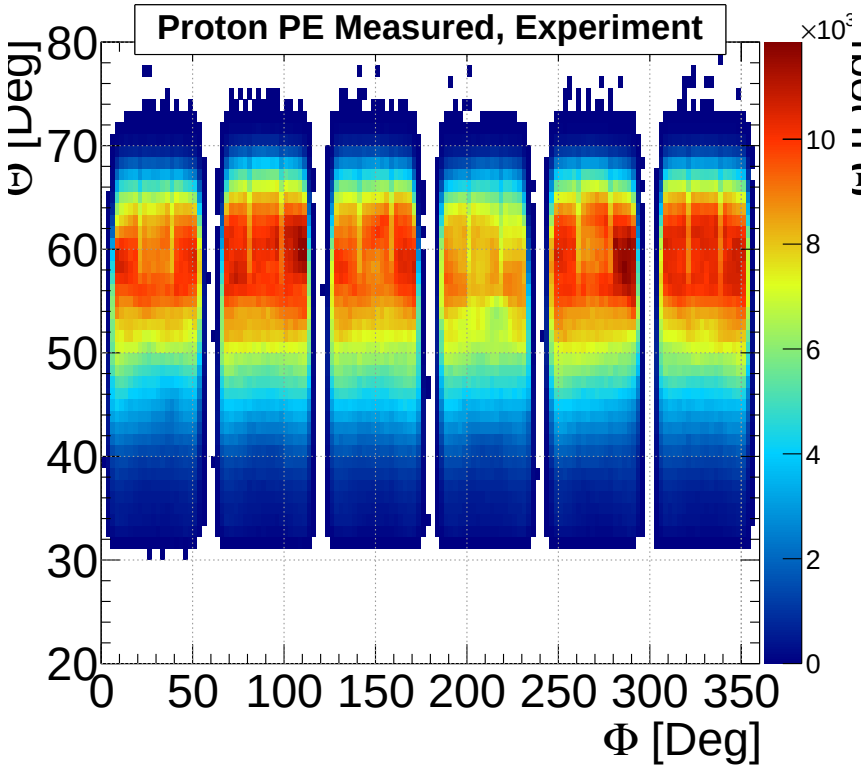
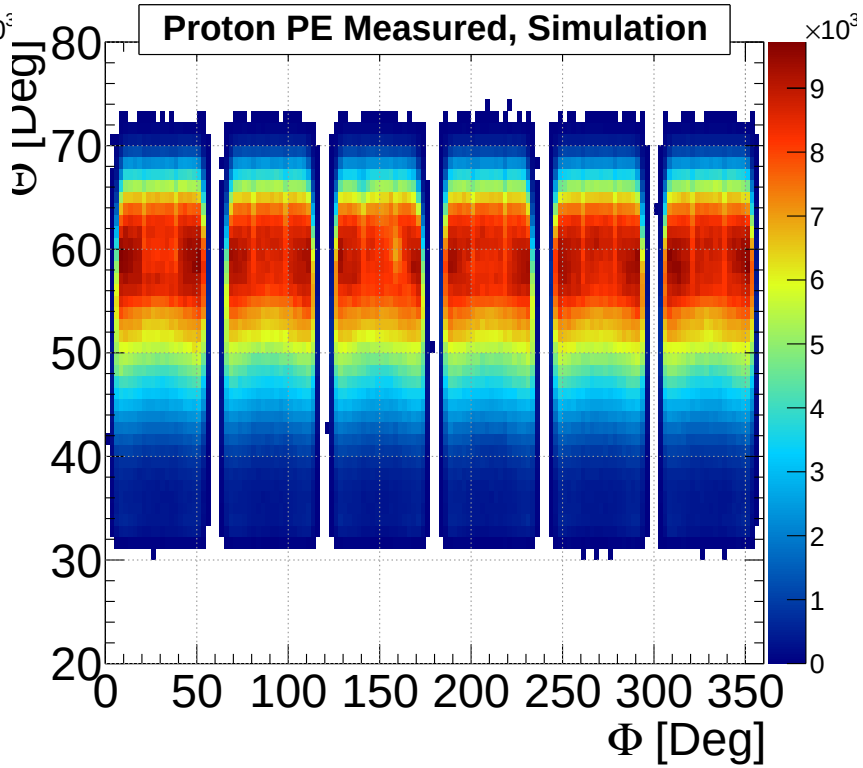
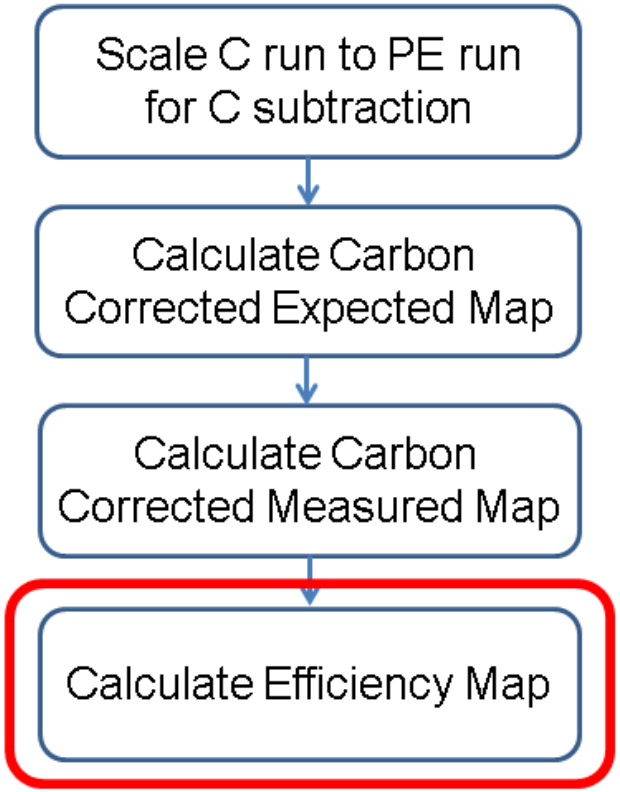




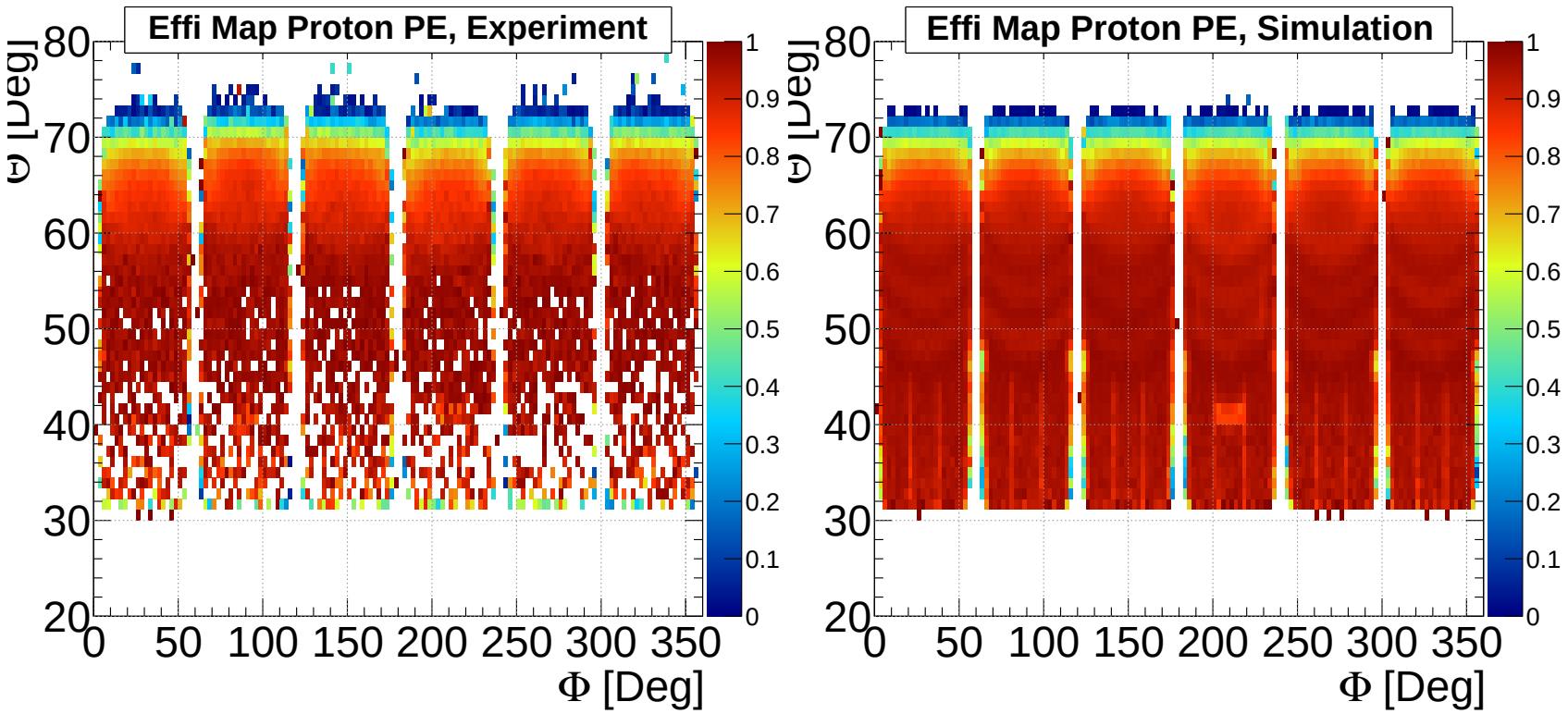


Compare Proton - Efficency



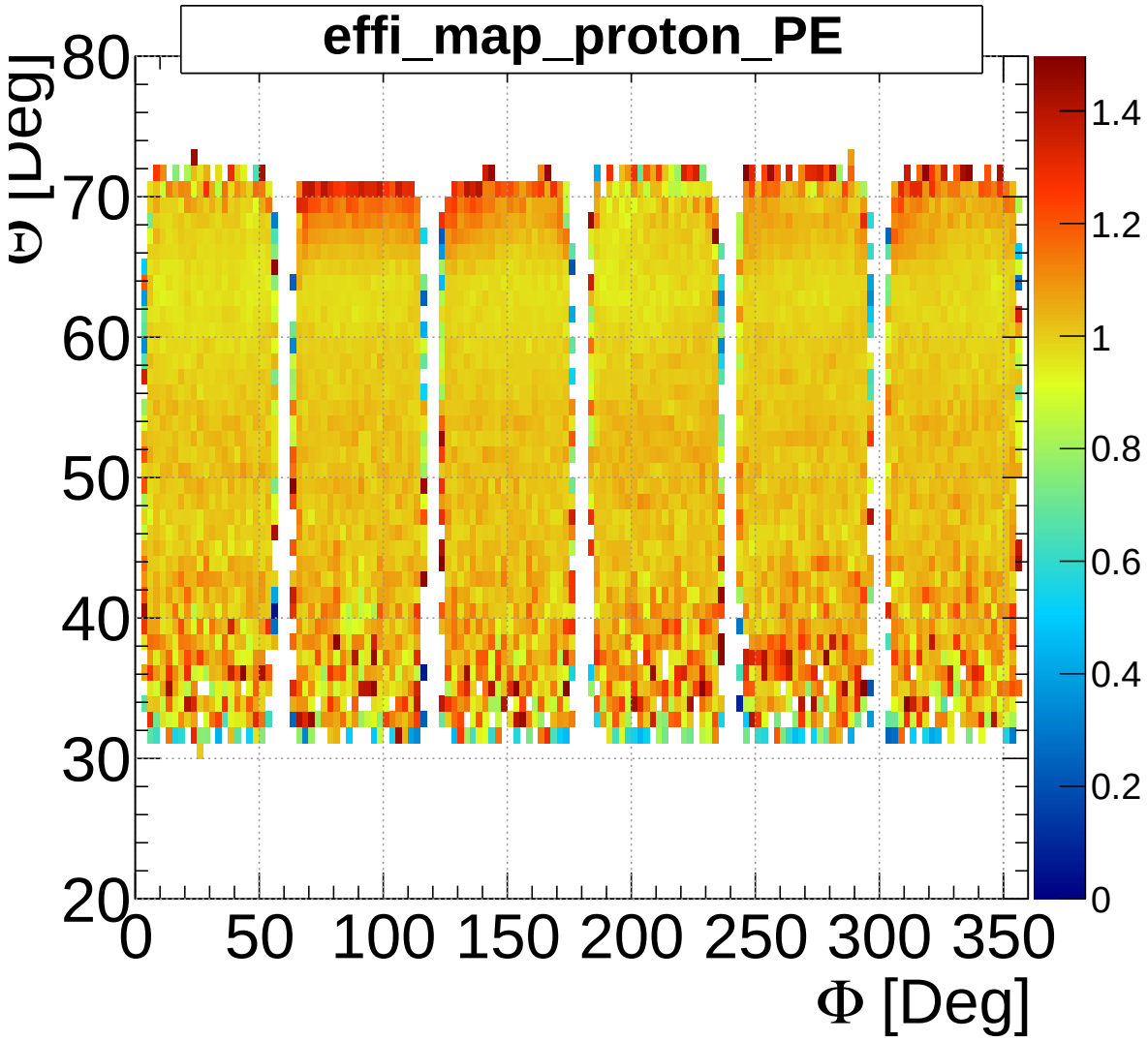
Compare Efficiency Map

- set value below 0 and above 1 to 0 (only exp map)



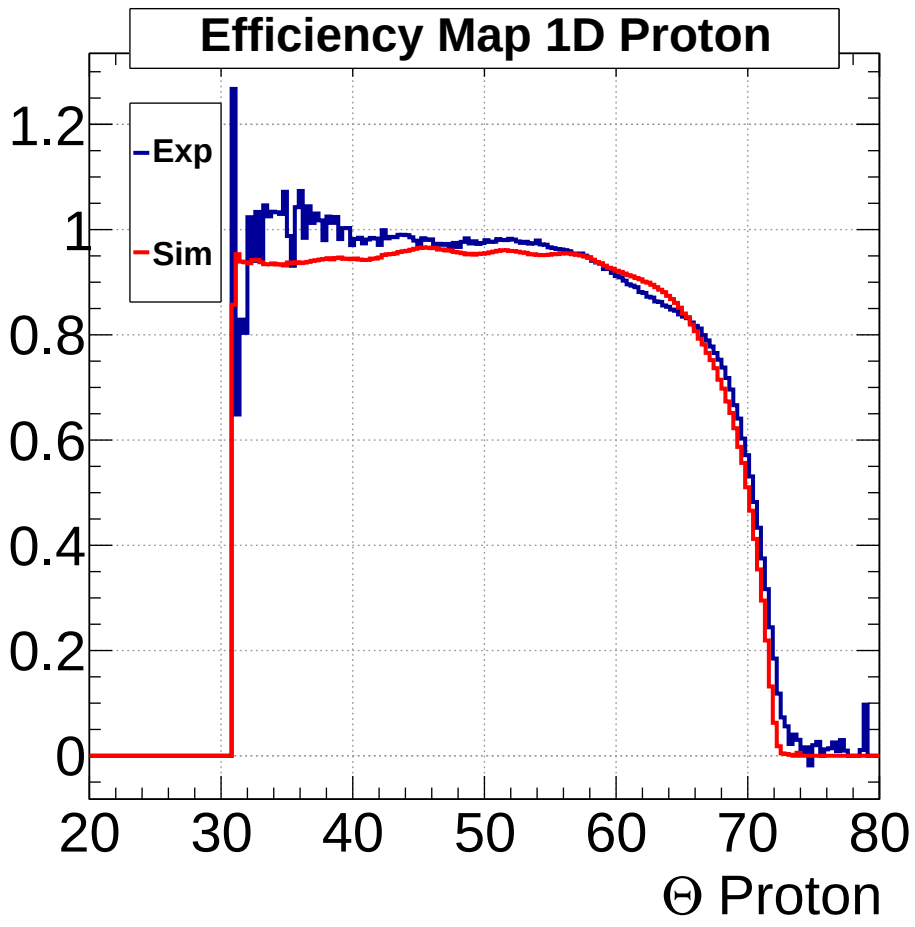
Compare Efficiency Map Agreement

- divide experimental by simulation map
- set value below 0 and above 1.5 to 0

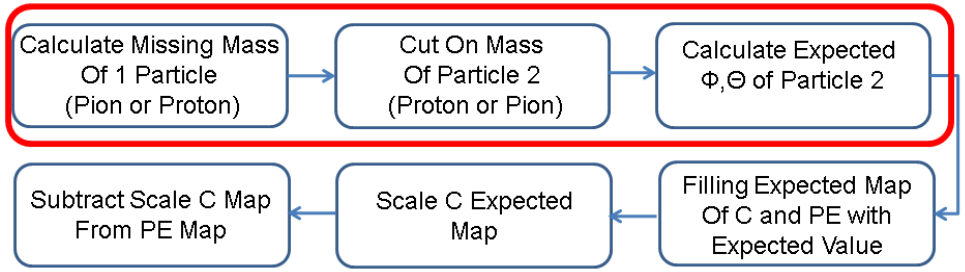


Compare Efficiency Map, 1d

- integrate both maps over phi



Compare Pion - Expected Map



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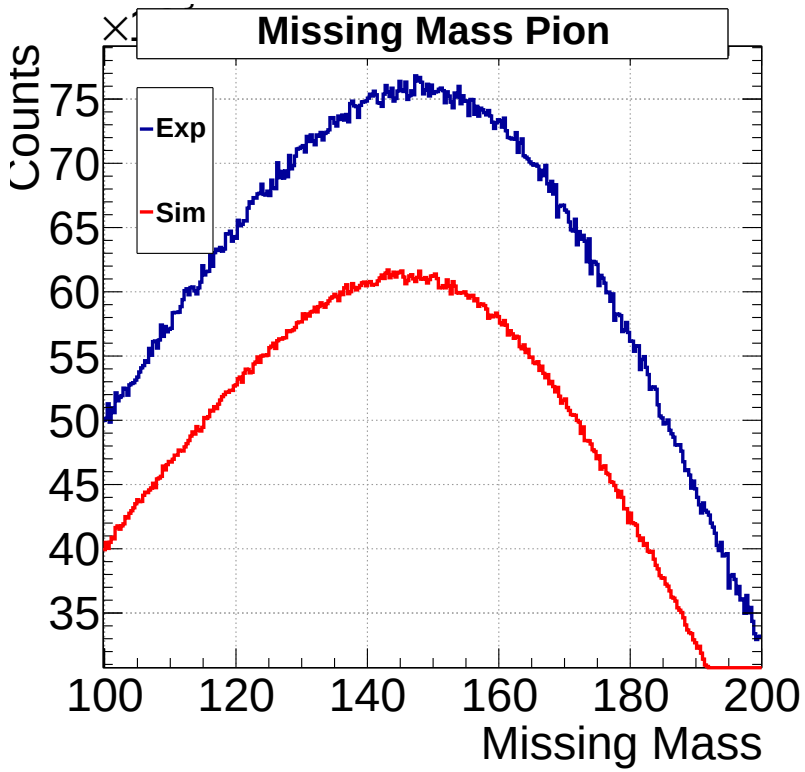

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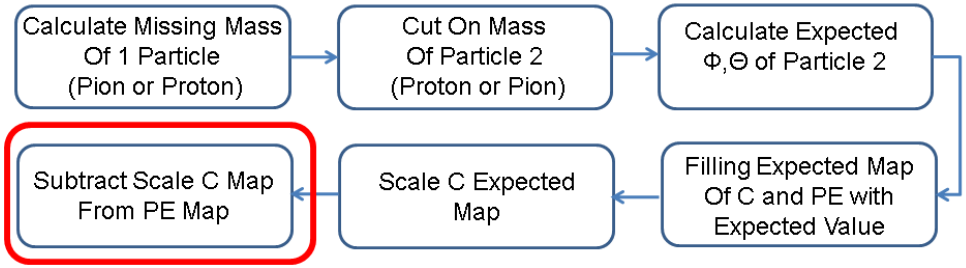
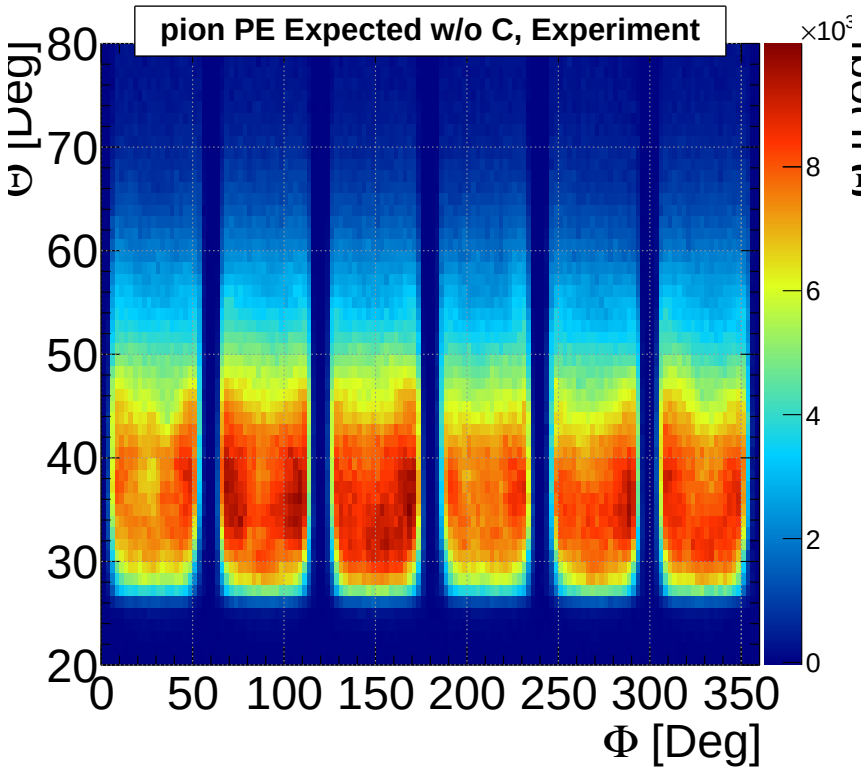
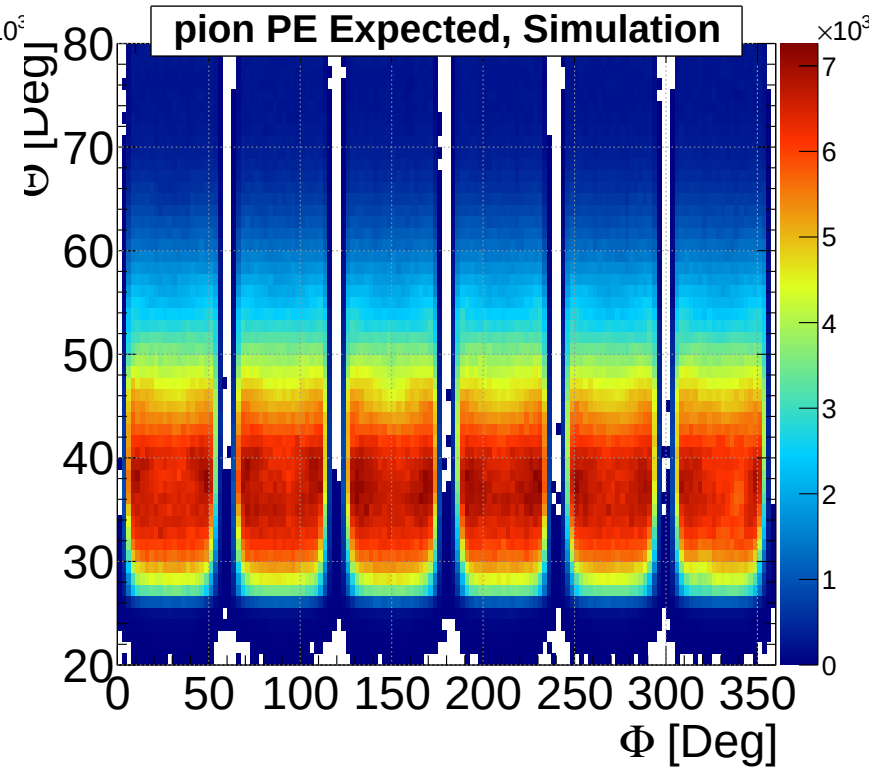
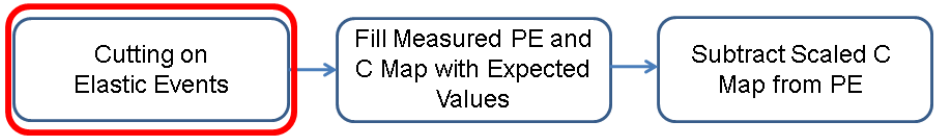


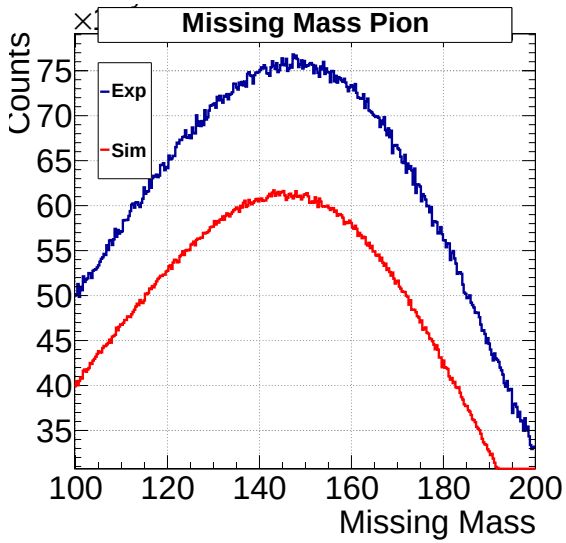
- exp map carbon corrected

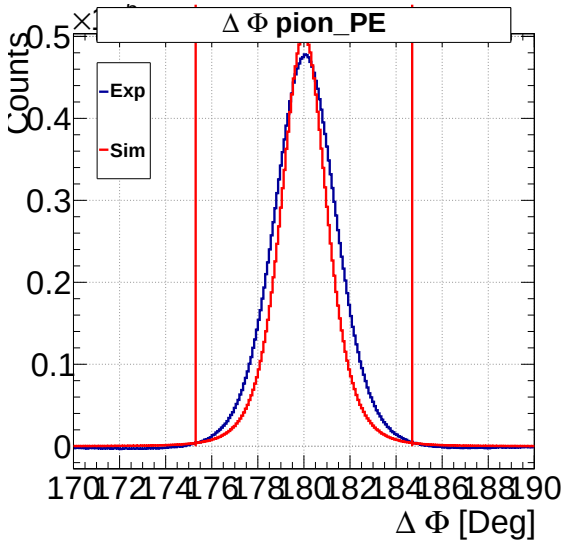


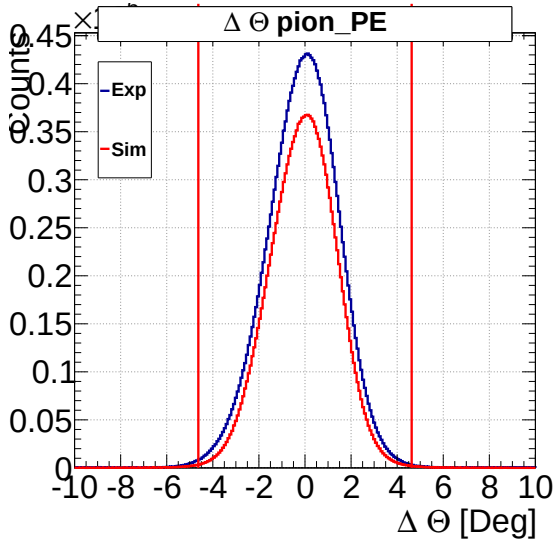


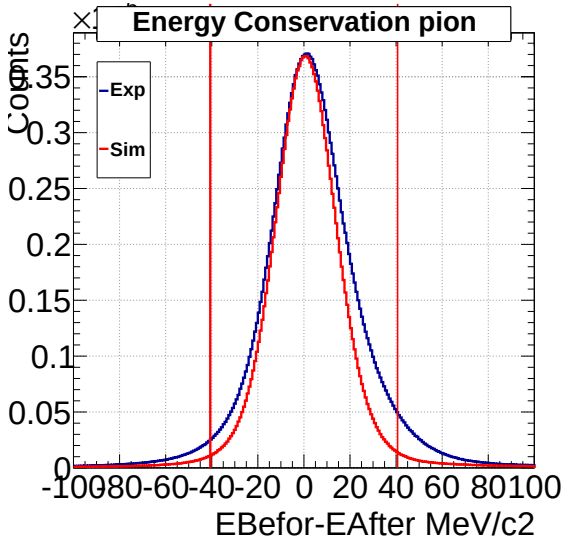
Compare Pion - Measured Map











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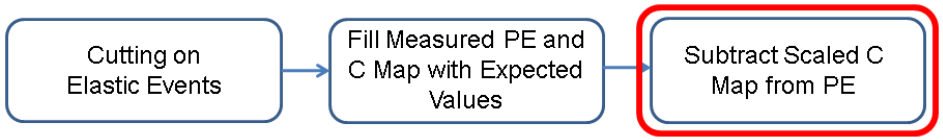
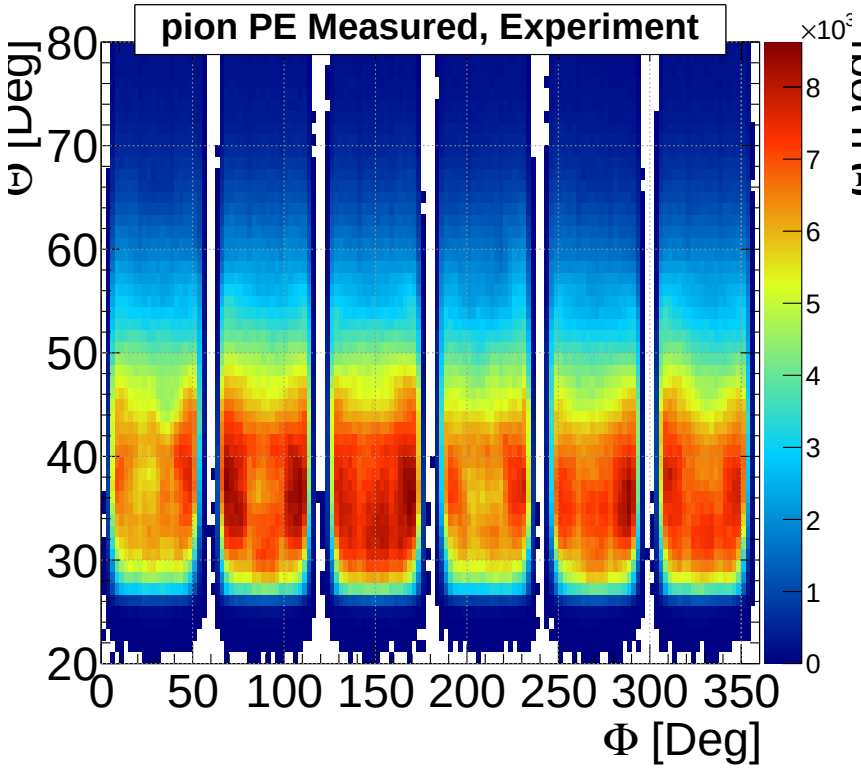
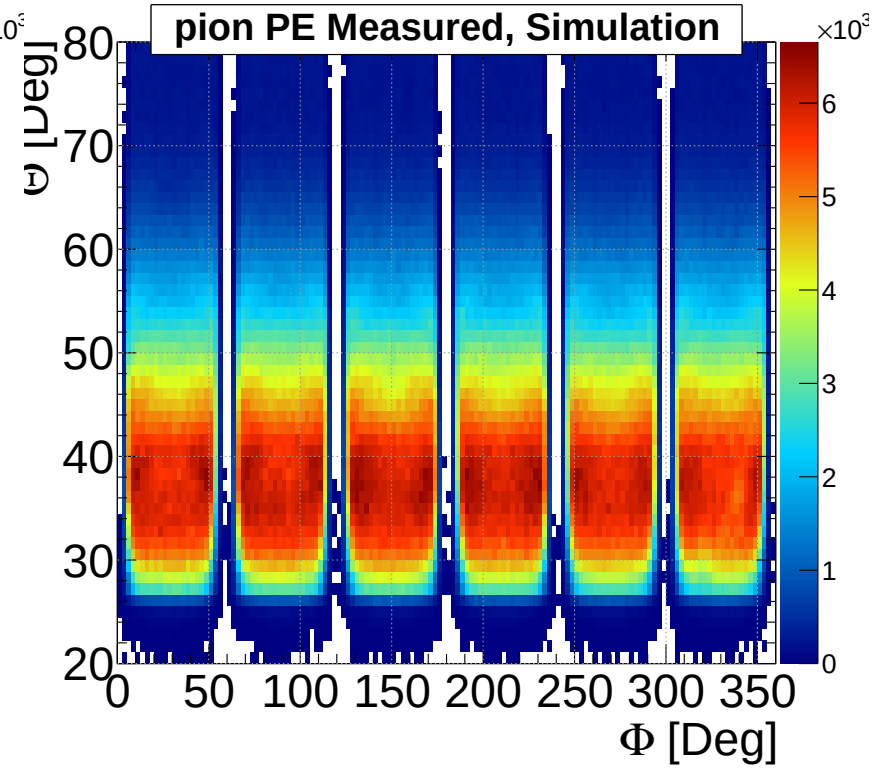
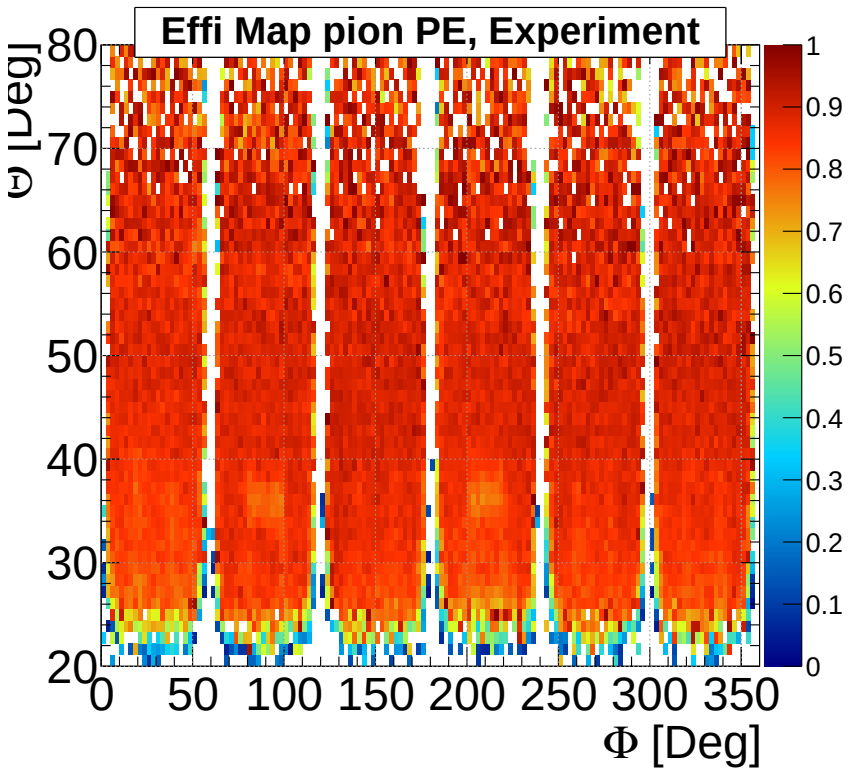


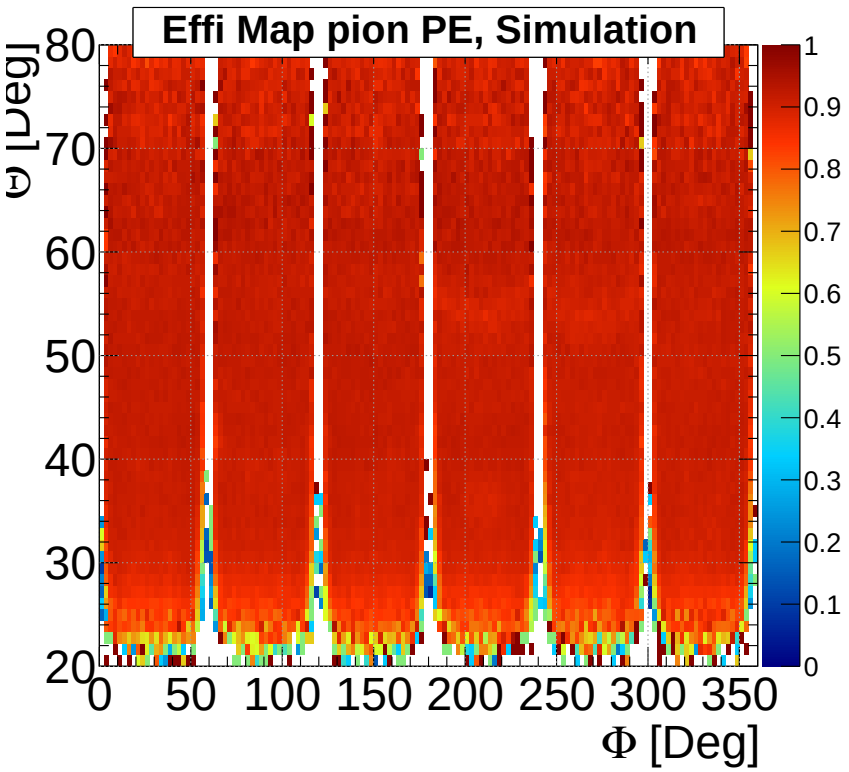




Compare Efficiency Map

- set value below 0 and above 1 to 0 (only exp map)





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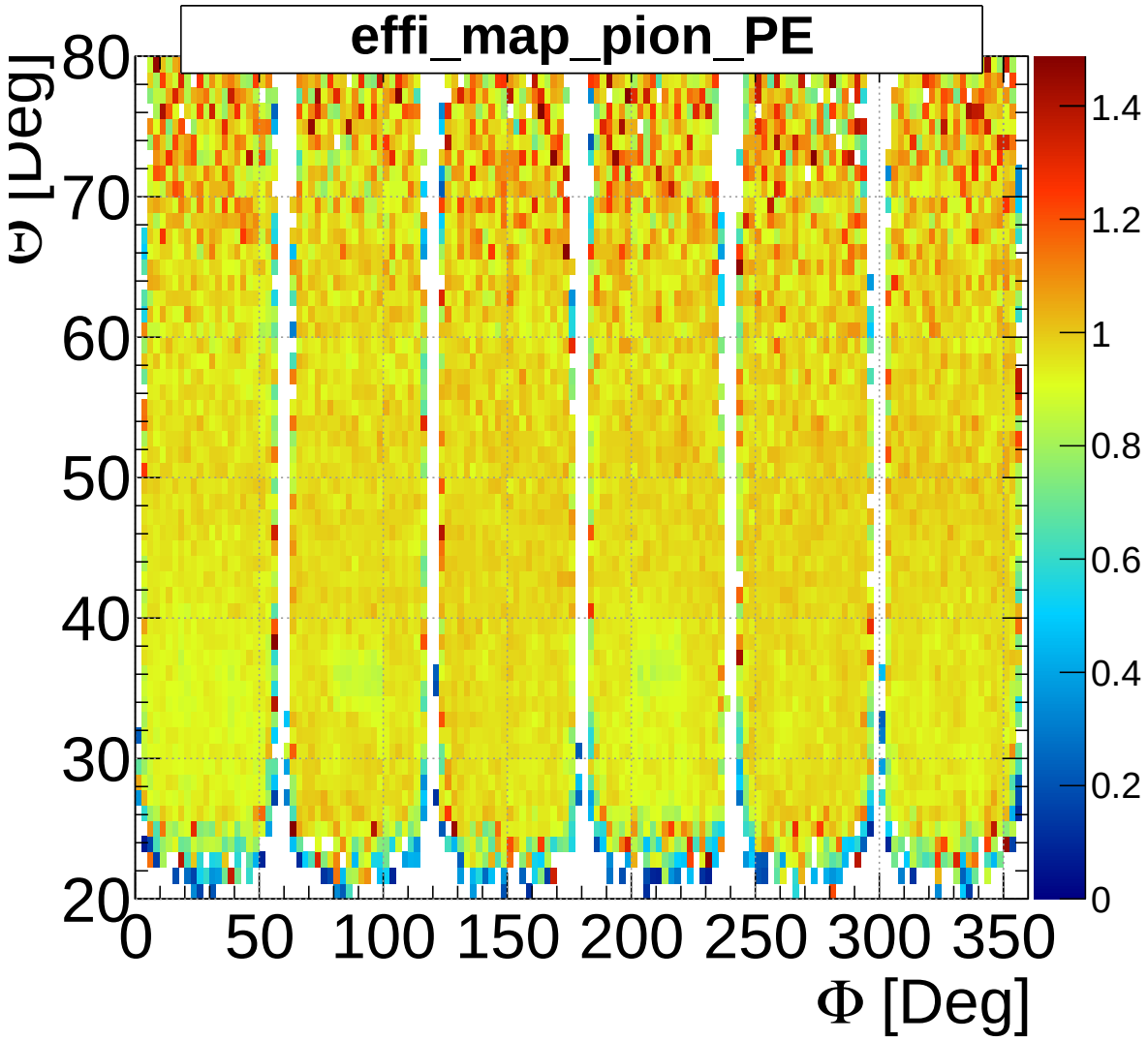

Compare Efficiency Map, 1d

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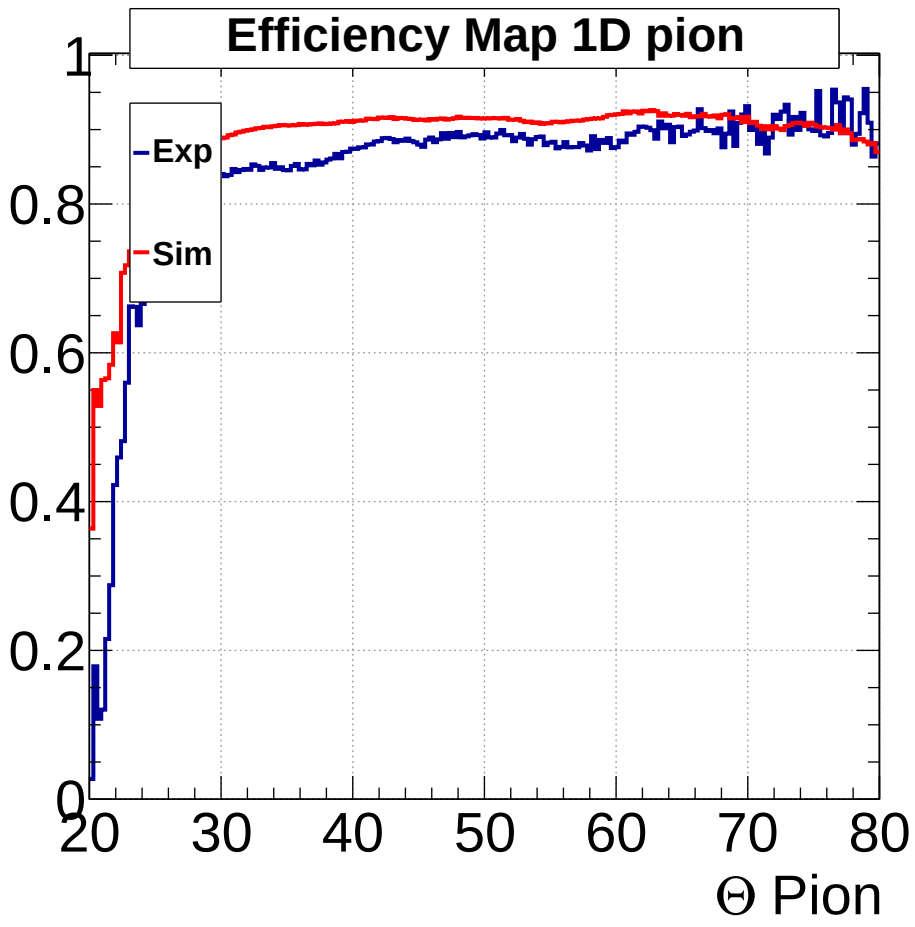

Other stuff

- what is missing?
- include cut stuff?